



TAMIL NADU STATE DISASTER MANAGEMENT PLAN 2023



**Tamil Nadu State Disaster Management Authority
Government of Tamil Nadu**

Tamil Nadu State Disaster
Management Authority

TAMIL NADU STATE DISASTER MANAGEMENT PLAN 2023



Tamil Nadu Disaster Risk Reduction Agency
Commissionerate of Revenue Administration and Disaster Management
Chennai - 600 005



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Abbreviations

AAI	: Airport Authority of India
AASC	: Anna Administrative Staff College
ADB	: Asian Development Bank
ADPC	: Asian Disaster Preparedness Centre
BARC	: Bhabha Atomic Research Center
BMTPC	: Building Materials and Technology Promotion Council
CBOs	: Community Based Organization
CBRN	: Chemical, Biological, Radiological & Nuclear
CCS	: Cabinet Committee on Security
CDRRP	: Coastal Disaster Risk Reduction Project
CGHQ	: Coast Guard Head Quarters
CMA	: Commissioner of Municipal Administration
CMDA	: Chennai Metropolitan Development Authority
COP 21	: Paris Climate Conference – 21 st conference of the parties
CRA	: Commissioner of Revenue Administration
CRZ	: Coastal Regulation Zone
DDMA	: District Disaster Management Authority
DEOC	: District Emergency Operation Centre
DGRE	: Defence Geoinformatics Research Establishment
DM	: Disaster Management
DRR	: Disaster Risk Reduction
DSM	: Digital Surface Model
DTM	: Digital Terrian Model
ETRP	: Emergency Tsunami Reconstruction Project
FC	: Finance Commission
FSI	: Forest Survey of India
GCC	: Greater Chennai Corporation
GIS	: Geographical Information System
GoTN	: Government of Tamil Nadu
HSC	: Hazard Safety Cell
HVRA	: Hazard and Vulnerability Risk Analysis
HQ	: Head Quarters
IDRN	: India Disaster Resource Network
IFAD	: International Fund for Agricultural Development

IGNOAPS	: Indira Gandhi National Old Age Pension Scheme
IIT-M	: Indian Institute of Technology Madras
IMD	: India Meteorological Department
INCOIS	: Indian National Centre for Ocean Information Services
IRS	: Incident Response System
IRS	: Institute of Remote Sensing
M	: Meter
MAH	: Major Accident Hazard
MDGs	: Millennium Development Goals
MHA	: Ministry of Home Affairs
MIT	: Madras Institute of Technology
MNREGA	: Mahatma Gandhi National Rural Employment Guarantee Act
MW	: Mega Watt
NC	: Natural Calamity
NCC	: National Cadet Corps
NCMC	: National Crisis Management Committee
NDEM	: National Database for Emergency Management
NDRF	: National Disaster Response Forces
NDRF	: National Disaster Response Fund
NDRMF	: National Disaster Risk Management Fund
NEOC	: National Emergency Operation Center
NGOs	: Non-Governmental Organisation
NIDM	: National Institute of Disaster Management
NIMHANS	: National Institute of Mental Health and Neuro Sciences
NPDM	: National Policy on Disaster Management
NRSC	: National Remote Sensing Centre
NSS	: National Service Scheme
NYKS	: Nehru Yuva Kendra Sangathan
PTSLP	: Post Tsunami Sustainable Livelihood Programme
PWD	: Public Works Department
R&D	: Research and Development
RADM	: Revenue Administration and Disaster Management
RGRP	: Rajiv Gandhi Rehabilitation Package
SC	: Scheduled Castes
SDEM	: State Database for Emergency Management
SDG	: Sustainable Development Goals

SDMP	: State Disaster Management Plan
SDRF	: State Disaster Response Forces
SDRF	: State Disaster Response Fund
SDRMF	: State Disaster Risk Management Fund
SEC	: State Executive Committee
SEOC	: State Emergency Operation Centre
SFDRR	: Sendai Framework for Disaster Risk Reduction
SHG	: Self Help Groups
SIRD	: State Institute of Rural Development
SOP	: Standard Operating Procedure
ST	: Scheduled Tribes
TANGEDCO	: Tamil Nadu Generation and Distribution Corporation
TEAP	: Tsunami Emergency Assistance Programme
TN	: Tamil Nadu
TNCSC	: Tamil Nadu Civil Supplies Corporation
TNDRF	: Tamil Nadu Disaster Response Force
TNDRRA	: Tamil Nadu Disaster Risk Reduction Agency
TNIUS	: Tamil Nadu Institute of Urban Studies
TNSDMA	: Tamil Nadu State Disaster Management Authority
UN	: United Nations
UNDP	: United Nations Development Programme
UNISDR	: United Nations Office for Disaster Risk Reduction
UTs	: Union Territories
VAO	: Village Administrative Officer
VRCC	: Vulnerability Reduction to Coastal Communities
WRD	: Water Resource Department

CHAPTER - 1

INTRODUCTION

1.1 Background

The National Disaster Management Act, 2005 (NDM Act 2005) which lays down institutional and coordination mechanism for effective Disaster Management (DM) at the National, State, District and local levels created a multi-layered institutional system consisting of State Disaster Management Authority (SDMA) headed by the Hon. Chief Minister and the District Disaster Management Authorities (DDMA) headed by the District Collector / District Magistrate and co-chaired by Chairperson of the local bodies. The institutional arrangements have been set up consistent with the paradigm shift from the relief-centric approach of the past to a proactive, holistic and integrated approach for Disaster Risk Reduction (DRR) by way of strengthening disaster mitigation, preparedness and response.

*The DM Act 2005 defines “**disaster**” as;*

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

The losses and impacts that characterise disasters usually have much to do with the exposure, vulnerability and coping capacity of people and places as they do with the severity of the hazard event. Therefore, there is no such thing as a natural disaster, but disasters often follow natural hazards.

According to the revised United Nations Office for Disaster Risk Reduction (UNISDR) terminology, Disaster Management (DM) is “the organizing, planning and application of measures preparing for, responding to and recovering from disasters” and Disaster Risk Management (DRM) is “the application of disaster risk reduction policies and strategies to prevent new disaster risk, reduce existing disaster risk and manage residual risk, contributing to the strengthening of resilience and reduction of disaster losses” (UNISDR 2016 a). The sense in which DM Act 2005 uses the term disaster management, covers nearly DM, DRR and DRM without maintaining a strict distinction between them.

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

A continuous and integrated process of planning, organising, coordinating and implementing measures which are necessary or expedient for the following:

- 1) Prevention of danger or threat of any disaster,
- 2) Mitigation or reduction of risk of any disaster or its severity or consequences,
- 3) Capacity-building,
- 4) Preparedness to deal with any disaster,
- 5) Prompt response to any threatening disaster situation or disaster,
- 6) Assessing the severity or magnitude of effects of any disaster
- 7) Evacuation, rescue and relief, and
- 8) Rehabilitation and reconstruction.

1.2 Need for the State Disaster Management Plan

The Disaster Management Act, 2005 Section 23 (1) reads “There shall be a plan for disaster management for every state to be called State Disaster Management Plan. Apart from the legal mandatory requirements, the hazard profile and disaster history of the state demands for a comprehensive state disaster management plan to be in place for coordinated and streamlined management of disaster in the state”.

The Hyogo Framework for action was the global blue print for Disaster Risk Reduction efforts between 2005–2015. Three international agreements post 2015 became the counterpart guiding frameworks that defined a new approach towards Sustainable Disaster Risk Reduction. Government of Tamil Nadu came up with a State Disaster Management Perspective Plan 2018-2030 with indicative timelines for Disaster Risk Reduction drawn in alignment with the three international framework. The State Disaster Management Plan 2022 is an updated document incorporating the present priorities and evolving approach post 15th Finance Commission recommendations.

1.3 Disaster Risk Reduction of post-2015

Post 2015, there has been a significant shift from the approach of Managing Disasters to Managing Risk. The three landmark global agreements viz. the Sendai Framework for Disaster Risk Reduction 2015–30 (SFDRR), Sustainable Development Goals (SDG) and the Paris Agreement (COP21) set the stage for future global action on DRR, sustainable development and climate change.

1.3.1 Prime Minister's Ten Point Agenda for Disaster Risk Reduction

1. All development sectors must imbibe the principles of Disaster Risk Management (DRM).
2. Risk coverage must include all, starting from poor households to Small, Medium and Micro Enterprises to multi-national corporations to Nation States.
3. Women's leadership and greater involvement should be central to DRM.

4. Invest in risk mapping globally to improve global understanding of Nature and disaster risks.
5. Leverage technology to enhance the efficiency of disaster risk management efforts.
6. Develop a network of universities to work on disaster-related issues.
7. Utilise the opportunities provided by social media and mobile technologies for DRR.
8. Build on local capacity and initiative to enhance DRR.
9. Make use of every opportunity to learn from disasters and to achieve that, there must be studies on the lessons after every disaster.
10. Bring about greater cohesion in international response to disasters.

The 10-point agenda provides the Roadmap for Disaster Risk Management to Climate Resilient and Sustainable Development.

1.3.2 Sendai Framework for Disaster Risk Reduction (2015–2030)

The outcome of 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.” To attain the expected outcome, Sendai Framework seeks to “Prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience.”

As per the Sendai Framework, it is necessary to address existing challenges and prepare for future ones by focusing on monitoring, assessing, and understanding disaster risk and sharing relevant information. The framework notes that, to cope with disasters, it is “urgent and critical to anticipate, plan for and reduce disaster risk”. It requires the strengthening of disaster risk governance and coordination across various institutions and sectors. It requires the full and meaningful participation of relevant stakeholders at different levels. It is necessary to invest in the economic, social, health, cultural and educational resilience at all levels. It requires investments in research and the use of technology to enhance multi-hazard Early Warning Systems (EWS), preparedness, response, recovery, rehabilitation, and reconstruction.

1.3.2.1 Four Priorities

The four priorities for action under the Sendai Framework are:

1. Understanding disaster risk
2. Strengthening disaster risk governance to manage disaster risk

3. Investing in disaster risk reduction for resilience
4. Enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation and reconstruction

1.3.2.2 Seven Targets

1. 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;
2. Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 in the decade 2020–2030 compared to the period 2005–2015;
3. Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030;
4. 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;
5. Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020;
6. 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;
7. Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to people by 2030.

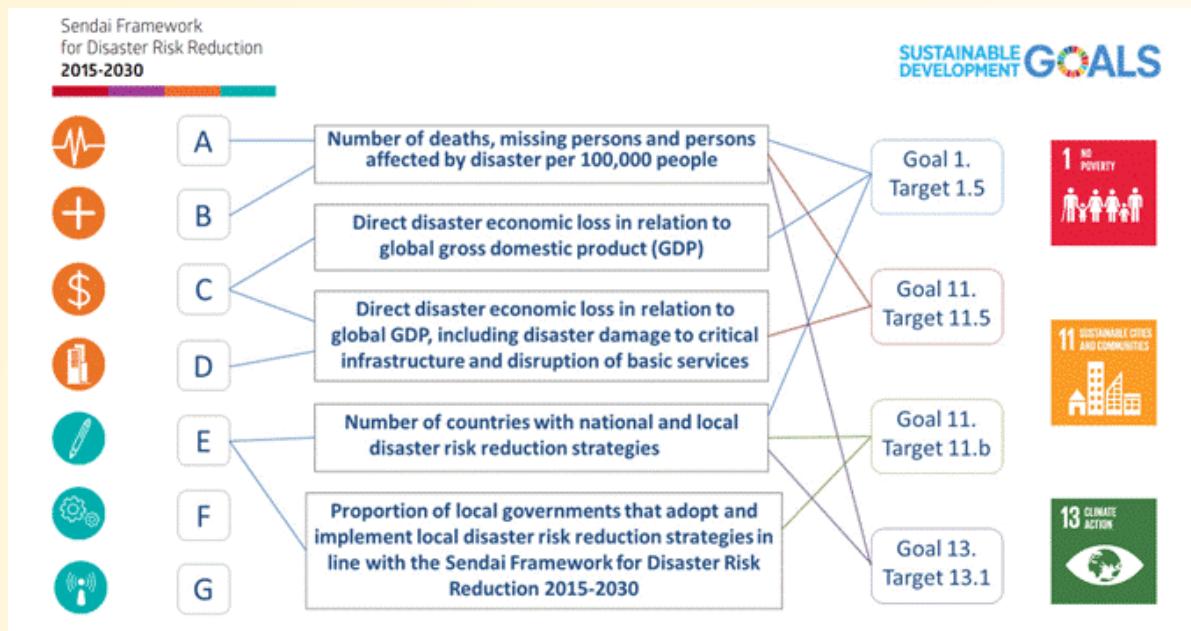
1.4 Sustainable Development Goals (SDG) and Disaster Resilience

The Sustainable Development Goals (SDGs), consisting of 17 Global Goals and 169 targets, are a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity. The 17 Goals build on the successes of the Millennium Development Goals (MDGs), while including new areas such as climate change, economic inequality, innovation, sustainable consumption, peace and justice, among other priorities. The goals are interconnected – often the key to success on one will involve tackling issues more commonly associated with another.

There are several targets across the 17 SDGs that are related to DRR. Conversely, all seven global DRR targets of the Sendai Framework are critical for the achievement of the SDGs.

The focus on strengthening resilience is expected to protect development gains and ensure people to have the resources and capacities to better reduce, prevent, anticipate, absorb and adapt to a range of shocks, stresses, risks and uncertainties. The chart below depicts how the coherence and mutual reinforcement of the SDGs and Sendai Framework are reflected in outcomes and targets.

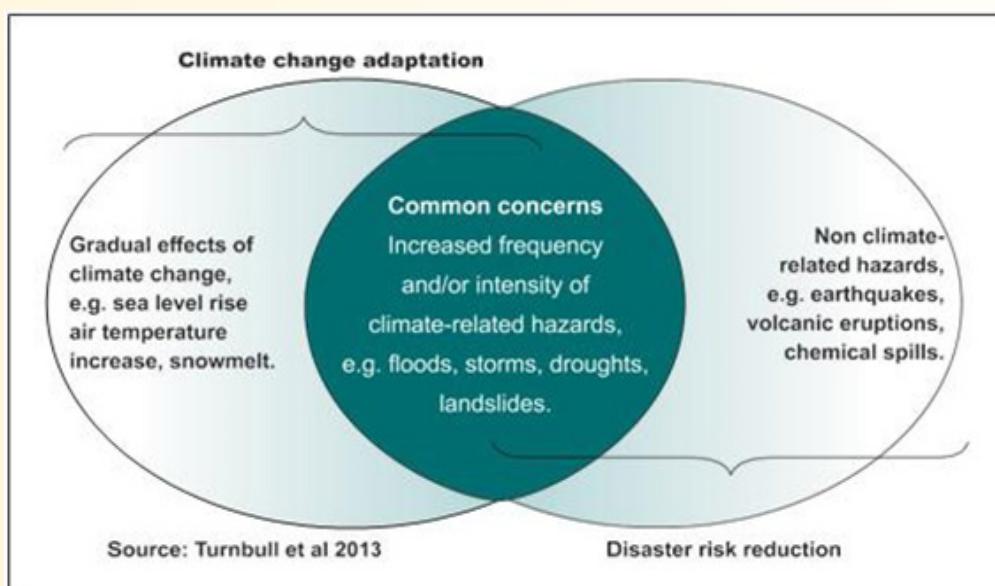
Figure -1.1 Coherence and mutual reinforcement of SDGs and Sendai Framework



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

The agreement aims at “holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change”. Article-7 dwells on establishing “the global goal on adaptation of enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change”. There is significant convergence between the problems that DRR and climate change adaptation seek to address (Fig.1.2). The regions already exposed to climate-related hazards and effects will be at greater risk due to a projected increase in the frequency and/or intensity of those hazards and effects because of global climate change.

Figure – 1.2 - Common concerns of climate change adaptation and DRR.



The Nationally Determined Contributions declared by signatories of the agreement define the mitigation and adaptation measures proposed by each country to limit the emissions with the permissible levels. The SDMP has proposed to mainstream the disaster risk reduction and climate change adaptation into the development plans of the State as a major strategy for vulnerability reduction.

1.6 Vision of the Plan

Making disaster resilient Tamil Nadu by enhancing the capacity of all stakeholders to respond to disasters in a planned way to minimize, loss of lives; livelihood and economy including critical infrastructure, basic services like health and education; and Socio-cultural and environmental loss.

1.7 Objectives of the Plan

1. To assess various hazard, vulnerability, capacity and risk of the state.
2. To prescribe standard operating procedures and guidelines for disaster risk mitigation, preparedness and capacity building, relief and response, recovery and reconstruction.
3. To build the capacity of all stakeholders in the state to cope with the disasters and promote community-based DRR.
4. To provide clarity on roles and responsibilities for line departments and all stakeholders concerned in various phases of disaster management.
5. To ensure co-ordination and promote productive partnership with all other agencies related to disaster management.
6. To mainstream disaster management concerns into the developmental planning for DRR and climate change adaptation.
7. To ensure socially inclusive, gender sensitive, children centric and differently abled and vulnerable caring disaster response.
8. To develop efficient, streamlined and rapid disaster response and relief mechanism in the state.
9. To minimize adverse impact of disasters and reduce losses in lives, livelihoods, health, and assets (economic, physical, social, cultural and environmental).
10. To invest in DRR for resilience through structural, non-structural and financial measures, as well as comprehensive capacity development.
11. To take-up recovery programme as an opportunity to build back better by ensuring community participation in the programme.
12. To promote the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures to prevent and reduce hazard exposure and vulnerabilities to disaster.

13. To strengthen the disaster risk assessment through mapping, modeling, monitoring and by establishing multi-hazard early warning systems with last mile connectivity.
14. To establish partnership with academic, scientific and research institutions for effective use of science, technology for Disaster risk management.
15. To collaborate with the local community for harnessing the traditional knowledge and wisdom for sustainable disaster risk reduction.

1.8 Scope of the plan

The State Disaster Management Plan provides a consistent, statewide institutional framework to enable the State, local governments, Central government and the private sector to work together to mitigate, prepare for, respond to and recover from the effects of emergencies regardless of cause, size, location, or complexity. This plan is in effect at all times and applies to all levels of state government and its administrative units such as District/Taluk / Firka / Villages. This plan is for the initial period of one year, after which it could be reviewed. However, the conceptual level instructions, procedures and roles/ responsibilities will remain unaltered.

1.9 Plan Activation

The disaster response structure will be activated on the receipt of disaster warning on the occurrence of the disaster. The occurrence of disaster may be forecasted or reported by the concerned authority to the Commissioner of Revenue Administration by the fastest means. The Commissioner of Revenue Administration will activate all stakeholders for emergency response including the State Emergency Operation Centre and District Emergency Operation Centres. Also, the line departments concerned will issue instructions to their respective department teams to include the following details:

- ◆ Exact quantum of resources (in terms of manpower, equipment and essential items from key departments/stakeholders) that is required.
- ◆ The type of assistance to be provided
- ◆ The time limit within which assistance is needed
- ◆ Details of other Task/Response Forces through which coordination should take place

The SEOC and other control rooms at the State level as well as district control rooms shall be activated with full strength. The State Government may publish a notification in the official gazette declaring such areas to be disaster-affected area under Section 11 (2) c. of the DM Act 2005.

Once the situation is totally controlled and normalcy is restored, the CRA declares End of Emergency Response and issues instructions to withdraw the staff deployed in emergency duties.

1.10 Plan Implementation

The DM Act 2005 enjoins State Governments to make provisions for the implementation of the disaster management plans. The Act also mandates that every Department of the State Government must prepare a Departmental Disaster Management Plan in accordance with the SDMP. Further, the Government Departments shall make provisions in their annual budget, for carrying out the activities and programmes set out in their plan.

1.11 Initiatives of TNSDMA

The TNSDMA is providing necessary thrust to enhance the level of Preparedness & Capacity building, Relief & Response and Mitigation of Disaster impacts.

The Goal is to substantially increase the

1. Availability and access to Multi Hazard Early Warning Systems
2. Hazard Vulnerability Risk Assessment and Risk Mapping
3. Mitigation measures for Disaster Risk Reduction
4. Mainstreaming of Disaster Risk reduction into Development Plans
5. Multi Stakeholder Participation and also

Substantially reduce the

1. Disaster Mortality
2. Number of affected people
3. Vulnerability of Weaker Sections
4. Disaster damages to critical infrastructures and disruption of basic services
5. Reduce Direct Economic Loss

TAMIL NADU INITIATIVE TOWARDS DISASTER RISK REDUCTION

The Greater Chennai Corporation and its Peri-Urban areas, Cuddalore Nagapattinam and Thoothukudi have been experiencing flooding during monsoon and unseasonal rains. Govt of Tamil Nadu has taken up flood mitigation works to reduce the risks of flooding at Rs 2,465 Crore from 2016 to 2021 under various projects. These projects have been implemented by the Greater Chennai Corporation, Water Resources Department, Highways Department and Commissionerate of Municipal Administration.

Govt have also taken up the Chennai Realtime Flood Forecasting and Spatial Decision Support System & Realtime Data Acquisition System at Rs 71.22 Crore. As part of the project, the Survey of India has taken up the drone survey of the Chennai Basin (5,820 Sq Km). The Hydro-Dynamic Modelling will be designed based on the DEM data from the drone survey. At present, Web Based Realtime Flood Forecasting, Lake and Reservoir Operation guidance, Forecasting and Alerts are functional. Installation of Automatic Rain Gauge Stations, Automatic Weather

Stations, Automatic Water Level Recorders, and Gate Sensors will be completed in 2023. This is a major initiative of the State to forecast flooding which is triggered by flows from the upper catchment and to regulate the drinking water reservoirs of Chennai.

The Government of Tamil Nadu has constituted an Advisory Committee of Experts for the Management and Mitigation of flood risks in the Chennai metro under the Chairmanship of Dr V.Thirupugazh IAS (Retired). Based on the recommendations of the Advisory Committee the Government has sanctioned Rs 291.35 crore to Greater Chennai Corporation and Rs 82.15 crore to the Municipal Corporations in the Suburban areas of Chennai. In respect of flood mitigation the proposed project will exclude the geography of Greater Chennai Corporation and focus on the entire Tamil Nadu.

The TNSDMA & NDMA have jointly taken up a Technical Co-operation Project in collaboration with Japan International Co-operation Agency (JICA). The objective is to formulate a Comprehensive Flood Control Master Plan for the targeted river basins in Chennai Metropolitan Area. The Comprehensive Plan will become a core part of the Chennai City Master Plan III.

Govt have sanctioned Rs 25.70 Crore for installation of 1400 Automatic Rain Gauges and 100 Automatic Weather Stations. In an effort to strengthen the weather forecast system, Two Doppler Weather Radars and Two Upper Weather Observations (Weather Balloon) will be established in the State. The TNSDMA has taken a policy decision to integrate the data from 500 plus existing functional Automatic Rain Gauge Stations & Automatic Weather Stations to the TNSDMA data base to strengthen the Weather Network.

A separate Technical Cell has been formed in the Collectorate The Nilgiris District to study the landslide vulnerability and prepare detailed project report for Landslide Risk mitigation.

CHAPTER - 2

PROFILE OF THE STATE

2.1 Geographic Location

The State of Tamil Nadu is situated in the southernmost part of the Indian Peninsula between the northern latitude of 8°05' and 13°35' and the eastern longitude of 76°15' and 80°20'. It is bordered by the Union Territory of Puducherry and the States of Kerala, Karnataka, and Andhra Pradesh. It shares a maritime border with the country of Sri Lanka. Tamil Nadu has the second longest coast line of 1076 km.

The State of Tamil Nadu covers an area of 1,30,058 Sq.km. The major administrative units of the State constitute, 38 districts, 94 revenue divisions, 313 taluks, 1,209 Firkas and 16,743 Revenue villages. There are 21 municipal corporations, (including Greater Chennai Corporation) 138 municipalities, 385 panchayat unions (Blocks), 487 town Panchayats and 12,525 village Panchayats.

2.2 Demographic features

As per the 2011 India census, Tamil Nadu had a population of 72,147,030 with 555 persons per Sq. Km out of which the proportion of rural population is 51.6%, while that of urban population is 48.41%. The sex ratio of the state is 995 with 36,137,975 males and 36,009,055 females and the recorded decadal growth rate of the State was 15.6%.

The state has 51,837,507 literates, making the literacy rate 80.33 per cent. Tamil Nadu is the seventh most populous state in India. 48.4 per cent of the state's population lives in urban areas, the third-highest percentage among large states in India.

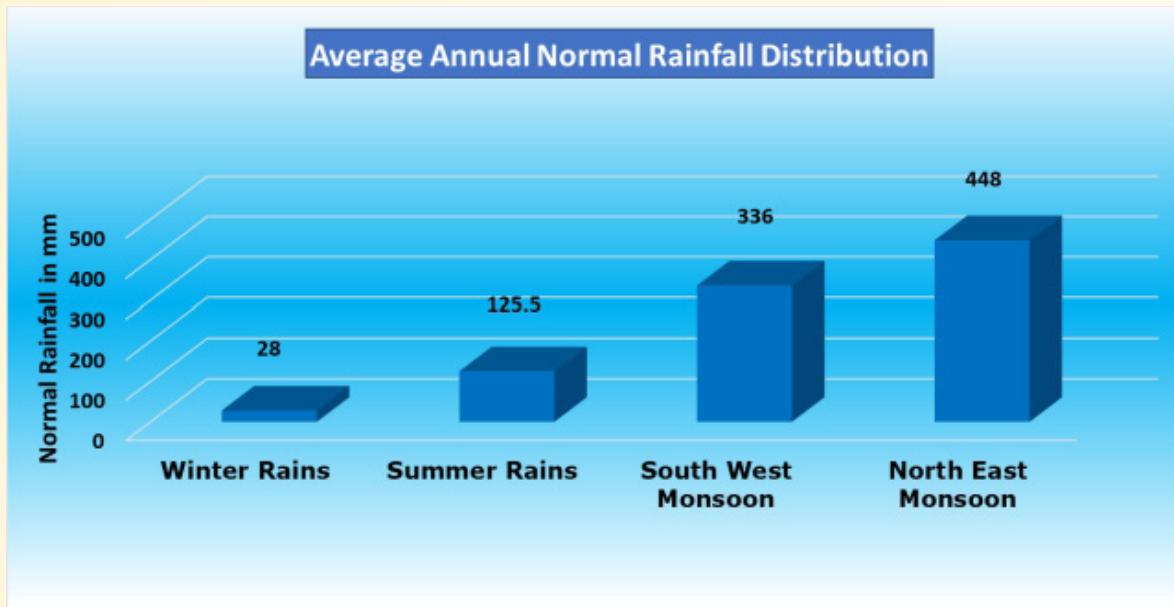
There are a total of 2,78,78,282 workers, comprising 47,38,819 cultivators, 60,62,786 agricultural labourers, 12,61,059 work in house hold industries and 1,16,95,119 other workers.

India has a human development index calculated as 0.619, while the corresponding figure for Tamil Nadu is 0.736, placing it among the top states in the country. The life expectancy at birth for males is 65.2 years and for females it is 67.6 years. There is a total of 2,31,66,721 households. A total of 1,44,38,445 people constituting 20.01 per cent of the total population belonged to Scheduled Castes (SC) and 7,94,697 people constituting 1.10 per cent of the population belonged to Scheduled tribes (ST).

2.3 Rainfall Pattern

Tamil Nadu receives an annual average rainfall of 937.5 mm. Approximately 36% of the rainfall is from the Southwest Monsoon and 47% from the Northeast Monsoon.

Figure 2.1 Average Annual Normal Rainfall Distribution



2.4 Climate and Soil

The Climatic seasons for the State of Tamil Nadu can be broadly classified into:

- i) Winter Season (January - February),
- ii) Summer Season (March - May),
- iii) Southwest Monsoon (June - September),
- iv) Northeast Monsoon (October - December).

The State receives rainfall from both Southwest and Northeast Monsoons. While most parts of the country receive their major share of rainfall through Southwest Monsoon, Tamil Nadu receives 36% of the precipitation from Southwest Monsoon. The Northeast Monsoon provides major part of the precipitation to the State. Important agricultural seasons such as Samba, Thaladi, Navarai, etc., depend entirely on the Northeast Monsoon. Hence the rainfall during October to December plays an important role in deciding the fate of the agricultural economy of the State. Although the economy of Tamil Nadu is predominantly agrarian, still agriculture in the State is a gamble on the Monsoon.

2.5 Soil and Agro-Climate Zones

The predominant soils of Tamil Nadu are red loam, laterite, black, alluvial and saline soils. The State has 7 agro climatic zones in which Cauvery Delta Zone, being the granary of Tamil Nadu, comprising the whole of Thanjavur, Tiruvarur, Nagapattinam, Myladuthurai and parts of Karur, Perambalur, Pudukkottai, Cuddalore and Tiruchirapalli districts, is an economically important zone for Tamil Nadu. The Tamil Nadu Government declared the Cauvery Delta region in the state as a Protected Special Agriculture Zone.

Figure 2.2 Tamil Nadu Agro Climate Zone Map



2.6 Natural Vegetation

Tamil Nadu has an area of 22,877 sq.km under forests, which constitute 17.59 percent of the geographical area of the State as against 33.33 percent required under the National Forest Policy, 1988. Out of 22,877 sq.km under forests, Reserved Forests comprise 84.75%, Protected forests 9.54% and Unclassified Forests 5.71%. The Nilgiris district has about 56% of its total area under forest, followed by Krishnagiri with 39.4%, Dharmapuri with 36.5%, Kanyakumari with 32.4% and Theni with 32.0%.

2.7 Transport

2.7.1 Road Network

Tamil Nadu has an extensive road network, Tamil Nadu has 28 National Highways running through it. The district centers are linked through 187 State Highways. Tamil Nadu is one of the few States in India to have 100 per cent metaled road connectivity even in the rural areas.

2.7.2 Railways Network

Tamil Nadu has four divisions of Southern Railway with total railway track length of 5,952 km and 532 railway stations. Chennai also has a well-established suburban railway network that connects it to the suburbs and the neighboring cities. The State also has established Mass Rapid Transport System (MRTS) and Metro Rail to augment the commuter's transport system in Chennai.

2.7.3 Airports and Ports

Tamil Nadu has international airports at Chennai, Trichirappalli, Madurai and Coimbatore and has domestic airports at Tuticorin and Salem. Tamil Nadu has three major ports at Chennai, Ennore and Tuticorin and 17 other minor ports.

2.8 Animal Husbandry and Fisheries

Tamil Nadu has 9.52 million cattle, 0.52 million buffaloes, 4.50 million sheep, 9.89 million goats, 0.07 million pigs, 1.29 million dogs and 120.78 million poultry sharing considerable proportion to national livestock wealth. Tamil Nadu, possessing 4.56% of India's livestock population, contributes 4.39% to country's milk production and 7.88% to meat production. The State contributes 5.29% to the total value of output from livestock in the country.

The maritime state of Tamil Nadu is blessed with 1,076 km long coast line contributing 4.97 lakh tons of marine fish production. The Fisheries Department supports the livelihood of 10.07 lakh marine fishers and 2.30 Lakh Inland Fishers. Tamil Nadu exported 1.10 lakh MT of marine products and earned a foreign exchange of Rs.5,565.46 crore during 2020-21.

2.9 Industrial Overview

Tamil Nadu has consistently retained its leading position as a highly industrialised State, as affirmed by the Annual Survey of Industries (ASI) report. The latest ASI report published for the year 2018-19 highlights that Tamil Nadu ranked 1st in the number of factories (38,131) and number of people employed in factories (25.82 lakh workers). The State was ranked 3rd across parameters such as Gross Output (Rs.9.33 lakh crore), Gross Value Added (Rs.1.81 lakh crore), Invested Capital (Rs.4.27 lakh crore). Tamil Nadu is a manufacturing hub in the country due to its significant presence in sectors such as automobiles and auto-components (including Electric Vehicles), textiles & wearing apparel, leather, chemicals (including rubber & plastic), electronics, machinery, and fabricated metal products.

2.10 Economic profile

Tamil Nadu is the second richest and wealthiest state in the Indian union and is the most industrialized state in the country. More than 60% of the state is urbanized, accounting around 10.6% of the urban population in the country, while only comprising 6% of India's total population. Services contributes to 55% of the economic activity in the state, followed by manufacturing at 34% and agriculture

at 11%. Government is the major investor in the state, with 52% of total investments, followed by private Indian investors at 29.9% and foreign private investors at 14.9%. It has been ranked as the most economically free state in India by the Economic Freedom Rankings for the States of India.

2.11 Culture and Tourism

Tamil Nadu is known for its rich tradition of literature, art, music and dance which continue to flourish today. Tamil Nadu is a land most known for its monumental ancient Hindu temples unique cultural features like Bharatanatyam, Tanjore painting, Siddha medicines and Tamil architecture that were developed at the home and still continue to be practiced. The state has some of the grand Hindu temples built in Dravidian style of architecture. The Nilgiri Mountain Railway, Thanjavur, Brahadeeswara Temple, Gangaikonda Cholapuram, the Airavatesvara Temple at Darasuram and the Shore Temple along with the collection of other monuments at Mamallapuram have been declared as UNESCO World Heritage Sites.

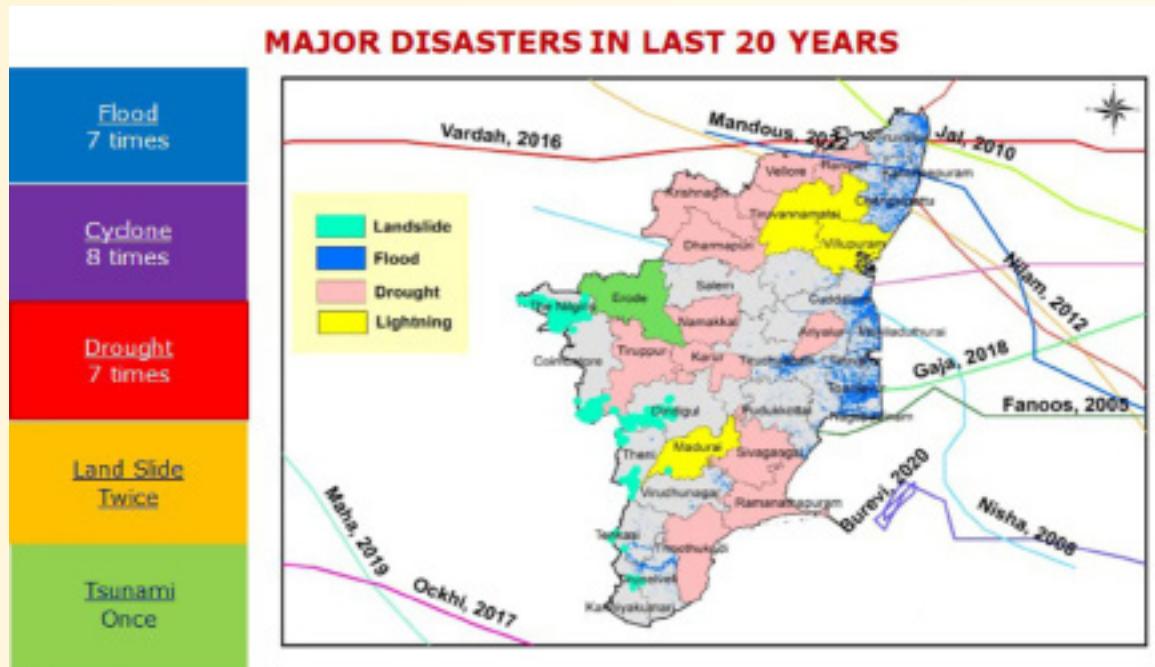
The tourism industry of Tamil Nadu is the largest in India, with an annual growth rate of 16 per cent. Tourism in Tamil Nadu is promoted by Tamil Nadu Tourism Development Corporation (TTDC) undertaken by the Government of Tamil Nadu. According to Ministry of Tourism statistics, 0.57 million foreign and 115.3 million domestic tourists visited the state in 2021.

2.12 Disaster Profile

The State of Tamil Nadu is located in the vulnerable part of the Indian Peninsula and subject to both climate and geological disasters viz., cyclone, flood, earthquakes, tsunami and drought to varying degrees. The geographic setting of the State makes it vulnerable also to lightning, landslide, forest fires, sea erosion etc.,

Tamil Nadu with a coastline of 1076 Km forming part of Coromandel Coast of Bay of Bengal and Indian Ocean stretching from Pulicat Lake to Cape Comorin makes the state vulnerable to tropical cyclones, floods and earthquake-induced Tsunami. The 14 coastal Districts, viz., Chennai, Kancheepuram, Tiruvallur, Cuddalore, Villupuram, Thanjavur, Tiruvarur, Nagapattinam, Myladuthurai, Pudukottai, Ramanathapuram, Thoothukudi, Tirunelveli and Kanniyanakumari are highly vulnerable and affected frequently by the trough and depression formed in the Bay of Bengal and Indian Ocean during South-West and North-East monsoon periods. The Western Ghats bordering Tamil Nadu acts as a barrier for the Southwest Monsoon, leaving a large rain shadow area with water stress. Due to uneven distribution of rainfall, drought conditions are prevalent in some parts of the state leading to crop failure, poor yields and drinking water scarcity. Tamil Nadu faces annual flooding, due to cyclone, monsoon rains and riverine floods-due to surplus releases from reservoirs. The hilly regions of the State are vulnerable to landslides, earthquakes, cloud burst and flash floods. Heat wave, thunderstorm and lightning, sea erosion, sea water incursion, whirl wind, gale wind and Pest attacks also have become a serious concern.

Figure 2.3 Major Disaster in last Twenty years



The State has witnessed natural disasters of severe intensity since the beginning of the current century.

- The large-scale losses of lives and colossal damages to the infrastructure during Tsunami 2004
- Battering of Cuddalore, Nagapattinam Districts, Chennai and its surroundings during 2015 Floods
- Extensive damages in several districts during Cyclones - Thane (2011), Nilam (2012), Vardha (2016), Ockhi (2017), Gaja (2018), Burevi (2020), Nivar (2020), Mandous (2022)
- Unprecedented Rainfall (2021),
- Heavy to Extremely Heavy Rains (2021),
- Crippling of the entire State due to the severe drought in 2016-2017

are some of the major disasters that impacted Tamil Nadu during the current century. The Management of these disasters is highly complex and poses serious challenges in all phases of disaster viz., Preparedness, Response, Recovery and Risk Mitigation.

The State adopts a comprehensive approach in ensuring that the Hazards, risks and vulnerabilities are mapped and mitigation efforts are taken to minimise the impacts. The State is also constantly working at improving the coping capacity of population at risk. The Government of Tamil Nadu is determined to handle the challenges posed by the known and emerging disasters, and seize the opportunity to build resilient communities, resilient villages, cities and Resilient Tamil Nadu. The state adopts a comprehensive approach in ensuring that the hazards, risks are mapped and mitigation efforts are taken to minimize the impacts. The state is also constantly working at improving the preparedness for facing any disasters.

CHAPTER – 3

RISK GOVERNANCE-INSTITUTIONAL FRAMEWORK FOR DISASTER MANAGEMENT

3.1 Disaster Management Act 2005

The Disaster Management Act, 2005 (DM Act 2005) lays down institutional and coordination mechanism for effective Disaster Management (DM) at the national, state, district and local levels. These bodies have been set up to facilitate a paradigm shift from the hitherto relief- centric approach to a more proactive, holistic and integrated approach of strengthening disaster preparedness, mitigation, and emergency response.

3.2 Ministry of Home Affairs – Govt of India

The overall coordination of disaster management vests with the Ministry of Home Affairs (MHA). The Cabinet Committee on Security (CCS) and the National Crisis Management Committee (NCMC) are the key committees involved in the top-level decision-making with regard to disaster management.

3.3 National Disaster Management Authority (NDMA)

The Government of India established the NDMA in 2005, headed by the Hon'ble Prime Minister. Under the DM Act 2005, the NDMA, an apex body for disaster management, is having the responsibility for laying down the policies, plans, and guidelines for disaster management for ensuring timely and effective response to disaster.

3.4 State Level

The DM Act, 2005 envisages specific roles to be played by the State in disaster management.

The Institutional Mechanism at the State and District level is furnished below:-

3.5 Tamil Nadu State Disaster Management Authority

Tamil Nadu State Disaster Management Authority, has been constituted under the chairmanship of the Hon'ble Chief Minister with the following members:

1. Hon'ble Minister for Revenue and Disaster Management
2. Chief Secretary to Government, Ex-Officio
3. Secretary, Revenue and Disaster Management Department
4. Secretary, Finance Department
5. Secretary, Home Department
6. Secretary, Higher Education

7. Secretary, School Education
8. Additional Chief Secretary / Commissioner of Revenue Administration and State Relief Commissioner.
9. Director, Centre for Disaster Management & Mitigation, Anna University, Chennai.
10. Head of Department of Civil Engineering, Indian Institute of Technology, Madras.

Tamil Nadu State Disaster Management Authority provides guidance for policy formulation, approval of state disaster management plan and monitoring implementation of disaster risk reduction measures.

3.6 State Executive Committee

The State Executive Committee functions under the Chairmanship of the Chief Secretary with Secretaries of Revenue Department, Public Works Department, Highways Department and Home Department as members and State Relief Commissioner, Secretaries of Finance Department, Health and Family Welfare Department and Water Resources Department as special invitees. The State Executive Committee is responsible for implementing the State Plan and to advise the State Government on all financial matters regarding Disaster Management. It ensures immediate release of funds for carrying rescue and relief operations during the event of disasters.

3.7 State Advisory Committee

The State Advisory Committee has been constituted under the Chairmanship of the Additional Chief Secretary / Commissioner of Revenue Administration. The Additional Chief Secretary Revenue is the co - chair. The Advisory Committee comprises of experts in various fields of Remote Sensing, Communication Networks, Weather Forecasting, Surface Transportation Engineering, Urban Drinking Water Supply and Sewerage, Public Health, Rural Drinking Water Supply, Ocean Sciences, Meteorology and Climate Change, Highways, Industrial Safety and Health, Public Health and Preventive Medicines, Petroleum and Explosives Safety, Forest Conservation and Forest Fires, Irrigation and Flood Management, Electrical Transmission, Water Resources Management and Environment to advise on measures for disaster risk reduction. It is proposed to reconstitute the State Advisory Committee by grouping them to serve specific thematic areas.

3.8 Revenue Administration & Disaster Management Department

The department is responsible for policy making and issuance of Government orders based on approvals accorded by Tamil Nadu State Disaster Management Authority and State Executive Committee.

3.9 State Relief Commissioner

The Commissioner of Revenue Administration is the State Relief Commissioner and implements the tasks assigned by the TNSDM Authority and State Executive

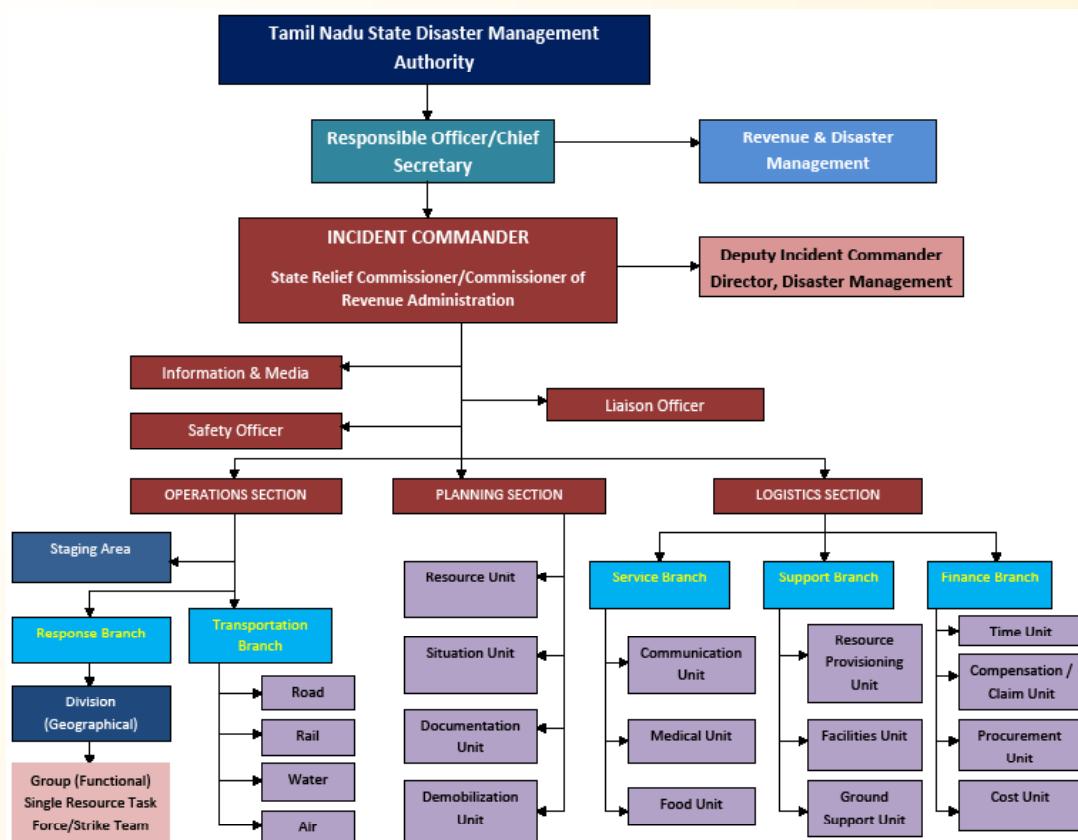
Committee relating to the different phases of Disaster Management. The CRA / State Relief Commissioner plays a pivotal role and is responsible for preparedness, capacity building, relief and rehabilitation measures, formulation of policies relating to disaster management in the State. To assist the Commissioner for Revenue Administration, a special purpose vehicle “Tamil Nadu Disaster Risk Reduction Agency (TNDRRA)” has been created and registered under Tamil Nadu Societies Registration Act.

3.10 Incident Response System

The management of response in disasters requires the Government, community, civil society and other stakeholders to carry out a large number of tasks. The activities involved in response management would depend on the nature and type of disaster. The Government of Tamil Nadu is adopting Incident Response System (IRS) in the State to ensure the unification of efforts of all the stakeholders to ensure immediate response during disasters to protect people & their properties.

The Incident Response System provides a systematic, proactive approach guiding the concerned departments and agencies at all levels of Government, the private sector and non-governmental organizations to work seamlessly in disaster situations. For effective, efficient and comprehensive management of disasters in the State of Tamil Nadu, IRS is critical. The aim is not only to minimize loss of life and property but also strengthen and standardize the disaster response mechanism in the State.

Figure 3.1 Incident Response System Organization Chart



Incident Response Systems (IRS) teams have been formed in all districts of Tamil Nadu. The National Institute of Disaster Management (NIDM) is training the team of officers on the various modules of IRS. They will be used as Master Trainers to train the other officials in the State and District.

The Incident Response System functions under the overall supervision of the Tamil Nadu State Disaster Management Authority. The Chief Secretary to Government is the Responsible Officer and the Additional Chief Secretary / Commissioner of Revenue Administration and State Relief Commissioner is the Incident Commander. The District Collector is the Incident Commander at District level. The Incident Commander is assisted by the Commissioner of Disaster Management who is the Deputy Incident Commander at State level. The Operations, Planning and Logistic section assist the Incident Commander in carrying out various measures during disaster.

3.11 Tamil Nadu Disaster Risk Reduction Agency (TNDRRA)

Tamil Nadu Disaster Risk Reduction Agency registered under Societies Act (1975) is the Executive Agency of the Tamil Nadu State Disaster Management Authority. Hon'ble Minister for Revenue and Disaster Management is the chairman of the Governing Council. The Commissioner of Revenue Administration/ State Relief Commissioner is the Chairman of the Executive Council of the Agency and the Director, Disaster Management acts as the Chief Executive Officer / Member Secretary. All the State / Centrally Sponsored / Externally aided projects implemented by the State for Disaster Risk Reduction such as Mitigation, Restoration, Reconstruction and Rehabilitation are coordinated by the Tamil Nadu Disaster Risk Reduction Agency.

3.12 District Disaster Management Authority (DDMA)

The District Disaster Management Authorities have been constituted as per the provisions of the Disaster Management Act, 2005 under the Chairmanship of District Collectors in all the 38 Districts. The District Disaster Management Authority acts as the District Planning, coordinating and implementing body for disaster risk reduction and takes all measures in accordance with the guidelines laid down by the National and the State Disaster Management Authority.

3.13 State Emergency Operation Centre (SEOC)

Establishing an institutional mechanism is vital for timely communication and dissemination of disaster risk to the vulnerable population. State Emergency Operation Center (SEOC) is the communication centre functioning at Chennai round the clock. The warning messages on Heavy Rainfall, Flood, Cyclone, Earthquake, Tsunami, etc. received from nodal agencies viz., IMD, INCOIS, CWC, GSI and other agencies etc., are being communicated by SEOC to the general public, fishermen, students, farmers, district administration and media in the state. During disaster period, the centre will function as command-and-control centre round the clock with the assistance of Senior Officers of the Line Departments including National

Disaster Response Force, Tamil Nadu Disaster Response Force, Police Department, Tamil Nadu Fire and Rescue Services for quick dissemination of alerts, under the supervision of Additional Chief Secretary / Commissioner of Revenue Administration.

The centre is accessed by the people in distress by calling toll free number 1070. During major disasters, Hon'ble Minister for Revenue and Disaster Management along with Additional Chief Secretary / Commissioner of Revenue Administration and Additional Chief Secretary, Revenue & Disaster Management Department brief the media about the various measures undertaken by the Government and create awareness among the public for their safety.

3.14 District Emergency Operation Centre (DEOC)

DEOC is functioning under the supervision of the District Collector. DEOC acts as a communication centre at the district level for carrying out all operations during disaster such as evacuation, search and rescue, relief and restoration operations at Taluk and Village level based on the forecast / alerts received from SEO and disseminates the information to the General Public. During disaster period the centre functions round the clock by drafting the services of the Line Departments in the district for quick dissemination of alerts and collects information on search, rescue, relief and rehabilitation operations from various quarters and updates the same to Commissioner of Revenue Administration and State Relief Commissioner. This centre is accessed by the public by calling tollfree No.1077.

3.15 Inter Departmental Zonal Teams for Group Of Vulnerable Areas

Inter departmental Zonal Teams are formed under the leadership of Revenue Officials at Taluk Level. The team members are drawn from Police, Fire services, Rural Development, Forest, Agriculture Departments etc. Each team will closely monitor 5 to 7 vulnerable areas. 662 Interdepartmental zonal teams are formed to monitor the 3,916 vulnerable areas during both the Monsoon season.

3.16 Community First Responders

The first responders are trained to make the communities strong and vibrant in proactively tackling the disasters. Community participation at grass root level is enabled through enrolment of able-bodied volunteers, with skills of swimming and climbing, as first responders (10 per vulnerable area). First responder teams are formed in Areas of very high and high vulnerability. The first responders are trained by Fire services / SDRF and Red Cross society. Mobile teams of First Responders and Snake Catchers at Block / Taluk / Sub-Divisional and District levels are formed for deployment based on need.

The First Responders play a key role in providing (first aid, search, and rescue, extrication from damaged buildings, road clearance, firefighting) raising awareness (about hazards, risks and disaster response) community drills (annual drills for disaster response in the community) equipping the community with minimum resources (first aid kit, extrication equipment, life jackets, lifebuoys, rope etc.)

3.17 Village/Ward Level Disaster Management Committee

The coastal districts bear the brunt of the monsoon, and hence to have a better community involvement in disaster management, Village/Ward level Committees are formed. This Committee of First Responders is perhaps the most important to be formed and the District Collector directly takes care to put in place a balanced committee with good representation. Every disaster requires total involvement and wholehearted cooperation of the village/ward level citizens. The Panchayat, VAO, local institutions, NGOs, youth clubs and the like will be encouraged by the administration to be involved in the event of an emergency.

3.18 Departments and Functions

The various departments of Government and the local bodies associated with the disaster management functions are presented below:

Table 3.1 various departments disaster management functions

Sl. No.	Departments / Agencies	Functions
1	SDMA, DDMA	Activation of Trigger mechanism.
2	RADM, SEO, DEOC, DIPR, Media and Telecommunication networks.	Risk Communication.
3	RADM, Urban and local bodies, Police, Home Guards, Fire and Rescue services, SDRF, NDRF, Armed Forces, Volunteers, "108" ambulance, community and others.	Evacuation, Search and Rescue of People.
4	RADM, Urban and Rural Local bodies.	Shelter arrangement for rescued people and Creating Temporary Shelters on need basis.
5	Traffic Police, Home Guards, Volunteers.	Traffic control and diversions
6	SDRF, NDRF, Police, Home Guards and Volunteers.	Cordoning off the disaster affected areas, apart from Evacuation, Search and Rescue of People.
7	Police and Home Guards	Law and Order Maintenance during Evacuation, Search and Rescue Operations
8	Health Department, Local bodies and RED Cross	Provision of First Aid/Triage, Trauma Care / Prevent Spread of Epidemic and Endemic Diseases.

9	RADM, Health Department & Local bodies	Relief camps and basic amenities in shelters.
10	RADM, Police, Health Department and Local bodies	Identification of dead and injured
11	Health Department	Arrangement of medical support for causalities
12	RADM, Urban and local bodies, Experts	Impact & Assessment of Loss and Damage
13	RD, PWD, Highways & Urban Local bodies	Clearance of disaster affected areas.
14	Health Department and local bodies	Preventive health camps
15	RADM, Civil supplies and Consumer Protection Dept., RD&PR and Urban Local bodies. RADM, CS & CP Dept. and Local bodies. RADM, CS & CP Dept. RD & PR and Urban Local bodies.	Mobilizing Resources for relief & restoration Food Arrangements. Provision of Relief supplies
16	SDRF, F&RS, PWD, Highways Department and Local bodies.	Clearance of debris / Solid waste.
17	PWD, Highways, Urban / Rural Local bodies, RD&PR, TANGEDCO	Restoration of Communication & Road networks
18	TWAD, CMWSSB and Local bodies	Provision of Water
19	TANGEDCO	Restoration of Electricity
20	Road Transport and Highways	Resumption of Transportation
21	Health, RADM and Local bodies	Temporary mortuary / Dead body disposal
22	Animal Husbandry Department, Blue Cross, Local bodies and Volunteers	Evacuation and shelter arrangement for cattle / Livestock Carcass disposal
23	RADM, all Line Departments	Restoring normalcy.

3.19 Fire & Rescue Services Department

Fire and Rescue Services Department of the Government of Tamil Nadu is entrusted with the task of fire fighting and rescue operations in times of emergency. The Fire and Rescue Services Directorate plays a very vital role in the area of firefighting and fire prevention. Apart from fire fighting, this department also undertakes rescue activities and helps people, marooned in floods, and caught in the debris of fallen buildings, road and rail accidents and other natural and man-made disasters.

3.20 State Disaster Response Force (TNDRF)

Government of Tamil Nadu have been strengthening its response mechanisms over a period of time, in order to ensure that people in vulnerable areas are evacuated to safer places based on forecast and search and rescue operations are carried out swiftly as and when the disaster strikes. In order to strengthen the disaster response, Government of Tamil Nadu have raised an exclusive battalion as Tamil Nadu Disaster Response Force. Further, modern equipment viz., Robotic Excavators, Vegetation De-clogger, Super Sucker, portable lights and inflatable boats have been procured in order to build the capacity of various agencies involved in search and rescue operations.

3.21 Home Guards

The Tamil Nadu Home Guards organization came into being in 1963 as per Tamil Nadu Home Guards Rules, 1963, as a voluntary citizens force to assist the Police in the maintenance of Law and Order and for meeting emergencies like floods, fires, cyclones, etc. The Home Guards organization renders valuable assistance in the regulation of traffic, crowd control, maintenance of internal security, promotion of communal harmony, the spread of awareness on health, hygiene, drug abuse, AIDS and road safety, etc.

3.22 Emergency Management Contact Directory

An Emergency Management Contact Directory containing contact numbers of all nodal officials in disaster management at the national, state and District level of the Government, private, NGOs and the community will be prepared and maintained. The Collector supervises and coordinates the preparation and regular updating of this directory at the district website.

3.23 Non-Governmental Organisation Co-ordination

NGOs play a key role in Disaster situations and go a long way in plugging the gaps during emergencies as they often have a good relationship with the local community. NGOs play a very important role in mobilizing communities and in initiating Disaster Risk Reduction activities. The strong linkages which NGOs have with grassroot communities will be effectively harnessed for creating greater public awareness on disaster risk and vulnerability, initiating appropriate strategies for strengthening the capacity of stakeholder groups to improve disaster preparedness, mitigation and improving the emergency response capacities of the stakeholders.

A NGO-Government-Civil Supply Organisation Co-ordination centre has been established at the State and District level. The Director, Disaster Management has been designated as the State Nodal Officer. In respect of districts, the District Revenue Officer has been designated as the Nodal Officer. This co-ordination centre will map the services of the partnering NGOs and their service area. A Donor's and Seekers platform is being established to support the supply chain management. The database will be made available at the district and state levels and can be used for all emergencies.

Similarly, an expert database comprising of trained experts in various disasters, volunteers, NGOs, retired Government servants, swimmers, rescuers etc. will be prepared by each district and sent to the TNSDMA. The District Collector will maintain an updated list of professionals like doctors, paramedical, civil and construction engineers, architects and town planners and send it to the TNSDMA every year for updating the State list.

3.24 National Institute of Disaster Management (NIDM)

As per the provisions of the Chapter-VII of the DM Act, Government of India constituted the National Institute of Disaster Management (NIDM) under an Act of Parliament with the goal of being the premier institute for capacity development for disaster management in India and the region. The vision of NIDM is to create a Disaster Resilient India by building the capacity at various levels for disaster prevention and preparedness. NIDM has been assigned nodal responsibilities for human resource development, capacity building, training, research, documentation, and policy advocacy in the field of disaster management.

3.25 Armed Forces (AF)

The role of armed forces in disaster management is very important. The armed forces have historically played a major role in emergency support functions and this includes search and rescue operations, health and medical facilities and transportation - especially in the immediate aftermath of a disaster. Armed Forces are deployed often when the crisis situation is far beyond the State Government to manage and agencies need help due to the magnitude of the disaster.

3.26 National Disaster Response Force (NDRF)

For the purpose of a specialized response to a threatening disaster situation or a disaster that's happening, the Disaster Management Act 2005 has mandated the constitution of a National Disaster Response Force (NDRF). These battalions are positioned at different needy locations across the Country. In Tamil Nadu, the NDRF is located at Arakonam, Ranipet District and Chennai, which maintains a close liaison with the designated State Governments and are available in the event of any disaster situation. The services of NDRF can be requested by the District Collector/ Commissioner of Revenue Administration in the event of any disaster situation.

3.27 Coast Guard

The Indian Coast Guard protects India's maritime interests and enforces maritime law, with jurisdiction over the territorial waters of India, including its contiguous zone and exclusive economic zone. The Coast Guard works in close cooperation with the Indian Navy, the Department of Fisheries, the Department of Revenue (Customs) and the Central and State police forces. There are currently 42 Coast Guard stations, which have been established along the coastline of the country. The state of Tamil Nadu comes under Eastern Region (E) CGHQ Chennai. The Coast Guard is the central co-ordinating Authority for managing Oil Spills as per the Coast Guard Act, 1978.

3.28 Nehru Yuva Kendra Sangathan (NYKS)

It is an autonomous body under the Ministry of Youth Affairs and Sports with a nation-wide presence. With the presence in nearly 500 districts, it is a large grass-root level youth organization. NYKS volunteers have traditionally been in the forefront of assisting the civil administration in times of disasters. The organization has been active in relief management and distribution. Their involvement will need to be harnessed and they should be a part of Mock drills.

3.29 Airport Authority of India (AAI)

When a major disaster strikes, airports are overwhelmed with receipt of tons of relief materials (like food, bottled water, medical supplies, clothes and tents, etc.) arriving from all over the world. This material is urgently needed to be in the field. The State Relief Commissioner (CRA) will make necessary plan and arrangements to dispatch the relief material during an emergency situation in coordination with Air Port Authority of India.

3.30 Indian Railways

Indian Railways is spread over a vast geographical length over 63,000 kms in India. In the event of a disaster, Southern Railways can assist in the rescue and relief operations. Railways are often preferred mode of transport, both for the movement of people and relief material in bulk. Railways will also have a disaster management plan that will involve coordination with the district and state administration. The more effective the networking mechanism is, the better will be the coordination in times of difficulty.

3.31 India Disaster Resource Network (IDRN)

India Disaster Resource Network (IDRN) is a web-based information system for managing the inventory of the equipment, skilled human resources and critical supplies for emergency response in the entire country. This database is to enable assessment of the level of preparedness for specific disaster related vulnerabilities. It is a nationwide district level resource database. The designated user of each district of the state has been given a unique username and password through which they can perform data entry, data updating on IDRN for resources available in their district. The IDRN network will enable quick access to resources to minimize response time in emergencies.

3.32 India Meteorological Department (IMD)

India Meteorological Department (IMD) monitors meteorological/ weather information /bulletins, warning, announcements and continuously communicates with disaster managers for preparedness. The meteorological department undertakes observations, communications, forecasting and weather information services.

During the cyclone and flood seasons, the State Government keeps close contact with the Regional Meteorological Centre for weather related forecasts. Earthquakes occurring in the State which is of magnitude 3.0 and above on the Richter scale are also reported and bulletins issued by the IMD to the State Government.

3.33 Indian National Centre for Ocean Information Services (INCOIS), Hyderabad

Indian National Centre for Ocean Information Services (INCOIS) is a national agency of the Government of India, under Ministry of Earth Sciences. It provides the coastal and ocean information services and supports coastal zone management in the country. The ocean parameters envisaged for dissemination include the wind, wave, current, mixed layer depth, heat budget and maps on the coral reef, mangroves, shore line change and land use pattern. INCOIS has already put in place an early warning system for Tsunami through which it alerts the coastal States whenever an undersea earthquake of a higher magnitude capable of triggering a Tsunami is reported.

3.34 National Remote Sensing Centre (NRSC)

The National Remote Sensing Centre is an operational center under Department of Space, Govt. of India, for receiving and distributing the remote sensing data models such as optical and radar images for applications like Natural Resource Management, Disaster Management, and Flood Management. Recently NRSC developed mobile apps for disaster management at the village level.

3.35 National Service Scheme (NSS)

NSS is the Social Service Unit at the College level and has a vibrant and easily approachable youth force which can reach a spot that is in close proximity to a college in an organized manner to take up challenges to provide preliminary urgent help, aid, and awareness to the victims. As this group is educated, highly motivated and disciplined, they are trained in disaster response techniques such as detection and location; Extrication and access; Fire Fighting; Medical and First Aid.

3.36 National Cadet Corps (NCC)

There are 5 NCC Groups HQ and 51 NCC units under the control of this Directorate for the state. 5 NCC Groups HQ are located in Chennai, Coimbatore, Madurai, and Tiruchirappalli. 51 NCC units are located in various places of Tamil Nadu. They will play an important role during search, rescue and evacuation.

3.37 Coastal Security Group

Tamil Nadu has a coastline of 1,076 km covering 591 fishing villages in 14 Coastal Districts. The Coastal Security Group was formed in 1994 by the Government of Tamil Nadu. The Personnel of the Coastal Security Group are working in liaison with the Navy, Coast Guard, Local Police, Fisheries Department, Customs and other Revenue

Authorities in disaster related activities and had played a pivotal role in rescue and relief operations during floods and cyclones.

3.38 Indian Red Cross Society

The Red Cross Society functions at the state and district levels. This is a movement for providing relief to the people when they are in dire need. As an organization that provides relief internationally to people in distress, it has credibility at the field level.

3.39 Industrial Associations

Industries play a pivotal role in protecting industrial areas as well as in supporting Emergency Disaster Response and Recovery in the event of any disaster. They have trained man power, technical equipment, and infrastructure within Industries that can be used effectively if networked. Industrial associations are active throughout the state. The corporate social responsibility funds available with public and private sector can be dovetailed for mitigation.

CHAPTER – 4

DISASTER PREPAREDNESS AND CAPACITY BUILDING

4.1 Preparedness Measures

Disaster preparedness refers to measures taken to prepare for and reduce the effects of disasters. Disaster preparedness is best viewed from a broad perspective and is more appropriately conceived of as a goal, rather than as a specialized programme or a stage that immediately precedes disaster response. Disaster preparedness is achieved partially through readiness measures that expedite emergency response, rehabilitation and recovery and result in rapid, timely and targeted assistance. It is also achieved through community-based approaches and activities that build the capacities of people and communities to cope with and minimize the effects of a disaster on their lives. A comprehensive disaster preparedness strategy would therefore include the following elements:

1. Hazard, vulnerability and risk assessments
2. End-to-end early warning systems
3. Information Management & Risk Communication
4. Community-Based disaster preparedness
5. Rehearsals.
6. Emergency Response mechanisms.
7. Institutional Frame work
8. Resource Mobilization.

4.2 Key Features Associated with the Preparedness

As part of the preparedness measures the following general preparedness measures are adopted to face the eventualities such as floods, cyclonic storms, landslides that arise during North East Monsoon and special measures are put in place to face disasters such as Tsunami, Earthquakes and others.

4.3 Hazard, Vulnerability and Risk Assessments (HVRA)

All planning and implementation of disaster preparedness measures will be based on an assessment and prioritization of the hazards and risks that people face, as well as their ability or inability to cope with and withstand the effects of those hazards. This assessment was meant to

- ❖ Identify the characteristics, frequency and potential severity of the hazards a community faces.

- ❖ Identify the particular geographical areas and communities that are most susceptible and vulnerable to those hazards.
- ❖ Identify the main sectors of a community (population, infrastructure, housing, services, etc.) that would be affected by a specific type of hazard and anticipate how they might be affected.

4.4 Identification of Vulnerable Areas

Identification of vulnerable areas due to Northeast Monsoon activities was done throughout the State based on legacy data and 3916 areas have been identified and they are classified into 4 categories as detailed below.

Table 4.1 – Vulnerability Analysis

1.	Areas of Very High vulnerability	317
2.	Areas of High vulnerability	799
3.	Areas of Moderate Vulnerability	1086
4.	Areas of Low vulnerability	1714
	Total	3916

4.5 Vulnerability Mapping

Maps have been prepared to depict the vulnerable areas in rural and urban areas. Each map incorporates not more than 3 vulnerable areas in a Firka (Rural areas) / Ward (Urban area). Analysis of the vulnerability and its magnitude in the areas identified, along with details of escape route to the nearest relief center are all captured in the vulnerability map.

4.6 Early Warning and Dissemination Systems

Early warning and dissemination systems play a very important role in minimizing the risks to the community. Several Central agencies are responsible for forecasting and sharing the early warning messages. The following Central agencies are mandated to provide early warning messages for different natural hazards. These agencies are responsible for keeping track of developments in respect of specific hazards assigned to them and inform the designated authorities about the impending disasters.

4.7 Nodal Agencies for Disaster Early Warning Dissemination

Table 4.2 – Nodal Agencies

Disasters	Agencies
Cyclone /Hydro Meteorological	India Meteorological Department
Earthquake	India Meteorological Department and National Center for Seismology

Floods	Central Water Commission
Drought	Ministry of Agriculture and Farmers Welfare
Landslides	Geological Survey of India
Tsunami	Indian National Centre of Ocean Information Services

The State Relief Commissioner / Commissioner of Revenue Administration coordinates with central agencies.

4.8 Preparedness Measures for various Disasters

4.8.1 Floods

Floods are often a result of heavy rains associated with the natural course of surplus water flow being hindered by encroachments, unplanned development and constructions/obstructions caused by human interventions to natural drainage systems. Heavy rainfall in excess of normal capacity to manage the quantity of water can also result in floods in cityscapes historically built on flat levels. The Central Water Commission has developed a network of flood forecasting stations and it issues Daily Flood Bulletins during the Monsoon seasons for all the major river basins in the following categories:

- 1. Category IV: Low Flood stage** (Water level of the river is flowing between Warning Level and Danger Level)
- 2. Category III: Medium Flood** (Water Level below 0.50m. less than HFL and above Danger Level)
- 3. Category II: High Flood** (Water Level less than Highest Flood Level but still within 0.50m. of the HFL)
- 4. Category I: Unprecedented Flood** (Water Level equal and above Highest Flood Level (HFL))

Declaration of Stages of Flood

The standard stages of the flood situation are as follows:

- 1. Flood Alert:** Flooding is possible. Be prepared
- 2. Flood Warning :** Flood is expected, require immediate action
- 3. Severe Flood Warning :** Danger to life and property
- 4. De Warning :** Flood warning /Flood alert is withdrawn

4.8.2 Tsunami

The Indian National Centre for Ocean Information Services (INCOIS) provides round-the-clock monitoring and warning services for the coastal population on tsunamis, storm surges, and high waves through the in-house Indian Tsunami Early Warning Centre (ITEWC). When an earthquake occurs in a Tsunamiogenic source and if the magnitude is more than 6.5 and the depth is less than 100 km, INCOIS automatically starts issuing a real-time tsunami warning.

4.8.3 Nature of Advisories issued by INCOIS

Real-time tsunami warnings are issued by INCOIS by first announcing the area of warning, alert and watch based on travel time together with an estimate of the height of the tsunami calculated on pre-run numerical models of tsunami propagations. Based on the hazard - ‘warning’, ‘alert’ and ‘watch’ are issued.

- A. Area under Warning:** Area that is within 60 minutes from the tsunami generic sources and wave height expected is more than 2 meters.
- B. Area under Alert:** Area within 60 minutes travel time of the tsunami and wave height is less than 2m and Area more than 60 minutes travel time of tsunami and the expected wave height is more than 2 m.
- C. Area under Watch:** Areas that are outside the 60 minutes travel time of tsunami and are kept under watch when the wave height is expected to be less than 2 m.

INCOIS issues bulletins over a period of four to five hours as many as six bulletins.

The First Bulletin (Type – I) is issued before the lapse of 20 minutes of the earthquake when the seismic network detects an earthquake occurring in the Andaman Sumatra Subduction Zone (ASSZ). The First bulletin informs that an earthquake has occurred and the preliminary estimates of the location of the epicentre, magnitude, depth of focus and time are informed.

The Second Bulletin (Type – II) is issued not later than 30 minutes of the earthquake in the subduction zone with a magnitude of > 6.3 and the depth of focus is less than 100 km detailing the areas under warning and threat.

The Third Bulletin (Type – II Supplementary) is issued with updated earthquake parameters and revised information on tsunami wave height and accordingly the status of the threat is updated.

The Fourth Bulletin (Type III) is issued when tsunami is confirmed. If the threat is upgraded to **warning** status evacuation will be started immediately.

The Fifth Bulletin (Type – III Supplementary) is issued when the tsunami reaches the coast with hourly updates and also whenever real-time water level information are available.

The Final-“ALL CLEAR” bulletin indicates withdrawal tsunami warning.

In addition, an early warning system for earthquake/tsunami in Indian Ocean is operational at Madras Atomic Power Station, Kalpakkam. This PC-based Earthquake Notification System (ENS) is installed in Control room of MAPS.

4.9 Cyclone

The cyclone warnings are issued by IMD in four stages.

The **First Stage** warning known as “**PRE CYCLONE WATCH**” issued 72 hours in

advance contains early warning about the development of a cyclonic disturbance and its likely intensification into a tropical cyclone..

The **Second Stage** warning known as “**CYCLONE ALERT**” is issued at least 48 hrs. It contains information on the location and intensity of the storm, likely direction of its movement, intensification, coastal districts likely to experience adverse weather and advice to fishermen, general public, media and disaster managers.

The **Third Stage** warning known as “**CYCLONE WARNING**” issued at least 24 hours in advance of the expected commencement of adverse weather over the coastal areas. Landfall point is forecast at this stage. These warnings are issued at 3 hourly interval giving the latest position of cyclone and its intensity, likely point and time of landfall, associated heavy rainfall, strong wind and storm surge along with their impact and advice to general public, media, fishermen and disaster managers.

The **Fourth Stage** of warning known as “**POST LANDFALL OUTLOOK**” is issued at least 12 hours in advance of expected time of landfall. It gives likely direction of movement of the cyclone after its landfall and adverse weather likely to be experienced in the interior areas.

Different colour codes are used in the cyclone warning bulletins.

Table 4.3 – Colour Codes

Stages of warning	Colour Code
Cyclone Alert	Yellow
Cyclone Warning	Orange
Post landfall outlook	Red

4.10 Drought

Drought is still largely unpredictable and varies with regard to the time of occurrence, duration, intensity, and extent of the area affected. It is a temporary condition caused by significantly less rainfall for an extended period of time. The severity of the drought can also be aggravated by other climatic factors such as high temperature, high wind and low humidity. Drought conditions can be predicted only by closely monitoring actual rainfall received and occurrence of dry spell during the monsoon periods. The guidelines for declaration of drought were revised in 2016.

- Meteorological drought:** When actual rainfall over an area is significantly less than the climatological mean.
- Hydrological drought:** When there is marked depletion of surface water causing very low stream flow and drying of lakes, reservoirs and rivers.
- Agricultural drought:** When inadequate soil moisture produces acute crop stress and affects productivity.
- Soil Moisture drought:** Inadequate soil moisture particularly in rain fed areas which may not support crop growth.

- 5. Socio economic drought:** The reduction of availability of fund and income loss on account of crop failures endangering food and social security of the people in the affected areas.
- 6. Famine:** When large scale of collapse of access to food occurs which without **intervention**, can lead to mass starvation.
- 7. Ecological drought:** When the productivity of a natural eco system fails significantly as a consequence of distress induced environmental damage.

4.11 Heat Waves

Heat-wave early warnings are designed to reduce the avoidable human health consequences from heat-waves through timely notification of prevention measures to vulnerable populations. Heat wave is considered only after maximum temperature of a station reaches at least 40° C for plains and at least 30° C for hilly regions. A departure of 4.5° C to 6.4° C from the Normal Temperature is considered as Heat Wave. When the temperature is more than 6.4° C the conditions are considered as Severe Heat Wave. At present the Heat Wave Bulletins (Colour Coded and Impact based) in text & graphic format for next 5 days are updated four times in a day (based on 0530, 0830,1430,1730 hours IST) in All India Weather Forecast Bulletin by IMD.

4.12 Landslides

The major landslides in Tamil Nadu occur mostly in the Nilgiris, parts of Eastern Ghats, Yelagiri and Shervory hills. Geological Survey of India issues alerts and warnings about landslides

Category I: Landslides that may occur over or in close vicinity of inhabited areas such as urban settlements or fairly large rural settlements wherein a landslide can result in loss of human lives and dwellings on a large scale.

Category II: The landslides that **may** occur on the fringes of inhabited areas and result in limited loss of life and property.

Category III: Landslides which are fairly large and affect infrastructural installations such as strategic and important highways and roads, rail routes, hydroelectric and irrigation projects.

Category IV: Landslides of small **dimensions** that occur away from habitations and do not affect either humans or their possessions.

4.13 Earthquake

An Earthquake is a sudden event and gives hardly any time to react. Early warning or prediction of an earthquake is not easy. The protocol for Early warning and prediction of an earthquake is not presently available. India Meteorological Department (IMD) monitors seismic activity in and around the country and disseminates information to all the concerned agencies. In Tamil Nadu, three seismological network stations are located as noted below:

Table 4.4 Locations of seismological monitoring centers

Location	Code	Latitude (Deg:Min)	Longitude (Deg:Min)	Altitude above MSL in Metres
Chennai	MDR	13:04.08N	80:14.78E	15
Kodaikanal	KOD	10:14.00N	77:28.00E	2345
Salem	SALM	11:39.00N	78:12.00E	278

4.14 Chemical Industrial Disaster

NDMA guidelines on chemical disasters have defined Levels of Emergencies which are useful in communicating the level of response needed to be provided.

- Level – 0:** A non-emergency period when mock drills, trainings, exercises and other preparedness activities for effective response should be done.
- Level – 1:** The emergency will spill over to off-site (outside the factory) and within the capabilities of the district administration to deal with.
- Level – 2:** The emergency will require assistance and help from the state government and within their capability.
- Level – 3:** A National level disaster requiring major direct intervention of the Central Government.

4.15 Nuclear and Radiological Emergency Scenarios

There are two main centers of nuclear facilities in Tamil Nadu viz., Kalpakkam DAE Centre and Kudankulam Nuclear Power Project. The Department of Atomic Energy (DAE) has been identified as the nodal agency in the country for providing the necessary technical inputs to the national or local authorities for responding to any nuclear or radiological emergency in the public domain. In the event of any radiological or nuclear emergency in the public domain, the Crisis Management Group is immediately activated and will co-ordinate between the local authority in the affected area and the National Crisis Management Committee (NCMC).

Both the nuclear facilities have a detailed emergency preparedness and response plan for responding to radiation emergencies arising out of the nuclear facilities.

4.16 Line of Communication and Responsibility for the State

Nuclear disaster arising from nuclear facilities is a situation, where sufficient time will be available to take preventive measures to minimize impact in public domain. However, radiological disaster caused by accidents or malevolent actions in the public domain is a situation where the chances of receiving any early warning are very low. In such a situation where no early warning signals are available, the primary objective of the trigger mechanism shall be to mount immediate isolation.

4.17 The following procedures are followed in such situations

- 1) The field functionary at ground zero will inform the District Emergency Operation Centre (DEOC)/the Commissioner of Greater Chennai Corporation or the concerned District Collectors and the CRA/SEOC. Immediately thereafter, personnel from the AERC will determine the source of the radioactive emission and its strength. The Commissioner of Greater Chennai Corporation/the District Collector will inform the Commissioner of Revenue Administration for carrying out the required operations. The SEC will meet under the chairmanship of the Chief Secretary and chart the plan of action.
- 2) The TNSDMA shall inform the National Emergency Operation Center (NEOC) and coordinate with DAE-CMG and Bhabha Atomic Research Center (BARC) for specialized support team from the 22 ERCs.
 - a) Health Secretary will place medical and para-medical teams if required at the disposal of the Incident Commander.
 - b) The Chemical, Biological, Nuclear and Radiological team (CBRN) shall be formed and deployed to ground zero

4.18 Information, Management & Risk Communication

Gathering, analysing and acting on timely and accurate information (hazard and early warning information), before during (disaster needs assessment) and after disasters (progress of post-disaster recovery) play a very important role in risk reduction as well as focused response in the areas falling in the disaster zone. Information is gathered on a 24x7 basis from the designated scientific institutions and is analysed for deciding the course of action.

4.18.1 Risk Communication

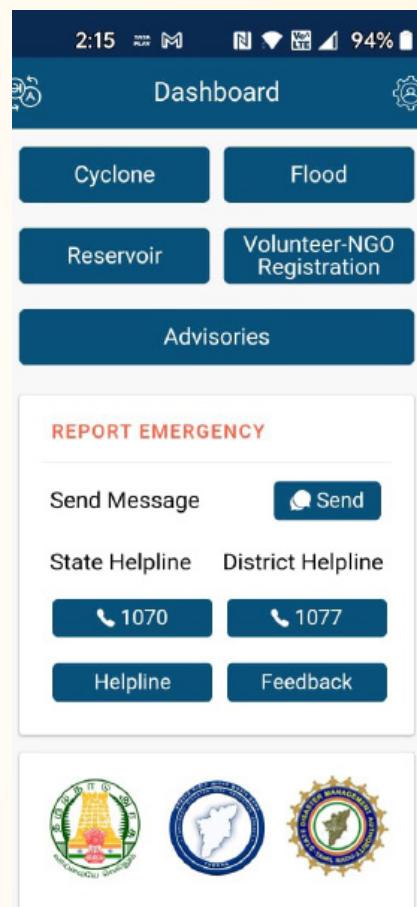
The Risk Communication is carried out through the State of Art, State EOC at Chennai in the O/o. Commissioner for Revenue Administration/ State Relief Commissioner at Chennai and the District EOCs in all 38 districts at the Collectorates. VHF mobile stations have been established in 38 districts in Tamil Nadu. Exclusive Video Conferencing facilities are being established in the office of the Commissioner for Revenue Administration/ State Relief Commissioner at Chennai and also in all District Collectorates. Dissemination of information is also made through Electronic Print media and social media like Face Book, Twitter, and WhatsApp Groups.

4.18.2 TNSMART – A State of Art Technology

The Tamil Nadu System for Multi-hazard potential impact Assessment, alert, emergency Response planning and Tracking (TNSMART), was developed in collaboration with the Africa – Asia’s Regional Integrated Multi-Hazard Early Warning System (RIMES) by the Commissionate of Revenue Administration and Disaster Management with funding from the World Bank, as a web and mobile-enabled decision support system for Disaster Risk Management.

The TNSMART is highlighted by the National Disaster Management Authority as one of the Best Practices of Tamil Nadu. There are more than 2,50,579 users presently benefitted by the Mobile Application. The users have the option of sending distress messages or alerts seeking support from authorities. The Mobile App also has a feature that enables the user to send messages through SMS, Photo and Video to seek the attention of and to get help in distress situations. The flood risk advisories issued through TNSMART were very helpful to the response teams and DDMA's in evacuating people from vulnerable areas to shelters or safe places. The TNSMART has been upgraded to include Lightning Alert during 2021-22 and a Module for Drought Monitoring is being included which will become functional from June 2022.

Figure 4.1 - TNSMART



4.18.3 Common Alerting Protocol (CAP)

There is a need for speedy dissemination of disaster alerts to maximum persons in order to ensure preparedness, both by the common person as well as the responding agencies. A **Common alerting protocol based integrated alert system which** integrates the Alert Generating Agencies (IMD, CWC, INCOIS, DGRE, FSI), Alert Disseminating Agencies and the Disaster Management Authorities (SDMAs) has been put in place on a CAP based platform. During the Northeast Monsoon period of 2022, messages were sent using this platform to reach out 89.30 lakh people.

Figure 4.2 - Common Alert Protocol

Generated By:	Tamilnadu SDMA	Entry Date & Time:	22 Jun 2022, 7:35 AM	
Effective Date & Time:	22 Jun 2022, 7:25 AM	Expiry Date & Time:	23 Jun 2022, 7:35 AM	
Area Description:	ADYAR RIVER FLOOD PLAIN	Areas covered:	18.7 Sq. Km (approx)	
Event Description:	Rainfall	Urgency:	Immediate	
Severity:	WARNING	Certainty:	Most Likely	
Dissemination Status:	Media Category	Media Name	Status	message(Language)
	TSP(SMS)	BSNL	CAP XML Sent Successfully	நீர் புறப்படும்பகுதி தீவிரிக்கைகளைப் போன்று 2-05-22... Tamil
		Vodafone Ideas	CAP XML Sent Successfully	நீர் புறப்படும்பகுதி தீவிரிக்கைகளைப் போன்று 2-05-22... Tamil
		Reliance Jio	CAP XML Sent Successfully	நீர் புறப்படும்பகுதி தீவிரிக்கைகளைப் போன்று 2-05-22... Tamil
		Airtel	CAP XML Sent Successfully	நீர் புறப்படும்பகுதி தீவிரிக்கைகளைப் போன்று 2-05-22... Tamil
Message Body:	Message in English:	Floods is Most Likely to occur over ADYAR RIVER FLOOD PLAIN.		
	Message in Tamil:	நீர் புறப்படும் பகுதிகளைப் போன்று 22-06-22, மேற்கொண்டு 500 மீ அடி கீழ் வரையில் பழுப்புப்படும் அனுமதியளிப்பதை நினைவு செய்யவேண்டும் என்று நீர்த்துவ விதிகளைப் போன்று விடும்.		
Warning	Organizations:	Tamilnadu SDMA		

4.18.4 Meeting the expectations of People

The TNSDMA has a responsibility to provide Risk Communication that meets people's expectations. People want reliable weather forecasts which can help them to plan their activities as well as to postpone, avoid travel and remain at home. Farmers need reliable weather based advisory to schedule their sowing, planting, fertiliser application, irrigation, plant protection measures. People need area specific forecasts for their City, Block /Taluk. With a view to meet the expectations of the people, TNSDMA has taken the following path breaking initiatives.

4.18.5 Initiatives of TNSDMA

- Upgrading the State Emergency Operation Centre as Multi Hazard Early Warning Centre with Experts and Infrastructure
- Increasing the density of Rain Gauge network- Installation of 1400 Automatic Rain Gauges
- 100 Automatic Weather Stations to supplement existing 285 AWS to provide block specific advisory to farmers
- Weather Balloons to gather atmospheric data at high altitudes
- Two Weather Radars to improve the short term now casting of weather systems

4.19 Community – Based Disaster Preparedness

4.19.1 Community Based Disaster Management

The community is the first responder to any Disaster. The Community has its own traditional wisdom and local knowledge to withstand the impact of disasters. Harnessing leadership and volunteerism among the Community and developing a team of trained community volunteers through participatory approach for special tasks of early warning, Search, Rescue Transport Arrangements & Evacuation,

First Aid, Shelter and Relief (Food, Water and Sanitation) are essential for successful Disaster Management.

Involvement and participation of the communities will ensure a collective and coordinated action during emergencies. Volunteers from local community are being identified from NSS, NCC, and Youth Groups with skills of swimming and climbing, as First Responders and teams of First Responder are formed in areas of vulnerability (for search, rescue and evacuation). It is also ensured that Women volunteers are also included in First Responders Teams and also in other Committees. The first responders are being trained by Fire & Rescue Department / SDRF or Red Cross society/ Civil Societies.

4.20 Public Awareness

Imparting Disaster Risk Knowledge and bringing attitudinal and behavioural changes to the early warning messages play a significant role in Risk Reduction especially in minimizing loss of lives. Considering the importance and the need for enhancing the knowledge levels of different stakeholders to tackle different disaster situations GoTN has been according very high priority in building the capacities of the community and other Stakeholders. In order to spread the awareness levels, all possible channels of communication such as print, electronic, social and traditional media are being used by GoTN.

4.21 Curriculum Development on Disaster Risk Reduction for Schools

It is imperative to enhance the awareness among school children about Disaster Management and prepare them to face the risks to enhance the overall resilience of the community. In order to prepare the future generation to face the disasters in a more confident and resilient manner and also make them part of disaster management the curriculum of 6th to 10th classes have been modified and lessons on Disaster Management have been incorporated.

4.22 Curriculum Development on Disaster Risk Reduction in Universities and other Institutions

The TNSDMA in its pursuit towards inculcating Disaster Management Knowledge in the minds of younger generation has initiated action to introduce a short-term course on Disaster Management in all Universities.

The short-term course will also be included as a core component in all the departmental training centres. The Departmental training centres will conduct this course for all the new incumbents of the department and also in the mid-carrier trainings.

The Anna Administrative Staff College, Chennai, Civil Services Training Institute, Bhavanisagar and Trainings organized by TNSDMA will include the Disaster Management short term course.

4.23 Mock Drills

Search and Rescue Teams at State Levels are carrying out mock drills on various disasters situation annually. For floods/flash floods mock drills are carried before the monsoon period. For earthquakes, landslides etc., such drills are being done periodically. At the district and State levels, mock exercises are being carried out for assessing and evaluating preparedness of the State machinery and that of community.

4.24 Sensitizing Hospitals/Educational Institutions and Oil Companies

Realising the importance of sensitizing the private institutions to be equipped with mechanism for immediate response during disasters, series of meetings were held at District and State levels to sensitize the Hospital/ Educational / Industrial organizations, communications service providers, Oil companies to be equipped with strategies at institutional levels and also to make back up arrangements to ensure lifesaving services unhindered especially in the hospitals.

4.25 Pre-Positioning of Men

Prepositioning of men in the vulnerable areas will be done to ensure that rescue and evacuation operations are carried out swiftly and the affected or people likely to get affected are saved and possibility of loss of lives is averted. Meetings are held during pre-monsoon phase to ensure that there is perfect coordination with NDRF and Central Agencies besides keeping the SDRF on alert mode.

4.26 Pre-Positioning of Materials

Prepositioning of two months requirement of essential commodities in the vulnerable areas is done by the TN Civil Supplies Corporation to ensure that rescue and relief operations are in place even if the vulnerable area is isolated due to breaches and inundation. Green corridors in vulnerable areas are designated to facilitate rapid movement of rescue teams to undertake necessary operations.

4.27 Institutional Framework

The Tamil Nadu State Disaster Management Authority headed by the Hon'ble Chief minister provides the policy guidance for the Disaster Management functions. The TNSDMA periodically reviews the preparedness arrangements and provides advice for proper and timely implementation of various preparedness measures.

The Co-ordination among the Departments, Central Agencies is ensured by the State Level Executive Committee headed by the Chief Secretary to Government. The Revenue, Disaster Management and Mitigation Department at the Government level is in charge of the Administrative Function. The Commissioner for Revenue Administration has been designated as the State Relief Commissioner. The DDMAs function under the control of the State Relief Commissioner/Commissioner for Revenue Administration. The DDMAs headed by the District Collector ensure the Co-ordination at the District level and carryout the following preparatory functions.

4.28 Medical Preparedness

Identification of the hospitals, doctors and para-medics teams including mental health and psycho-social service provider at sub-divisional and district levels will be carried out by CMO's to deploy medical teams at short notice. Their names, addresses, telephone numbers, mobile numbers, email etc. will be available at the State District Emergency Operation Centres. The list will be updated half yearly. The stock of medicines, accessories and equipment for each of the identified teams at the district and sub-divisions would be decided in advance as per need and disaster.

4.29 Emergency Health Preparedness

Disasters may cause an unexpected number of deaths, injuries, or illness in the affected community, exceeding the management capacities of local health services and requiring external assistance. The disaster may disrupt the local health infrastructures such as hospitals, which will therefore not be able to respond to the emergency. Some disasters may have adverse effects on the environment and the population, increasing potential risk for communicable diseases and environmental hazards that will increase morbidity, mortality, and diminished quality of life in the future.

Measures to Prevent Infectious Diseases During Disasters The following basic responsibilities are being planned for:

1. Maintenance or restoration of safe water supply and temporary measures of rendering water safe for drinking and other essential uses.
2. Adequate food inspection especially, inspection of emergency kitchens and canteens
3. Regulation of sanitation in shelters and emergency camps.
4. Disposal of corpses and carcasses.
5. Maintenance or restoration of sanitation standards in the disposal of sewage and solid waste despite less or diminution of water – supply.
6. Control of pests, rodents and insects which carry disease, destroy, food or become serious nuisances.
7. Requirements for Health relief:
 - a. Disinfectants such as bleaching powder, chlorine liquid, Phenyl/cresol, Chloroscope for ensuring quantity of free chlorine and supplying safe potable and protected water.
 - b. Mobile water tankers, drums and cans for transporting drinking water.

The health department ensures that all the Relief shelters whether temporary or permanent are frequently visited by medical professionals to prevent spread of epidemic diseases. The Rapid Response Teams at District/Block and Municipal levels formed by Health Department will be rushed immediately to the spot for necessary remedial action. As a precautionary measure medicine required for controlling spread

of epidemic diseases are adequately stocked and made available on 24x7 basis. The “108” ambulances are deployed in all 38 districts across the State. At present 1,353 ambulances are under operation providing Basic Life Support, Advanced Life Support, Neonatal Care and 4 VVIP ambulances. In addition, 41 First Responder Bike Ambulances also form part of ‘108’ service.

4.30 Animal Care

Animals both domestic as well as the wild are exposed to the effects of natural and man-made disasters. The department of Animal Husbandry devises appropriate measures to protect animals and finds means to shelter and feed them during disasters and their aftermath, through a community effort, to the extent possible. It is pertinent to note that many communities have shown compassion to animals during disasters, and these efforts need to be formalized in the preparedness plans including Carcass Disposal Management Plan by the Departments of Animal Husbandry at the State level.

4.31 Logistics & Transport

The Disaster Management response operations require transport of food and other essential commodities, evacuated people to the relief centres etc. This also involves identification of Transport vehicles, boats, ambulances, etc. The DDMAs prepared an elaborate and comprehensive list of resource inventory for the use of inter-departmental zonal teams, medical professional, NDRF/SDRF, Police, Fire & Rescue Department who are involved in the search, Rescue & Evacuation operation.

4.32 Resource Mobilization

a) State Disaster Risk Management Fund (SDRMF)

The State Executive Committee is empowered to sanction funds under SDRMF to ensure immediate release of funds for carrying operations during disasters. The SDRMF is utilized for Capacity Building of Departments and Communities, Procurement of Search, Rescue & Evacuation equipment and to provide relief to the victims of the Disasters including the local Disasters like Gale wind, Thunderstorm and Lightning.

b) State Disaster Mitigation Fund

The 15th finance Commission has recommended for the constitution of State Disaster Mitigation Fund by earmarking 20% of the State Disaster Risk Management Fund. The constitution of State Disaster Mitigation Fund has been notified by the Government.

4.4 Capacity Building

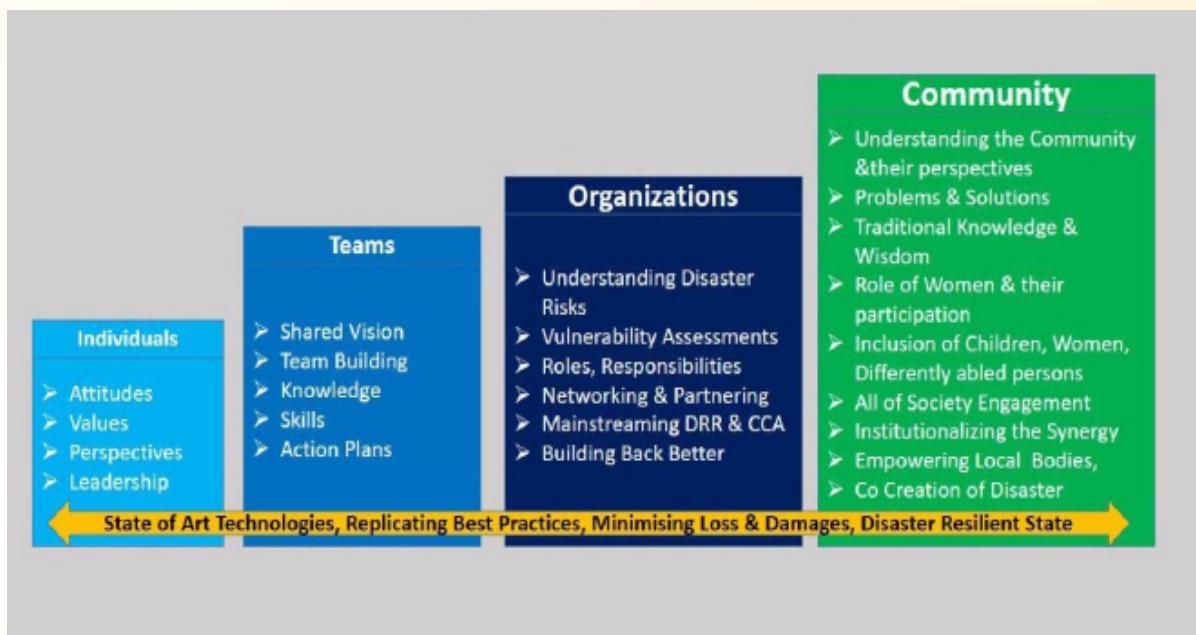
The Sendai Framework emphasizes the technical, financial, and administrative capabilities of institutions, governments, and communities to deal with the identified risks at different levels. The framework calls for reinforcing the capacity to implement

and enforce risk reduction measures. Capacity development commonly refers to a process that is driven from the inside and starts from existing capacity assets. The Sendai framework underlines the need for capacity development of women in disaster management and building their ability to participate effectively in managing disaster risk.

4.4.1 Capacity Building Strategy

The capacity development for DRR is a continuing process of enhancing the capability of individuals, Teams, Organisations and communities to realise disaster Resilience at all levels.

Figure 4.3 Capacity Building Strategy



The process of capacity building will include elements of human resource development focused on i.e., individual training, organizational development such as improving the functioning of groups, and the strengthening of organizations. Involving stakeholders through participatory approaches is essential to establish ownership and commitment. The sustainability of capacity development initiatives increases in direct relation to the level of participation and ownership of the internal partners. Mainstreaming of DRR is incomplete without mainstreaming of capacity building on DRR at the level Revenue and Disaster Management department, various line departments, Urban & Rural local bodies and at Community level.

The reason for this is that changes at one level often require changes at other levels too, as these levels are interdependent. Therefore, the focus on capacity development efforts for DRR will go beyond human resource development paying enough attention to organisational and institutional issues. Partnerships and collaborations are integral to institutional capacity building. In institutional capacity development, emphasis should also be on use of state-of the-art technologies to

upgrade the existing systems. Public and private investment in disaster risk prevention and reduction through structural and non-structural measures are essential to enhance the disaster resilience. Investing in capacity development is the cost-effective way to save lives, prevent or reduce losses and ensure effective recovery and rehabilitation. The capacity development being a continuous process, it must address challenges of staff attrition, transfer and changeovers, task of educating new recruits, keeping pace with technical changes and incorporating the rapid advances in scientific knowledge.

4.4.2 Institutions

The Capacity Building of Revenue and Disaster Management Department, all line departments, urban and Rural Local Bodies, Community First Responders and Community will be accomplished through the Anna Administrative Staff College (AASC) Chennai, State Institute of Rural Development (SIRD) Chennai, Tamil Nadu Institute of Urban Studies (TNIUS) Coimbatore. The State has established Disaster Management Resource Centres in all the districts for ensuring NGO-CSO co-ordination. The expertise of NGO-CSO who are willing to partner with capacity development process will be utilised.

4.4.3 Hybrid Master Trainers

Besides, the TNSDMA has established a MoU with the Asian Disaster Preparedness Centre (ADPC) Bangkok and Regional Integrated Multi-Hazard Early Warning System Bangkok. Their services will be utilised for providing international exposure. In order to establish a pool of in-house expertise, a set of Hybrid Master Trainers on Incident Response Systems, Emergency response and Crisis Management, Community Based Disaster Risk Management and Post Disaster Need Assessment will be created, who will continuously upgrade the training modules, customise it to various level of audiences, and impart trainings.

4.4.4 Source of Funds

The Ministry of Home Affairs (DM Division) Government of India have issued the Guidelines for "Preparedness and Capacity Building" post 15th Finance Commission recommendations which entail 10% of the State Disaster Risk Management Fund towards preparedness and Capacity Building. An allocation of Rs 142.80 Crore is available for the year 2022-23.

4.4.5 Capacity Building Action Plan 2022-2023

The proposed action plan focusses on the priorities reflected in the policy of Government and the training needs of the Revenue and Disaster Management Department, other line departments and the Community.

4.4.5.1 Improving Community Participation for Disaster Risk Reduction Objectives

- To improve community participation in disaster risk reduction.

- To identify and develop the Skills of 2,00,000 Volunteers at the rate of at least 2 Volunteers per Habitation.
- To empower the Local bodies (Rural & Urban) by making them understand the Hazards and their Vulnerabilities, and to develop a plan of action in carrying out disaster risk reduction measures.

The main aim of the Government is to develop the capacity and the skills of the volunteers at habitation level so the community can deal with the disasters by themselves. This approach provides an opportunity to the local community to evaluate their preparedness based on their experiences and it becomes part of preparing plans and decisions and also plays a major role in disaster reduction measures. In this context a scheme of identifying at least two first responders at every habitation level in 14 Coastal Districts and the Nilgiris District and imparting training to 65,000 First Responders at a cost of Rs.20.42 crore has been taken up in order to form a Community Disaster Response Force.

From among the Community First Responders, Co-ordinators at Village, Firka, Taluk, Division and District level will be identified through the process of capacity Building. Interactions with the Local body representatives will have the opportunity learn from peer groups. The Line Department officials will join the trainings with the local body representatives. The strategies for mainstreaming development plans for disaster risk reduction to synergise with Village level Disaster Management Plans will be identified. The convergence of Revenue, Rural Development and other line departments will be improving the DRR efforts. Sharing of Best Practices, Cross Learnings and Peer Motivation will increase the focus on Disaster Risk reduction at every level from among the Community First Responders. Best performing Volunteers, Best performing Local bodies, best performing Departments and officials will be recognised.

4.4.5.2 Upscaling of Aapda Mitra – Community Volunteers Training Scheme

The National Disaster Management Authority has approved a Centrally Sponsored Upscaling of Aapda Mitra Scheme for imparting training to 5500 community volunteers in 16 disaster prone districts. Under this Scheme it is proposed to impart an inhouse training for 12 days to the Community Volunteers involving the Resource Institutions viz., State Institute of Rural Development, Chengalpattu, Tamil Nadu Disaster Response Force, Chennai, Tamil Nadu Fire Service State Training Centre, Tambaram, Tamil Nadu Institute of Urban Studies, Coimbatore, National Disaster Response Force, Arakkonam and Anna Administrative Staff College, Chennai.

4.4.5.3 Community Volunteers as Local Resource

Community Volunteers at habitation level will be utilized to bridge the gap in the last mile connectivity to take the early warnings and alerts. A well-organized Community First Responder System with divergent skill sets will be developed to lend support to the Village Panchayat and Local bodies, during all phases of Disaster Management and beyond.

CHAPTER – 5

HAZARD, VULNERABILITIES AND RISK OF THE STATE

5.1 Hazards

An experiential understanding of the hazard, risks and vulnerability of State witnessed from the adverse impacts of the recent disasters from 2015 is presented below.

Figure 5.1 Types of Disasters impacting Tamil Nadu

Types of Disasters				
Water and Climate Related	Geophysical Related	Chemical & Radiological, Nuclear Related	Accident Related	Biological Related
Drought, Lightning & Thunder Storm, Storm Surge, Sea Erosion, Sea Water Incursion, Flash Floods, Floods and Cyclone.	Earthquake, Tsunami, Landslide, Debris Flows/ Mud slides.	Industrial Fires, Gas and Chemical Leakages, Oil Spills, Radiological, Nuclear.	Forest Fires, Electrical Fires, Urban and Village Fires, Building Collapses, Festival/Fair/ Temple Stampedes, Road, Rail and Air based Accidents, Boat Capsizing, Fire Accident	Pandemic-COVID-19, Epidemics Pest Attacks, Food poisoning, Water Contamination, and Cattle epidemics.

5.1.1 Floods of 2015

In the month of November 2015, Chennai has reported 1,024 mm (40.31 inches) of rain, more than 300 percent of the normal rainfall that is expected for the entire month, according to the Indian Meteorological Department (IMD). An unrelenting deluge flood of Chennai on December 1, 2015, submerged one of India's largest cities. The World Meteorological Organization observed that this is the wettest December day in more than 100 years of records in Chennai with 300 mm of rainfall.

The heaviest rainfall and continuous flow from the upper catchments worsened the situation. The flood left around three million people without basic services, collapsed roads and bridges and halted train and grounded air services.

Figure 5.2 Ariel view of Adayar river in Saidapet during the 2015 Flood



The catastrophic rains not only isolated the city, but forced tens of thousands of people flee their homes. The military dropped food supplies to residents stranded on rooftops.

5.1.2 Drought 2017

During the year 2016, Tamil Nadu received only 539.3 mm of rainfall against the normal rainfall of 920.9 mm with a deficit of about 42%. The performance of the South West Monsoon 2016 was below par in the State of Tamil Nadu with deficit being 20% and during North East Monsoon-2016 the deficiency of rainfall was to the extent of 62%.

In view of the shortage of rainfall during Northeast Monsoon to the extent of 62%, a detailed exercise was launched to assess the situation to determine the need for possible declaration of drought. The assessment was made based on the revised guidelines stipulated in Manual for Drought Management 2016. Considering the results of ground truthing, the State Government declared Drought in all 32 districts of Tamil Nadu. Crop damages were assessed in an area of 15.41 lakh hectares and 28.41 lakh farmers were affected. The State Government announced waiver of land revenue to farmers for the Fasli year 1426 in all the districts (Except Chennai) and orders were issued to reschedule the short term and medium term Crop loans availed by the farmers from the Cooperative Banks. An amount of Rs.2,247.07 Crores was sanctioned towards input subsidy to farmers where crop loss is more than 33% as per SDRF Norms.

5.1.3 Vardah Cyclone 2016

On December 12th 2016 a severe cyclonic storm Vardah struck Tamil Nadu leaving behind a trail of severe destruction in the coastal districts of Chennai, Thiruvallur and Kancheepuram. The Vardah cyclone uprooted the green cover and battered the infrastructure, especially power and telecommunication and plunged the districts into darkness.

Figure 5.3 Cyclone Vardah damages in Chennai



Figure 5.4 Cyclone Vardah damages in Chennai



In these districts normalcy was restored within a short time due to efforts of the Government. An amount of Rs 585.00 lakhs was sanctioned towards restoration to 14 departments.

5.1.4 Ockhi Cyclone 2017

The cyclone “OCKHI”, crossed 70 km southwest of Kanniakumari on 30.11.2017. The impact was enormous in Kanniakumari District as well as in pockets of neighbouring Thoothukudi and Tirunelveli districts. Due to the heavy rain received

in these districts during the movement of Ockhi Cyclone, damages were reported particularly to huts, tiled houses and agricultural and horticultural crops, besides, heavy damages to the fisheries sector. The cyclonic storm uprooted large number of electric poles and transformers in Kanniyakumari plunging the district into darkness.

Figure 5.5 Ockhi cyclone damages in Kanniyakumari District -2017.



Five Senior IAS officers were deputed to the neighbouring States/ UT viz., Gujarat, Karnataka, Kerala, Maharashtra and Lakswadeep to bring back stranded fishermen. A sum of Rs.20 lakhs was provided to each of the kin of the 27 fishermen who lost their lives in the high seas and Rs.10 lakhs was provided to the kin of the 15 fishermen who lost their lives due to Ockhi cyclone.

A sum of Rs. 5,000/- as livelihood assistance was provided each to the 32,500 families of the affected fishermen at a cost of Rs.1,625 Lakhs in Kanniyakumari District. Further, a sum of Rs. 5,000/- as immediate special livelihood assistance was provided to each of the 274 families of the missing fishermen at a cost of Rs.13.70 Lakhs. Fuel allowance and ration expenses were sanctioned to 2,912 fishermen families at cost of Rs.220.95 Lakhs. An assistance of Rs.10.20 crore was sanctioned by Government towards Horticultural Crop loss incurred by 28,080 farmers. Similarly an assistance of Rs.79.06 Lakhs was sanctioned by Government towards Agricultural Crop loss incurred by 4,886 farmers. 1,926.03 Hectares of Banana was damaged more than 33% due to the cyclone. Government have sanctioned a sum of Rs.934.13 Lakhs as special assistance at the rate of Rs.48, 500/- per hectare of paddy, tapioca, coconut, crops of 2,84,960 affected farmers. 1,408 Hectares of rubber crop was damaged in Kanniyakumari District, for which Rs.1,408 Lakh sanctioned as special assistance at the rate of Rs.1,00,000/- per hectare to the affected farmers.

5.1.5 Kurangani Forest Fire, 2018

Totally 36 trekkers from the various districts of Tamil Nadu ventured into the forests in the Kurangini range from Kurangini to Kozhukumalai in Kottakkudi Village, Bodinayaganur Taluk in Theni district for trekking were caught in the forest fire on

11.03.2018. In this disaster incident, 10 persons lost their lives and due to the continuous efforts of the State Government, 10 persons were rescued from the accident spot with minor injuries. 17 persons were severely injured and given immediate first aid and then taken to hospital. As per SDRF norms Rs.4 lakhs was paid to the kin of those who lost their lives. Three severely injured persons were given Rs.1 lakh each from the Chief Minister's Relief Fund.

5.1.6 Gaja Cyclone – November 2018

The Cyclone "Gaja" crossed the Tamil Nadu coast between Nagapattinam and Vedaranyam on the early hours of 16.11.2018, with cyclonic winds gusting upto 130-145 kmph. During landfall of 'Gaja' extensive damages were caused to huts, tiled houses, concrete houses, agricultural and horticultural crops, cattle, poultry, power infrastructure in Nagapattinam, Pudukottai, Tiruvarur, Thanjavur and pockets of Dindigul districts. The Cyclone has also caused damages in Tiruchirapalli, Sivaganga, Cuddalore, Karur, Madurai, Theni and Ramanathapuram Districts.

Figure 5.6 Gaja Cyclone damages Velankanni in Nagapattinam district.



Govt have resorted evacuation of people in advance. The Government have organised 828 numbers of Relief centres for 1,22,754 families who have been left homeless and provided them with temporary shelter, food, milk and essentials. Rs 2395.29 crores were sanctioned as relief to the affected people and temporary restoration of damaged infrastructures.

5.1.7 Landslides 2019

The Nilgiris District witnessed heavy rainfall during August 2019. While the average rainfall for The Nilgiris District for the month of June, July, and August is 707 mm, the district witnessed an average rainfall of 642 mm in 4 days from 6.8.2019 to 9.8.2019, which is 647% increase. Avalanche in Kundah Taluk recorded a rainfall of 405 mm, 820 mm, 911 mm and 350 mm on these 4 days respectively and 911 mm per day is the highest rainfall recorded in Tamil Nadu's history. The unprecedented rainfall in The Nilgiris District lead to series of landslides in 77 locations which resulted in loss

of life and damages to infrastructure in the various parts of the Nilgiris District. On the onset of the heavy rainfall in the Nilgiris District, the State Administration was quick on its toes to be very responsive and active in its rescue and relief operations. 35 Inter-departmental Zonal Teams headed by Revenue Officials comprising SDRF, Fire and Rescue Services, Horticulture, Rural Development, Highways etc., cleared uprooted trees and landslides that cut off road transport leading to Manjoor, Gudalur and the Emerald dam. More than 15,000 people were evacuated from their homes to prevent any untoward incidents. Udhagamandalam, Kundah, Gudalur and Pandalur taluks were severely affected by the heavy rainfall.

Figure 5.7 Landslides -2019 in The Nilgiris District.



Due to the extremely heavy rainfall, electrical infrastructure comprising HT/LT lines, HT/LT Poles, Distribution Transformer etc., have been damaged. Further, road network, storm water drains, retaining walls, street lights, culverts and other infrastructure in Municipalities, Town Panchayats and Village Panchayats in the District suffered damage. Crop damages were also reported. The Government have sanctioned funds towards the restoration of the damages to the infrastructure and for input subsidy to affected farmers.

5.1.8 Cyclone 'Nivar'

The severe cyclonic storm 'Nivar' crossed the Tamil Nadu and Puducherry coast near Puducherry between 23.30 Hrs on 25.11.2020 and 02.30 Hrs on 26.11.2020. As a result, Thanjavur, Tiruvarur, Nagapattinam, Cuddalore, Chennai, Kanchipuram, Chengalpattu, Myladuthirai, Ariyalur, Perambalur, Kallakurichi, Villupuram, Tiruvannamalai Districts received rainfall coupled with cyclonic winds gusting upto 120-130 kmph, which left trees uprooted, power transmission lines disrupted and threw normal life out of gear. 8 Rain Gauge stations have recorded extremely heavy rainfall, of which Tambaram Rain Gauge station has recorded 314.10 mm. Moreover, 51 Rain Gauge stations have received very heavy rainfall and 65 Rain Gauge stations in the state have recorded heavy rainfall and inflicted the loss and damage tabulated below:

Table 5.1 Nivar Cyclone Loss and damages details

Sl. No	Description	Numbers
1	Severely affected districts	18
2	Revenue Villages affected	2,265
3	Human Loss	6
4	Cattle loss	381
5	Poultry loss	31,011
6	Huts fully damaged	506
7	Huts partly damaged	3,167
8	Pucca houses fully damaged	27
9	Pucca houses partly damaged	698
10	Crop damage in Hectares	15,650.25
11	Length of Roads affected	
a	Highways Roads	561.80 Km
b	Chennai Corporation Roads	205.00 Km
c	Municipal Roads	94.96 Km
d	Town Panchayat Roads	3.80 Km
e	Village Panchayat Roads	762.32 Km
12	No. of culverts damaged	865
13	Fallen Electric Poles	7617
14	Damaged Distribution Transformers	221
15	Damaged Conductors	322.20 Km
16	Trees fallen in public and private areas	2297
17	Damages to Water Resources	157
18	Damages to Government Buildings	574

5.1.9 Burevi Cyclone 2020

The cyclonic storm, 'Burevi' originated as a Low-Pressure area over South Andaman Sea and adjoining areas of Southeast Bay of Bengal & Equatorial Indian Ocean on 28th November 2020, which became a Well-Marked Low-pressure area on 29th November 2020. It just followed the Nivar Cyclone while relief operations for Nivar were underway. Subsequently it moved west-north-westwards and intensified

into Cyclonic Storm ‘Burevi’ over Southwest Bay of Bengal on 01st December 2020. Thereafter the movement slowed down significantly and it remained practically stationary over Gulf of Mannar close to Ramanathapuram district coast for nearly 18 hours and further weakened into a Depression in the evening of 04th December over the same region. Under the influence of this system, widespread rainfall with heavy to very heavy falls at a few places & extremely heavy (≥ 20 cm) falls at isolated places occurred over Tamil Nadu during 02nd – 04th December. Its long stay without any movement in the Gulf of Mannar area was a new experience. Though damages have not been reported due to wind velocity, there has been an extensive damage to houses, huts, agricultural/ horticultural crops and other infrastructure due to extremely heavy rainfall causing overflow of many rivers which had resulted in inundation of many pockets in Chennai, Cuddalore, Nagapattinam, Pudukkottai, Ramanathapuram, Sivaganga, Thanjavur, Thoothukudi, Tirunelveli and Tiruvarur Districts.

Figure 5.8 Burevi Cyclone crop damages in Cuddalore & Nagapattinam



Table 5.2 Burevi Cyclone crop damages at a glance

SI .No	Description	Numbers
1	Severely affected districts	10
2	Revenue Villages affected	1894
3	Human Loss	7
4	Cattle loss	719
5	Poultry loss	19292
6	Huts fully damaged	222
7	Huts partly damaged	4310
8	Pucca houses fully damaged	10
9	Pucca houses partly damaged	967

10	Crop damage in Hectares		246281.40
11	Length of Roads affected		
a	Highways Roads	725.40 Km	
b	Chennai Corporation Roads	120 Km	
c	Municipal Roads	192.21 Km	
d	Town Panchayat Roads	0.500 Km	
e	Village Panchayat Roads	1266.77 Km	
12	No. of culverts damaged	1401	
13	Fallen Electric Poles	635	
14	Damaged Distribution Transformers	94	
15	Damaged Conductors	28.2 Km	
16	Trees fallen in public and private areas	970	
17	Damages to Water Resources	740	
18	Damages to Government Buildings	565	

5.1.10 COVID 19

Taking into account the spread of Corona Virus in India and considering the fact that the World Health Organization has declared the COVID-19 as a Pandemic, the Union Government, Ministry of Home Affairs (Disaster Management Division) declared COVID-19 as a notified disaster for the purpose of providing assistance under SDRF. As per the guidelines issued by the Union Government complete lockdown was enforced throughout the State and extended from time to time. As on 03.07.2022, more than 34.82 lakh persons have tested positive for Covid-19. There was considerable increase in the number of Covid-19 positive cases across the State during the second wave of Covid-19 in the year 2021. The Govt of Tamil Nadu has been reviewing at regular intervals to take stock of the prevailing situation due to the outbreak of pandemic and has issued regular instructions for the effective containment of the disease. The Government of Tamil Nadu have released a sum of Rs.9,171.23 Crore from State Disaster Response Fund during the year 2021-22.

5.1.11 NEM 2021 and associated Extreme Weather Events

The Northeast Monsoon 2021 made its onset on 25.10.2021 and since then there was widespread rainfall activity across the State due to formation of low-pressure area, depression over Bay of Bengal and associated upper air cyclonic circulation. Tamil Nadu received 711.6 mm rainfall during the Northeast Monsoon period which is 59% excess.

The low-pressure area over Bay of Bengal in the October 2021, depression over Bay of Bengal in the early November brought heavy to extremely heavy rainfall in many districts. The rainfall which battered Chennai and few other districts caused extensive

damages to life, property and other critical infrastructure. Subsequently another depression formed over Bay of Bengal which crossed Tamil Nadu coast on 19.11.2021 also brought copious amount of rainfall in Villupuram, Vellore, Ranipet, Tiruvannamalai, Kallakuruchi and Cuddalore districts.

Further, due to the heavy down pour in the neighbouring states viz., Andhra Pradesh, Karnataka there was huge flow of water in Palar, Thenpennaiyar, Kollidam, Kosasthalaiyar causing inundation in many villages and resulting in damages to infrastructure of various departments.

While the relief and restoration works in respect of series of disasters viz., low pressure area and depressions over Bay of Bengal which ravaged the State during the month of October-November, 2021 were being carried out on a war footing basis, there were incessant rains in many parts of the State from 26.11.2021 to 01.12.2021. When most of the reservoirs and tanks were in full capacity due to the heavy downpours since October, 2021, the high intensity rainfall in many districts from 26.11.2021 to 01.12.2021 resulted in release of surplus water / overflow of many tanks causing inundation in many pockets and also caused damages to agricultural/horticultural crops, infrastructure viz., roads, power, housing etc. in Chengalpet, Tiruvallur, Kancheepuram, Viluppuram, Cuddalore, Nagapattinam, Mayiladuthurai, Tirunelveli, Ranipet, Kallakurichi, Virudhunagar, Tiruvannamalai, Kanniyakumari, Ramanathapuram, Madurai, Dindigul, Tenkasi, Tiruchirappalli, Theni Districts.

A total sum of Rs.32.66 crore has been sanctioned as relief towards loss of lives, cattle loss and hut damages to 96,273 families. The Government also provided enhanced relief of Rs.168.37 crore to 3.59 lakh farmers whose agricultural and horticultural crops were severely damaged in an extent of 1.80 lakh Hectares.

The Government of Tamil Nadu also sanctioned a sum of Rs.300.00 crore to various line departments for providing relief to the people affected and taking up the restoration works.

Taking into account the extensive damages caused by heavy down pours and subsequent floods, the State Government presented three Memorandums to Government of India seeking financial assistance of Rs.6230.45 crores as detailed below:-

Table 5.3 Memorandums submitted to Government of India details

Sl. No.	Details of Memorandums	Amount sought for		
		Temporary Restoration	Permanent Restoration	Total
		(Rs. in crore)		
1.	First Memorandum	549.63	2079.66	2629.29
2.	Additional Memorandum	521.29	1475.21	1996.50
3.	Supplementary Memorandum	439.91	1164.75	1604.66
Total		1510.83	4719.62	6230.45

The Inter-Ministerial Central Team of the Government of India visited the affected areas in Chennai, Chengalpet, Kancheepuram, Cuddalore, Nagapattinam, Thanjavur, Tiruvarur, Mayiladuthurai, Kanniakumari, Vellore and Ranipet Districts from 21.11.2021 to 24.11.2021 to make an on-the-spot assessment of the damages caused due to the low pressure area and depressions during October-November, 2021.

The Ministry of Home Affairs has released a sum of Rs.352.85 crore from National Disaster Response Fund towards relief and restoration of damages caused during Northeast Monsoon, 2021 which is only 5.66% of the total sum of Rs.6230.45 crore sought for from Government of India.

5.1.12 Northeast Monsoon 2022

The Northeast Monsoon - 2022 season commenced on 29.10.2022. There was widespread rainfall across the State. During the Northeast Monsoon - 2022, the State recorded 444.8 mm of rainfall as against the normal rainfall of 441.7 mm which is 1 % excess.

5.1.13 Heavy Rains in Mayiladuthurai District – November 2022

The Indian Meteorological Department, Chennai in its bulletin dated 9.11.2022 had stated that a Low-Pressure Area has formed over Southwest Bay of Bengal and adjoining Equatorial Indian Ocean and under its influence there may be heavy to very heavy rainfall in several districts.

Due to the formation of Low-Pressure Area in Bay of Bengal there was heavy to extremely heavy rainfall across many districts in the State. Mayiladuthurai District in particular recorded 1198% Larger Excess rainfall from 10.11.2022 to 11.11.2022.

The torrential rain battered several parts of Mayiladuthurai District resulting in inundation of many pockets especially in Sirkali and Tharangampadi Taluks. Kazhumalaiyaru and Vellapallam Uppanaru are the two drainages in the Sirkali, Kollidam and Tharangampadi region with a carrying capacity of 2700 cusecs. But, due to heavy to extremely heavy rainfall resulting in 25,000 cusecs of flood water in the drainage caused extremely severe flooding and inundation of habitations in Sirkali and Tharangampadi Taluks. Out of 677 habitations in these taluks 489 habitations fully and 188 habitations partially have been marooned, which brought normal life to stand still.

Extensive damages were caused to huts, tiled houses, power infrastructure, agricultural and horticultural crops. Loss of human life, injury and cattle loss were also reported. More than 57,000 persons from 20,196 families have been evacuated and accommodated in relief shelters till date and provided with food, safe drinking water, medical facilities and other basic amenities. Further, due to rough sea conditions from 09.11.22 the fishermen are unable to venture into the sea and two of their boats in the fishing dock were damaged. Due to these rains the normalcy of life in the district is thrown out of gear and livelihood of the people is seriously affected in the district and particularly in Sirkali and Tharangampadi Taluks.

The Government sanctioned Rs.16.1647 crore for providing Gratuitous relief of Rs.1000/- to the 1,61,647 families living in Sirkali and Tharangampadi Taluks of Mayiladuthurai District whose livelihood was seriously hampered.

A sum of Rs.50.89 crore was sanctioned as input subsidy to 48,593 farmers for the crop damages caused in 37,755.65 hectares in 27 Districts.

5.1.14 Mandous Cyclone, December 2022

A remnant upper air cyclonic circulation from south China Sea developed over south Andaman Sea, adjoining equatorial Indian Ocean and strait of Malacca on 4.12.2022. Under its influence, a low-pressure area formed over South Andaman Sea & neighbourhood on 5.12.2022.

It became a well-marked low-pressure area over Southeast Bay of Bengal on 6.12.2022. It further intensified into the cyclonic storm “Mandous” over southwest Bay of Bengal around midnight of 7.12.2022 and into a severe cyclonic storm in the evening of 8.12.2022. The peak intensity of the storm was 85-95 kmph gusting to 95 kmph during this period.

This Severe Cyclone weakened into cyclonic storm on 9.12.2022 and crossed north Tamil Nadu, Puducherry and adjoining south Andhra Pradesh coasts between Puducherry and Sriharikota, close to Mamallapuram between 2330 hours IST of 9.12.2022 and 0230 hours IST of 10.12.2022 as a Cyclone Storm with the maximum sustained wind speed of 65-75 kmph gusting to 85 kmph.

Pre-emptive Evacuation

9280 persons were accommodated in 205 shelters across 9 Districts. The pre-emptive evacuation is one of the reasons for minimizing loss of life.

Preposition of Monitoring officers and Inter Departmental Zonal Teams

The Monitoring officers were requested camp at the districts and oversee the rescue and relief operations. Further the Inter Departmental Zonal Teams were prepositioned at vulnerable locations to closely monitor the situation and respond immediately.

Pre-positioning of Response Forces

12 teams (6 NDRF Teams and 6 TNDRF Teams) were deputed to Nagapattinam, Tiruvarur, Thanjavur, Mayiladuthurai, Cuddalore, Villupuram, Chengalpet, Kancheepuram and Tiruvallur District.

The Tamil Nadu Fire and Rescue Services were advised to position their machinery and equipment at strategic locations.

Impact of Mandous Cyclone

- The impact of the cyclone was visible in 501 villages Chengalpattu, Kancheepuram, Chennai, Villupuram, Tiruvallur and Ranipet Districts covering population of 70,95,114 people.
- Damages to 6736.2073 hectares of crops were reported.
- 3,066 trees fallen down due to the impact of high-speed Wind.

- 1,134 Electric Poles, 73 Transformers power lines of 28,440 Km length and 10 Substations were damaged
- 37 Fiber Boats (6-fully and 31 partly), 215 Mechanized Boats (79 fully and 136 partly) and 932 Fishing nets were damaged.
- Human Loss was 5.

In view of the extraordinary efforts and immediate action taken by the Hon'ble Chief Minister of Tamil Nadu, loss of human lives and other damages have been prevented and reduced hugely during the Mandous Cyclone. As per orders of the Hon'ble Chief Minister of Tamil Nadu, the relief operations were expedited, the services of Transport, Power Supply were restored in record time and as a result the situation returned to normalcy within 48 hours.

Post landfall, the News Media both Press and Visual Media and Common Public praised the preparedness of the State machinery for minimizing the loss and damages.

5.1.15 Local Disasters

Government of Tamil Nadu declared Sea Erosion, Lightning, Thunder, Whirl wind and Gale Wind as local disasters eligible for SDRF/NDRF relief assistance. In view of the seriousness, Government of Tamil Nadu has declared the above as a Local area specific disaster in 2017 (vide G.O.Ms No 246, Revenue and Disaster Management {DM III (2)} Department, dated 03-8-2017) and prescribed relief from SDRF.

a) Sea Erosion

High Erosion Zones along the Tamil Nadu coast include the districts of Kanyakumari, Tirunelveli, parts of Tuticorin, Ramanathapuram, Pudukkottai, Thanjavur, Thiruvarur, Nagapattinam, Cuddalore, Villupuram, Kancheepuram, Chennai, and Tiruvallur. The State has prepared shoreline change maps for each district. The Coastal Zone Management Plan for the coastal stretch of Tamil Nadu is being prepared by Institute of Remote Sensing, Anna University. Further, the Storm Surge Model is being prepared by the MIT, Madras.

b) Sea Water Incursion

The coastal districts of Tamil Nadu are highly vulnerable to multiple disasters especially due to tidal waves and recurrent floods along the coastal areas.

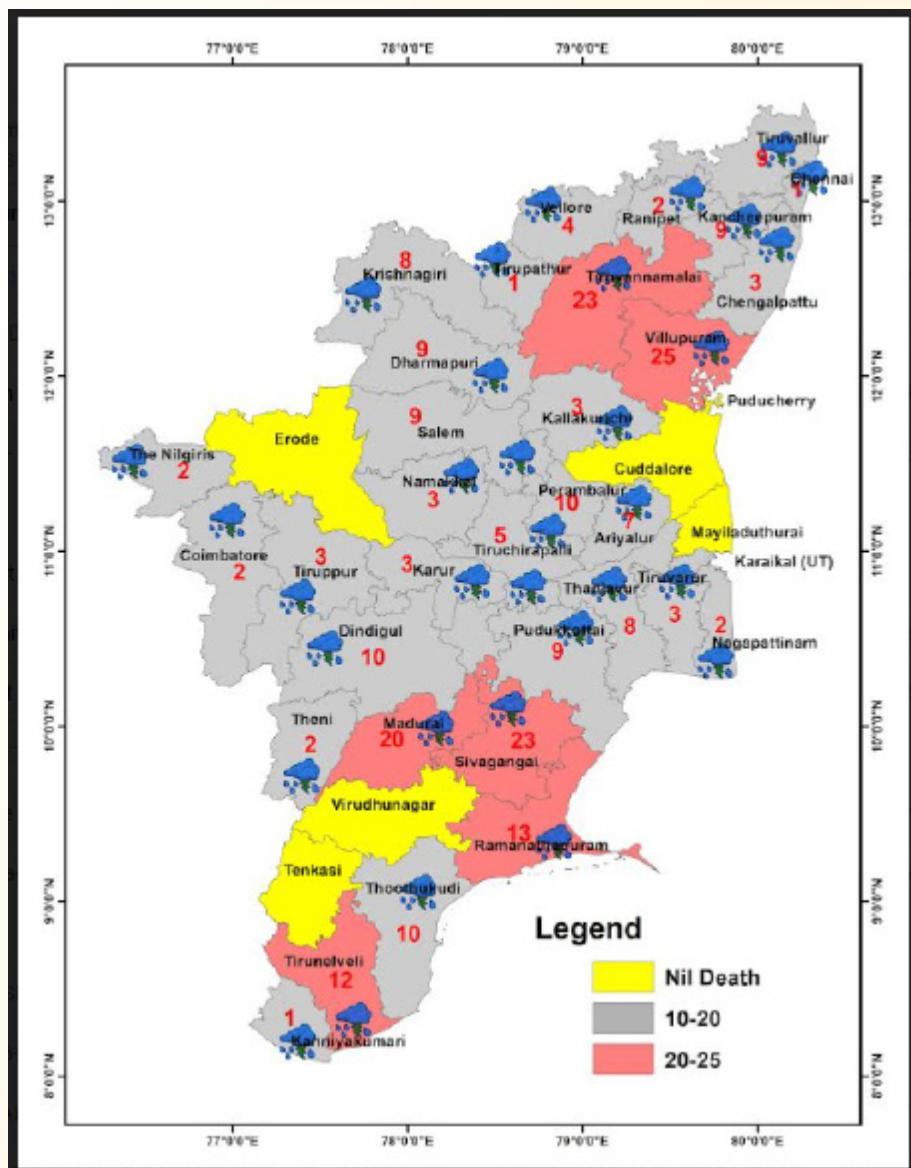
The lands are subjected to periodic inundation of tidal waters and the saline soils are the result of inundation of backwaters from sea. These lands are low lying and remain submerged under water during the monsoon. As a result, the fresh water aquifer is converted into a saline water aquifer due to sea water incursion and intrusion of sea water into the land. The Climate change and the resultant sea level rise, changing monsoon behavior and increased groundwater demand have a significant influence on saltwater intrusion. Sea water incursion causes reduction in drinking and irrigation water supplies of potable and usable quality respectively and makes the valuable agricultural lands unfit for cultivation, adversely impacting the small and marginal farmers from Kanyakumari, Thoothukudi, Nagapattinam, Ramanathapuram and Tiruvallur Districts.

c) Lightning & Thunderstorm

Lightning associated with Thunderstorms causes catastrophic damages to human lives, livestock, forests, communication & electronic equipment and infrastructure. Injuries and fatalities happen during lightning and thunderstorm due to under estimation of risks by people and lack of awareness on safety measures to be adopted. Off late the loss of life due to lightning have increased and it is more pronounced in the central part of Tamil Nadu.

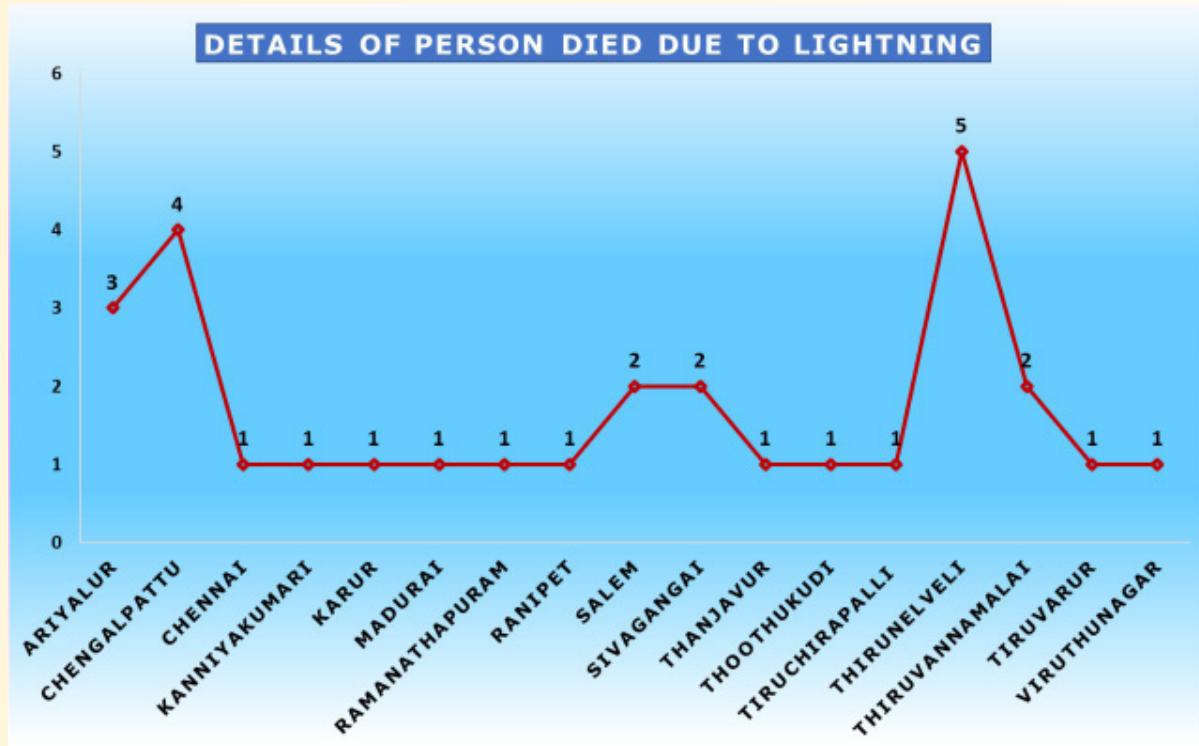
Lightning in Tamil Nadu is common during the Pre-monsoon season (March / April) and during the South West monsoon and North East Monsoon with intense thunderstorm. It is also pertinent to mention that lightning generally takes place during second half of the day particularly in the late afternoon or evening. In Tamil Nadu as many as 29 persons lost their lives due to lightning and thunderstorm during the year 2021-22. Steps have been taken to provide ex-gratia assistance of Rs.4,00,000/- per victim to the next of kins of the deceased from SDRF.

Figure 5.9 Deaths due to Lightning from 2017-2021



In Tamil Nadu 15 Districts have reported Thunderstorm and lightning and in Villupuram the number of causalities are more. The district-wise number of human casualties during 2021-22 is indicated below:

Figure 5.10 Number of Human causalities in Tamil Nadu due to lightning during 2021-22



TNSDMA in collaboration with the Indian Institute of Tropical Meteorology –IITM, Pune under the Ministry of Earth Science, Government of India issues lightning and thunder alert which gives information on location of lightning strike and provide forewarning about impending lightning strikes.

d) Gale Wind

Gale wind is stronger than a breeze, specifically a wind of 50–102 km per hour as issued by the meteorological Department. In Tamil Nadu mostly in the months of April and May gale wind incidents have occurred. The Government of Tamil Nadu has provided input subsidy to the farmers whose agriculture / horticulture crops were damaged due to the Gale wind in Erode, Villupuram, Trichy, Perambalur, Dharmapuri, Salem, Coimbatore, Theni, Virudhunagar, Karur, Thanjavur, The Nilgiris, Tiruvannamalai, Krishnagiri, Sivagangai, Thoothukudi and Pudukkottai districts.

5.1.16 Tsunami

An earthquake of magnitude 9.00 on the Richter scale struck the seabed off the Sumatra Coast, Indonesia at 6.28 AM on 26.12.2004. The resultant seismic giant sea wave (Tsunami) battered the coast of South India. These giant sea waves ravaged the coastline of Tamil Nadu ferociously on 26.12.2004 at 8.30 A.M. The people living in

villages and towns all along the coastline of 13 Districts viz. Chennai, Kancheepuram, Tiruvallur, Villupuram, Cuddalore were severely affected leading to loss of lives, livelihood and infrastructure.

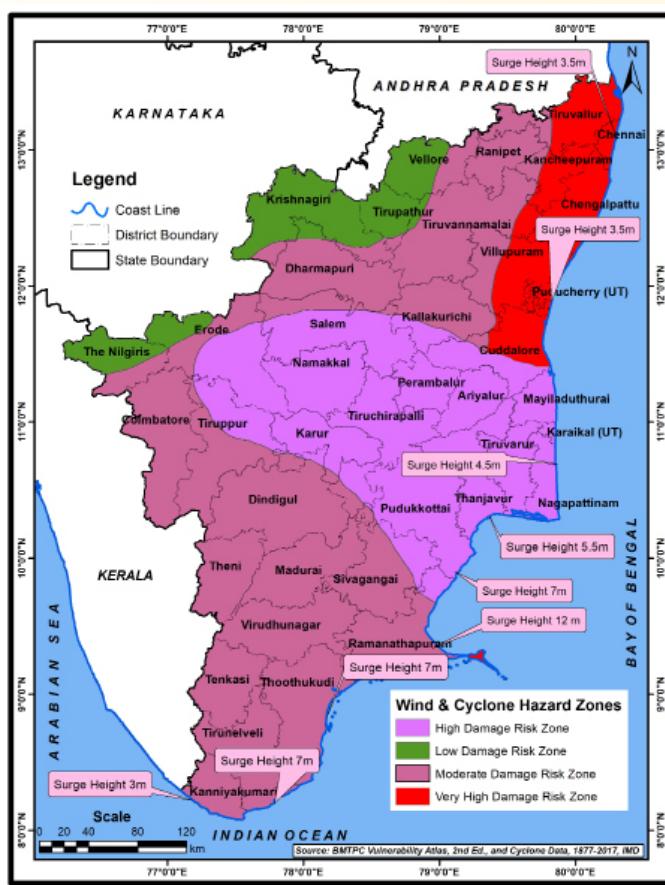
5.2 Vulnerability

5.2.1 Heavy Rainfall

The geographical setting of Tamil Nadu makes the state vulnerable to natural disasters such as cyclones, floods and earthquake-induced tsunami. About 8% of the state is affected by five to six cyclones and depressions every year, of which two to three are severe. In recent times slow onset of extreme weather events are experienced in the form of cyclones, Unseasonal Heavy to Extremely Heavy rainfall, cloud bursts etc., leading to inundation of crop lands, flooding habitations, disruption of normal life.

Cyclonic activities on the east coast are more severe than on the west coast and occur mainly during October-December. On an average, the State encounters one or two cyclonic events during the Northeast monsoon period. Even during the non-cyclonic phase, the State receives sudden and very heavy spells of incessant rains during the formation of low pressure/deep depressions in the Bay of Bengal.

Figure 5.11 Tamil Nadu State map of Wind & Cyclone Hazard Zones



The low pressure/deep depressions so formed cause flooding and inundation in the vulnerable areas. Of late extreme weather events are resulting in heavy rains way beyond the carrying capacity of the river systems and the drainage system, disrupting normalcy. Some of the cyclonic storms are accompanied by gale winds gushing even beyond 140 Kmph, wreaking havoc on the public infrastructure and causing loss of lives and damages to housing and agricultural properties.

5.2.2 Flood Vulnerability

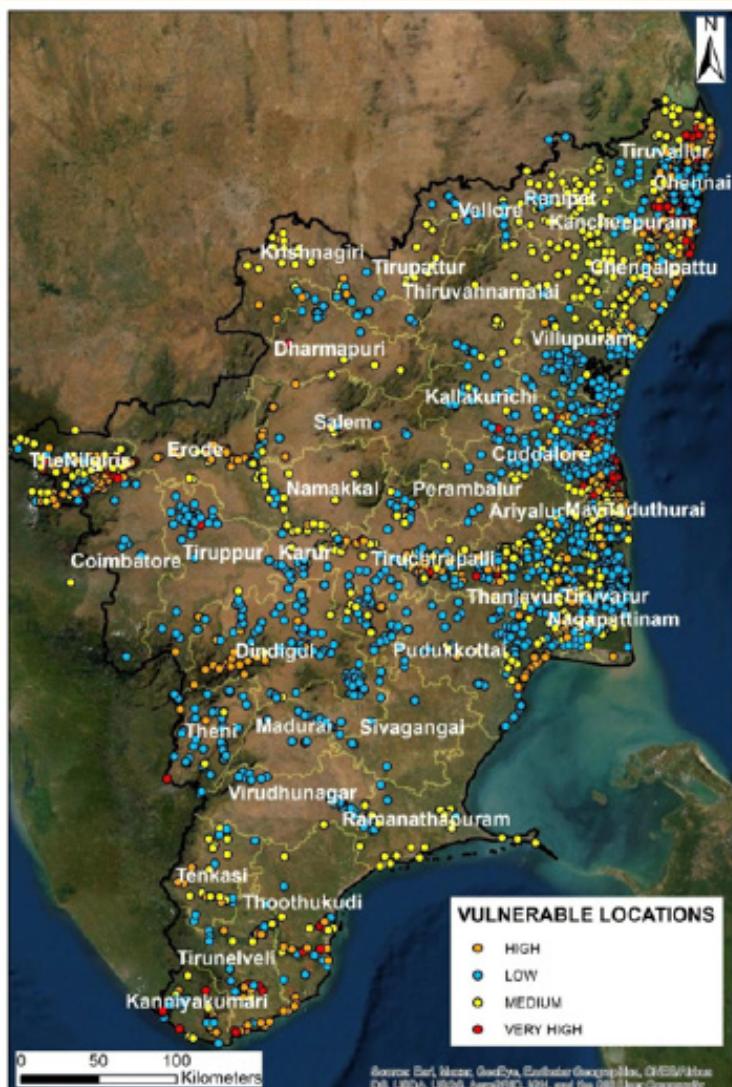
Tamil Nadu is subjected to annual flooding, including flash floods, floods due to cloudbursts, monsoon floods of single and multiple events, cyclonic floods and those due to dam bursts or failure. Every year, number of people are affected, some succumbing to the floods, thousands are rendered temporarily homeless and several hectares of crops are damaged. Floods in the State are mainly caused during cyclones and heavy rains. The coastline of Tamil Nadu even at the time of depression experiences heavy flooding. For instance, in the years 1997 to 2021 even though there were no cyclonic storms, extremely heavy rainfall caused severe floods in most of the coastal areas and affected the districts of Chennai, Kancheepuram, Tiruvallur, Cuddalore, Thanjavur, Nagapattinam, Thiruvarur, Pudukkottai, and Thoothukudi.

Based on the depth of inundation in habitations during peak flooding situations the vulnerability has been assessed by the field functionaries in consultations with the local community and Water Resources Department Officials. The District wise local flood vulnerability profile is presented below:

Table 5.4. District Wise Vulnerability Profile

District wise Vulnerability Profile						
SI.No	District	Low (0-2) in feet	Medium (2-3) in feet	High (3-5) in feet	Very High (above 5) in feet	Total
1	Ariyalur	8	21	0	0	29
2	Chengalpattu	73	125	120	71	389
3	CHENNAI	206	1	88	37	332
4	Coimbatore	18	0	0	0	18
5	Cuddalore	168	18	50	57	293
6	Dharmapuri	19	4	1	1	25
7	Dindigul	56	4	24	0	84
8	Erode	15	37	61	0	113
9	Kallakurichi	33	6	1	4	44
10	Kancheepuram	43	42	29	13	127
11	Kanniyakumari	22	20	13	21	76
12	Karur	40	29	7	0	76
13	Krishnagiri	13	16	6	0	35
14	Madurai	25	0	0	0	25
15	Mayiladuthurai	80	107	29	12	228
16	Nagapattinam	122	25	12	0	159
17	Namakkal	1	28	4	0	33
18	Perambalur	8	0	0	0	8
19	Pudukkottai	64	11	2	0	77
20	Ramanathapuram	0	48	0	0	48
21	Ranipet	15	81	0	0	96
22	Salem	10	6	7	0	23
23	Sivagangai	88	0	0	0	88
24	Tenkasi	12	14	8	0	34
25	Thanjavur	92	50	50	3	195
26	The Nilgiris	48	79	89	68	284
27	Theni	54	3	2	1	60
28	Thiruppur	38	1	0	3	42
29	Thiruvarur	70	82	56	1	209
30	Thoothukkudi	12	11	9	4	36
31	Tiruchirappalli	72	41	38	3	154
32	Tirunelveli	21	10	24	10	65
33	Tirupathur	0	11	0	0	11
34	Tiruvallur	58	60	61	8	187
35	Tiruvannamalai	6	53	0	0	59
36	Vellore	16	7	0	0	23
37	Villupuram	79	35	8	0	122
38	Virudhunagar	9	0	0	0	9
Total		1714	1086	799	317	3916

Figure 5.12 Vulnerability map of Tamil Nadu



5.2.3 Storm Surge Vulnerability

Storm surge varies from 3 meters to 11 meters in the Tamil Nadu coast. The Southern parts of Thanjavur, Pudukkottai, Ramanathapuram, Thoothukudi, Tirunelveli, and Kanyakumari have experienced storm surges exceeding 6m above the current sea level. The northern regions of Thanjavur, Cuddalore, and Chennai has lower storm surge heights of around 3 meters. Storm surges are a major threat to the fishing community damaging their livelihood support and to small and marginal farmers by rendering agricultural lands unfit for cultivation.

5.2.4 Heat Wave Vulnerability

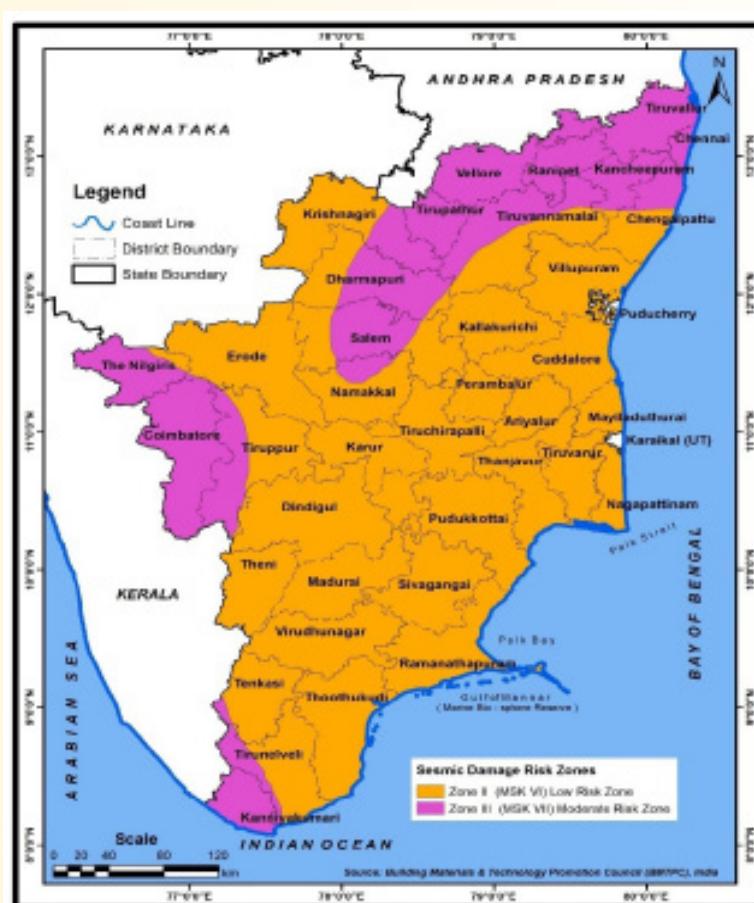
A Heat Wave is a period of abnormally high temperatures, more than the normal maximum temperature that occurs during the (Hot weather) summer season. Heat Waves typically occur between March and June. The extreme temperatures and resultant atmospheric conditions adversely affect people living in these regions as they

cause physiological stress, sometimes resulting in death. Some of the districts in Tamil Nadu that have witnessed heat wave impacts are Vellore, Tiruvannamalai, Krishnagiri, Dharmapuri, Salem, Namakkal, Tiruppur, Coimbatore, Erode, Karur, Tiruchirappalli, Ariyalur, Perambalur, Sivaganga, Virudhunagar, Theni, Dindigul, and Madurai.

5.2.5 Seismic Vulnerability

Tamil Nadu is one of the 13 identified seismotectonic zones of Peninsular India. The East – West Cauvery fault Tirukkovilur – Pondicherry fault, Vaigai River fault and North-Southern trending Comorin – Point Calimere Fault and Rajapatnam– Devipatnam Fault are some of them which run close to the urban centers like Coimbatore, Madurai, Nagapattinam, Thanjavur, and Pondicherry and thus make the state vulnerable to tremors and earthquakes geologically. Tamil Nadu experienced moderate earthquakes in the past earthquake history of 200 years as is evident from the published literature. Twelve earthquakes of M>5.0 are known to have occurred in the State so far. The latest Seismic zoning map of Bureau of Indian Standards classifies Tamil Nadu into two categories - Zone II and Zone III (representing an area of 73% and 27% respectively), which is under Low risk (up to magnitude 4.9) and Moderate risk (up to Magnitude 6.9) respectively including many districts in the state namely Chennai, Tiruvallur, Vellore, Coimbatore, Dharmapuri, Salem, Tirunelveli, Kanyakumari and The Nilgiris. Chennai, the state capital and the major cities Coimbatore and Salem fall under seismic zone III.

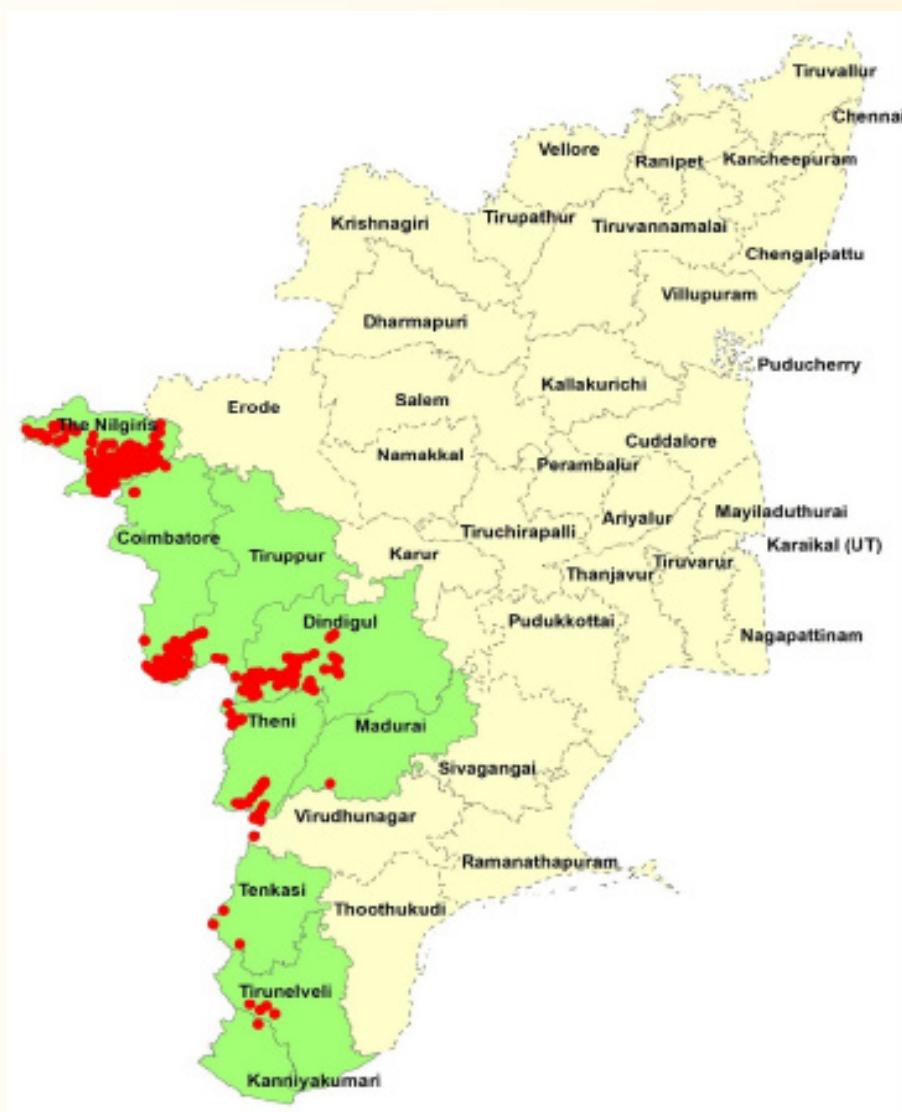
5.13 Seismic Vulnerability Map of Tamil Nadu



5.2.6 Landslide Vulnerability

Landslide is one of the major natural hazards that are commonly experienced in hilly terrains. The landslide hazard zonation atlas of India published by Building Materials and Technology Promotion Council (BMTPC), Government of India, categorized the Nilgiris district of Tamil Nadu state as one of the severe to very high landslide hazard prone areas of India. 73 Vulnerable Villages have been identified as most vulnerable for Landslides in The Nilgris District. Landslides occur during the seasonal rains in the Nilgiris Hill Range and some of the major ones that have occurred are the Runnymede landslide, the Glenmore landslide, the Coonoor landslide, the Karadipallam landslide, Megamalai landslide and the Marapalam landslide. Besides Nilgiris, Salem, Erode, Thirupathur, Dindigul (Kodaikanal hills) and Theni districts face the Landslide disaster.

Figure 5.14 Landslide Locations of Tamil Nadu



5.2.7 Hazard due to Fire and Explosives

Tamil Nadu is vulnerable to fire risk disasters and some of the districts fall in the very high risk and high-risk categories. Districts have been analyzed based on fire risk ranking by specialized groups and the analysis reveals that six districts namely Chennai,

Coimbatore, Dindigul, Kancheepuram, Madurai, and Tiruvallur are under the ‘very high risk’ category, Cuddalore, Namakkal, Thanjavur, Tuticorin, Tiruchirapalli, Tirunelveli, Tiruppur, Vellore and Virudhunagar in the ‘high risk’ category. The analysis was borne out of assessing the population density, residential built-up area and Industrial areas in these districts.

Forest fires are also a major problem in Nilgiris, Salem, Theni, and Dharmapuri due to acute drought conditions, lightning and sometimes induced by human activities.

5.2.8 Chemical, Biological, Radiological and Nuclear (CBRN) Vulnerability

Tamil Nadu also has a number of Industries which are vulnerable to natural as well as man-made disasters. There are 180 MAH units in Tamil Nadu falling under this category because of the storage of highly inflammable petroleum products in large quantities. There are underground pipelines carrying petroleum products across the state apart from tankers and railways carrying chemicals which are potentially hazardous. The three major types of hazards possible with chemical emergencies are fires, explosions, and toxic releases that could affect the population and the environment. Kancheepuram, Tiruvallur, Cuddalore, Madurai, Vellore, Thoothukudi, Thanjavur and Ramanathapuram districts have industries that are dealing with potentially hazardous materials and hence have the vulnerability factor.

Tamil Nadu has two nuclear power plants namely, Madras Atomic Power Station at Kalpakam two units of 220 MW each and the Koodankulam nuclear power station with a 1000 MW unit in Tirunelveli district. Koodankulam has one 1000 MW reactor and operations of the second 1000 MW reactor commenced in the year 2017.

5.3 Hazard Vulnerability Risk Analysis

The Government of Tamil Nadu has initiated number of studies to assess the multi-Hazard and Vulnerability Risk Analysis of (HVRA) various disasters. The HVRA study for Thiruvallur and Cuddalore District has been completed by the Disaster Management Cell, Anna Institute of Management, Chennai during 2014. The State has plans to take up HVRA studies based on systems approach in all other river basins covering the entire state.

5.3.1 Ongoing Risk Assessments - Aerial Photogrammetry Study for Flood Mapping

The Aerial Photogrammetry study for Flood Mapping in the State of Tamil Nadu by capturing the images of water courses and their buffers areas using Unmanned Aerial Vehicle has been taken up through the Centre for Aerospace Research, Madras Institute of Technology (MIT) Anna University. An area of 5650.45 sq.km. spread over 1. Cuddalore, 2. Madurai, 3. Virudhunagar, 4. Sivagangai, 5. Thoothukudi, 6. Ramanathapuram, 7. Nagapattinam, 8. Tiruvarur, 9. Thanjavur, 10. Villupuram, 11. Pudukkottai, 12. Kanyakumari, 13. Tiruchirapalli, 14. Tiruppur, 15. Salem, 16. Dindigul, 17. Namakkal, 18. Erode and 19. Karur Districts has been completed except in Kanyakumari District for 100 sq.km. The captured data is being processed for generating Digital Surface Model (DSM),

Digital Terrian Model / Elevation Model (DTM / DEM) analysis and web hosting the output in a GIS web portal.

5.3.2 State Database for Emergency Management (SDEM)

The Geographical Information System (GIS) Cell established in TNDRRA is engaged in customizing the National Database for Emergency Management (NDEM) to create the State Database for Emergency Management (SDEM). The TNDRRA has entered into a collaborative work agreement with the Institute of Remote Sensing (IRS), Anna University and Indian Institute of Technology Madras (IIT-M) for populating SDEM with Disaster specific Database and integration of Storm Surge Model for early warning. These initiatives will be completed in 2022-2023. The outcome from the above studies will provide Flood & Cyclone Risk Mapping and also the inputs for mitigation.

5.3.3. Proposed HVRA Studies

a) District-wise HVRA Studies

The Hazard Vulnerability Risk Analysis Studies have been completed in respect of Cuddalore and Tirvallur Districts. In respect to the other districts the HVRA Studies is proposed to be taken up to cover vulnerability due to chemical, biological, radiological, nuclear, sea erosion, sea water incursion other than flood and drought which covered by a separate study.

b) Multi Criterion Analysis of Drought

A comprehensive assessment of drought vulnerability and its impact on Agriculture, Animal Husbandry and Livelihood is proposed to be taken up. The factors such as rainfall distribution, lack of irrigation facilities, fall in ground water levels, Water quality issues contribute to moisture stress and lead to agricultural drought. Failure of monsoon and consequent fall in ground water levels lead to Hydrological drought. A Multi-criterion analysis will be employed to identify chronically drought affected areas (Blocks) in order to develop location specific mitigation practices.

c) Landslides

The potential Landslide Hot Spots have been identified for the Nilgris District with the technical support from Geological Survey of India. Risk mapping in 1:10,000 Scale has been taken up with GSI.

d) Earthquake

Seismic Micro Zonation of Earthquake Zones for Chennai (177 Sq Km) was completed in 2013. Follow up action for implementing the recommendations of the above study will be taken up with GCC, CMDA, CREDAI and Builders Association of India. Expanding the Study for the entire CMA area will be taken up with CMDA. Seismic Micro Zonation of Earthquake Zones of Salem and Coimbatore City have been initiated in 2021. It is also proposed to explore the possibilities of expanding the Study.

d) Heat Waves

The NDMA has carried out a study to assess the Temperature thresholds for Heat waves for various Cities. The Study has covered Vellore and Madurai Cities. A Study for assessment of Temperature thresholds for all cities in the State and to fix the nature-based solution for minimizing the impacts of heat wave will be taken up.

- a. Risk reduction and response.
- b. Details of vulnerable population
- c. Geographical areas of concentration
- d. Extreme events due to changing climate
- e. Administrative and Institutional arrangements

CHAPTER – 6

DISASTER PREVENTION AND MITIGATION

The Government of Tamil Nadu have been taking up many structural and non-structural measures with a purpose to minimize the impact of disasters as part of its prevention and mitigation strategies. The preventive measures aim at risk avoidance, wherever it is feasible, considering social, cultural and economic practices of the communities that are highly vulnerable to the hazards. [For example, a conscious effort was made to relocate the houses of the fisherman community between beyond 200m to 1000 m from the high tide line so as to make these houses colonies risk proof to Tsunami, Cyclones and storm surges. Even the houses of those families who were unwilling to relocate have been repaired and reconstructed in-situ with multi hazard resistant standards.]

The prevention and mitigation measures of the state can be broadly classified into structural and non-structural measures. The major measures implemented are detailed below: -

Figure 6.1 Disaster Prevention and Mitigation

Disaster Prevention & Mitigation	
Structural Measures	Non Structural Measures
Housing (MPES, Multi Hazard Resistant Houses, Green Houses)	Economic Measures (Subsidies, Credit Waiver, Risk Cover)
Water Resources Management (Restoration of River Drainage Systems, River Grading, Flood Routing, Stream Training, Improving Inflow Channels)	Social Measures (Public Information Campaigns, Non-formal Education, Community Participation)
Infrastructures (Roads, Bridges, Drinking Water, Power, Communication, Education, Heritage Tourism)	Physical Planning Measures (Land Use Planning, Safe Designs, Retrofitting)
Ecosystem Restoration (Shelterbelts along the Coast, Afforestation, Restoring fragile interface Ecosystems, Creeks, Marshlands, Wetlands etc., Enhance Ecosystems Health)	Safety Audit (Schools, Hospitals, Disaster Resilient Public Infrastructure, Buildings, Roads, Bridges, Reservoirs & Water Bodies, Industries)
	Management & Institutional Measures (Educational Training, School/College Disaster Research, Strengthening Technical Expertise, Strengthening of Local Authorities)

6.1 Structural Measures

6.1.1 Disaster Resistant Housing-Multi-Hazard Resistant Houses

Government of Tamil Nadu have always been in the forefront in creating durable assets for the poor and over the years has been replacing huts with concrete houses.

Taking into account the devastating destruction caused by Tsunami, as part of the Tsunami Rehabilitation measures, the houses for the poor who lost their houses were designed as Multi-Hazard Resistant with cyclone and earthquake proof features. All the houses were provided with rainwater-harvesting structures. Fly ash bricks were used in construction, which are stronger and eco-friendlier than common red bricks. Most of the houses were relocated 200 to 1000 metres from the high tide line to prevent exposure of the communities to Tsunami.

All the houses were provided with a staircase which served as a safety provision for people to run to a higher level in case of another calamity. As a precautionary step, bio-shields in major re-settlements and also near all the existing habitations were taken up. The habitations were developed with adequate space to enable easy evacuation at times of emergencies. The reconstructed houses after post Tsunami have withstood the fury of Thane cyclone (which was historical) and the recurrent floods including the most severe in recent time in December 2015. The houses were not only safe but due to the provision of the staircase there was an additional space to move to a higher level in case of inundation due to flood. The Manual for Disaster Resistant Construction Practices and Cyclone Resistant Building Architecture prepared under UNDP Disaster Risk Management has been made available to different departments responsible for construction of Housing and other public infrastructure. Government of Tamil Nadu has taken up the construction of green houses as a follow up programme adopting the same design.

6.1.2 Multi-Purpose Evacuation Shelters

During the response and rehabilitation of the community to Tsunami and subsequent cyclone disasters, it was found that the existing number of cyclone shelters in Tamil Nadu along the coast were insufficient to accommodate the vulnerable population in coastal areas. Based on a study of the coastal topography, demography and social structure and community needs, 121 Multipurpose Evacuation shelters have been constructed with statutory CRZ clearances, to house vulnerable population during the disaster. Further separate facility was also created to protect cattle during disasters.

These shelters are multipurpose utility buildings and can be used for activities like class rooms, community functions, Hospitals, meetings etc., during the lean seasons.

Community meetings, vocational trainings and other such activities, making this infrastructure a vital part of the development of the communities and maintains its functionality so that it is ready for use at any point of time.

6.1.3 Flood Control & Drought Mitigation Measures

The structural measures under the broad water resources segment to combat Flood and Drought are complimentary to each other. The Flood control measures include, River Grading, River / Stream training, construction of new as well as revamping of reservoirs, dams, check dams, instream reservoirs, riverine reservoirs, tail

end regulators etc., Flood routing through diversion Canals/ Channels and creating new storage facilities to store excess runoff meets out the domestic, agriculture and animal water requirement during the peak off seasons, there by mitigating the menace of drought. These structures are to be constructed on a priority basis in the river basins known for recurring floods in the state.

6.1.4 Removal of Encroachments

The problems of flooding in several locations are due to the structural anthropogenic interventions which obliterate the existing width of the water ways and in some locations even block the water ways. The structural interventions are due to the unauthorized construction of buildings and illegal encroachments by people of different strata. Removal of the encroachments and the relocation of the structure plays a very important role in maintaining the integrity of the water ways and minimise the risks due to floods. The Government of Tamil Nadu has launched a special drive to remove the encroachments on a priority basis in all water bodies and water ways. In cases where the matter is subjudice necessary clearances will be obtained from the Hon'ble courts. Accordingly, after securing clearance from the judiciary, a massive drive has been launched to remove the encroachments in Adayar, Kosasthalayar Coovam, Kovalam and other river basins. The district administration will be according high priority for removal of the encroachments in the waterways and water bodies.

6.1.5 Road Infrastructure

Proper maintenance of all National, State Highways and Rural Roads, clearing blockages under culverts, bridges including 1000 meters upstream and downstream to enable free flow of flood waters are being done on a periodical basis. Further, special drive is being organized before monsoon seasons for clearing the blockages under bridges & culverts. The Government has also decided to increase the vent ways to cover the full width of the River/Stream and convert the existing pipe culverts to Box Type Culverts and also construct elevated bridges at appropriate locations as part of its prevention and mitigation strategies.

6.1.6 Drinking Water

Harnessing the excess run off in Chennai Metro and pumping them to Water Bodies (Tanks, Ponds – Quarries & other Storages) in the upstream to augment drinking water needs during scarcity periods. Promoting Rain Water Harvesting in large institutional areas by creating sub-surface storage tanks for meeting the domestic needs of respective institutions. (Eg. – The Institute of Water Studies Tharamani has a similar system established by JICA which meets a major part of the water requirement).

6.1.7 Safety of Lifeline Infrastructures

The impact of sudden, high intensity disasters viz., Floods, Cyclone, Earthquake and Landslide is devastating not only on people, but also buildings like hospitals,

schools & other infrastructures like dams, reservoirs, water bodies, Power and Communication facilities, Heritage & Tourist Infrastructures.

The structural interventions required for safety against disasters are arrived after the safety audit by respective organisations. The mitigation measures will include safety of lifeline infrastructure viz., retrofitting of buildings, strengthening of the infrastructure.

6.1.8 Restoration and Protection of Diverse Ecosystems

Eco system restoration is the process of reclaiming habitat and eco system functions by restoring the lands & waters on which plants & animals depend. Restoration is a corrective step which involves eliminating or modifying causes of ecological degradation and re-establishing the natural processes.

Eco Protection and Eco Restoration of Marsh Lands, Wetlands Creeks and estuaries are being undertaken to enable flood protection and ensure livelihood of communities traditionally dependent on them. Massive tree plantation programmes in Rural & Urban areas in addition to the augmentation and conservation efforts in the protected and reserved areas.

6.1.9 Structural Measures for Mitigation of Landslides

Prevention & Mitigation of the adverse impacts of landslides is achieved by the following structural measures in the identified watersheds

- i. Prevention of Soil Erosion through engineering and vegetative measures
- ii. Improvement of drainage systems of the entire watershed through River / Stream training, strengthening of embankments, to facilitate free flow of runoff.
- iii. Stabilization of Slopes through Bio Engineering Methods
- iv. Construction of Revetments to protect landslides along Highways and Roads
- v. Installing structures such as piles & retaining walls grouting rock joints & fissures

6.1.10 Structural Measures for Mitigating Earthquakes

Structural measures implemented to considerably reduce the impact of earthquake are:

- i. Properly designed, engineered and constructed structures—residential, service or infrastructure—built on well tested soil and adapting to suitable adjustments in design.
- ii. Retrofitting in old structures so that short-comings in construction could be externally strengthened to a considerable extent to withstand the convulsions caused by earthquake.

6.2 Non-Structural Measures

The Structural measures can be effectively translated on field only with appropriate Non-Structural measures such as policies, guidelines and standards, community participation, regulatory mechanism, prescribed from time to time in accordance with the changing patterns of disasters. The non-structural measures being implemented for prevention and mitigation are detailed below:

Economic Measures

Tamil Nadu, which is a multi-hazard risk prone State is highly vulnerable to the cyclonic storms, down pours during Northeast Monsoon on the one hand and the vagaries of the monsoon impacting the fortunes of the farming community on the other. In addition, the deficit rainfall adversely affects the drinking water resources impacting essential supplies to the community particularly those in the drought prone districts of the State. In order to mitigate these risks, Government of Tamil Nadu invokes economic incentives and alternate strategies to enhance the resilience of the highly vulnerable sections of the society.

Fishermen bear the highest brunt of the disaster risks which threaten their lives, housing as well as economic wellbeing. In order to reduce the impact of these risks, the Government of Tamil Nadu have decided to provide multi hazard resistant houses free of cost, and provide grants during lean season and prohibited periods of fishing. In addition, the Government has been taking several measures to enhance their livelihood opportunities comprising of skill upgradation and value addition to their existing fishing centric income generating activities and imparting skills for diversification of livelihood opportunities.

Agriculture is the other main sector which bears the brunt of the risks due to vagaries of monsoon and its consequent risks of floods and drought. The problem of the farmers is accentuated in the areas irrigated from the rivers that originate outside the State due to issues involved in timely releases of water from the upper riparian States and the seasonal rivers of the State being at the mercy of the monsoonal rains.

In order to mitigate the plight of the farmers Government is providing incentives to the farmers of Cauvery delta during Kuruvalai & Samba Seasons to shift from water intensive crops to less water consuming crops and extends 100 percent financial assistance for installation of Micro Irrigation Systems throughout the state in order to conserve water and utilise the resources judiciously to protect the interests of the farmers.

6.3 Societal Measures

6.3.1 Public Awareness and Mass Campaigns

Imparting Disaster Risk Knowledge and bringing attitudinal and behavioral changes to the early warning messages play a significant role in Risk Reduction especially in minimising loss of lives. Considering the importance of the need for

enhancing the knowledge levels of different stakeholders, to tackle different disaster situations GoTN have been accorded very high priority in building the capacities of the community and other stakeholders. In order to spread the awareness at various levels, all possible channels of communication such as print, electronic, social and traditional media are being used by GoTN.

In order to prepare the future generation to face the disasters in a more confident and resilient manner and also make them part of disaster management the curriculum of classes 7th to 10th have been modified and lessons on Disaster Management have been incorporated. Special campaigns are being organized for different disasters to involve communities particularly children and other vulnerable sections. Schools, Colleges, NCC, NSS, Social defence, SHGs, NGOs, CBOs, traders associations, Builders associations, contractors, masons, local body representatives, religious and social organisations, academic institutions and professionals are being involved to make Tamil Nadu a disaster resilient State. In addition, the farming community is being encouraged to diversify their crops to minimize the water requirement and is also being encouraged to adopt Micro Irrigation Practices to conserve water and enhance resilience to face drought.

6.3.2 Social Safety Nets

Various social protection nets are provided by Government of Tamil Nadu under both State Government schemes and externally aided special Projects (with World Bank, ADB and IFAD funding) like Emergency Tsunami Reconstruction Project (ETRP), Tsunami Emergency Assistance Programme (TEAP), Rajiv Gandhi Rehabilitation Programme (RGRP), Post Tsunami Sustainable Livelihood Project (PTSLP) and Coastal Disaster Risk Reduction Project (CDRRP) which have been implemented in response to the Tsunami 2004.

6.3.3 Social Security Schemes

The following schemes provide social security protection to the vulnerable groups

- Old Age Pension Scheme
- Widow Pension Scheme
- Destitute Widow Pension Scheme
- Disability Pension Scheme
- Differently Abled Pension Scheme
- Destitute / Deserted Wives Pension Scheme (DDWP)
- Pension to Un-married, Poor, Incapacitated Women of age 50 years and above (UWP).
- Accident Relief Scheme
- Chief Minister's Uzhavar Pathukappu Thittam.
- Mahatma Gandhi National Rural Employment guarantee scheme

- Deendayal Anthodia Yojana - National Urban Livelihood Mission (DAY-NULM)
- Tamil Nadu Pudhu Vaazhv Project (Funded jointly by World Bank and GoTN).
- Self Help Groups (Micro Credit & Livelihood)
- Priceless kits to pregnant women and lactating mothers.

These schemes provide Safety nets to the poor and in-turn their vulnerability during disasters and post disasters phases.

6.3.4 Management & Institutional Measures Capacity Building

Capacity Building of the Institutions involved in the Disaster Response and Management and more importantly disaster risk reduction, is an important component of non-structural measures. In this context, 4.10 lakh persons have been trained under Community-based Disaster Risk Management programme through SIRD to involve the community in disaster management. In addition 65000 First Responders from every habitation level have been identified at 14 Coastal Districts and The Nilgiris District and imparted training thereby to form a Community Disaster Response Force. Under upscaling of AAPDA MITRA scheme funded by NDMA, 5500 community volunteers across 16 disaster prone districts are being imparted in house training for 12 days.

6.3.5 Institutional Capacity Building

Government of Tamil Nadu is committed to build the capacity of its employees to build a pool of highly committed and competent teams right from the gross root level up to top management to address the concerns of the community in facing disasters, evolve strategies to prevent and mitigate risks and in implementation of prevention, mitigation and build back better projects.

The Revenue Administration, Disaster Management Department is primarily responsible for disaster management in the State and is ably supported by several departments, the main departments being Police, SDRF, Fire & Rescue Services, Coastal Security, Fisheries, PWD, Highways, Agriculture, Horticulture, Animal Husbandry, Health, Electricity Board, Municipal Administration and other departments. In order to enhance the skills of the personnel engaged in Disaster Risk Reduction and those involved in different phases of disasters, GoTN have been according priority for Capacity Building Programme which are being organised with the help of NIDM, NDRF & SDRF, Fire services, Anna Staff Administrative College, Revenue and Disaster Management Department and other Government agencies at District / State and National Levels.

The capacity of NGOs is also tapped to train the Personnel from different departments in Search, rescue & Evacuation Operations as well as other issues of Disaster Management, RED Cross Society, Sathya Sai Trust and other bodies. In order to ensure the involvement of NGOs in disaster management related activities, NGO co-ordination centres have been established both at State & District level and co-ordination meetings are also conducted. Further, Government and Private

educational institutions are also building the capacities of employees through special programmes. Government of Tamil Nadu is committed to build the capacity of its employees to build a pool of highly committed and competent teams right from the gross root level up to top management to address the concerns of the community in facing disasters, evolve strategies to prevent and mitigate risks and in implementation of prevention, mitigation and build back better projects.

6.3.6 Research and Technology Transfer

- I. Mainstreaming Research and Development to alleviate ill effects of disaster mitigation / reduction has become a necessity in the context of complexities of climate change.
- II. R&D in management of earthquakes, floods, droughts, climate change, industrial, nuclear disasters and other disasters will ensure risk identification at the early stage in a holistic manner and minimize risks by suitably integrating mitigation measures into the development model.

6.3.7 Physical Planning Measures

It is not uncommon to note that the risks due to disasters being exacerbated due to in-adequate understanding of the topography while undertaking projects for housing, commercial, industrial and public infrastructure. Construction of public & private facilities in water bodies & water ways, change in land use pattern from agriculture to residential and industrial purposes, building public infrastructure on water ways due to the rapid urbanization to name a few have compounded the intensity of several disasters. Many of these issues will be addressed through regulations and prevent serious risks that exist today. GoTN is undertaking physical planning measures to minimise the risks as noted below:

A. Regulatory Mechanisms and Redesigning

As a part of mainstreaming of risk concerns into developmental plans, GoTN consciously decided to re-examine the designs & codes relating Buildings, Irrigation Structures, drinking water supply systems, Power Infrastructure, Bridges & Culverts in National and State highways & Rural Roads are being redesigned to reduce risks that arise due to flooding. For instance, in order to ensure that the gushing water during the flood, seamlessly flows through the culverts & Bridges, the existing piped culverts are being converted into box type RCC structures & low-level bridges and cause ways are being converted into slightly elevated structures providing adequate space for flood waters to flow even during extreme weather events. Redesigning of these structures will prevent inundation of the surroundings areas which is happening currently now due to inadequate no. of vent ways and inadequate capacity of the piped culverts. In the power sector cables are being laid underground and junction boxes are being located on (1 to 2 feet) tall support structures.

B. National Building Code Standards

Development Control Rules for CMDA provide for, regulating the constructions with reference to zone, location, height, number of floors, size of buildings, setback spaces to be left around, and the use of the building and land. Building rules under the Local Bodies Acts provide for regulation of location of buildings, foundations, plinths, superstructures-walls, floors, and rooms, licensing of surveyors and inspection of municipal engineers at various stages of constructions, wind load / pressure, reinforced cement concrete and framed structures, construction materials, etc. Structural safety and soundness are being regulated under the building rules under the Local Body Acts.

The special provisions contained in the Building Rules under the Chennai City Municipal Corporation Act, Building Rules under the T.N. District Municipalities Act and Building Rules under T.N. Panchayats Act respectively, regulate structural design of buildings to reduce risks due to natural hazards viz. earth quake, cyclone, flood flow or inundation, tsunami, etc. The Public Works Departments adopts the NBC standards for guiding the construction of buildings.

C. Guidelines for Planning, Design and Construction of Multi Hazard Resistant Buildings

Disaster prevention includes structural interventions in buildings and structures to make them strong enough to withstand disaster impacts so that the resilience of the society to manage disasters is improved. The Public Works department buildings organization is committed to plan, design, construct and maintain the Public Buildings and monitor the stability of the public buildings. Every building shall be so planned, designed, constructed, equipped, maintained and operated so as to provide not only adequate comfort to the occupants but also to take meticulous care to protect them from undue danger to the life and safety of the occupants from fire, earthquake, Tsunami, Cyclone, Flood and other hazards. The Public Works Department has brought comprehensive guidelines including, but not limited to, the above features.

The public buildings are constructed based on the Codes published by the Bureau of Indian standards including the National Building code 2016.

D. Building Stability

A Hazard Safety Cell (HSC) under the direct supervision and control of the Engineer-in-Chief of the State PWD as an advisory body was established for proper enforcement of the buildings code in all future constructions, thereby ensuring the safety of buildings and structures from all hazards such as earthquakes / cyclones etc.

E. Structural Stability of the Public Building

The Structural stability of the public buildings is ensured through the Tamil Nadu Public Building Licensing Act 1965 and Rules 1966. The Public Buildings

have to renew their licenses periodically. These licenses are issued / renewed after inspection of the buildings and satisfying structural stability certified by the PWD.

F. Fire-safety Audit

Inspections are conducted in Multistorey buildings, Educational Institutions, Commercial Complexes, Public Buildings, Hospitals and Multi-Occupations by the High-Rise Building Inspection Committees constituted by Tamil Nadu Fire and Rescue Services. In addition, fire safety audits are also being conducted in Government Buildings.

A Multi Departmental Committee under the head of the District Officer of Fire Services Department conducts inspection in all cinema theatres in the districts once in a year and forwards its report to the licensing authorities for taking appropriate action.

G. Industrial Safety Audit

The Major Accident Hazard (MAH) control activities in Tamil Nadu are monitored by Chief Inspector of Factories, Chennai.

- Risk Assessment and mapping of hazardous industries is done by the Department of Industrial Safety.
- Risk mitigation is done in MAH Units with preparation of the “On-Site Emergency Plan” and these plans are got approved from the Chief Inspector of Factories.
- Factories Inspectors conduct one day Training Program on Industrial safety every month for Plant Operators and Supervisors in factories, as part of their field level activities.
- Factories Inspectorate in Tamil Nadu is having a State Level Safety Audit Cell. Chief Inspector of Factories is the Chairman of the Cell. Experts in the field of Safety, Health and Environment are members in the Safety Audit Cell.
- 176 MAH Units have been identified for conducting statutory Safety Audit in their facilities by External Auditor every year and to submit the Audit Reports to Chief Inspector of Factories under “Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989” (MSIHC Rules).

H. School Safety

The National Disaster Management Authority formulated the National Disaster Management Guidelines on School Safety Policy in February 2016. The Hon'ble Supreme Court has directed the School Safety Guidelines issued by NDMA have to be implemented in letter and spirit.

The School Education department as well as the DDMA have been advised to follow the guidelines given in the School Safety Policy. Some of the major roles and responsibilities of DDMA as per the School Safety Policy are:

- Collaborate with and involve education authorities in DM lanning, policies processes and in developing minimum standards for school safety before, during and after emergencies. This will be done by co-opting the District Education Officer and other officials / NGOs / Private agencies as part of the DDMA.
- DDMA's will make sure that school safety is given due attention in the DDMPs. DDMA's will collaborate with and provide training inputs to Department of Education for training of School Safety Focal Point teachers and School Management Committee members to lead school safety efforts in their respective schools.
- Ensure that all school buildings whether government or private, comply with the building codes and directives of the Hon'ble Supreme Court of India in relation to the safety of children.
- Facilitate specialized training in schools for teachers and peer educators.
- Include issues of school safety – in the Disaster Management Plans.
- Conduct periodic mock drills at the district level activity involving schools.

I. Multi-hazard Resistant Designs in Housing

The State is striving to mitigate loss of life and property by adopting Multi Hazard resistant designs and specifications in the type design of Tsunami Houses and other social housing schemes for economically weaker sections. Manual for Disaster Resistant Construction Practices and Cyclone Resistant Building Architecture prepared under UNDP Disaster Risk Management Programme has been made available to the Departments. A matrix of specific measures to be taken for mitigating hazards is provided in Volume - II.

J. Dam Safety and Adaptive Reservoir Management

Under the World Bank assisted Dam Rehabilitation Project, Emergency Operational Plans have been evolved for the major reservoirs.

Adaptive Reservoir Management: During the NIVAR, (November 2020) BUREVI (December 2020) and the unseasonal heavy rains experienced in January 2021, and NEM 2021 the Commissioner of Revenue Administration and State Relief Commissioner has been reviewing the storage inflow and release details of reservoirs with inputs from the Chief Engineer (O & M), Water Resources Department and Co-ordinating with the Secretary, PWD, Regional Chief Engineers of WRD and the District Collectors. As per the standard protocol, the quantum of water release was moderated and well informed to the public through media and location based alerts from Common Alert Protocol.

DDMA's have been advised to follow the guidelines for School Safety, Boat Safety, Hospital Safety and Safety of Museums issued by the National Disaster Management Authority and ensure safety.

CHAPTER – 7

MAINSTREAMING DISASTER RISK REDUCTION (DRR) AND CLIMATE CHANGE ADAPTATION (CCA) INTO DEVELOPMENT PLANS

7.1 Mainstreaming Disaster Risk Reduction – A Mandate of DM Act 2005

The Disaster Management Act 2005 mandates “Mainstreaming Disaster Risk Reduction” into Development Plans at the National and State Levels.

National

“To 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 (Powers and functions of National Authority- Para 6.e of DM Act 2005). To Monitor the implementation of the guidelines laid down by the National Authority for integrating of measures for prevention of disasters and mitigation by the Ministries or Departments in their development plans and projects (Powers and functions of National Executive Committee Para 10.g of DM Act 2005)”

State

“To 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; (Powers and functions of State Authority Para 18.d of DM Act 2005). To Monitor the implementation of the guidelines laid down by the State Authority for integrating of measures for prevention of disasters and mitigation by the departments in their development plans and projects; (Functions of the State Executive Committee- Para 22.e of DM Act 2005)”

The State Plan shall include the manner in which the mitigation measures shall be integrated with the development plans and projects (State Plan- Para 23.4 c of DM Act 2005)

7.2 Context

The need for mainstreaming disaster risk reduction gains urgency in the context of frequent disasters faced by the State and loss of life of humans and animals and damages to public and private properties and critical infrastructures, vast croplands and livelihood of a significant proportion of population.

7.3 Mainstreaming Disaster Risk Reduction & Climate Change

7.3.1 Methodologies for Mainstreaming

Figure 7.1 Adaptation Framework

Mainstreaming	State Development Plans/Strategies	To Mitigate	To ensure Reduced Disaster impacts
	<ul style="list-style-type: none">➢ Policies➢ Land Use, Flood Plain Regulations➢ Building Regulations➢ Budget➢ Sector Plans➢ Programmes➢ Projects➢ City Development plans	<ul style="list-style-type: none">➢ Floods➢ Cyclone➢ Tsunami➢ Landslide➢ Earthquake➢ Drought➢ Heat Wave➢ Lightning➢ CBRN	<ul style="list-style-type: none">❖ Reduction in Number of Vulnerable Areas,❖ Reduction in degree of Vulnerability❖ Minimising loss of Lives❖ Minimising Loss and Damages to public & private properties

Mainstreaming disaster risk reduction into the development planning process essentially means, looking critically at each activity that is being planned, not only from the perspective of reducing the disaster vulnerability of that activity, but also from the perspective of minimizing that activity's potential contribution to hazard-specific vulnerability. To mainstream DRR, appropriate policy interventions and adequate financial allocation would be required.

There are three suggested methods of mainstreaming disaster management into the development process and disaster management. They are:

- Structural Measures
- Non-Structural Measures
- Disaster Mitigation Projects

7.3.2 Structural Measures

The structural measures can address the risk concerns of new projects, ongoing projects and existing structures. All new projects / programmes have to be reviewed to see whether Disaster management concerns have been incorporated. This will ensure that all new critical infrastructure projects like power, water, communication etc., compulsorily comply with the safety standards of disaster reduction.

Strengthen the techno-legal regime like the implementation of provisions of BIS code, Town and Country Planning Act and building bye-laws as well as the national guidelines issued by the NDMA on various disasters ensure that all existing infrastructures are retrofitted from future disasters to the extent possible. It will be ensured that the Ongoing Projects / Programmes are audited so that the

completed structures (infrastructure & installations) have structural alternatives added on to ensure resilience, to specific disasters to which the concerned locations are vulnerable and revisiting existing structures and Projects / Programmes already completed selectively, say first focusing on lifeline buildings like district hospitals, multi-storied buildings etc.

7.3.3 Non-Structural Measures

Flood Plain Zonation is considered an effective non - structural measure for flood management. The basic concept of Flood Plain Zonation is to regulate the land use in the flood plains of a river to restrict the damage caused by floods which occur from time to time. Flood Plain Zonation will aim at defining the locations and the extent of areas likely to be affected by floods of different magnitudes or frequencies and to develop those areas in such a manner that the damages are reduced to the minimum. This in effect is expected to bring restrictions on indiscriminate development and encroachment of flood plains of a river. Flood plain zoning is considered not only necessary in the case of management of floods by rivers it is also useful in reducing the damage cost by drainage congestion, particularly in urban areas. The above approach of structural and non-structural intervention is expected to result in sustainable flood management.

The TNSDMA & NDMA have jointly taken up a Technical Co-operation Project in collaboration with Japan International Co-operation Agency (JICA). The objective is to formulate a Comprehensive Flood Control Master Plan for the targeted river basins in Chennai Metropolitan Area. The Comprehensive Plan will become a core part of the Chennai City Master Plan III.

Non Structural Measures

- 1) Risk Sensitive land use planning consistent with Non-negotiable principles in respect of flood plains along river corridors, water bodies, wetland ecosystems, estuaries and river creeks,
- 2) Building regulations with provisions for structural safety against natural hazards,
- 3) Reconstruction of multi hazard resistant critical infrastructures including Housing, Climate Resilient Power, Irrigation & Flood Control Infrastructures and
- 4) A mechanism for Disaster Risk Audit similar to Environment and Social Audit.

The above measures will be prescribed to pre-empt the damages that would be inflicted by the new development proposed.

In addition new Risk Transfer Instruments to provide risk coverage to reduce the burden of the Government in line with the paradigm shift from relief centric disaster management to resilience focused disaster risk reduction.

The projects & programmes of the following Departments and the regulatory authorities have the scope to reduce the Disaster Risks.

7.4 Disaster Mitigation - Scope for Mainstreaming and DRR & CCA

An analysis of the ongoing projects / programmes implemented by various line departments, revealed that there is good scope to take up the following for disaster risk reduction measures in respective project / programme areas and reduce the degree of vulnerability. In order to mainstream DRR and CCA in to developmental plans, the State Disaster Management Authority (TNSDMA) has directed that “the State Executive Committee shall prescribe the methods and approaches by which the Mitigation Projects proposed by the departments have to be prioritized, and funded from the respective department’s budget and monitored. The thrust of mainstreaming will focus on the following structural and non-structural interventions under prevention & mitigation for reducing the degree of vulnerability and improve the resilience of vulnerable areas.

Figure 7.2 Scope for Mitigation Measures

Scope	Mitigation Measures
<ul style="list-style-type: none"> ➤ Flood protection ➤ Drainage channels ➤ Construction of Instream Reservoirs ➤ Check Dams ➤ Tail end Regulators ➤ Measures to minimize the inundation of crop lands in Cauvery Delta ➤ Periodical maintenance of River Mouths ➤ Prevention of Sea erosion 	<ul style="list-style-type: none"> ➤ Prevention of Sea Water Incursion ➤ Augmenting Drinking Water ➤ Establishing Bio shields, Shelter Belts to diffuse the intensity of Cyclone winds and its impacts ➤ Mitigation of drought through Technology Demonstrations ➤ Land use Regulations, Flood Plain regulation, regulation for coastal ecosystem ➤ Building Regulations, Retrofitting ➤ Retaining walls to prevent landslides ➤ Storm Water drains to channelize rainwater into canals and rivers

Figure 7.3 Departments having ongoing projects and programs for mainstreaming DRR

Identified Departments
<ul style="list-style-type: none"> ➤ Water Resources Department ➤ Public Works Department ➤ Highways & Minor Ports Department ➤ Agriculture & Farmers Welfare Department ➤ Agricultural Engineering Department ➤ Horticultural and Plantation Crops Department ➤ Animal Husbandry, Fisheries and Fishermen Welfare Department ➤ Commissioner of Municipal Administration ➤ Director of Town Panchayats ➤ Rural Development and Panchayat Raj Department ➤ Environment, Climate Change and Forest Department ➤ Director of Environment ➤ Housing and Urban Development Department (Housing Board, Slum Clearance Board) ➤ Chennai Metropolitan Development Authority ➤ Director of Town and Country Planning

7.5 Capacity Building for Mainstreaming DRR and CCA

There is a strong need for building the capacity of departments and local bodies on the need for mainstreaming disaster risk reduction and climate change adaptation, methodologies to bring in a better understanding and effective compliance, up to the implementation level.

CHAPTER – 8

DISASTER RESPONSE AND RELIEF

8.1 Response & Relief Mechanisms

The Revenue Administration and Disaster Management Department (RAMD), is in the process of strengthening disaster management capacity in the State by providing access to essential facilities, creating support systems and building human capacities. To cope effectively with crisis and emergency situations, the department coordinates with the other State departments, policy makers and technical institutions which develop well-defined strategies to manage crisis and also to mitigate the risks caused by the same.

The Commissioner of Revenue Administration / State Relief Commissioner undertakes all activities relating to Disaster Management and Mitigation besides managing relief and rehabilitation activities of any disaster in the State.

At the district level, the District Collector has the responsibility for the overall management of disasters (The Commissioner of Greater Chennai Corporation will be responsible for the overall management of disasters in Chennai Corporation areas). All departments of the State Government, including the Police, Fire Services, Public Works, Irrigation, etc., work in a coordinated manner under the leadership of the District Collector during disasters, except in Metropolitan areas where the Municipal body plays a major role. NGOs are also involved in providing relief, rescue and rehabilitation in recent times.

8.2 Incident Response System

The management of response in disasters requires the Government, Community, civil society and other stakeholders to carry out a large number of tasks. The activities involved in response management would depend on the nature and type of disaster. The Government of Tamil Nadu is adopting Incident Response System (IRS) in the State to ensure the unification of efforts of all the stakeholders to ensure immediate response during disasters to protect people & their properties.

The Incident Response System provides a systematic, proactive approach guiding the concerned departments and agencies at all levels of Government, the private sector and Non-Governmental organizations to work seamlessly in disaster situations. For effective, efficient and comprehensive management of disasters in the State of Tamil Nadu, IRS is critical. The aim is not only to minimize loss of life and property but also strengthen and standardize the disaster response mechanism in the State.

The Chief Secretary to GoTN is the overall RESPONSIBLE OFFICER and is assisted by the Revenue and Disaster Management Department at the secretariat level and by the Commissioner of Revenue Administration / State Relief Commissioner who

is the Incident Commander of the Incident Response System at the State level. The Commissioner, Disaster Management is the deputy Incident Commander. During Disasters all Line Departments function under the overall guidance of the Incident Commander. The District Collector is the Incident Commander at District level.

8.3 Inter Departmental Zonal Teams for Pre-Inspection and Monitoring

- a. Constitution of Inter Departmental Zonal Teams to closely monitor the situation in designated areas covering 5 to 7 vulnerable areas on an average in Areas of Very High and Areas of High Vulnerability and in other areas.
- b. The Inter Department Zonal teams lead by Revenue Authority comprises of representatives from Police, Fire services, Forest department, Agriculture, Rural Development Department, etc.,

8.4 Revenue Administration and Disaster Management Department

- a. To coordinate the preparedness functions of all line departments; It is also overall in charge of formulating and implementing the disaster management policies of the state. Ensure adequate resources are allocated for preparedness work for all departments. Main support department for District Disaster Management Authority. Quick mobilization of resources for relief and rehabilitation to the Disaster spot. Ensure basic facilities for personnel who work on disaster response. Prepare a list of potential shelters while clearly specifying them capacity and check their suitability for accommodating people.
- b. Prepare a detailed contingency plan for disposal of dead bodies and carcasses that will include adequate documentation. Constitute Village-level Preparedness Teams with the help of local bodies, local NGOs and revenue officials.
- c. Coordinate Village/Habitation level mock drills with the assistance of the Rural Development department and Police.
- d. Prepare and update inventory of manpower and resources database every quarter inclusive of Earthmoving equipment, Tipper Lorries, Power saws, Cranes, Boats and any other lifesaving equipment. Annually facilitate the DDMA to update the District Disaster Management Plan.
- e. Maintain, activate and monitor the district level Emergency Operations Centre (DEOC). Establish communications with State Emergency Operations Centre (SEOC) and all stakeholders at all levels for the purpose of receiving and sending warning and information exchange through district control room. Ensure collation of expense accounts for sanctions and audits and to ensure full accountability for funds utilized through the department. The revised norms of assistance for sanction of relief to the victims of the natural calamities under State.

8.5 Response, Relief and Rehabilitation, Evacuation, Search & Rescue

The vulnerability maps provide details of escape routes, relief centres, transportation arrangements, details of Interdepartmental teams, Contact details of first responders which is much needed for Search, Evacuation and Rescue operations.

Maps have also been uploaded in all districts and Greater Chennai Corporation Web sites. They are also made available to the respective Inter Departmental Zonal Teams. The Team of First Responders made in charge of designated vulnerable areas are adequately familiarized and trained.

8.6 Fire Services & other State Level Agencies

The Fire & Rescue Services Department plays a significant role in Search, Rescue and Evacuation operations during different disasters. In order to augment their existing fleet of fire tenders & other equipment, Government have provided additional financial support to the Fire and Rescue Services Department. The Tamil Nadu Special Police, Coastal Security Group & others will also assist in Search, Rescue and Evacuation operations on need basis.

8.7 Emergency Medical Response

The Emergency Medical Response is provided by the Health Department through the Government Hospitals spread throughout the state. The District Disaster Management Authority ensures, a) Adequate stocks of essential medicines and life-saving drugs, b) Scheduled visit of Doctors and Para medical staff to the Relief Centres. The “108” ambulances are deployed in all 38 districts across the State. At present 1,353 ambulances are under operation providing Basic Life Support, Advanced Life Support, Neonatal Care and 4 VVIP ambulances. In addition, 41 First Responder Bike Ambulances also form part of ‘108’ service.

8.8 Emergency Support Functions

The District Disaster Management Authority holds periodical meetings with concerned line departments to foresee emergency situations and puts in place, a system to deliver emergency support functions. Inter Departmental Zonal Committee comprising of multi departmental officials oversee the pre arrangements and monitor the functions of various systems such as Restoration of Electricity, Water supply and Sanitation system, Telecommunication, Road and Transportation Network, Supply chain of food and other essential items etc during disasters. Food being the quite essential commodity, the Tamil Nadu Civil Supplies Corporation keeps two months stock of food items especially in vulnerable areas at any given point of time. The public are also advised repeatedly to keep stock of Food, Water essential medicines and house hold items readily available.

8.9 Tamil Nadu Disaster Response Force (TNDRF)

Government of Tamil Nadu have been strengthening its response mechanisms over a period of time, in order to ensure that people in vulnerable areas are evacuated

to safer places based on forecast and the search & rescue operations are carried out swiftly as and when the disaster strikes. In order to strengthen the disaster response, Government of Tamil Nadu have raised an exclusive battalion as Tamil Nadu Disaster Response Force. Further, modern equipment viz., Robotic Excavators, Vegetation De-clogger, Super Sucker, portable lights and inflatable boats have been procured in order to build the capacity of various agencies involved in search and rescue operations.

8.10 Community First Responders

The skill sets of the community first responders are being enhanced through focussed training programmes to get their services for first aid, CPR, dissemination of alerts, search, rescue and evacuation, distribution of relief materials, organizing community kitchens, shelter management etc.,

8.11 Disaster Relief

As and when a disaster strikes or an early warning is issued the first priority is to ensure that the affected or likely to be affected, are evacuated/rescued from the danger zone to pre-identified Relief Shelters. Evacuation to relief shelters ensures that valuable lives along with their most valuable assets are protected. Once people are shifted to the Relief Shelters, the Government extends, relief measures which play a critical role in providing much needed succour to those affected during the disaster and are temporarily accommodated in the relief centres. The Government of Tamil Nadu follows the minimum standard prescribed by NDMA to provide relief to those accommodated in the relief centres.

The objective of Disaster Relief and Rehabilitation is to provide immediate relief and rehabilitation to the affected Community. The focus of the relief strategies adopted in Tamil Nadu is to ensure that those evacuated and shifted to the relief centres are provided with food and other basic necessities as well as ensuring that their health is taken care. The special needs of Women, Children, Aged and differently abled are given distinctive attention. The security of Women and Children, rebuilding their emotional equilibrium are also part of the priorities of the Government.

The Guidelines for providing Minimum Standards of Relief to the victims of disasters issued by NDMA relating to food & nutrition, Drinking Water and sanitation are being adopted in the State.

8.12 Minimum Standard of Relief (Food And Nutrition)

1. Milk and other dairy products are provided to the children and lactating mothers.
2. Steps are taken to ensure that hygiene is maintained in the camp kitchens.
3. It is ensured that Men and women are supplied food that provides a minimum of 2,400 Kcal per day and children / infants a minimum of 1,700 Kcal per day.
4. The date of manufacture and the date of expiry on the packaged food items are verified before distribution.

5. The community and camp kitchens have adequate facility for large number of people.

8.13 Drinking Water, Dewatering and Sanitation

Supply of clean drinking water to disaster affected areas is extremely essential to prevent any incidence of water borne diseases. The minimum standards prescribed by the State for supply of drinking water to people affected by disasters are adhered to in the relief centres. 3 litres of safe drinking water per person per day is provided to the inmates of the centres.

Providing proper sanitation facilities to men, women and children and ensuring privacy concerns is an important challenge met in the relief centres. The minimum standards prescribed by the NDMA have been adopted by the State for providing sanitation services to people affected by disasters.

In respect of Sanitation, the following standards are maintained in the Relief centres

- 1 toilet per 30 persons.
- Separate toilet and bathing facilities for women and children.
- 15 litres of water per person for toilet / bathing requirements.
- Dignity Kits for women are provided with sanitary napkins and disposable paper bags with proper labelling.
- Necessary arrangements are put in place for clearing the solid waste and for keeping the premises clean.

8.14 Relief Logistics and Supply Chain Management

The Tamil Nadu Civil Supplies Corporation (TNCSC) transports essential commodities of two months requirement to inaccessible and vulnerable / highly vulnerable and its nearby areas, as part of preparedness measures.

8.15 Health and Mental Health Care

Health care of disaster affected pregnant women and lactating mothers, neo-natal, aged, and terminally ill and those suffering from chronic diseases receive utmost priority as they suffer from double jeopardy.

8.16 Relief assistance for loss and damages

The State Government have been providing relief assistance for the approved categories of loss and damages as per the guidelines of the Ministry of Home Affairs issued in April, 2015 under State Disaster Risk Management Fund. The State Government has also notified the specific local disaster which also become eligible for relief assistance. The proposal for enhancement of relief assistance for the already approved items and new items has been approved by the SDMA and sent to Government of India for approval.

CHAPTER – 9

SOCIAL INCLUSION

Tamil Nadu has always been a pioneer State in rooting social inclusion as a core principle of development by the implementation of welfare schemes to protect and benefit all sections of socially disadvantaged groups. The Disaster Management Act 2005 (Chapter 11, Section 61) prohibits all forms of discrimination – be it based on sex, caste, community, descent or religion – in any activities related to disaster risk reduction, disaster relief or humanitarian assistance to the affected people.

The State Disaster Management Plan lays special emphasis on total social inclusion encompassing the

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

The social inclusion will be accomplished engagement of complete society without discrimination of age, gender, race, ethnicity, culture, and language, physical, economic, and social disadvantages in DRR. Meeting the context specific special needs before, during and after a disaster and ensuring inclusive Disaster Risk Management that assures visibility of their presence and equality of rights and opportunities, protection to the dignity of the individual, acknowledging diversity, resilience for everyone, not leaving aside members of any community based on age, gender, and disability. This stems from the complete understanding of the vulnerability of the disadvantaged groups specifically during the periods of disaster and a characteristic compassion, commitment of the State to protect their interests.

9.1 Understanding Vulnerability

The exclusion and enduring undervaluing of women, persons with disabilities and socially excluded groups perpetuates a progression of poverty and isolation. The realities on the ground exhibit that these groups of people suffer the most from the disaster damages and have least capacities to resist and recover from the losses sustained from a hazard or other threats.

The persons with disabilities and older persons face significant challenges due to the gaps in accessibility, for example in obtaining information about risk and in evacuating in the event of a disaster. The effects of natural hazards and disasters similarly tend to cause disproportionate harm to vulnerable and disadvantaged

individuals and groups. They are more likely to be affected by injury, illness or death, damage to homes, workplaces and essential infrastructure, and by limited or absent public services and the availability or affordability of water, food and other consumption items.

9.2 Gender Issues in Disaster Management

The relationships between men and women are powerful forces in every culture. The way these relationships are defined creates differences in the roles and responsibilities of men and women. It also leads to inequalities in their access to, and control over, resources and decision-making powers. Women and girls generally tend to be the main victims of natural disasters for example, lack of skills such as swimming, tree climbing, which are traditionally taught to males. Women and girls are usually denied the opportunity to acquire lifesaving skills such as swimming because of gender bias rendering them less capable of coping with hazards. Following a disaster, there are many situations in which there is likelihood of women becoming victims of domestic and sexual violence. There are cases women avoiding using shelters for fear of being sexually assaulted. Women are more likely to suffer from malnutrition because they have specific nutritional needs when they are pregnant or breast feeding. During drought, in food scarcity situations, women are the first ones to compromise on their food intake. Their traditional gendered role as caretakers and nurturers intensifies in post disaster situations having to take care of the injured and sick when they themselves are injured.

9.3 State's Initiatives

The Corporation of Development of Women Limited started in 1982 and it promotes Women SHGs (Self Help Groups) for enlarging livelihood opportunities of women. The SHGs facilitated to go beyond traditional income generating activities and aim at enhancing skills as masons, carpenters, trading of local products, developing local shops for housing, sanitation and other materials, etc.

Table 9.1 Details of Self-Help Groups Tamil Nadu in 2021

Details of Self-Help Groups		
Sl. No.	Details	Values
1.	No. of SHGs	7.22 lakhs
2.	No. of SHG Members	106.68 lakhs
3.	No. of Rural SHGs	4.80 lakhs
4.	No. of Members	70.97 lakhs
5.	No. of Urban SHGs	2.42 lakhs
6.	No. of Members	35.71 lakhs

7.	Total Savings of SHGs	Rs.8,921 crores
8.	Revolving Fund (RF) @ the rate of Rs.15,000/- per SHG	
	No. of SHGs	6.33 lakhs
	Revolving Fund Amount	Rs.664.09 crores

9.4 Third Gender Welfare

Third Genders face many problems without any care in the society. The Government of Tamil Nadu has constituted a Third Gender Welfare Board to redress their grievances by providing livelihood opportunities, educational assistance and social security through which the Third Gender are given an identity in the society. The Tamil Nadu Third Gender Welfare Board consists of 11 Official Members under the Chairpersonship of the hon'ble minister for Social Welfare and Nutritious.

9.5 Unorganized Workers Welfare Boards

Unorganized Workers Welfare Boards Tamil Nadu is the pioneer among states in enacting law for providing social security cover with respect to Education, Marriage, Maternity, Natural Death, Accidental Death, Funeral, Accident Disability, Monthly Pension and Family Pension. The following welfare boards were taking care of the unorganized workers in the society.

Figure 9.1 Unorganized Sector Welfare Board Details





9.6 Social Inclusions in the Covid 19 Pandemic Period

Over 10.67 lakh migrant workers, rendered jobless following the COVID-19 lockdown, have been brought under a surveillance system where senior bureaucrats directly monitor their welfare, including the provision of accommodation, food and healthcare.

A majority of the migrant labourers, worked in the textile industry, brick kilns and the construction sector and most of them belongs to Odisha, Bihar, Utter Pradesh, West Bengal and Assam. A 'Guest Workers' committee, comprising senior officers was set up to look into issues affecting migrant workers. The District Collectors were entrusted to assist migrant labourers in providing accommodation and food.

A Standard Operating Procedure (SOP) was evolved to identify, enumerate and bring the workers under a management plan under which accommodation, food and healthcare would be ensured for the workers, with daily checks conducted by the local police. District nodal officers in the rank of Deputy Superintendent of Police and police liaison staff in the rank of Head/Police Constable for each accommodation centre were nominated in all cities/districts to gather details of the workers.

Figure 9.2 Migrant Workers organized for their basic needs during Pandemic Time in Chennai -2020



9.7 Scheduled Castes and Scheduled Tribes

Most of the SC and ST communities tend to be poor living on marginal lands that are also highly hazard prone, such as flood plains, unsafe coastal tracts and unstable hillsides. The dwellings of scheduled caste and tribal communities are usually on the margins - be it in urban or rural areas. Combined with hazardous living conditions, chronic poverty and lack of amenities they are most likely to suffer the outbreak of diseases in times of disaster.

It must be ensured that in post disaster situations and in disaster mitigation planning and implementation activities full attention should be provided to ensure social inclusion practices in early warning, evacuation, relief support, rehabilitation and any other process. Special effort should be made to ensure that there are no instances of discriminatory practices in evacuation, distribution of relief material, damage assessment, allocation of housing plots, etc.

9.8 Children

The huge impact of disasters on children is visible with the staggering number of deaths and injuries to children. Children's vulnerability increases with the decrease in age and existing ill-health conditions. Among lives lost in disasters, at least one out of three is a child below 18 years. They are psychologically vulnerable due to their tender age and little experience of disaster situation. Children are the worst affected during disasters due to physical, psychological and social vulnerabilities. The major impact remains due to physical vulnerability as children bear the brunt of shock due to any disaster. Be it natural disasters like flood, earthquake, cyclone,

heat and cold wave or man-made disasters like Fire, epidemic etc. Children are the worst sufferers as they are doubly hit due to separation or loss of their families and their homes in post disaster.

The village disaster management plans need to prioritize children in terms of rescue or evacuation in a disaster situation. School safety becomes an important issue as children spend a considerable amount of time in schools. Children are quick learners and thus need to be involved in all exercises for school safety. Thus, it is important to identify hazards in school premises involving children and develop a school disaster management plan including regular mock drills and training on first aid. There is a strong need for post disaster interventions such as counseling, recreational facilities, children food, nutrition supplements, education materials etc.

9.9 Elderly

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

Tamil Nadu is a pioneer at the national level in implementation of the Social Security Schemes. The Social Security Pension Schemes are extended to all the vulnerable sections of the society such as senior citizens, Differently Abled persons, widows, agricultural labourers, poor farmers, deserted wives and unmarried women of the age of 50 years and above who are destitute and poor. Currently, the Government is granting Rs. 1,000/- per month as pension uniformly under Indira Gandhi National Old Age Pension Scheme (IGNOAPS).

9.10 Differently Abled

Tamil Nadu Government is recognized to be one of the best in the State when it comes to the empowerment of Differently Abled. In order to achieve all round development of Differently Abled persons, Government of Tamil Nadu has created a separate Directorate for the Differently Abled Persons in 1993 by bifurcating the Social Welfare Department. Based on the State Policy, which was formulated in 1994 several initiatives have been taken by the State Government, focusing on comprehensive rehabilitation and inclusion of Differently Abled persons in the society.

As per the 2011 Census, there are 11.79 lakh Differently Abled persons in Tamil Nadu. This constitutes 1.63 % of the State's population and 4.4 % of the Differently

Abled population of the country. As of January 2020, 13.35 lakh Differently Abled persons have been identified and ID card with disability certificate and passbook has been issued. The State Government's endeavor is to create an inclusive society by integrating the Differently Abled persons in the mainstream by eliminating all kinds of barriers to their overall development. Several innovative schemes have been introduced to prevent and control the occurrence of disabilities and to manage the disabilities.

9.11 Responsibility Framework—Social Inclusion

Social inclusion being a cross-cutting thematic area for DRR relevant to all types of hazards and disasters, the responsibilities will be rest with every agency. However, for clarity the leadagencies relevant to each sub-theme have been mentioned.

Table 9.2 – Departments Responsibilities on Social Inclusion

STATE AGENCIES DISTRICTS ADMINISTRATION AND THEIR RESPONSIBILITIES					
Sl. No.	Sub-Thematic Area for DRR	State Agencies (Lead Agencies)	Responsibility - State	Districts (Lead Agencies)	Responsibility - District
1	Gender	Lead Agencies: Department of Social Welfare, Agencies with major roles: Department of Rural Development and Panchayat Raj, Corporation for the Development of Women Limited, Tamil Nadu State Commission for Women,	<ul style="list-style-type: none"> • Guidance and support for gender sensitive DRR approaches • Studies and research • Support for review and changes in existing regulations, norms and directives. • Promote insurance/ risk transfer; encourage gender- sensitive products/campaigns from insurance providers • Guidelines, IEC, mass media campaigns • Capacity development guidelines • Inclusion of gender concerns of DRR in curriculum Development. • Guidance on preventing, checking and investigating discriminatory practices, violence and abuse 	Lead Agencies: District Social Welfare Office. Agencies with major roles: District Revenue Office, District Rural Development Agency, TNCDW/ TNSRLM. Supporting Agencies: All Agencies Associated with DRR directly or indirectly	<ul style="list-style-type: none"> • Ensure that special efforts are made to make DRR gender inclusive and to ensure participation of women • Ensure that there are no discriminatory practices that marginalize sexual and gender minorities at any stage of DRR, Recognize the additional vulnerabilities of sexual and gender minorities such as transgender. • HRVCA- Risk Assessment to take care of women and transgenders vulnerabilities. • Use of Information and Data Management to support gender sensitive approach - DDMAs and SDMA Convergence of concerned departments to ensure gender sensitive DRR • Shelters/ Temp Shelters/ Relief Camps - provision for specific needs • Enabling Environment • Review and changes in existing regulations, norms and directives to make them gender sensitive • Training, Awareness, Mock drills, Vocational Training/ Skill development • Empowering, especially leadership in DRR

STATE AGENCIES DISTRICTS ADMINISTRATION AND THEIR RESPONSIBILITIES					
Sl. No.	Sub-Thematic Area for DRR	State (Lead Agencies)	Responsibility - State	Districts (Lead Agencies)	Responsibility - District
2	Scheduled Castes (SC) & Tribes (ST)	<p>Lead Agencies: Department of Adi Dravidar and Tribal Welfare.</p> <p>Agencies with major roles: Department of Law, All line departments</p>	<ul style="list-style-type: none"> • Guidance and support • Promote studies and research on DRR challenges for SC communities • Promote studies and research on disaster response and mitigation strategies appropriate and acceptable to the tribal communities • Review and amendment of existing regulations, norms and directives to make them consistent with needs of DRR 	<p>Lead Agencies: District Adi-Dravidar and Tribal welfare officer</p> <p>Agencies with major roles: THADCO office</p>	<ul style="list-style-type: none"> • Curriculum Development with gender sensitive approach • Specific knowledge products • Promoting insurance • Gender audit of DRR measures with the assistance of the State Women's Commission • Ensure joint ownership in the name of husband and wife of houses reconstructed and assets provided under post-disaster recovery assistance
				<p>Supporting Agencies: All Agencies Associated with DRR directly or indirectly</p>	<ul style="list-style-type: none"> • HRVCA – Risk Assessment to specifically include SC/ST vulnerabilities (locational, existing discriminatory practices, any, creating hindrances in DRR, access to information, access to risk reduction resources) • Protecting the tribal identity, traditions and customs in post-disaster situations in different phases of DRR • Ensure steps taken for DRR do not cause irreversible damage to the community's culture, tradition, habitat and ecosystem • Use of Information and Data Management to support relevant issues - DDMA and SDMA

STATE AGENCIES DISTRICTS ADMINISTRATION AND THEIR RESPONSIBILITIES					
Sl. No.	Sub-Thematic Area for DRR	State (Lead Agencies)	Responsibility - State	Districts (Lead Agencies)	Responsibility - District
				<ul style="list-style-type: none"> • Convergence between concerned departments in schemes meant for SC/ST for DRR Shelters/ Temp Shelters/Relief Camps – non- discriminatory • Ensuring enabling environment for participation • Review and amendment of existing regulations, norms and directives to address requirements of implementing DRR in SC/ST settlements (e.g. retrofitting, social housing, hazard resistant construction) • Training, Awareness, Mock drills, Vocational Training/ Skill development • Empowering, especially leadership in DRR • Curriculum development with focus on issues of SC/ST communities • Specific knowledge products • Promoting insurance products/ campaigns • Include non-discriminatory implementation of DRR in Social audit 	

STATE AGENCIES DISTRICTS ADMINISTRATION AND THEIR RESPONSIBILITIES					
Sl. No.	Sub-Thematic Area for DRR	State (Lead Agencies)	Responsibility - State	Districts (Lead Agencies)	Responsibility - District
3	Children	Lead Agencies: Social Welfare and Women Empowerment Department Agencies with major roles: TNSDMA Supporting Agencies: All Agencies Associated with DRR directly or indirectly	<ul style="list-style-type: none"> Guidance and support for various DRR initiatives for children Review regulatory and institutional needs for the protection and safety of children Supervision and monitoring of DRR initiatives for children – pre-school, school-going and children not in school Support for implementing measures for proper protection and care of disaster affected children Mobilizing support to disaster-affected children from national and international agencies working for children's welfare Guidance and support from NCPCR for care and protection of children immediately after a disaster and during PDR 	<ul style="list-style-type: none"> Lead Agencies: District Noon meal scheme office, District Integrated Child Development Scheme office and District Child Protection office, Agencies with major roles: 	<ul style="list-style-type: none"> Make special arrangements for disaster preparedness and safety of various children's institutions Regulatory measures for ensuring school safety and disaster preparedness in schools Regular mock drills and other preparedness measures in all schools and children's institutions Pay special attention to children's institutions after early warning and post-disaster Ensure that in post disaster situations children do not face isolation, anxiety, trauma, separated from their families or parent(s) Take adequate measures to prevent and stop child abuse and maintain strict vigil against child trafficking Take measures to prevent and stop child labour in post disaster situation Sensitize all agencies and key personnel associated with protection of child rights and safety, including those connected with juvenile justice such as police, CWC, JJB, CARA and DCPU

STATE AGENCIES DISTRICTS ADMINISTRATION AND THEIR RESPONSIBILITIES

Sl. No.	Sub-Thematic Area for DRR	State Agencies (Lead Agencies)	Responsibility - State	Districts (Lead Agencies)	Responsibility - District
				<p>Supporting Agencies: Integrated Child Development Scheme office and District Child Protection office.</p>	<ul style="list-style-type: none"> Promote community-based care and protection of the affected children. SCPS should initiate steps to monitor post-disaster threats to children and take counter measures along with the nodal agency at the state/UT for child rights and protection
4	Elderly	<p>Lead Agencies:</p> <p>Department of Social Welfare, TNSDMA</p> <p>Department of Social Welfare, TNSDMA</p>	<ul style="list-style-type: none"> Guidance and support to address DRR needs of the elderly Promoting awareness of the challenges faced by the elderly in disasters Promoting agencies and organizations working for the welfare of the elderly to develop expertise for supporting DRR efforts for the elderly Mobilizing support to the elderly in disaster-affected areas from national and international agencies working for the wellbeing of the elderly 	<p>Lead Agencies: DDMA and District Social Welfare office.</p> <p>Agencies with major roles: DDMA and District Social Welfare office.</p> <p>Supporting Agencies:</p> <p>All Agencies Associated with DRR directly or indirectly</p>	<ul style="list-style-type: none"> Sensitizing local communities about additional vulnerabilities of the elderly persons in the communities and promote neighborhood groups or responsible individuals to assist the elderly Make special arrangements for disaster preparedness and safety of various institutions for the elderly such as old age homes, retirement homes and shelter homes for the elderly Linking organizations working for the welfare of elderly with community initiatives for DRR Preparing lists of all the elderly persons living without adequate support, periodically reviewing their situation and check the status of social network (neighbours, relatives, friends) and other arrangements for their support

STATE AGENCIES DISTRICTS ADMINISTRATION AND THEIR RESPONSIBILITIES					
Sl. No.	Sub-Thematic Area for DRR	State (Lead Agencies)	Responsibility - State	Districts (Lead Agencies)	Responsibility - District
4				<ul style="list-style-type: none"> In the risk season or after early warnings, take measures to ensure that the elderly is informed and prepared Involve elderly in disaster preparedness and planning to the extent they can contribute Assess medical and health support needs of the elderly in each area and maintain stocks of crucial items Special attention to the protection of property and assets of the elderly after evacuation or post disaster situations. 	<ul style="list-style-type: none"> Sensitizing local communities about the Differently Abled living in the community and their special needs particularly during disasters Promote neighborhood groups assist Differently Abled or ensure a Personal Support Network consisting of at least three persons who are trusted for each Differently Abled Make special arrangements for disaster preparedness and safety of various institutions for the Differently Abled such as school for the blind, hostels for Differently Abled and any facilities dedicated to Differently Abled's Linking organizations working for the welfare
5	Differently Abled	Lead Agencies: Commissionerate for Welfare of the Differently Abled,	<ul style="list-style-type: none"> Guidance and support to address DRR needs of Differently Abled as per global best practices Promoting awareness of the DRR challenges for Differently Abled Promoting agencies and organizations working for the welfare of Differently Abled to develop expertise in DRR Mobilizing support to the Differently Abled in disaster-affected areas from national and international agencies working for the wellbeing of the Differently Abled Encourage technological support and innovations for the benefit of the Differently Abled in DRR, 	<p>Lead Agencies:</p> <p>District officer for Welfare of the Differently Abled, DDMA All line departments.</p>	<ul style="list-style-type: none"> Sensitizing local communities about the Differently Abled living in the community and their special needs particularly during disasters Promote neighborhood groups assist Differently Abled or ensure a Personal Support Network consisting of at least three persons who are trusted for each Differently Abled Make special arrangements for disaster preparedness and safety of various institutions for the Differently Abled such as school for the blind, hostels for Differently Abled and any facilities dedicated to Differently Abled's Linking organizations working for the welfare

STATE AGENCIES DISTRICTS ADMINISTRATION AND THEIR RESPONSIBILITIES					
Sl. No.	Sub-Thematic Area for DRR	State (Lead Agencies)	Responsibility - State	Districts (Lead Agencies)	Responsibility - District
				<ul style="list-style-type: none"> • In anticipation of a hazard or after early warnings, take measures to ensure that all Differently Abled's are properly informed and prepared • Involve Differently Abled's in disaster preparedness and planning as equal participants • Special attention to the protection of property and assets of the Differently Abled's after evacuation or post disaster situations. 	of Differently Abled's with community initiatives for DRR

CHAPTER - 10

MEDIA MANAGEMENT

Media and communication plays a crucial role in disaster management by disseminating information about the disasters, educating public about disaster, highlighting vulnerable zones, spreading warning and alert, reporting of disaster events, gathering and transmitting information about affected areas, assisting in rescue and relief operations, disseminating information about public safety, informing and alerting the concern authorities and government officials, assisting volunteers, relief organizations etc. The continuous and factual coverage of disaster event by media immediately after a disaster aids response and decision-making activities, thereby saving lives and property.

There is a need to focus on promotion of efficient, safe and resilient communication environment for emergencies and disaster situations. Better linkage, coordination and cooperation among stakeholders and media for exchange of ideas, information, knowledge and experiences on disaster risk management is vital. Encouragement of the media to be partners in disaster relief, building a culture of proactive reporting, establishment of community based media and communication network to ensure last mile connectivity will be the new approaches to harness the power of media.

The Media Coordination unit at State /District level has to Collect, process and disseminate information about an actual or potential disaster situation to all stakeholders to facilitate response and relief operations with updated information on disaster and loss.

The Media Co-ordination Unit must maintain contacts with mass media to inform public regarding the impact of disaster and the measures taken for the welfare of the affected people. A proper schedule for media briefing (once/twice/thrice/daily depending on the severity of the disaster) by a designated nodal officer at State / District level to be charted out. Department of Information and Public Relations has to provide the approved press releases to the Visual and Print media so that people have access to reliable and uniform message. TNSDMA / DDMA may brief the press on various measures initiated by the Government. The official briefing the media need to interact proactively with public and media during and after the disaster on rescue and relief work.

Ethical guidelines for coverage of disaster will be prepared and shared with all media agencies. Mechanisms will be laid for broadcasting warnings, do's and don'ts etc. to media and public before (if applicable), during and after the disasters. The Government of Tamil Nadu has declared the Media Persons as Front-Line Workers. A Capacity Building Programme for Officials and Media will be launched to ensure the guidelines are followed by both sides.

Visibility

All the vehicles engaged in relief work should have banners and stickers of the Government of Tamil Nadu emblem and the logo of TNSDMA for visibility. Department officers/staff drafted for Disaster-related works should be provided with Armbands with Emblem of Government of Tamil Nadu, Department name & Tamil Nadu State Disaster Management Authority (TNSDMA) to make better visibility and thereby making the public aware about their services.

A separate media room for on-the-spot information dissemination on the current natural disaster is also part of SEO. Briefing to press and media on the imminent disaster is also carried out. Ensure the precise and accurate incident briefing to public and proper rumour and panic management. Ethical guidelines for coverage of disaster are prepared and shared with all media agencies. Plan is prepared for providing/broadcasting warnings, do's and don'ts etc. to media and ensure its dissemination.

DISASTER RECOVERY, RECONSTRUCTION AND BUILD BACK BETTER

11.1 Tamil Nadu Experience

Tamil Nadu is one of the few States that addresses the long-term concerns of the Community by not only building resilient infrastructures but also by improving access to services, imparting new skills, strengthening livelihood security and expanding services with well-coordinated actions as part of the Build Back Better strategies. The process of “Building Back Better” starts with the commitment to deliver the best with the available resources and also by accessing international funding & implementing the Projects within specified time limits. The Build Back Better strategies adopted by Tamil Nadu instill confidence in the communities which were psychologically traumatized and economically devastated due to unprecedented disasters. The activities and measures initiated under build back better strategies focus on prevention and mitigation of disaster risks.

As a part of build back better strategies and experience gained during the past disasters, Government of Tamil Nadu undertook need assessment in a post-disaster scenario, taking into account not only the damages that have been caused to the infrastructure, losses incurred by the community but also design interventions needed through a detailed assessment carried out by different agencies encompassing Housing, Industry, Public Infrastructure, Health, Agriculture and – other sectors.

Based on the needs assessment, projects are undertaken with a special focus on risk-proofing the housing infrastructure of the vulnerable sections and enhancing livelihood opportunities and resilience of the community. In addition, the infrastructure of different sectors is built back better. The core philosophy principle of Building Back Better is deeply ingrained in all the project designs and interventions.

The completed major projects in the recent past, and on-going for the purpose of rehabilitation and reconstruction of Housing, Public Infrastructures, Livelihood systems to enhance the resilience of the community and also for Disaster Risk Reduction are detailed below:-

11.2 Tsunami Rehabilitation

The Government of Tamil Nadu implemented a number of projects one after the other to rehabilitate the Tsunami affected areas. The Emergency Tsunami Rehabilitation Project (ETRP), Tsunami Emergency Assistance Programme (TEAP), Vulnerable Reduction to Coastal Communities (VRCC) Rajiv Gandhi Rehabilitation Package Aided by Government of India, and currently the Coastal Disaster Risk Reduction Project (CDRRP) have addressed various aspects such as Housing, Livelihood, of

the Tsunami affected areas and the community Shelters, Fisheries infrastructures, Reclamation of agricultural lands, Reconstruction of Public Infrastructures, Early Warning Systems, Communication facilities to Fishermen, Community Based Disaster Risk Management etc.

To be more specific under Coastal Disaster Risk Reduction Project, among others, 14,347 Multi Hazard Resilient Houses have been constructed in 488 coastal habitations, 121 Multi-Purpose Evacuation Shelters have been constructed which are put to use as Schools, Community Halls and Waiting Halls in Public Health Centres during normal days and as Evacuation Shelters during disaster events.

11.3 15th Finance Commission - Paradigm Shift in Recovery & Reconstruction

According to the recommendations of 15th Finance Commission, Recovery presents an opportunity to get development activities off the ground as governments and communities spend recovery assistance on rebuilding infrastructure and houses, reviving livelihoods and improving civic services. The present near-total expenditure focus on response and relief does not leave any resources left for recovery. Without recovery, development gets seriously affected, which deepens the incidence of poverty and backwardness.

Based on a clear appreciation of the pressing needs to rebuild assets and livelihoods, **the 15th Finance Commission has recommended setting up a Recovery and Reconstruction Facility, both within the SDRF and NDRF, and suggested that 30 per cent of the resources available with these two funds be earmarked for this purpose.**

11.4 Post Disaster Need Assessment (PDNA)

In parallel to the PDNA planning process, the formulation of Reconstruction and Rehabilitation will be initiated by TNSDMA with the objectives to –

- Provide indicative steps to facilitate a sequenced, prioritized and flexible multisectoral planning guide for recovery programmes.
- Provide guidance to state for organizing post-disaster recovery in accordance with the damages, losses and needs following a disaster event.
- Plan and implement a post-disaster recovery programme in an inclusive and transparent manner (including financial planning and institutional arrangements).
- Recommend policies, strategies, areas of technical assistance and monitoring support needed for recovery programming.
- Optimise the use of national and state flagship programmes, other schemes and resources for implementing recovery. Provide guidance to reduce future disaster risks and allow for further opportunities for long-term sustainable development.

11.5 Short, Medium- and Long-term Recovery Strategies

The disaster recovery programmes usually proceed in three distinct stages to facilitate a sequenced, prioritized, and flexible multi-sectoral approach. Three recovery stages, in which appropriate policies and programmes tend to be planned and implemented are: a) Short term, b) Mid -Term, and c) Long-term.

11.6 Repair, Reconstruction and Relocation Strategies

The State as per the existing policy provides assistance to the affected citizen to repair and restore damaged houses and dwellings. Respective departments carry out repair and restoration of the related infrastructure, facilities, services, etc. at the earliest so that the essential services can be resumed to bring the life back to normalcy. The government shall also coordinate with national and international NGOs, donor agencies and other government bodies to prioritize restoration of critical infrastructure like health, temporary housing, lifesaving facilities, critical government infrastructure, etc.

11.7 Relocation

The State Government believes that need-based considerations and not extraneous factors drives the relocation of people. The local authorities, in consultation with the affected persons and under the guidance of TNSDMA, shall determine relocation needs taking into account criteria relevant to the nature of the calamity and the extent of damage. Relocation efforts will include activities like:

1. Gaining consent of the affected population
2. Land acquisition
3. Urban/rural land use planning
4. Customizing relocation packages
5. Obtaining due legal clearances for relocation
6. Getting the necessary authorization for rehabilitation
7. Livelihood rehabilitation measures for relocated communities,

Wherever necessary while planning on site reconstruction or relocation, adequate care will be taken to provide the community with all basic amenities in close vicinity of the reconstruction site. This leads to inclusive and holistic reconstruction process. Some of the basic amenities are as follows:

1. Health
2. Education
3. Provision of adequate drainage system
4. Provision to drinking water
5. Provision for proper sanitation
6. Provision for Electricity

7. Provision for waste collection and management
8. Market place and
9. Connectivity to road and railways

11.8 Rehabilitation Planning and Strategy (Socio-Cultural, Psychological, Economic and Environmental Issues)

Holistic rehabilitation post disaster includes many inter linked aspects. It is critical to address the need of affected population in order to achieve early recovery and to bring back life to its normalcy.

11.9 Socio-economic Rehabilitation

Socio-economic rehabilitation is aimed at revamping the social and economic fabric to the pre-disaster or a better situation. It also addresses issues like that of restoration and generation of livelihoods. This is done by providing required training, skill, tools and equipment to restart the previous or new livelihood options. Care should also be taken to address the needs of various socially and economically vulnerable groups like that of women, adolescent girls, old age persons, person with disabilities, children, destitute, below poverty line population, scheduled castes, scheduled tribes, particularly vulnerable tribal groups, etc.

11.10 Psychological Rehabilitation

Disasters often lead to long time stress and trauma due to loss of near and dear ones, injuries, loss of limbs, loss of housing and related property, trauma generated by facing the disaster and fearful sites, fear of repetition of the disaster, etc. If not addressed appropriately, it may lead to lifelong psychological fear and disorders, thus it is necessary to provide psycho-social first aid and psychological care to the affected population.

11.11 Environmental Rehabilitation

Environmental impacts of disasters can result in serious risk to life and livelihoods if not addressed. Environmental emergencies like uncontrolled, unplanned or accidental release of a substance into the environment not only impact human life in many ways but also damage environment to great extent which may be impossible or may take years to restore to its original. Thus, without proper consideration of the environment, pre-existing vulnerabilities may be recreated or exacerbated. Thus, Government of Tamil Nadu along with other concerned department will ensure measures to decontaminate the affected elements like air, river, water bodies, forests, etc. and to revive the eco-system services.

11.12 Build Back Better approach in recovery, rehabilitation and reconstruction

As a part of build back better strategies and experience gained during the past disasters, the core philosophy principle of Building Back Better is deeply ingrained in

all the project designs and interventions. The World Bank assisted Coastal Disaster Risk Reduction Project, Irrigated Agriculture Modernization of Water Resources Management Phase, Tamil Nadu Irrigated Agriculture Modernization, Dams Renovation Improvement Project, ADB assisted Climate Adaptation in Vennar Subbasin in Cauvery Delta Project have imbibed the Build Back Better principles. The Multi Hazard resilient housing evolved during Post Tsunami Rehabilitation has led to the launch of Chief Minister's Green Houses implemented by the State. In the Highways Sector, a practice of providing Box Type Culverts (which allows smooth and speedy flow of flood waters) in place of Pipe Culverts (which get clogged often and hinder the flow of water) is followed.

A) Services required during recovery process:

Once the response process is in place, the recovery process is activated by resorting to the following actions

- Providing and erecting temporary housing for the victims of the disaster who are displaced.
- Facilitating and providing claims and grants as per the relief manual.
- Providing counseling to the victims
- Providing and facilitating medical support to the victims requiring long term care.
- Clearing and disposing off the debris created as a result of collapse of physical infrastructure and elements.
- Initiating the process of reconstruction by adopting improvised technologies for safe construction and with participation of the communities.

The Department of Social Welfare, Government of Tamil Nadu, will take extensive steps for bringing the affected villagers out of the trauma and depression. Psychosocial support will be provided with the support of experts from Government and Non-Governmental Organisations. Also, the Anganwadi workers are trained to provide counseling services to the rural women in trauma. Institutes like NIMHANS, will extend the capacity building support, willing community First Responders are proposed to the trained for providing psychosocial support.

B) Livelihood Support:

People affected by disasters, more often than not, lose their livelihood. Relief employment under MNREGA is one of the several avenues for providing alternate source of livelihood to the affected people. During the year 2016-17, as a measure to mitigate the effects of drought situation, and to improve livelihood of the rural mass, the number of days of employment provided to a family was increased from 100 to 150 days. As part of the coastal disaster risk reduction and tsunami rehabilitation strategies Government has launched special programmes for enhancing livelihood opportunities for the vulnerable poor.

C) Coordination with Non- State Actors for Relief Efforts:

When a natural calamity of extremely severe in terms of intensity and extent strikes, lot of Non-State Actors such as national, international agencies and even foreign nationals pour in relief material and assistance. Special arrangements are made to coordinate with multiple agencies to ensure that the relief so obtained reaches all the needy in the most transparent manner. The NGOs co-ordination centres at State & Districts, the Donors and Seekers platform will render their services.

D) Institutional Mechanism:

The Commissioner of Revenue Administration State Relief Commissioner with the support of DDMA ensures smooth distribution of relief material, undertakes all activities relating to Disaster Management and Mitigation besides managing relief and rehabilitation activities of all the disaster in the State. At the district level, the District Collector has the responsibility for the overall management of disasters (The Commissioner of Greater Chennai Corporation will be responsible for the overall management of disasters in Chennai Corporation areas). All departments of the State Government, including the Police, Fire and Rescue services, Urban and Rural Local Bodies, Health, Public Works, Irrigation, etc., work in a coordinated manner under the leadership of the District Collector during disasters. In the Greater Chennai Corporation areas the Municipal body plays a major role.

11.13 Restoration of Damaged Cultural Heritage Sites, their Precincts and Museums

Post disaster repairs and reconstruction of damaged sites / precincts to be undertaken based on sound documentation and assessment practices. Poor reconstruction practices lead to further physical damage to heritage structures, may worsen its structural vulnerability and carries the risk of erasing the heritage features. Restoration or reconstruction of heritage after disasters should go beyond buildings and it should look at heritage livelihood, traditional trades/ crafts etc.

11.14 Way Forward

The Ministry of Home Affairs is expected to approve the Guidelines for Recovery and Reconstruction. Based on the guidelines the State will take up Recovery and Reconstruction Programmes on a priority basis. However major projects for Recovery, Reconstruction and Rehabilitation will be taken up with the funding support of Externally Aided Projects.

CHAPTER - 12

FINANCIAL MANAGEMENT

The expenditure on disaster management more specifically for post-disaster response, relief and rehabilitation, are incurred by the State Governments and district administration and almost the entire budgetary allocations for the same are met from the allocations made to the States annually for the five year fiscal cycle on the basis of the recommendation made by the Finance Commissions. The entire system of financing disaster management in India has evolved around the recommendations of the successive Finance Commissions. The recommendations of the Finance Commissions have been based on the over-riding principle that financial assistance to the States shall be limited to providing immediate gratuitous relief to the victims of natural calamities and to restore the public utilities so that the affected persons are able to restart their economic activities again. This relief centric approach did not encourage strategic thinking on the total financial requirement of the States for holistic management of disasters, quantification of resource gaps and how such gaps can be met over time by various innovative financial instruments for risk management.

The Disaster Management Act, 2005 has ushered a complete paradigm shift in disaster management in India. As per DM Act 2005, financial assistance in wake of notified disasters is provided through State Disaster Response Fund (SDRF) and National Disaster Response Fund (NDRF). These funds have been created under the legal framework of Section 46 and 48 (1) of the Disaster Management Act, 2005 respectively. The allocations to SDRF and NDRF are as per Finance Commission recommendation.

The immediate relief is provided in accordance with the guidelines on constitution and administration of State Disaster Response fund and National Disaster Response Fund issued by Ministry of Home Affairs, Disaster Management Division vide OM No. 33 - 5 / 2015 - NDM - 1, dated 30th July 2015. The quantum of relief paid is in accordance with items and norms of assistance approved by Ministry of Home Affairs, Government of India. Necessary proposals for revision of the SDRF Norms have been sent to the Ministry of Home Affairs with the approval of the TNSDMA in June, 2021.

In the event of a calamity of severe nature, when the State's SDRF is insufficient, additional central assistance is sought from NDRF by submission of memorandum and following other laid down procedure. The MHA follows the following procedure to release financial assistance to the affected state government.

- The memorandum of the State Government is examined to assess the likely requirement of funds as per the items and norms of expenditure under SDRF/NDRF. If a preliminary examination reveals that there are adequate funds in the SDRF with State for providing relief as per norms, the state will be advised accordingly.
- If a preliminary examination reveals that the State is in need of assistance, an Inter-Ministerial Central Team will be deputed to the disaster affected area for an on the spot assessment.
- The report of the Central team will be examined by the National Executive Committee (NEC) through its sub-committee, which will assess the extent of relief expenditure, which can be made available through the NDRF, as per the norms of NDRF and SDRF, and make recommendations for the same.
- The High Level Committee will consider the recommendations of the Sub-Committee of NEC and approve the quantum of immediate assistance to be released from the National Disaster Response Fund.

12.1 Recommendations of the 15th Finance Commission

The 15th Finance Commission has made recommendations on all aspects of disaster risk financing based on the following.

- i. The primary responsibility for disaster management rests with States.
- ii. A disaster management cycle consists of several functions – Prevention, Preparedness, Response, Mitigation, Recovery and Reconstruction.
- iii. After subsuming a substantial amount of the National Calamity Contingency Duty (NCCD) into the goods and service tax (GST) and the creation of SDMF and NDMF, the Union Government's fiscal space for disaster management at the national level has reduced significantly.
- iv. Recognizing the importance of alternative sources of funding and the role that market instruments can play in risk management.

As per the recommendations of the 15th Finance Commission, mitigation Funds has been created separately at the national and state levels, in the form of a National Disaster Mitigation fund (NDMF) and State Disaster Mitigation Fund (SDMF) are setup. The Mitigation funds aims to support those local level and community-based interventions, which reduce disaster risks and promote environmental-friendly settlements and livelihood practices, and not large-scale infrastructure interventions.

12.2 Disaster Response fund, Disaster Mitigation Fund

State Disaster Risk Management Funds (SDRMF) has been set up as per the recommendation of 15th Finance Commission (FC). SDRMF comprises of the State Disaster Mitigation Funds (SDMF). Out of the total SDRMF, the share of SDRF shall be 80 per cent and the share of SDMF 20 per cent. Within the SDRF allocation of 80 per cent, there would be three sub-allocation as listed below.

Response and Relief (40 percent), Recovery and Reconstruction (30 percent) and Preparedness and Capacity-building (10 percent).

While the funding windows of SDRF and SDMF are not inter-changeable, there could be flexibility for re-allocation within the three sub-windows of the respective Funds and such re-allocation shall not exceed 10 percent of the allotted amount of that sub-window.

The Ministry of Home Affairs, Government of India have also requested the States to constitute the State Disaster Mitigation Fund and accordingly, the State Government have constituted the State Disaster Mitigation Fund for undertaking projects exclusively for the purpose of disaster mitigation. Necessary guidelines on constitution and administration of State Disaster Mitigation Fund has also been issued by the State Government, based on the guidelines issued by the Ministry of Home Affairs, Government of India dated 14.1.2022.

SDMF shall be used for those local level and community-based interventions which reduce the risks and promote environment-friendly settlements and livelihood practices. However, large-scale mitigation interventions such as construction of coastal walls, flood embankments, support for drought resilience etc. should be pursued through regular development schemes and not from the mitigation fund.

12.3 Provision of funds for programmes and activities

The allocation for SDRMF for the year 2022–2023 for Tamil Nadu is Rs.1428 crores.

Table 12.1 SDRMF Break Up Details

Breakup for 2022 - 2023	Rs. (In Crore)
State Disaster Risk Management Fund (Union Share 75% + State Share 25%)	1428.00
Funds Earmarked from SDRMF	
State Disaster Mitigation Fund (20% of SDRMF)	285.60
Response and Relief (30% of SDRMF)	428.40
Recovery and Reconstruction (40% of SDRMF)	571.20
Preparedness and Capacity Building (10% of SDRMF)	142.80

12.4 Earmarked allocations from NDRF/NDMF

12.4.1 Reducing the Risk of Urban Flooding in Chennai from NDMF

The 15th Finance Commission has provided Rs 2500 Crores for Reducing the Risk of Urban Flooding in Seven most populous Cities. An allocation of Rs 500 Crore Chennai is to be provided at the rate of Rs 100 Crore per year in five years. (2021–2026)

12.4.2 Catalytic Assistance to Twelve Most Drought-prone States from NDMF

In order to take up drought mitigation programmes Tamil Nadu has been provided with Rs 100 crore. This will be provided at the rate of Rs 20 Crore over a period of 5 Years. (2021-2026).

12.4.3 Managing Seismic and Landslide Risks in Ten Hill States from NDMF

An allocation of Rs 750 Crore has been provided for Managing Seismic and Landslide Risks in Ten Hill States. In view of the recurring landslides in Nilgris District and emerging landslide related risks in the hill areas of Theni, Dindigul, Salem, Thirupatthur districts the Govt of India will be approached to provide allocations to Tamil Nadu.

12.4.4 Expansion and Modernization of Fire Services (NDRF – Capacity Building)

An allocation of Rs 5,000 Crore has been provided under NDRF – Capacity Building Component for Modernizing the Fire Services of the Country. The State will prepare a perspective plan for modernization of fire services to avail funding support from Govt of India.

12.5 Other national state level funding provisions, schemes and programs

- a. **Public Private Partnership:** There are projects/schemes in which funding can be done by a public sector authority and a private party in partnership. In this State Govt. along with Private organizations and with Central Govt. share their part.
- b. **Grant in Aid:** State government may receive a grant in aid from Central Govt, or a local authority, bilateral or multilateral funding agencies, etc. to carry out specific projects/schemes related to disaster risk reduction and management.
- c. **Donations:** The Authority may accept grants, subventions, donations and gifts from the Central or State Government or a local authority or any individual or body, whether incorporated or not.
- d. **Funds:** Disbursement and Audit the funds raised from funding agencies are usually accompanied by stringent disbursement and usage restrictions. It is therefore important to monitor the disbursement of such funds to ensure that none of the covenants are breached. TNSDMA, in conjunction with relevant agencies, shall monitor disbursal of funds by:
 - Prioritizing resource allocation across approved projects
 - Establishing mechanisms (like a chain of banks, collection centres, nature of accounts, spread etc.,) for collection of funds
 - Ongoing monitoring and control of fund usage throughout actual project implementation.

In the event of SDRMF and NDRMF assistance falling short of the required assistance, the Union and States should have recourse to other financial instruments. These instruments are identified as reconstruction bonds, contingent credit/stand-by facility with international financial institutions, crowd funding platforms and corporate social responsibility

Insurance mechanisms, which act as a social safety net and supplement the existing financial mechanisms, need to be introduced in partnership with insurance companies after due diligence is done. These mechanisms are: national insurance scheme for disaster-related deaths, synchronising relief assistance with crop insurance, risk pool for infrastructure protection and recovery, and access to international reinsurance to the outlier hazard events.

12.6 Guidelines / directions other funds including Corporate Social Responsibility Fund (CSR)

Corporate social responsibility is a broad concept that can take many forms depending on the company and industry. Through CSR programs, philanthropy, and volunteer efforts, businesses can benefit society while boosting their brands. Section 135 of the Act, Schedule VII and Companies (CSR) Policy Rules, 2014, provide a robust framework for companies to partner in contributing to the country's development challenges through its managerial skills, technology and innovation. Besides providing an overall guidance framework for the corporates to carry out their CSR initiatives, it also provides them with ample autonomy and flexibility to design and implement programmes.

The monitoring is based on disclosures made by the company in the prescribed form and annual report. The company has to disclose its details on CSR implementation, including allocation of funds, destination state and development sector where the CSR expenditure is done, etc. annually to this Ministry through filing of annual report on CSR. The mandatory CSR reporting has its advantages as it allows the corporates to demonstrate their commitment towards CSR and communicate with different stakeholders, including shareholders, regulators, customers and society at large.

CHAPTER 13

SDMP - PLAN MANAGEMENT

13.1 SDMP - Development

The State Disaster Management Plan will be reviewed and updated annually. A process will be established for reviewing and revising the plan in consultation with all the relevant stakeholders. This will focus on adding the information gained by exercising the plan to the lessons learnt while executing and start the planning cycle all over again the plan up-dation process should begin in January in each year and should be completed by month of April, based on inputs from the following:

- a. Drills and Rehearsals, Awareness Campaigns
- b. Recommendations from all departments in their Annual DM Plan.
- c. After any significant change in operational resources (e.g., policy, personnel, organizational structures, management processes, facilities, and equipment)
- d. After enactment of a new law or amended law or ordinance
- e. Directions from Ministry of Home Affairs, National Disaster Management Authority, Government of India, Policies and Priorities of TNSDMA etc.
- f. Lessons learnt from any disaster event within Tamil Nadu, other states and countries and all other concerned Depts.
- g. Formal and informal interaction with various stakeholders at different levels to learn and document their experiences, so that such experiences can contribute productively towards up-dation of State Disaster Management Plan for further improving the capability to deal with future disasters.

13.2 Activation

The disaster response structure will be activated on the receipt of disaster warning/ on the occurrence of the disaster. The occurrence of disaster may be reported by the concern monitoring authority to the Commissioner of Revenue Administration and Disaster Management / State Relief Commissioner (CRA/SRC) by the fastest means. The Commissioner of Revenue Administration and Disaster Management, will activate all departments for emergency response including the State EOC and District EOCs. Also, they will issue instructions to include the following details:

- ❖ Exact quantum of resources (in terms of manpower, equipments and essential items from key departments/stakeholders) that is required.
- ❖ The type of assistance to be provided
- ❖ The time limit within which assistance is to be organized and made available.
- ❖ Details of other Task/Response Forces through which coordination has to take place.

The State EOC, DEOC's and other control rooms at the State level as well as district control rooms have to be activated with full strength. The State Government may publish a notification in the official gazette declaring such areas to be disaster-affected area. Once the situation is totally controlled and normalcy is restored, the Commissioner of Revenue Administration and Disaster Management (CRA) will declare End of Emergency Response and issues instructions to withdraw the staff deployed in emergency duties.

13.3 Implementation mechanism

The DM Act 2005 directs the state governments to make provisions for the implementation of the disaster management plans. The DM Act 2005 states that every Department of the Government shall make provisions, in its annual budget, for funds for the purposes of carrying out the activities and programmes set out in its disaster management plan. The Act also mandates that every Department of the Government must prepare a departmental Disaster Management Plan in accordance with the SDMP.

13.4 Information, Education and Communication

Communication activities are necessary to convey to the larger community the scope and nature of the proposed reconstruction and rehabilitation effort so as to increase the stakeholder's awareness and buy-in for the ongoing activities. Hence, TNSDMA and relevant government departments, district administration and local authorities shall undertake:

- **Ongoing media management/ Public Relations:** To ensure that accurate communication of the reconstruction and rehabilitation measures are being informed to the various stakeholders;
- **Community management:** This includes communicating to the affected communities with a view to appraising them of efforts being made for their relocation/ rehabilitation/ reconstruction;
- **Feedback mechanisms:** Using the communication network to get feedback on reconstruction and rehabilitation measures.

Tamil Nadu State Disaster
Management Authority

TAMIL NADU STATE DISASTER MANAGEMENT PLAN 2023

VOLUME-II

ACTION PLAN FOR VARIOUS DISASTERS



Tamil Nadu Disaster Risk Reduction Agency
Commissionerate of Revenue Administration and Disaster Management
Chennai - 600 005



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1 - ACTION PLAN FOR EARTHQUAKE

1.1 Introduction

This Actions plan addresses the measures to be taken directly during or immediately after an earthquake in order to save lives, reduce health impacts, ensure public safety and meet the basic subsistence needs of the affected people. Indian subcontinent is among the world's most disaster prone areas due to its unique geo- physical and socio economic conditions. In total 59% of the land is prone to the earthquake in which 10.9% is liable to severe earthquakes.

1.2 Seismic Vulnerability

Tamil Nadu is one of the 13 identified seismotectonic zones of Peninsular India. The East – West Cauvery fault Tirukkovilur – Pondicherry fault, Vaigai River fault and North-Southern trending Comorin – Point Calimere Fault and Rajapatnam– Devipatnam Fault are some of them which run close to the urban centers like Coimbatore, Madurai, Nagapattinam, Thanjavur, and Pondicherry and thus make the state vulnerable to tremors and earthquakes geologically.

Tamil Nadu experienced moderate earthquakes in the past earthquake history of 200 years as is evident from the published literature. Twelve earthquakes of $M>5.0$ are known to have occurred in the State so far. The latest Seismic zoning map of Bureau of Indian Standards classifies Tamil Nadu into two categories - Zone II and Zone III (representing an area of 73% and 27% respectively), which is under Low risk (up to magnitude 4.9) and Moderate risk (up to Magnitude 6.9) respectively including many districts in the state namely Chennai, Tiruvallur, Vellore, Coimbatore, Dharmapuri, Salem, Tirunelveli, Kanyakumari and The Nilgiris. Chennai, the state capital and the major cities Coimbatore and Salem fall under seismic zone III.

1.3 Declaration of Earthquake Disaster

Disaster Management Act, 2005 provides for the State Government to declare any area where earthquake has occurred as disaster affected area on the recommendations of the State Relief Commissioner or the District Collector. The purpose of declaration of disaster is to organize effective response and mitigating the earthquake effects. Such a declaration provides wide powers and responsibilities to the State Relief Commissioner and the District Collectors in order to handle the incident effectively.

1.4 Institutional Mechanism of the State Government for Response

Tamil Nadu has developed a well-organized administrative structure for earthquake response in the State. Particularly, in the aftermath of 2001 earthquake in the State, the management of earthquake has undergone a quantum change. The Tamil Nadu State Disaster Management Authority has also formulated a well-defined policy for the Reconstruction and Rehabilitation of earthquake in the state. The State government has undertaken long term capacity building initiatives to deal with future earthquake. The focus of the government has now broadened to include earthquake risk reduction, mitigation and preparedness also, along with response & relief.

The Revenue department is primarily responsible for emergency response and relief in the State, while the Tamil Nadu State Disaster Management Authority (TNSDMA) is designated as the nodal agency for formulation of policies, long term planning, coordination and monitoring body for Prevention and mitigation, reduction and preparedness for disasters in the State.

The National Centre for Seismology, under the Department of Earth Science, is established to carry out seismological research and monitoring activities. In addition, a network of Seismological Observatories and Strong Motion Accelographs has been established under the operational control of ISR for constant seismological monitoring and prediction. As a result of this network, it has been possible to locate even micro earthquakes of magnitude < 3 on Richter scale. These are useful to scientists for statistical analysis and knowing the sites of ongoing seismicity.

The institutional mechanism established in the State for management of disasters is given in Chapter 4 of Vol. 1. The composition of the State Emergency Operation Centre (SEOC) along with its staff structure has also been laid down.

1.5 Trigger Mechanism

An earthquake of magnitude 5 or more is likely to cause deaths and injuries to human beings and damage to all kinds of property, both private and public. Unfortunately, there is very little warning available before the earthquake. Therefore, planning should cater for a quick response at all levels to reduce the effects of the earthquake to the minimum.

The Revenue Department of the State will be the nodal department for formulating, controlling, monitoring and directing measures for earthquake preparedness, organizing rescue, relief and rehabilitation. All other concerned departments should extend full cooperation in all matters pertaining to the management of the earthquake whenever it occurs.

The occurrence of an earthquake may be reported by the Indian Meteorological Department (IMD) / National Geophysical Research Institute (NGRI) / National Centre for Seismology (NCS), Indian National Centre for Ocean Information Services (INCOIS) to the Commissioner of Relief by the fastest means. The State Crisis Management Committee (SCMC) under the chairmanship of the Chief Secretary should be activated immediately on the occurrence of any major earthquake.

Besides these, the SEOC also receives reports on the earthquake from INCOIS, district and taluk levels. On receipt of the information, the SEOC verifies the authenticity of the reports and will inform the real situation to concerned authorities. The State Government may, by notification published in the official gazette and in any one or more newspapers having widest circulation in the area, declare such area to be disaster affected area under DM act 2005.

1.6 Response Mechanism

1.6.1 Information and Reporting

The agencies which provide information to the SEOC about the occurrence of an earthquake in the State are:

- a. Indian Meteorological Department (IMD), Chennai / New Delhi
- b. Indian National Centre for Ocean Information Services (INCOIS)
- c. National Centre for Seismology (NCS)
- d. National Geophysical Research Institute (NGRI)
- e. District Emergency Operation Centre (DEOC)
- f. Police Control Rooms
- g. Fire Brigade Control Rooms
- h. Any other agency/ individual

The SEOC should be activated for emergency response on the occurrence of any major earthquake. The SEOC should initiate following activities:

- a. State EOC should report the occurrence of a major earthquake to the following:
 - i. Director, Disaster Management
 - ii. ACS (Revenue) / State Relief Commissioner
 - iii. Chief Secretary of the State
 - iv. Members of Crisis Management Committee
 - v. Chief Minister
 - vi. Minister of Revenue & Disaster Management
 - vii. National Disaster Management Authority EOC at MHA, Gol
 - viii. Vice Chairman, National Disaster Management Authority (NDMA)
 - ix. Member Secretary, MHA
- b. State EOC to verify the authenticity of the information from authorized scientific agencies as well as district control rooms.
- c. State EOC to alert state first responders/search and rescue machinery for emergency response.
- d. State EOC to contact its regular and emergency staff to report immediately.
- e. All Secretaries of the State Departments to be contacted to remain available in the EOC immediately.
- f. State EOC to remain in constant touch with control rooms at national and district level.
- g. Overall management of state EOC shall be taken over by the Commissioner of Relief.
- h. Management of media (Press/TV Channels/Government Press Notes) to be carried out by the Secretary (Information & Broadcasting) with special emphasis on rumour control. He shall maintain constant liaison with Commissioner of Relief.

1.6.2 On receipt of information

- i. Contact all member of Crisis Management Group to inform them about the venue and time of first meeting (chaired by Chief Secretary) to assess the situation and decide the course of action to be adopted by the State Government
- ii. Issue instructions to all departments to ensure that all state government employees to report for duty immediately in order to execute their responsibilities as mentioned in their departmental Earthquake Management Plan.
- iii. Instruct all line departments to ensure their duty officers to remain available round the clock in state EOC with full updated information of the activities of their departments.
- iv. Prepare and submit daily situation report to Government of India, Chief Secretary, Principal Secretary (Revenue), etc.
- v. If necessary, depute senior state level officers to worst affected taluks for effective implementation and supervision of Relief Operation.
- vi. Mobilize additional manpower from the departments to the affected district / taluks for supporting the Relief Operation. They should be provided Task Force Action Plans of the concerned taluks / district prepared earlier.

1.7 Restoration of Critical Services

- a. Establishment of Emergency Communication
- b. Restoration of Transportation (Rail, Road & Air)
- c. Restoration of power and electricity
- d. Supply of safe drinking water
- e. Restoration of essential lifeline infrastructure

1.8 Search, Rescue and Medical Assistance

- a. Identification of areas where SAR Teams, SDRF and Aapda Mitra to be deployed
- b. Coordination of SAR teams for their quick deployment in allotted areas
- c. Provision of quick transport of SAR teams to affected areas
- d. The department of Roads and Buildings to evolve a mechanism for clearing access routes and debris in order to facilitate search and rescue operations
- e. Mobilization of specialized equipment and machinery to affected areas
- f. Cordon off affected areas with control of entry and exit
- g. Traffic Management by establishment of traffic points and check-posts
- h. The Home Department to evolve a mechanism for providing security of properties of government and public in the affected areas.
- i. Setting up of field hospitals in the affected areas and deployment of mobile hospitals
- j. Arrangements to be made for quick transportation of injured victims to the hospitals
- k. Secretary (Health) to evolve a mechanism for speedy treatment of casualties

1.9 Emergency Relief

- a. Establishment of Temporary shelters for evacuees.
- b. Ensuring provision of essential services.
- c. Arrangement for food, clothing, blanket/bedding, drinking water, sanitation and hygiene, lighting arrangements and essential medicines
- d. Establish a mobilization centre at the airport/railway station for the movement of relief supplies within the state.
- e. Deploy special transportation for the movement of relief supplies within the state.
- f. Make arrangements to receive and distribute relief and emergency supplies received from different parts of the state and country.
- g. Coordinate transportation (air, rail, road, water) with state and Central ministries/departments / agencies.
- h. Arrange alternative means of transportation to reach relief supplies to the affected locations if normal transport cannot reach
- i. Deployment of mobile hospitals in affected areas for treatment of victims.
- j. Providing counselling services to the earthquake victims and their relatives.
- k. Arrangement for providing transport facility to send dead bodies of non-locals to their natives. The administration should also ensure Law and Order during shifting of the dead bodies
- l. Ensure establishment of communication link between the affected people and their relatives outside

1.10 Task & Responsibility Matrix for Emergency Response Phase

A Task and Responsibility Matrix for Emergency Response Phase (first 72 Hours of the incident) is given below:

1.11 Standard Operating Procedures (SOP)

Time Frame	Task	Responsibility
0 + 15 Minutes	<ul style="list-style-type: none"> • Report the occurrence of earthquake to CRA, ACS (RD), CEO - TNSDMA, Heads of all line departments, Chief Secretary, Minister (DM) and Chief Minister's Office and National Disaster Management EOC at MHA, GoI 	In-charge SEOC
0 + 30 Minutes	<ul style="list-style-type: none"> • Verify the authenticity of the incident from agencies like IMD, INCOIS, ISR, DEOCs, Police and Fire Brigade control rooms and find magnitude of disaster and immediate impacts 	In-charge SEOC

	<ul style="list-style-type: none"> • In case of L-2 level event, take overall management of SEOC • Deploy Emergency Rescue Vehicles to affected areas for establishing communication link • Activate ERCs for prompt mobilization teams and resources to affected areas • Hold planning meeting of HODs (all line depts.) in SEOC • Instruct duty officers of line departments to report in SEOC and hold meeting for further plan of action/ instruction. • Request for the services of NDRF and Armed forces, if required • If required, inform IC-IRT to ensure that all State Govt. employees report for emergency duties within half an hour • Establish alternate communication link through Satellite Phones, HF/ VHF set, HAM Radio, VSAT, etc. in SEOC, DEOCs, 	CRA & DIR-DM
0 + 1 Hour	<ul style="list-style-type: none"> • Mobilize Search & Rescue teams and equipment of Fire Emergency Services, Home Dept., R&B, etc. to affected areas • Deploy medical teams and paramedics to the affected areas • Deploy rapid assessment team to affected areas • Make arrangements for aerial survey of the affected areas • Contact NRSC, ISRO and Ministry of Defence for aerial / satellite imageries of the affected areas. • Instruct local administration to evacuate population at risk to safer sites. • Instruct concerned authorities or agencies to shut down critical operations • Contact Chief Secretary for deciding on time and venue for holding Crisis Management Group (CMG) meeting at the earliest • Inform all CMG members to attend CMG meeting in designated venue to assess situation and review emergency measures 	CRA

	<ul style="list-style-type: none"> Enforce evacuation from unsafe structures to pre-decided safe evacuation sites With help of local authorities, local agencies, volunteers, Aapda mitrans, First Responders ensure that people do not go back to unsafe structures unless instructed as safe Provide security in affected areas and maintain law and order situation to prevent incidents of thefts and stampede 	Home Dept., District Collector, Municipal Commissioners
	<ul style="list-style-type: none"> Establish alternate communication links through HF, VHF, HAM, Satellite Phones, etc. Issue alert for secondary shocks/disseminate critical information by SMS through service providers 	Dept. of Science & Technology
	<ul style="list-style-type: none"> Restore essential services like power, water supply, telecommunication of critical infrastructure like hospitals, SEOC, Control Rooms, AIR, Doordarshan, relief camps and temporary shelters, etc. on priority basis. 	CRA, TNWSSB, DOT, Energy & Petrochemicals
	<ul style="list-style-type: none"> Restore essential services or arrange for alternative facilities like power, water supply and telecommunication to the affected area 	
	<ul style="list-style-type: none"> Assess the conditions of road, rail and air communication link for quick mobilization of emergency responders and teams and resources to affected areas and take follow up actions 	Port & Transport, R&B Dept., CRA
	<ul style="list-style-type: none"> Establish media management/information cell for public information, guidance and rumour control Instruct district information officers to establish information centre near affected areas to provide guidance to volunteers and aid agencies 	Information and Public Relations Dept.
	<ul style="list-style-type: none"> Delegate responsibilities for organizing rescue and relief operations as per outcomes of CMG and planning meet Depute senior State Level officers to the affected areas Inform Secretaries of all depts. to provide necessary logistics support to emergency operation task forces 	Chief Secretary/CRA
	<ul style="list-style-type: none"> Activate Operations Section of IRS for Emergency Response Operation If required, seek assistance from neighbouring states, Central Govt. or external agencies Set up separate desks for each operation task force and NGO coordination desk in the SEOC for coordinating emergency operations 	CRA
	<ul style="list-style-type: none"> Contact private/public sector agencies in the State to assist in emergency rescue and relief operations 	

0 + 3 Hours	<ul style="list-style-type: none"> • Make suitable transport arrangement for mobilization of quick response teams to the affected areas 	Port & Transport Dept., Civil Aviation Dept.
	<ul style="list-style-type: none"> • Maintain constant touch with the control room of MHA, NDMA and DEOCs 	CRA, SEOC
	<ul style="list-style-type: none"> • Arrange for press / media release for rumour control and public information and guidance 	CRA, Information Dept.
	<ul style="list-style-type: none"> • Make necessary arrangement for treatment of injured and mass casualty management 	Health Dept.
	<ul style="list-style-type: none"> • Restore & ensure serviceability of communication towers in affected area through respective service providers 	Dept. of Science & Technology, DOT
0 + 6 Hours	<ul style="list-style-type: none"> • Establish relief coordination centre at airport, railway station, etc. for arrival of Search & Rescue and Medical Teams coming for humanitarian aid 	CRA
	<ul style="list-style-type: none"> • Arrange for a logistic plan and warehouse for receipt & management of relief material 	
	<ul style="list-style-type: none"> • Instruct to cordon off affected areas and setting up of check posts to control entry and exit 	Home Dept.
	<ul style="list-style-type: none"> • Ensure mechanism to prevent human trafficking 	
	<ul style="list-style-type: none"> • Open access routes and manage traffic for mobilization of equipment, machinery and volunteers to the affected areas 	Home Dept., Port & Transport Dept.
	<ul style="list-style-type: none"> • If required, establish temporary access routes & disseminate route maps to all EOCs, control rooms and information cells 	
	<ul style="list-style-type: none"> • Conduct aerial survey to understand scale of damage and impacts 	CRA / Head, Quick Assessment Task Force
0 + 12 Hours	<ul style="list-style-type: none"> • Establish information centres at the arrival and departure points especially at the airports, railway stations and interstate bus terminus 	Information and Public Relations Dept.
	<ul style="list-style-type: none"> • Hold review meetings with duty officers in every 12 hours 	DIR - DM
	<ul style="list-style-type: none"> • Prepare rapid need assessment report for planning of relief operation and mobilization of resources to the affected areas 	
	<ul style="list-style-type: none"> • Mobilize relief materials i.e. tents, food materials, water, essential medicines, blankets, etc. to the affected districts and taluks 	DIR - DM, District Collectors, Municipal Commissioners, Line Depts.

	<ul style="list-style-type: none"> Establish relief centres, temporary shelters and godowns near affected areas & ensure provision of basic facilities like food, water, medical aid, toilets, etc. Provide food and other relief material to relief camps, community kitchens, etc. Provide water tankers to affected areas, relief camps, temporary shelters, community kitchens, etc. Arrange to shift people from evacuated sites to temporary shelters Arrange road, rail and air transport at State / District headquarters for dispatch of relief materials to the affected areas Set up field hospitals near the affected areas Arrange to shift injured persons to field hospitals Ensure medical aid to injured cattle Provide security to relief camps, godowns, evacuated structures, medical camps, etc. 	Food & Civil Supply Water Supply Dept. Port & Transport Dept. Health Dept. Animal Husbandry Dept. Home Dept.
	<ul style="list-style-type: none"> Instruct to set up coordination centres at the Resident Commissioner's Office in New Delhi and other Metro Cities as well 	
	<ul style="list-style-type: none"> Prepare and circulate the situation report 	
	<ul style="list-style-type: none"> Coordinate with Operation Task Forces mobilized to the affected areas 	
	<ul style="list-style-type: none"> Organize media briefing twice a day at pre-determined intervals 	
	<ul style="list-style-type: none"> Depute additional officers and supporting staff to affected areas from non-affected areas 	
	<ul style="list-style-type: none"> Identify and declare unsafe structures in earthquake affected areas 	
	<ul style="list-style-type: none"> Ensure safety and security of personnel deputed in affected areas for emergency response operation 	
	<ul style="list-style-type: none"> Arrange for identification, photograph, post mortem and maintenance of records for disposal of dead bodies 	
0 + 24 Hours	<ul style="list-style-type: none"> Earmark storage points for medical supplies at affected sites 	Health Dept.
	<ul style="list-style-type: none"> Arrange information centre at shelter site for maintaining records of victims and to provide guidance to relatives, NGOs, etc. 	CRA, DIR - DM
0 + 48 Hours	<ul style="list-style-type: none"> Ensure safety and security of personnel deputed in affected areas for emergency response operation 	Home Dept.
	<ul style="list-style-type: none"> Arrange for identification, photograph, post mortem and maintenance of records for disposal of dead bodies 	
	<ul style="list-style-type: none"> Earmark storage points for medical supplies at affected sites 	Health Dept.
	<ul style="list-style-type: none"> Arrange information centre at shelter site for maintaining records of victims and to provide guidance to relatives, NGOs, etc. 	CRA, DIR - DM

	<p>Ensure following procedures before disposal/ handing over of dead bodies:</p> <ul style="list-style-type: none"> • Photographs of dead bodies are taken • Identification of dead bodies is done • Post mortem wherever necessary and possible is carried out • Handing over dead bodies of persons known/ identified to their relatives • Disposal of unclaimed and unidentified dead bodies 	Revenue Dept., District Collector, Municipal Commissioners, Health Dept & Local Authorities
	<ul style="list-style-type: none"> • Ensure mechanism for complaints regarding missing persons and initiate search in shelters, hospitals and police records 	Home Dept., CRA
	<ul style="list-style-type: none"> • Arrange for transportation of dead bodies to their native places if so required 	Port & Transport Depts. Health Depts.
	<ul style="list-style-type: none"> • Arrange for transportation of injured animal 	Animal Husbandry Dept.
0 + 72 Hours	<ul style="list-style-type: none"> • Arrange for dignified disposal of unidentified and unclaimed dead bodies 	Home Dept.
	<ul style="list-style-type: none"> • Arrange for disposal of unidentified and unclaimed animal carcasses 	
	<ul style="list-style-type: none"> • Arrange for transportation of injured from field hospitals to base hospitals 	Health Dept. , Transport Dept.
	<ul style="list-style-type: none"> • Activate short and interim relief measures 	CRA, Line Depts.
	<ul style="list-style-type: none"> • Arrange for distribution of cash doles to the victims 	CRA

1.12 Immediate relief

1.12.1 Short-Term Relief Measures

- Provide temporary shelter to affected people
- Evacuation site should be safe and easily accessible
- Continue to provide essential services to the affected people i.e. food, water, clothing, sanitation and medical assistance
- The CRA to ensure relief measures are provided in the relief camp are as per the Minimum standard of relief defined by the state government which includes –
 - Special emphasis on Hygiene and sanitation aspects should be given in relief camp sites.
 - Separate area should be earmarked within the relief camp for storage of relief materials

- iii. Adequate manpower and transport facilities for the camp site
- iv. Arrangements to be made for trauma management
- v. Mobile medical units to be sent to remote areas with a view to provide medical assistance to the victims/injured
- vi. Information centre should be established by the administration

1.12.2 Interim Relief Measures

- a. Arrangements to be made for identification and maintenance of the records of dignified disposal of dead bodies in the affected areas.
- b. Arrangements to be made to record the complaints of all persons reported missing. Follow up action in terms of verification of the report also needs to be made.
- c. Sub-divisional magistrates to be empowered to exempt the requirement of post-mortem in case of mass casualties. Revenue Dept. may depute additional SDMs to expedite disposal of the dead bodies in dignified manner.
- d. Unclaimed/unidentified dead bodies to be disposed of at the earliest after keeping their records.
- e. Additional manpower to be deployed in the affected areas for supplementing the efforts of the local administration.
- f. Separate Cell to be established at state/district/taluks level to coordinate with the NGOs and outside donor/aid agencies.
- g. Regular meetings of the different stakeholders/departments should be organized at state level for sharing of information, developing strategies for relief operations.
- h. Information & Broadcasting Dept. to coordinate with the media to play a positive role in disseminating appropriate information to public and the government in order to facilitate the speedy recovery.

1.12.3 Assessment of Damage / Loss and Relief Needs

- a. The CRA to issue instructions to the district collectors for the damage and loss assessment
- b. Adequate manpower, vehicles, stationery etc should be provided to supplement the efforts for need/damage and loss assessment
- c. Identification and demolition of dangerous structures in the affected areas to minimize further loss of life and injuries
- d. Arrangements for debris removal and its appropriate disposal
- e. Arrangements for distribution of gratuitous relief and cash doles
- f. Arrangements to be made for survey of human loss and distribution of ex-gratia relief to the families of deceased persons
- g. Teams to be formed and dispatched to the affected areas for detailed assessment of houses and property assessment

- h. As reconstruction of houses will take a long period, arrangements to be made to provide interim shelters to the affected
- i. Identification of the site for interim shelter
- j. Allocation of areas to the affected families
- k. Providing essential services at the interim shelter sites such as water, power, drainage / sanitation, PDS shops, etc.
- l. Distribution of shelter materials to individual families

2 - ACTION PLAN FOR CYCLONE

2.1 Introduction

Tropical cyclone, generally known as cyclone, is the term used globally to cover tropical weather systems in which winds equal or exceed gale force (minimum of 34 knot, i.e., 62 kmph). These are intense low-pressure areas of the earth-atmosphere coupled system and are extreme weather events of the tropics. As per broad scale assessment of the population at risk, nearly one third of India's population is vulnerable to cyclone related hazards. Climate change with the resultant sea-level rise and expected increase in severity of cyclones can significantly increase the vulnerability of the coastal population.

The coastal states and union territories (UTs) in the country, encompassing 84 coastal districts which are affected by tropical cyclones. Four states (Tamil Nadu, Andhra Pradesh, Odisha and West Bengal) and one UT (Puducherry) on the east coast and one state (Tamil Nadu) on the west coast are highly vulnerable to cyclone disasters. The tropical cyclones are classified according to their wind speed which is as per table as shown below.

Tamil Nadu comes in the region of tropical cyclone with the longest coast line of 1076 km in the country which makes it highly vulnerable to Cyclone and associated hazards. The accompanying hazards consist of high-speed winds, storm surges, and torrential rainfall. Most of the cyclones that have affected the State are generated in the Bay of Bengal and Arabian Sea. They hit the east coastal part and the southern part of Tamil Nadu. Thus, fourteen coastal districts of Tamil Nadu are at a very high risk of Cyclone. The purpose of this action plan is to develop a quick response at all levels to reduce the effects of cyclone with an effective coordinated disaster risk reduction approach.

Table: Classification used in India for tropical cyclones

S. No.	Type	Wind Speed	
		km per hour (kmph)	Knots
1.	Low Pressure area	Less than 31	Less than 17
2.	Depression	31 to 49	17 to 27
3.	Deep Depression	50 to 61	28 to 33
4.	Cyclonic Storm	62 to 88	34 to 47
5.	Severe Cyclonic Storm	89 to 118	48 to 63
6.	Very Severe Cyclonic Storm	119 to 221	64 to 119
7.	Super Cyclone	More than 221	More than 119

Note: One kmph = 0.54 knot; one knot = 1.852 kmph

2.2 Associated Authority

The nodal department for controlling, monitoring and directing measures for organizing rescue, relief and rehabilitation is the Revenue and Disaster management Department of the State. All other line Departments should extend full cooperation in all matters pertaining to the management of the Cyclone disaster whenever it occurs.

2.3 Disaster Declaration

The Disaster Management Act, 2005 provides for the State Government to declare any area where Cyclone has hit as disaster affected area on the recommendations of the Commissioner of Revenue Administration or the District Collector. The purpose of declaration of disaster is to organize effective response and mitigating the Cyclone effects. Such a declaration provides wide powers and responsibilities to the Commissioner of Revenue Administration and the District Collectors in order to handle the incident effectively.

2.4 Four Stage Warning System for Tropical Cyclones

a. Pre-Cyclone Watch (Before 72 hours)

It is issued when a depression forms over the Arabian Sea / Bay of Bengal irrespective of its distance from the coast and is likely to affect Indian coast in future. The pre-cyclone watch is issued by the IMD and is issued at least 72 hours in advance of the commencement of adverse weather. It is issued at least once a day.

b. Cyclone Alert (Before 48 hours)

It is issued at least 48 hours before the commencement of the bad weather when the cyclone is located beyond 500 Km from the coast. It is issued every three hours.

c. Cyclone Warning (Before 24 hours)

It is issued at least 24 hours before the commencement of the bad weather when the cyclone is located within 500 km from the coast. Information about time /place of landfall is indicated in the bulletin. The probable estimation of its landfall and severity increases as the cyclone approaches closer to the coast.

d. Post Landfall Outlook (Before 12 hours)

It is issued 12 hours before the cyclone landfall, when the cyclone is located within 200 Km from the coast. More accurate and specific information about time /place of landfall and associated bad weather is indicated in the bulletin. In addition, the information regarding expected damage due to cyclone is also included as a warning in this bulletin.

e. Warning Dissemination Process

1. Cyclone/flood forecasting is generally the responsibility of the India Meteorological Department (IMD). IMD is the nodal agency for providing cyclone warning services. IMD's INSAT satellite based Cyclone Warning Dissemination System (CWDS) is one of the best in India to communicate cyclone warnings to community and important officials in areas likely to be affected directly. There are 424 Cyclone Warning Dissemination System (ACWDS) stations in Tamil Nadu.
2. After getting information from IMD, warning dissemination is responsibility of the State Government (CRA). The CRA under the Revenue and Disaster Management Department is responsible for disseminating cyclone warnings to the public and Line Departments.
3. On receiving an initial warning, the office of the CRA disseminates the warning to all Line Departments, District administration and DG Police. Warning messages are transmitted to all districts and taluks. District Collectors are provided with satellite phones and HAM radios to maintain effective communication, even if terrestrial and cell-phone communication fails.

4. The state EOC and control rooms of the other line departments at the State level as well as district level also get the warnings. The control rooms are activated on receiving the warnings.

a. Plan Activation

The cyclone response structure will be activated on the receipt of cyclone warning by the Indian Meteorological Department (IMD). The occurrence of a cyclone may be reported by the IMD to the Commissioner of Revenue Administration / TNSDMA by the fastest means. The Commissioner of Revenue Administration (CRA) will activate all the Departments for emergency response including the State EOC, District EOCs. He will issue instructions to include the following details:

- Specify exact resources (in terms of manpower, equipment and essential items from key dept. / stakeholders) required
- The type of assistance to be provided
- The time limit within which assistance is needed
- Details of other Task / Response Forces through which coordination should take place.

The State EOC and other control rooms at the state level as well as district control rooms should be activated with full strength. The state Government may publish a notification in the official gazette, declaring such area to be disaster-affected area under DM Act 2005.

Once the situation is totally controlled and normalcy is restored, the CRA declares End of Emergency Response and issues instructions to withdraw the staff deployed in emergency duties.

2.5. Roles and Responsibility

The roles and responsibilities of various line departments and stakeholders in the event of a Cyclone alert are as follows:

Standard Operating Procedure (SOP)

Time Frame	Task	Activity	Responsibility
Time = 0 – 72 Hrs.	Warning Receipt and Dissemination	<ul style="list-style-type: none"> • Inform ACS / PS (Revenue), CEO (TNSDMA), Crisis Management Group, Hon. CM, Hon. Minister (R&DM), NDMA, Ministers and Secretaries of all line depts. as per the warning of IMD • Inform & instruct relevant District Collectors to activate District Control Room at full strength • Alert state response teams for deployment • Remain in constant touch with control rooms at National & State Level. 	CRA

		<ul style="list-style-type: none"> Instruct and alert heads of departments of the key line departments to activate their departmental plan and SOPs for Cyclone Response 	
	Interdepartmental Coordination	<ul style="list-style-type: none"> Instruct all State Government officers and employees in the State to report to their respective Head for emergency duties (Only if the warning is of a level 2 disaster or as per the decision taken in the meeting of the Crisis Management Group headed by Chief Secretary) 	CRA & DIR DM
		<ul style="list-style-type: none"> Alert the District Collectors of districts not likely to be affected to be prepared for providing the following to the districts likely to be affected: <ul style="list-style-type: none"> Additional manpower Additional resources Vehicles, Machinery & Equipment Relief material 	
	Establishment of Lines of Communication	<ul style="list-style-type: none"> Activate alternative communication equipments i.e. satellite phones, HF/ VHF sets, HAM radio, VSAT in SEOC and DEOCs. Establish communication links with SEOC, DEOCs and Search & Rescue Teams in all Municipal Corporations and alert them to be in stage of readiness Establish communication links with villages likely to be affected as per the contact details available in SDRN. 	CRA & DIR DM
Time = 0 – 48 Hrs	Review of situation and reporting	<ul style="list-style-type: none"> Establish contact with IMD, CWC, ACWC, ISRO and the defense ministry of GoI for aerial / satellites imageries of the latest Cyclone threat Get the latest weather report from IMD/other international websites to know the exact location of Cyclone and the likely site where the landfall will take place 	Revenue Dept./ CRA

		<ul style="list-style-type: none"> After reviewing the weather report and satellite images issue instructions and orders for emergency response to areas likely to be Affected 	
	Management of EOC and Cyclone Response	<ul style="list-style-type: none"> Take over full command of SEOC. Instruct line departments to depute representatives at the State and District EOCs Hold a meeting with leaders of task forces and entrust them their tasks. Arrange emergency meeting with State Crisis Management Group to devise a plan of action Arrange dissemination of information through various means of communication such as Radio, TV, Cable Network, SMS about Cyclone Warning to districts/ areas which are likely to be hit by Cyclone. 	CRA
		<ul style="list-style-type: none"> Alert teams to remain in readiness- Evacuation, Emergency Medical Services, Search & Rescue, Fire & Emergency Services, NDRF, Police, Home Guards, SRPF, Army, Air Force 	
		<ul style="list-style-type: none"> Impose restriction on all transport activities heading towards coastal areas that are likely to be affected by Cyclone 	Port & Transport Dept.
		<ul style="list-style-type: none"> Impose restriction to or alert all vessels in high sea through display of signals on respective ports, AIR broadcasts, coastal weather bulletins, etc. 	Tamil Nadu Maritime Board/ Coastal Radio Station/ Port Authorities
	Cyclone Response to Coastal Areas (Likely to be Affected)	<ul style="list-style-type: none"> Based on the warning issued by IMD, pin point the districts and villages likely to be affected by cyclone and start the procedure for identifying safe places/shelters for evacuation in those villages Prepare route maps for safe place and evacuation shelters 	Revenue Dept., Transport Dept. and Dist. Collectors, Municipal Commissioner

	<ul style="list-style-type: none"> • Village wise data of safe shelters for evacuation available on SDRN should be referred and the District Collectors/Village level officers should be contacted to know the status of the shelters with the capacity of the shelter and other available facilities at the site • Make transport arrangement for mobilization of all emergency response teams • Make logistic arrangements for response teams 	
	<ul style="list-style-type: none"> • Ensure arrangements are in place to evacuate fishermen and salt workers if needed 	Commissioner of Fisheries, Industries Dept.
	<ul style="list-style-type: none"> • Ensure safety of tourists visiting beaches along the coastline 	Tourism Dept.
	<ul style="list-style-type: none"> • Cordon off coastal areas for restricting entries of rail or road traffic • Ensure law and order is maintained in areas likely to be affected 	Home Dept., Dist. Collectors,
	<ul style="list-style-type: none"> • Ensure that all critical activities (mainly industrial production) in areas likely to be affected are shutdown 	Line Depts., Industries and Mines Dept.
	<ul style="list-style-type: none"> • Ensure that the schools and colleges are closed in areas likely to be affected by Cyclone and associated hazards • Ensure availability & serviceability of cyclone shelters issued in schools 	Education Dept.
	<ul style="list-style-type: none"> • Ensure dissemination of information to remote areas by local means • Ensure that local helplines are opened and effectively managed for public information, guidance and rumor control • Ensure that the information to public and media (AIR/ Doordarshan/ print/ FM) about the progress of Cyclone at periodic intervals is released 	Dist. Collector, Information and Public Relations Dept.

		<ul style="list-style-type: none"> Activate Departmental Disaster Management Plan and Departmental SOPs for Management of casualties. Ensure availability of QRT & essential Medicines. 	Health Dept.
		<ul style="list-style-type: none"> Issue alert/warning through mass SMS by establishing liaison with telecom service providers Ensure safety & serviceability of critical communication towers through respective service providers Ensure establishment of alternate communication links like HF, VHF, HAM, Satellite Phones, etc. 	Dept. of Science & Technology
		<ul style="list-style-type: none"> Ensure availability of safe drinking water 	TWAD & CMWSSB
		<ul style="list-style-type: none"> Ensure safety of dams & dewatering in case of heavy rains 	WRD Dept.
Time = 0 - 24 Hrs	Review of Situation and Reporting	<ul style="list-style-type: none"> Establish contact with IMD, CWC, ISRO and the defense ministry of GoI for aerial / satellites imageries of the latest Cyclone threat After reviewing the weather report and satellite images, issue instructions and orders for emergency response to areas likely to be affected areas Review and monitor – evacuation from to be affected areas; positioning of search & rescue teams, mobile communication units, quick medical response teams; dissemination of information to vulnerable areas; preparedness measures to be taken by various authorities Keep in touch with National and District control rooms Release information at appropriate time to media and public regarding response measures organized by the Government 	Revenue Dept./ CRA Information and Public Relations Dept.

	Emergency Response Management	<ul style="list-style-type: none"> If reports regarding striking of cyclone are confirmed by IMD and other sources, start the emergency response and relief operations Divert the emergency services to areas likely to be affected as per the warning issued by IMD Inform the public residing in areas likely to be affected to evacuate through various means such as SMS, AIR, FM Radio, Doordarshan, etc. Start evacuation from the likely affected areas through Police support, if necessary 	Revenue Dept., CRA, Dist. Collector, Home Dept.
		<ul style="list-style-type: none"> Disconnect power supply at the time of striking of cyclone. 	TANGEDCO and Petrochemical
		<ul style="list-style-type: none"> To confirm & account for the exact number of fishermen in the sea and fishermen that have already reached the shore 	Coast Guard, Commissioner of Fisheries
	Emergency Relief Management	<ul style="list-style-type: none"> Ensure that the Relief Management work planned in the areas likely to be affected by the Cyclone is well organized Inform the following agencies to be in a state of readiness for assisting the Cyclone response measures (if required): <ul style="list-style-type: none"> Public sector agencies Private sector agencies NGOs, CBOs Volunteer Organizations Request for help (if needed) to MHA/ National Disaster Management Authority 	CRA/ Revenue Dept.
		<ul style="list-style-type: none"> Ensure that the arrangement for basic amenities(shown below) at evacuation/relief centres are made by the respective departments: <ul style="list-style-type: none"> Drinking water Food Clothing Sanitation and hygiene 	CRA, Food & Civil Supply Dept., Revenue Dept. & Dist. Collectors, TWAD, TANGEDCO, Health Dept.

		<ul style="list-style-type: none"> Lighting Medicines and other Health Care 	
		<ul style="list-style-type: none"> Make necessary arrangements for public information/guidance, public opinion and rumor control 	Information and Public Relations Dept.
		<ul style="list-style-type: none"> Impose restrictions for transportation in threatened areas 	Transport Dept. and Dist. Collector, Home Dept.
Time = 0 Hrs	Disaster Declaration	<ul style="list-style-type: none"> When Cyclone makes a landfall, Cyclone affected Dist. Collectors should send a communication to the State Govt. to declare the area as disaster affected, if necessary, (depending upon the nature and intensity of impact) 	CRA, Dist. Collector
	Preliminary Assessment, Deployment of Emergency Response Teams and Information Dissemination	<ul style="list-style-type: none"> Send teams to the affected areas to take stock of the effects of Cyclone and associated rain. Send sector wise situation reports to: <ul style="list-style-type: none"> State EOC/CRA TNSDMA 	District Collector
		<ul style="list-style-type: none"> Deployment of following teams to Cyclone affected areas: <ul style="list-style-type: none"> Emergency Communication Teams Emergency Medical Services Teams Search and Rescue Teams (With Equipment) Preliminary damage Assessment Teams Need Assessment Teams 	CRA, Dist. Collector, Municipal Commissioner
		<ul style="list-style-type: none"> Establish communication link with affected districts by activating alternate communication equipments such as Satellite Phones, HF/VHF Sets, HAM Radio/ V-SAT etc., in State/District Emergency Control Rooms Arrange dissemination of information about occurrence of Cyclone and areas that are affected by it to media & public. 	CRA, Dist. Collector, Information and Public Relations Dept.

Time = 0+ 24 Hrs	Mobilization and Deployment	<ul style="list-style-type: none"> • Remain in constant touch with IMD for updates on weather forecast for the coming hours and plan accordingly • Immediate mobilization of following units/teams to areas affected by Cyclone and associated rains <ul style="list-style-type: none"> • S&R Teams of Fire and Emergency Services • Quick Medical Response Teams • Quick Damage & Loss Assessment Teams • Quick Need Assessment Teams • Road Clearance Teams • Teams for disposal of dead bodies • Teams for disposal of carcasses • Teams for debris clearance (if any) • Teams for maintaining Law & Order in the affected areas • Arrange for S & R teams of Air Force (If required) 	CRA, Dist. Collector, Municipal Commissioner, Line Dept.
	Clearance of Access Roads to Reach at the Sites of Affected Areas	<ul style="list-style-type: none"> • To survey the access roads/routes leading to the affected areas and manage traffic for mobilization of equipments, machinery and volunteers. • Identify alternate roads/routes for evacuation of affected people • Undertake repairing/restoration of damaged roads leading to the affected areas. • Identify and declare unsafe buildings / structures in Cyclone affected areas. • Evacuate people from unsafe buildings / structures and shift them to relief camps / sites • Divert/stop transport activities (Rail + Road) heading towards Cyclone affected areas 	RDPR Dept., Transport Dept., Railways, CRA

	Necessary Arrangements at Evacuation/ Relief Centres	<ul style="list-style-type: none"> • To ensure that necessary arrangements at evacuation/relief centers is made with sufficient availability of: <ol style="list-style-type: none"> a. Food b. Water c. Blankets/Clothing d. Medicines e. Lighting f. Sanitation and hygiene etc. • To ensure necessary security arrangements for the evacuees and the personnel (Emergency responders/relief teams) who are working at Relief Centers and involved in distribution of Relief Materials • To ensure that law and order is maintained at evacuation/relief centers and in the affected areas as well • Arrange for a logistic plan and warehouse for receipt and management of relief material 	Revenue Dept., Civil Supply Dept., Collectors, Municipal Commissioner, TWAD Board, Health Dept., TANGEDCO, Power & Energy Dept., CMWSSB & Local Authorities, Home Dept.
	Safety of Fishermen and Salt Workers	<ul style="list-style-type: none"> • Take immediate actions for safety of fishermen, salt workers and visitors at cyclone affected coastal areas • Ensure that all the fishermen and salt workers have returned from the sea or those who are in the sea are rescued and evacuated to safer places 	CRA/ DIR DM, Port & Fisheries Dept., Tourism Dept., Industries Dept.
	Immediate Health and Minimization of Disease Outbreak	<ul style="list-style-type: none"> • To establish camp hospitals near the affected areas • To make transportation arrangements to shift seriously injured persons to nearest-camp Hospitals, Taluk and District Hospitals, Regional and State Hospitals • Ensure that the Hospitals are well prepared to deal with seriously injured persons • Ensure that the required medical assistance/aid and medicines are provided to the affected people at 	CRA/ DIR DM, Health Dept.

		<p>site as well as at evacuation/relief centers in the affected area and necessary records are maintained</p> <ul style="list-style-type: none"> • Take sanitation and epidemic control measures for preventing any water borne disease • Keep adequate stock of essential medicines, first-aid etc. at taluk/ district hospitals • Take steps to purify drinking water sources • If required, take the help of doctors/ paramedics from the list of doctors/ paramedics available at the taluk/ district level for immediate medical assistance 	
		<ul style="list-style-type: none"> • Assess need for fodder if required • Keep teams ready for carcass disposal (if required) 	Animal Husbandry Dept.
	Information to Public and Media	<ul style="list-style-type: none"> • Establish Media/Press Centre for media management and information dissemination • Ensure that the information to media/general public about the response of the State Government is released in an organized manner • Organize media briefing twice a day at pre- determined intervals 	Information and Public Relations Dept., CRA
	Other Important Work Related to Immediate Response	<ul style="list-style-type: none"> • Prepare quick need assessment report for planning of relief operation • Additional assistance may be asked for emergency response/relief from GoI-NDMA (If needed) • Prepare situation report and circulate it twice a day in the morning and evening to key Government functionaries • Maintain constant touch with National, District and Taluk EOCs and other control rooms • Remain in constant touch with IMD for updates on weather forecast for the coming days and plan accordingly • Conduct aerial survey of affected areas for taking a stalk of the situation 	

		<ul style="list-style-type: none"> • Prepare quick need assessment report for planning of relief operation • Additional assistance may be asked for emergency response/ relief from GoI-NDMA (If needed) • Prepare situation report and circulate it twice a day in the morning and evening to key Government functionaries • Maintain constant touch with National, District and Taluk EOCs and other control rooms • Remain in constant touch with IMD for updates on weather forecast for the coming days and plan accordingly • Conduct aerial survey of affected areas for taking a stalk of the situation 	CRA
		<ul style="list-style-type: none"> • Activate evacuation & relief centers according to needs / situation • Maintain record of persons admitted at evacuation / relief centres 	Revenue Dept. Collector, CRA
Time = 0 + 24 to 48 Hrs	Review of Situation and Reporting	<ul style="list-style-type: none"> • Establish contact with IMD, CWC, ACWC, ISRO and the defense ministry of GoI for aerial / satellites imageries about further weather condition and plan accordingly 	CRA
	Restoration of Critical Infrastructure/ Essential Services	<ul style="list-style-type: none"> • Ensure that the essential services/ critical infrastructure of the affected areas have been restored or alternative arrangement is made for ensuring safety of people and smooth management of emergency response. • Ensure that key administrative and lifeline buildings are brought back to operation quickly. • Designate and deploy senior officers (as per the need) to worst affected area/s to oversee rescue/ relief operation. 	CRA, Line Depts., Dist. Collectors, Municipal Commissioner

		<ul style="list-style-type: none"> • Ensure following primary necessities are restored <ul style="list-style-type: none"> • Power • Water • Telecommunication • Roads • Bridges 	
	Disposal of Dead Bodies	<ul style="list-style-type: none"> • Ensure following procedure is followed before disposal/handing over of dead bodies: <ol style="list-style-type: none"> a. Photographs of the dead bodies are taken, b. Identification of the dead bodies is done, c. Post Mortem where ever necessary and possible is carried out, d. Handing over dead bodies of persons known/identified to their relatives, e. Disposal of unclaimed and unidentified dead bodies. 	Revenue Dept., Dist. Collector
		<ul style="list-style-type: none"> • Ensure medical aid to injured cattle • Disposal of animal carcasses with the help of local bodies/health dept. 	Animal Husbandry Dept.
	Public Information and Media Management	<ul style="list-style-type: none"> • Ensure that the information about progress of rescue and relief is provided to media/public in an organized manner at least twice a day • Establish help lines for facilitating communication between the victims and their relatives residing outside the affected areas • Establish Information Centers at strategic locations for providing information about persons evacuated to the relief centres/hospitals 	CRA, Information and Public Relations Dept., Dist. Collector, Municipal Commissioner
	Miscellaneous Rescue and Relief Works	<ul style="list-style-type: none"> • Assess the situation and take appropriate action to accelerate the Search & Rescue Operations • Depute additional officers and supporting staff to Cyclone affected areas from non-affected areas (if required) to accelerate the rescue and relief operations 	CRA, District Collector, Municipal Commissioner

		<ul style="list-style-type: none"> • Ensure that the relief assistance received from outside is centrally received, stored and sent for distribution to Cyclone affected areas according to their need and proper accounts are maintained about both receipt and distribution 	CRA, Civil Supply Dept.
		<ul style="list-style-type: none"> • District Collector to oversee the functioning of relief centres and ensure adequate supply of relief materials 	Revenue Dept, Civil Supply Dept.,
Time = 0 + 48 to 96 Hrs	Continuous Rescue and Relief Works	<ul style="list-style-type: none"> • Remain in constant touch with IMD for updates on weather forecast for the coming days and plan accordingly • Arrange for procurement of additional relief material required for relief operations (on the basis of need assessment) 	CRA, Dist. Collectors, Civil Supply Dept.
		<ul style="list-style-type: none"> • Mobilize additional relief material required for relief operations • Maintain constant touch with State & Districts EOCs 	
		<ul style="list-style-type: none"> • Arrangement for transportation of injured from field hospital to base hospital • Arrangement for transport of dead bodies to their native places • Ensure maintenance of record, timely reporting and information management • Ensure maintenance of record and information database 	Revenue Dept., Health Dept., Transport Dept., Line Depts.
Time = 0 + 96 to 168 Hrs	Continuous Rescue and Relief Works	<ul style="list-style-type: none"> • Remain in constant touch with IMD for updates on weather forecast for the coming days and plan accordingly • Review the restoration of all the public and essential buildings/ structures in Cyclone affected areas • Review and follow-up all necessary arrangements for emergency response & relief in the affected area/s 	CRA

	<ul style="list-style-type: none"> On receiving the message from IMD about degradation of Cyclone, inform the concern dist. Collector 	CRA, IMD
	<ul style="list-style-type: none"> Organize a quick rapid visual survey of the affected areas (through a technical team of engineers) to ascertain the safety of the structures and decide on giving the go-ahead to people to move back to their respective houses 	CRA, Dist. Collectors, Municipal Commissioner, RD & PR Dept.
	<ul style="list-style-type: none"> After receiving the message of de-warning, ensure that people are moved back safely to their houses 	CRA, Collector, Police Dept.
	<ul style="list-style-type: none"> Ensure relief disbursement, allotment of funds and grants to line department and district collectors for organizing emergency response, relief and evacuation arrangements 	Revenue Dept.

2.6 Immediate Relief

2.6.1 Short-term Relief Measures

a. Search, Rescue and Medical Assistance

- Identification of areas where SAR Teams are to be deployed
- Coordination of SAR teams for their quick deployment in allotted areas
- Provision of quick transport of SAR teams to affected areas
- The department of Roads and Buildings to evolve a mechanism for clearing access routes in order to facilitate search and rescue operations
- Mobilization of specialized equipment and machinery to affected areas
- Cordoning off affected areas with control of entry and exit
- Traffic Management by establishment of traffic points and check-posts
- The Home Department to evolve a mechanism for providing security of properties of government and public in the affected areas

b. Emergency Relief

- Establishment of Temporary shelters for evacuees
- Ensuring arrangement for food, clothing, blanket/bedding, drinking water, sanitation and hygiene, lighting arrangements and essential medicines

- iii. Ensure deployment of mobile hospitals in affected areas for treatment of victims
- iv. Provide counselling services to the cyclone victims and their relatives
- v. Ensure establishment of communication link between the affected people and their relatives outside

c. The CRA to ensure the following in the relief camps

- i. Special emphasis on Hygiene and sanitation aspects should be given in relief camp sites
- ii. Separate area should be earmarked within the relief camp for storage of relief materials
- iii. Adequate manpower and transport facilities for the camp site.
- iv. Arrangements to be made for trauma management
- v. Mobile medical units to be sent to remote areas with a view to provide medical assistance to the victims/injured
- vi. Information centre should be established by the administration

2.6.2 Interim Relief Measures

- a.** Arrangements to be made for quick identification and maintenance of the records of disposal of dead bodies in the affected areas (**Home, Revenue, Health Dept., Local Authorities**)
- b.** Arrangements to be made to record the complaints of all persons reported missing. Follow up action in terms of verification of the report also needs to be made (**Home Dept.**)
- c.** District Magistrates and Sub-Divisional Magistrates to be empowered to exempt the requirement of identification and post-mortem in case of mass casualties. Revenue Dept may depute additional sub- divisional magistrates to expedite disposal of the dead bodies (**Revenue & Home Dept.**)
- d.** Unclaimed/unidentified dead bodies to be disposed off with the help of pre-identified voluntary agencies at the earliest after keeping their records (**Home, Revenue, Health Dept. & Local Bodies**)
- e.** Additional manpower to be deployed in the affected areas for supplementing the efforts of the local administration (**RD&PR**)
- f.** Separate Cell to be established at state/district/taluk level to coordinate with the NGOs and outside donor/aid agencies (**Revenue Dept.**)
- g.** Regular meetings of the different stakeholders/departments should be organized at state level for sharing of information, developing strategies for relief operations. (**Commissioner of Relief & Collectors at District Level**)
- h.** Information & Public Relation Dept to coordinate with the media to play a positive role in disseminating appropriate information to public and the government in order to facilitate the speedy recovery

2.6.3 Assessment of Damage/Loss and Relief Needs

- a. The Commissioner of Relief to issue instructions to the District Collectors to provide the need assessment report. The Commissioner of Relief should consolidate the same and to prepare—States Need Assessment Report II
- b. The Commissioner of Relief to issue instructions to the District Collectors to provide the damage and loss assessment report. The Commissioner of Relief to consolidate the same and to prepare state's damage and loss assessment report II which will be useful in planning and implementing the relief operation after the disaster for the victims of the disaster
- c. Adequate manpower, vehicles, stationery etc should be provided to supplement the efforts for need/loss assessment. (**Commissioner of Relief & Revenue Dept.**)
- d. The relief need assessment report should be provided by the Collectors (**Commissioner of Relief & Collectors**)
- e. Identification and demolition of dangerous structures in the affected areas to minimize further loss of life and **injuries. (R & B Dept., Revenue Dept and Local Bodies)**
- f. Arrangements for distribution of gratuitous relief and cash doles (**Revenue Dept., Panchayat & Rural Housing Dept., UD&UHD Dept. and Collectors**)
- g. Arrangements to be made for survey of human loss and distribution of ex-gratia relief to the families of deceased persons (**Revenue Dept.**)
- h. Teams to be formed and dispatched to the affected areas for detailed assessment of houses and property damage assessment (**Revenue Dept and Local authorities**)
- i. As reconstruction of houses will take a long period, arrangements to be made to provide interim shelters to the affected (**Revenue Dept and Line Departments like Water Supply Dept., TANGEDCO, RD&PR Dept. etc**)
 - I. Identification of the site for interim shelter
 - II. Allocation of areas to affected families
 - III. Providing appropriate shelters to the affected families
 - IV. Providing essential services as under in the interim shelter sites like water, transportation, power, road, drainage/ sanitation, school, PDS, health, protection, distribution of shelter materials to individual families, etc.

3 - ACTION PLAN FOR TSUNAMI

3.1 Introduction

This plan will address the response measures to be taken up to reduce the effects of tsunami waves with an effective coordinated way. Tsunami's are a series of waves usually generated by movement of the seafloor. These movements are caused by different types of geophysical phenomena such as earthquakes, landslides and volcanic eruptions. Tsunamis move at a speed equals to the square root of the product of gravity and the depth of the water. The tsunami waves behave very differently in deep water than in shallow water as their speed is related to the water depth. Tsunami waves form only a small hump, barely noticeable and harmless, which generally travels at a very high speed of 500 to 1,000 km/h. The tsunami's speed diminishes as it travels into shallower water to only tens of kilometers an hour, consequently increasing the wave height. Because of this shoaling effect, a tsunami, imperceptible at sea, may grow to be several meters or more in height near the coast forming the large destructive waves.

Tamil Nadu is prone to tsunami risk due to its long coastline and probability of occurrence of near and offshore submarine earthquakes in the Bay of Bengal.

The Chapter 6 in Volume 1 of this SDMP mentioned the roles, functions and responsibilities of Emergency Support Functions (ESFs) that have a key role to play during the Response.

Further, SDMP gives emphasis on well-being of the economically weaker and socially marginalized sections, persons with disability, women, Children, Scheduled Castes, Scheduled Tribes and minorities as they tend to suffer more during disasters. The SDMP forbids all forms of discrimination – be it based on sex, caste, community, descent or religion – in any aspect of disaster risk management.

3.2 Associated Authority

The Nodal Department for controlling, monitoring and directing measures for organizing response & relief and recovery is the Revenue Department (through Commissionarate of Relief and TNSDMA, respectively) of the State. All other concerned line Departments should extend full cooperation in all matters pertaining to the management of the Tsunami disaster whenever it occurs.

3.3 Disaster Declaration

The Disaster Management Act, 2005, provides for the State Government to declare any area where Tsunami have occurred or likely to occur as disaster affected area on the recommendations of the State Relief Commissioner or the District Collector. The purpose of declaration of disaster is to organize effective response in reduction of the Tsunami effects. Such a declaration provides wide powers and responsibilities to the Commissioner of Revenue Administration and the District Collectors in order to handle the incident effectively.

3.4 Early Warning

Early warning helps to detect tsunamigenic earthquakes and to monitor tsunamis and to provide timely advisories to vulnerable community through proper communication with help of real time database, vulnerability study and Decision Support System.

Decision Support system is the set of rules to be followed for issue of tsunami bulletins. These rules are appropriately coded in the form of software that automatically generates bulletins by accessing the real-time data from the observing network as well as the model scenario database.



The Tsunami Early Warning Centre (at INCOIS) continuously monitors the seismic activity in the tsunamigenic source regions of the Indian Ocean through the network of national and international seismic stations. This network enables us to detect any tsunamigenic earthquakes within a time period of 10-12 minutes of occurrence. Tsunami bulletins are then generated based on pre-set decision support rules and disseminated to the concerned authorities for action, following the SOP. Thus, Early Warning Centre provides 24 x 7 timely advisories as a part for prevention of a disaster.

Early warning centre helps in:

1. Continuous monitoring of Seismic and sea-level data.
2. Use of community level inundation maps which helps in assessing the population and infrastructure at risk as part of early warning.

Tsunami Alert, Watch and Advisory Bulletins received at the SEOCs and DEOCs need to be disseminated through the fastest means to the people in the coastal areas likely to be affected.

3.4.1 Warning/ Alert / Watch

Based on earthquake parameters, region's proximity to the earthquake zone (Travel Times) and expected run-up from pre-run model scenarios, warnings to far source regions are issued only after confirmation of tsunami triggering based on real-time water-level observations and correction of scenarios. This reduces possibility of false warnings.

The warning criteria are based on the premise that coastal areas falling within 60 minutes travel time from a tsunamigenic earthquake source need to be warned based solely on earthquake information, since enough time is not available for confirmation of water levels from Bottom Pressure Recorder (BPRs) and Tide Gauges. Those coastal areas falling outside the 60 minutes travel time from a tsunamigenic earthquake source are put under a watch status and upgraded to a warning only upon confirmation of water-level data, e.g. If a tsunamigenic earthquake happens in the coast of the Northern Indonesia, parts of the Andaman & Nicobar Islands falling within 60 minutes travel time of a tsunami wave are put under Warning status. Other areas are put under watch status and upgraded to a warning only if the Bottom Pressure Recorder's or Tide Gauges reveal significant change in water level. This implies that the possibility of false alarms is higher for areas close to the earthquake source; however for other regions since the warnings are issued only after confirmation of water-level data, the issue of false alarms doesn't arise. To reduce the rate of false alarms even in the near source regions, alerts are generated by analyzing the pre-run model scenarios, so that warnings are issued only to those coastal locations that are at risk.

3.4.2 Types of TWC Tsunami Bulletin Messages

a. Earthquake Information Bulletin (T+20 Min)

It contains information about origin time, latitude and longitude of the epicenter, name of geographical area, magnitude and depth of an earthquake. This message also contains preliminary evaluation of tsunami potential based on the magnitude. (e.g. earthquake occurring on land or earthquake with < M 6.5 or earthquake occurring > 100 Km depth or earthquake occurring in very shallow water column, etc. no tsunami is expected; Bulletin is provided to Ministry of Home Affairs (MHA).

b. Tsunami Warning (T+30 Min) (RED)

It contains information about the earthquake and a tsunami evaluation message indicating that tsunami is expected (e.g. For earthquakes with > M 6.5 occurring in the Ocean within a depth of < 100 Km, a tsunami warning will be issued for those areas falling within 60 minutes travel time from the earthquake source and if expected run up is > 2 m). This is the highest level wherein immediate actions are required to move public to higher grounds. Message also contains information on the travel times and tsunami grade (based on run-up estimates) at various coastal locations from pre-run model outputs. Information provided to Ministry of Home Affairs (MHA) and public.

c. Tsunami Alert (T+30 Min) (ORANGE)

It contains information about the earthquake and a tsunami evaluation message indicating that tsunami is expected (e.g. For earthquakes with > M 6.5 occurring in the Ocean within a depth of < 100 Km, a tsunami alert will be issued for those areas falling within 60 minutes travel time from the earthquake source and if expected run up is between 0.5 to 2 m as well as for those areas falling above 60 minutes travel time from the earthquake source and if expected run up is >2 m). This is the second highest level wherein immediate public evacuation is not required. Public should avoid beaches since strong current are expected. Local officials should be prepared for evacuation if it is upgraded to warning status. Message also contains information on the travel times and tsunami grade (based on run-up estimates) at various coastal locations from pre- run model outputs. Information provided to Ministry of Home Affairs (MHA) and public.

d. Tsunami Watch (T+30 Min) (YELLOW)

It contains information about the earthquake and a tsunami evaluation message indicating that tsunami is expected (e. g. For earthquakes with > M6.5 occurring in the Ocean within a depth of < 100 Km, a tsunami watch will be issued for those areas falling within 60 minutes travel time from the earthquake source and if expected run up is < 0.5 m and for those areas falling above 60 minutes travel time from the earthquake source and if expected run up is 0.5 to 2 m). This is the third highest level wherein immediate public evacuation is not required. Local officials should be prepared for evacuation if it is upgraded to warning status.

Message also contains information on the travel times and tsunami grade (based on run-up estimates) at various coastal locations from Pre-run model outputs. Information provided to Ministry of Home Affairs (MHA).

e. Tsunami Cancellation (GREEN)

It will be issued if the tsunami warning was issued on the basis of erroneous data or if the warning center determines from subsequent information that only an insignificant wave has been generated. In addition, tsunami warning may be canceled on a selective basis when a significant wave that has been generated clearly poses no threat to one or more of the areas the warning center warns, either because of intervening continents or islands which screen them or because the orientation of the generating area causes the tsunami to be directed away from these areas. To maintain credibility the warning center will use the terminology—non-destructive tsunami II in the cancellation message whenever applicable.

f. Tsunami All Clear (GREEN)

This bulletin indicates that the Tsunami Threat is passed and no more dangerous waves are expected.

3.5 Plan Activation

The tsunami response structure will be activated on the occurrence of a major tsunami. The Commissioner of Revenue Administration (CRA) will activate all the Departments for emergency response including the State EOC (SEOC). He will issue instructions to include the following details:

- Specify exact resources required
- The type of assistance to be provided
- The time limit within which assistance is needed
- The state, district or other contact persons/agencies for the provision of the assistance
- Other Task Forces with which coordination should take place

The SEOC and other control rooms at the state level as well as District Emergency Operation Centres (DEOCs) shall be activated with full strength. The State Government may publish a notification in the official gazette, declaring such area to be disaster-affected area under DM Act 2005.

Once the situation is totally controlled and normalcy is restored, the CRA declares End of Emergency Response and issues instructions to withdraw the staff deployed in emergency duties.

3.6 Roles and Responsibility

Following are the key emergency response measures when occurrence of tsunami generating earthquake under the ocean is reported:

3.7 Standard Operating Procedures (SOP)

Time Frame	Task	Activity	Responsibility
0 to (-) 60 Minutes	Warning Receipt and Dissemination - Monitoring seismic activity, provide warnings, based on seismic models and issue periodic bulletins	<ul style="list-style-type: none"> • Report the occurrence of Tsunami generating earthquake to following officials: <ul style="list-style-type: none"> • Hon. Chief Minister • Hon. Minister – Disaster Management • MHA & National Disaster Management Authority, GoI. • CRA/DIR DM • ACS / Principal Secretary (Revenue) • Chief Secretary of the State • Members of Crisis Management Group • All concerned District Collectors as well as Control Room DEOCs of the district/s likely to be affected as per preliminary warning of IMD and INCOIS. • Ministers and Secretaries of all line departments • Instruct Collectors (of the districts likely to be affected) to activate DEOCs at full strength • Alert all response teams in the State for deployment • Remain in constant touch with control rooms at National & State Level • Instruct and alert all secretary / heads of departments of the key line departments to activate their departmental plan and SOPs for Tsunami response 	INCOIS, ISR, IMD, COR

	Inter departmental Coordination	<ul style="list-style-type: none"> Instruct all State Government officers and employees in the State to report to their respective Head for emergency duties (Only if the warning is of a level 2 disaster or as per the decision taken in the meeting of the Crisis Management Group headed by Chief Secretary) Alert the District Collectors of districts not likely to be affected to be prepared for providing: Additional manpower Additional resources <ul style="list-style-type: none"> Vehicles, Machinery & Equipment Relief material to the districts likely to be affected 	CRA
	Establishment of Lines of Communication	<ul style="list-style-type: none"> Activate alternative communication equipments i.e. satellite phones, HF/VHF sets, Ham radio, VSAT in State EOC and District control rooms. Establish communication links with SEOCs and Search & Rescue Teams in all Municipal Corporations/Districts and alert them to be in stage of readiness. Establish communication links with villages likely to be affected as per the contact details available in SDRN. 	CRA
0 to (-) 50 Minutes	Review of situation and reporting	<ul style="list-style-type: none"> Establish contact with IMD, INCOIS, ISRO and the Defence Ministry of GoI for aerial / satellites imageries. After reviewing the satellite images, issue instructions and orders for emergency response to areas likely to be affected. 	CRA
	Management of EOCs and Tsunami Response	<ul style="list-style-type: none"> Take over full command of State EOCs. Instruct line departments to depute representatives at the State and District EOCs. 	CRA

		<ul style="list-style-type: none"> • Hold a meeting with leaders of emergency support functions (as detailed in Vol.1 of the plan) and entrust them their tasks. • Ensure that Tsunami information is disseminated to all who are at danger. • Arrange emergency meeting with State Crisis Management Group to devise a plan of action. 	
		<ul style="list-style-type: none"> • Arrange dissemination of information through various means of communication such as Radio, TV, Cable Network, SMS about Tsunami to districts/areas which are likely to be hit. 	CRA
		<ul style="list-style-type: none"> • Impose restriction on all transport activities heading towards coastal areas that are likely to be affected by Tsunami. 	Secretary Transport
		<ul style="list-style-type: none"> • Mobilize following teams: <ul style="list-style-type: none"> • Evacuation • Emergency Medical Services • Search and Rescue 	CRA
		<ul style="list-style-type: none"> • Mobilize following emergency response forces: <ul style="list-style-type: none"> • Fire & Emergency Services • NDRF/ SDRF • Village Disaster Management Teams • Police, Home Guards, Civil Defence • State Reserve Police Force • Army (if required) • Air Force (if required) 	
	Tsunami Response to Coastal Areas (Likely to be Affected)	<ul style="list-style-type: none"> • Based on the warning issued by IMD/ INCOIS, pin point the districts and villages likely to be affected by Tsunami and start the procedure for identifying safe places/shelters for evacuation in those villages. • Village wise data of safe sheltering for evacuation 	CRA, Transport Dept., Dist. Collector, Municipal Commissioner

	<p>available on SDRN should be referred and the District Collectors/Village level officers should be contacted to know the status of the shelters with the capacity of the shelter and other available facilities at the site.</p> <ul style="list-style-type: none"> • Make transport arrangement for mobilization of all emergency response teams. 	
	<ul style="list-style-type: none"> • Ensure arrangements are in place to evacuate fishermen and salt workers if needed. 	Ports & Fisheries Dept., Revenue Dept.
	<ul style="list-style-type: none"> • Ensure safety of tourists visiting beaches along the coastline. 	Tourism Dept.
	<ul style="list-style-type: none"> • Cordon off coastal areas for restricting entries of rail or road traffic. • Ensure law and order is maintained in areas likely to be affected. 	Home Dept., Dist. Collector, Municipal Commissioner
	<ul style="list-style-type: none"> • Ensure that all critical activities (mainly industrial production) in areas likely to be affected are shutdown. 	Line Depts. (TANGEKO, Fire and rescue Dept., Industries & Mines etc.)
	<ul style="list-style-type: none"> • Ensure dissemination of information to remote areas by means. • Ensure that local help lines are opened and effectively managed for public information, guidance and rumour control. 	Dist. Collector, Municipal Commissioner, Information Dept.
	<ul style="list-style-type: none"> • Ensure that the information to public and media about the progress of Tsunami waves at periodic intervals is released. 	Information and Public Relations Dept.
	<ul style="list-style-type: none"> • Health Department to activate their Departmental Tsunami Disaster Management Plan and SOPs for Management of casualties 	Health Dept.

0 to (-) 15 Minutes	Review and Reporting	<ul style="list-style-type: none"> Review and monitor following activities: <ul style="list-style-type: none"> Evacuation of people from coastal areas likely to be affected Positioning of Search and Rescue Teams Positioning of mobile communication units Positioning of quick medical response teams Mobilization of restoration teams of respective departments Requirement of armed forces in rescue and relief operations Dissemination of information to the vulnerable areas All preparedness measures to be taken by various authorities Keep in touch with National, State and District EOCs/Control Rooms Release information at appropriate time to media and public regarding response measures organized by the Government 	CRA, Information and Public Relations Dept.
	Emergency Relief Management	<ul style="list-style-type: none"> Ensure that the Relief Management work in the likely affected areas / districts are well organized. Ensure that the arrangement for basic following amenities at evacuation/relief centres are made available: <ul style="list-style-type: none"> Drinking water Food Clothing Sanitation and hygiene Lighting Medicines and Health Care 	CRA CRA, Civil Supply Dept., Revenue Dept. & Dist. Collector, Municipal Commissioner, Water Supply Dept., TANGEDCO, Health Dept.

		<ul style="list-style-type: none"> • Inform following agencies to be in a state of readiness for assisting in the Tsunami response measures (if required): <ul style="list-style-type: none"> • Public sector agencies • Private sector agencies • NGOs • CBOs • Volunteer Organizations • Request for assistance (if needed) to MHA / National Disaster Management Authority • Make necessary arrangements for public information/guidance, public opinion and rumour control. 	CRA CRA Information and Public Relations Dept.
Time = 0 Hrs	Disaster Declaration	<ul style="list-style-type: none"> • Record the reports in detail with time, source of reports etc. and declare the area as disaster affected, if necessary, (depending upon the nature and intensity of impact) 	CRA, Dist. Collector
	Preliminary Assessment, Deployment of Emergency Response Teams and Dissemination of Information	<ul style="list-style-type: none"> • Dist. Collector/s and Municipal Commissioners should send teams to the affected areas to take stalk of the effects of Tsunami. • District Collector/s and Municipal Commissioners should send sector wise situation reports to: <ul style="list-style-type: none"> • State EOC /CRA • TNSDMA • Deployment of following teams to Tsunami affected areas: <ul style="list-style-type: none"> • Emergency Communication Teams • Emergency Medical Services Teams • Search and Rescue Teams (With Equipment) • Preliminary damage and needs Assessment Teams 	CRA, Dist. Collector, Municipal Commissioner

		<ul style="list-style-type: none"> Establish communication link with affected districts and towns by activating alternate communication equipments such as Satellite Phones, HF/VHF Sets, HAM Radio, VSAT etc., in State/District EOCs and Taluk offices. Arrange dissemination of information about occurrence of Tsunami and areas that are affected by it to Media & Public 	CRA, Dist. Collector, Municipal Commissioner, Information and Public Relations Dept.
Time = 0 + 24 Hrs	Mobilization and Deployment	<ul style="list-style-type: none"> Immediate mobilization of following units / teams to areas affected by Tsunami <ul style="list-style-type: none"> S & R Teams of Fire and Emergency Services SDRF Quick Medical Response Teams Quick Damage & Loss <p>Assessment Teams</p> <ul style="list-style-type: none"> Quick Need Assessment Teams Road Clearance Teams Teams for dignified management of the dead Teams for disposal of carcasses Teams for debris clearance (if any) Teams for maintaining Law & Order in the affected areas Arrange for S & R teams of Air Force (If required) 	CRA, Municipal Commissioner, Home Dept., Concern line Dept., DSP
	Measures for quick and organized response	<ul style="list-style-type: none"> State EOC, the Collectors/ Municipal Commissioners of the affected district should ensure that the following response activities are carried out immediately: 	CRA, Collector, DSP, Municipal Commissioner, Line Dept.

a. Clearance of access roads to the affected areas	<ul style="list-style-type: none"> • To survey the access roads/routes leading to the affected areas and manage traffic for mobilization of equipments, machinery and volunteers. • Identify alternate roads/routes for evacuation. • Undertake repairing/restoration of damaged roads leading to the affected areas. • Identify and declare unsafe buildings/structures in Tsunami affected areas. • Evacuate people from unsafe buildings/ structures and shift them to relief camps/sites. 	RD & PR Dept., Transport Dept., Dist. Collector, Municipal Commissioner, Railways, CRA
b. Necessary Arrangements at evacuation/relief centres	<ul style="list-style-type: none"> • To ensure that necessary arrangements at evacuation/ relief centers is made with sufficient availability of: <ul style="list-style-type: none"> a. Food, b. Water, c. Blankets/Clothing d. Medicines e. Lighting f. Sanitation and hygiene etc. • To ensure necessary security arrangements for the personals (Emergency responders/relief teams) who are working at Relief Centers and involved in distribution of Relief Materials. • To ensure that law and order is maintained at evacuation/relief centers and in the affected areas as well. 	Revenue Dept., Civil Supply Dept., Collector, DSP, Municipal Commissioner, Water Supply Dept., Health Dept., TNEB, Power & Energy Dept., TWAD and CMWSSB & Local Authorities, Home Dept.
c. Safety of fishermen and salt workers	<ul style="list-style-type: none"> • Immediate actions to be taken for safety of fishermen, salt workers and visitors at Tsunami affected coastal areas. • Ensure that all the fishermen and salt workers have returned from the sea or those who are in the sea are rescued and evacuated to safer places. 	CRA, Port and Fisheries Dept., Tourism Dept., Industries & Mines Dept.

	d. Ensure immediate health and minimization of outbreak of disease	<ul style="list-style-type: none"> • To establish camp hospitals near the affected areas. • To make transportation arrangements to shift seriously injured persons to nearest- <ul style="list-style-type: none"> a. Camp Hospitals, b. Taluk and District Hospitals, c. Regional and State Hospitals • Ensure that the Hospitals are well prepared to deal with seriously injured persons. • To ensure that the required medical assistance/aid and medicines are provided to the affected people at site as well as at evacuation/relief centers in the affected area and necessary records are maintained. • Take sanitation and epidemic control measures for preventing any water borne disease. • Keep adequate stock of essential medicines, first-aid etc. at taluk/ district hospitals • Take steps to purify drinking water sources • If required, take the help of doctors/paramedics from the list of doctors/paramedics available at the taluk/district level for immediate medical assistance. 	Health Dept., Transport Dept.
		<ul style="list-style-type: none"> • Assess need for fodder if required. • Keep teams ready for carcass disposal (if required). 	Animal Husbandry Dept.
	e. Information to public and media	<ul style="list-style-type: none"> • Establish Media/Press Centre for media management and information dissemination • Ensure that the information to media/general public about the response of the State Government is released in an organized manner. • Organize media briefing twice a day at pre-determined intervals. 	Information and Public Relations Dept., CRA

	f. Other important work related to immediate response	<ul style="list-style-type: none"> • Prepare quick need assessment report for planning of relief operation. • Additional assistance may be asked for emergency response/relief from GoI-NDMA (If needed). • Maintain constant touch with National, District EOCs and other control rooms. • Conduct Aerial survey of affected areas for taking a stalk of the situation. 	CRA
Time = 0 + 24 to 48 Hrs	Restoration of critical infrastructure / essential services	<ul style="list-style-type: none"> • Ensure that the essential services/critical infrastructure of the affected areas have been restored or alternative arrangement is made for ensuring safety of people and smooth management of emergency response. • Ensure that key administrative and lifeline buildings are brought back to operation quickly • Ensure following primary necessities are restored <ul style="list-style-type: none"> • Power • Water • Telecommunication • Roads • Bridges 	CRA, Line Depts., Dist. Collector, Municipal Commissioner
	Dignified Management of Dead	<ul style="list-style-type: none"> • Ensure following procedure is followed before disposal/handing over of dead bodies: <ul style="list-style-type: none"> • Photographs of the dead bodies are taken, • Identification of the dead bodies is done • Post Mortem where ever necessary and possible is carried out, • Handing over dead bodies of persons known/identified to their relatives, • Disposal of unclaimed and unidentified dead bodies. 	Collector, DSP, Municipal Commissioner, Home Dept., Health Dept., Local Authorities

	<ul style="list-style-type: none"> Animal Husbandry Department to ensure medical aid to cattle which are injured Disposal of animal carcasses with the help of local bodies/ health dept. 	Animal Husbandry Dept, Local Authorities, health dept.
Public Information and Media Management	<ul style="list-style-type: none"> Ensure that information about progress of rescue and relief is provided to media/public in an organized manner at least twice a day. 	CRA, Information and Public Relations Dept., and Dist.
	<ul style="list-style-type: none"> Establish Help Lines for facilitating communication between the victims and their relatives residing outside the affected area/s. Establish Help Lines/Information Centers at strategic locations for providing information about persons evacuated to the relief centres/hospitals. 	Collector, Municipal Commissioner
Miscellaneous rescue and relief works	<ul style="list-style-type: none"> Assess the situation and take appropriate action to accelerate the Search & Rescue Operations. Depute additional officers and supporting staff to Tsunami affected areas from non-affected areas (if required) to accelerate the rescue and relief operations. 	CRA, Districts Collector, DSP, Municipal Commissioner
	<ul style="list-style-type: none"> Ensure that the relief assistance received from outside is centrally received, stored and sent for distribution to Tsunami affected areas according to their need and proper accounts are maintained about both receipt and distribution. 	CRA, Civil Supply Dept.
	<ul style="list-style-type: none"> District Collector may oversee the functioning of relief centres and ensure adequate availability & supply of relief materials. 	Revenue Dept, Civil Supply Dept.

Time = 0 + 48 to 96 Hrs	<ul style="list-style-type: none"> Arrange for procurement of additional relief material required for relief operations (on the basis of need assessment). Mobilize additional relief material required for relief operations. Maintain constant touch with State & Districts EOCs. 	CRA, Dist. Collector, Municipal Commissioner, Civil Supply Dept.
	<ul style="list-style-type: none"> Arrangement for transportation of injured from field hospital to base hospital Arrangement for transport of dead bodies to their native places. 	Revenue Dept, Health Dept., Transport Dept
	<ul style="list-style-type: none"> Ensure maintenance of record, timely reporting and information management. Ensure maintenance of record and information database 	Line Depts., Dist. Collector, CRA
Time = 0 + 96 to 168 Hrs	<ul style="list-style-type: none"> Review the restoration of all the public and essential in Tsunami affected areas Review and follow-up all necessary arrangements for emergency response & relief in the affected areas. 	CRA
	<ul style="list-style-type: none"> After receiving the message of de- warning, ensure that people are moved back safely to their houses. 	CRA, Collector, DSP
	<ul style="list-style-type: none"> Organize a quick rapid visual survey of the affected areas (through a technical team of engineers) to ascertain the safety of the structures decide on giving the go- ahead to people to move back to their respective houses. 	CRA, Dist. Collectors, Municipal Commissioner, RD&PR
	<ul style="list-style-type: none"> Ensure relief disbursement, allotment of funds and grants to line department and district collectors for organizing emergency response, relief and evacuation arrangements. 	Revenue Dept.

3.8. Relief Measures

3.8.1 Short Term Relief Measures

Ensure that all the following identified measures addresses the Minimum standard of relief defined by the state government.

- a. Provide temporary shelter to the affected people
- b. Temporary shelter site should be safe and easily accessible.
- c. Continue to provide essential services (food, water, clothing, sanitation, medical assistance, power, etc.) to the affected people.

The CRA, Secretaries of Line Departments and concerned Collectors to ensure the following in the relief camps:

- i. Special emphasis on hygiene and sanitation aspects should be given in relief camp sites. (Health Dept.)
- ii. Separate area should be earmarked within the relief camp for storage of relief materials. (Civil Supply & PWD Dept.)
- iii. Adequate manpower and transport facilities for the camp site. (Transport Department)
- iv. Arrangements to be made for trauma management. (Health Department)
- v. Mobile medical units to be sent to remote areas with a view to provide medical assistance to the victims/injured. (Health Dept.)
- vi. Information centre should be established by the administration. (I&B Department)

3.8.2 Interim Relief Measures

- a. Arrangements to be made for quick identification and maintenance of the records of disposal of dead bodies in the affected areas (Home, Revenue, Health Dept., Local Authorities).
- b. Arrangements to be made to record the complaints of all persons reported missing. Follow up action in terms of verification of the report also needs to be made. (Home Dept.)
- c. District Magistrates and Sub-Divisional Magistrates to be empowered to exempt the requirement of identification and post-mortem in case of mass casualties. Revenue Dept may depute additional Sub-Divisional Magistrates to expedite disposal of the dead bodies. (Revenue & Home Dept.).
- d. Unclaimed/unidentified dead bodies to be disposed of with the help of pre identified voluntary Agencies at the earliest after keeping their records. (Home, Revenue, Health Dept. & Local Bodies)
- e. Additional manpower to be deployed in the affected areas for supplementing the efforts of the local administration. (Revenue Dept.).
- f. Separate Cell to be established at state/ district/ taluk level to coordinate with the NGOs and outside donor/aid agencies. (Revenue Dept.)

- g. Regular meetings of the different stakeholders/departments should be organized at state level for sharing of information, developing strategies for relief operations. (Commissioner of Revenue Administration & Collectors at District Level).
- h. Information & Public Relation Dept. to coordinate with the media to play a positive role in disseminating appropriate information to public and the government in order to facilitate the speedy recovery. (I& B Dept.)

3.8.3 Assessment of Damage/Loss and Relief Needs

- a. The Commissioner of Relief to issue instructions to the District Collectors to provide the needs assessment report. The Commissioner of Relief should consolidate the same and to prepare—States Needs Assessment Report.
- b. The Commissioner of Relief to issue instructions to the District Collectors to provide the damage and loss assessment report. The Commissioner of Relief to consolidate the same and to prepare —Relief Memorandum (if necessary) which will be useful in planning and implementing the relief operation after the disaster for the victims of the disaster.
- c. Adequate manpower, vehicles, stationery, etc. should be provided to supplement the efforts for need/ loss assessment. (CRA & Revenue Dept.)
- d. The Relief Memorandum should be provided by the Collectors. (Commissioner of Relief & Collectors)
- e. The damage assessment Performa is also attached in the annexure 3. (CRA & Collectors)
- f. Identification and demolition of dangerous structures in the affected areas to minimize further loss of life and injuries. (PWD Dept., Revenue Dept and Local Bodies)
- g. Arrangements for distribution of gratuitous relief and cash doles. (Revenue Dept., RD&PR Dept., UD&UHD Dept. and Collectors)
- h. Arrangements to be made for survey of human loss and distribution of ex-gratia relief to the families of deceased persons. (Revenue Dept.)
- i. Teams to be formed and dispatched to the affected areas for detailed assessment of houses and property damage assessment. (Revenue Dept and Local authorities)
- j. As reconstruction of houses will take a long period, arrangements to be made to provide interim shelters to the affected. (Revenue Dept and Line Departments like Water Supply Dept., PWD and TNEB. etc)
 - i. Identification of the site for interim shelter
 - ii. Allocation of areas to affected families
 - iii. Providing appropriate shelters to the affected families
 - iv. Providing essential services as under in the interim shelter sites like water, transportation, power, road, drainage/ sanitation, school, PDS, health, protection, distribution of shelter materials to individual families, etc.

4 - ACTION PLAN FOR FLOOD

4.1 Introduction

Floods are among the most recurrent phenomena and destructive natural hazard causing extensive damage to infrastructure, public and private services, environment and economy. With the growing incidences of climate change across the globe, the frequency and intensity of floods has grown in the State over the years. This may be attributed to unplanned development and increased encroachment of flood plains. The rivers bring heavy sediment load from the catchments. These, coupled with inadequate carrying capacity of the rivers are responsible for causing floods, drainage congestion and erosion of river-banks. Hence, apart from an effective disaster response system, it becomes of utmost importance to have a good flood prevention and mitigation strategy to achieve the objectives of vulnerability reduction.

4.2 Declaration of disaster

The Disaster Management Act, 2005, provides for the State Government to declare any area where flood have occurred or likely to occur as disaster affected area on the recommendations of the CRA or the District Collector. The purpose of the declaration is to organize effective response in mitigating the flood effects.

4.3 Flood Forecasting and Warning

India receives 80 percent of its annual rainfall during the southwest monsoon season of June to September. Rainfall over the country during this season shows a wide range of spatial variation due to orographic influences and preferential occurrence of rain-bearing systems in certain regions. India has a very extensive rain-gauge network and rainfall monitoring over the country. The real-time monitoring and statistical analysis of district-wise daily rainfall is one of the important functions of the Hydrometeorological Division of IMD. Based on the real time daily rainfall data, weekly district-wise, sub-division wise and state-wise rainfall distribution summaries are prepared regularly by the Rainfall Monitoring Unit. Maps showing weekly and cumulative rainfall figures in 36 meteorological sub-divisions of the country are prepared. This information is very important to many user agencies, particularly for agricultural planning.

The Central Water Commission (CWC) for issuing flood warnings in respect of the Cauvery, Palar, Thenpennai, Tamirabaruni, Bhavani Sagar, Ponnaiyar, Kosasthalaiyar and Araniyar rivers.

Further, a nationwide flood forecasting and warning system covering major inter-state rivers has been established by the Central Water Commission (CWC). The system under CWC is often supplemented by the states that make arrangements for advance warning at other stations strategically important to them. The CWC also extends FF services to such stations at the request of the states concerned. With reliable advance information/ warning about impending floods, loss of life and property can be reduced to a considerable extent. People, cattle and valuable assets can be shifted in advance to safer places.

The main components of a national flood forecasting and warning system are as follows:

- Collection of real-time data and prediction of flood severity and time of onset of particular levels of flooding
- Preparation of warning messages, describing what is happening, predictions of what will happen and expected impact and the same must be disseminated properly.
- Interpretation of the predictions and other flood information to determine flood impacts on vulnerable communities
- If predictions fail, the reasons of prediction failure should be communicated to communities in order to establish trust.
- For a flood warning system to work effectively, all these components must be integrated with each other rather than operating in isolation.

4.4 Procedure for Disseminating Warnings to Remote Areas

Responsibilities need to be defined clearly for lower tiers of administration and the emergency services to have predefined links with communities in remote areas. This should include:

- a) Community stations, FM Radio should be supplied with clear and accurate information
- b) Mass messaging and use of mobile phone operators in information dissemination
- c) Doordarshan and the local cable channels (TV channels & radio Channels including FM radio), Press Bulletin, Fax/Telephone, Social Media
- d) Power failures occur during times of inclement weather particularly during passage of a tropical cyclone/floods over the community and portable transistor radios may prove to be the best form of information in receiving flood warnings
- e) Use of appointed community wardens with direct two-way radio or mobile telephone access to warning agencies and emergency authorities
- f) Local means of raising alarms, for example church bells, sirens, loud hailer, loudspeakers, etc. The latter could be the responsibility of selected individuals or wardens, who need to be provided with equipment and transport, for example motor cycles or bicycles;
- g) Use of high end technology like mass mobile messaging, SMS, use of social media etc., satellite based disaster warning systems like satellite phones, Early Warning Dissemination System

4.5 Trigger Mechanism: Plan Activation

The flood response system will be activated on the occurrence of a heavy rain. The Commissioner of Revenue Administration (CRA) will activate all the Departments for emergency response including the State EOC. He will issue instructions to include the following details:

- a) Specify exact resources required
- b) The type of assistance to be provided

- c)** The time limit within which assistance is needed
- d)** The state, district or other contact persons/agencies for the provision of the assistance
- e)** Other Task Forces with which coordination should take place

The state EOC and other control rooms at the state level as well as district control rooms should be activated with full strength. The State Government may publish a notification in the official gazette, declaring such area to be disaster-affected area under DM Act 2005. Once the situation is totally controlled and normalcy is restored, CRA declares End of Emergency Response and issues instructions to withdraw the staff deployed in emergency duties.

4.6 Roles and Responsibility

Following are the key emergency response measures in case of occurrence of floods:

Standard Operating Procedures (SOP)

Time Frame	Task	Activity	Responsibility
0-48 hours	Warning Receipt and Dissemination - Monitoring rainfall activity, provide warnings, based on hydraulic models and disseminate information	Report the occurrence of heavy rainfall to following officials: <ul style="list-style-type: none"> • Hon'ble Chief Minister • Hon'ble Minister – Disaster Management • MHA & National Disaster Management Authority, Gol. • CRA/DIR DM • ACS / Principal Secretary (Revenue) • Chief Secretary of the State • Members of Crisis Management Group • All concerned District Collectors as well as DEOCs of the district/s likely to be affected as per preliminary warning of IMD and CWC. • Ministers and Secretaries of all line departments • Instruct Collectors (of the districts likely to be affected) to activate DEOCs at full strength • Alert all response teams in the State for deployment • Remain in constant touch with Emergency Operation Centre at National & State Level 	IMD, CWC, CRA, Water Resources Department

		<ul style="list-style-type: none"> Instruct and alert all secretary / heads of departments of the key line departments to activate their departmental plan and SOPs for Flood response 	
	Inter departmental Coordination	<ul style="list-style-type: none"> Instruct all State government officers and employees in the State to report to their respective Head for emergency duties Alert the District Collectors of districts not likely to be affected to be prepared for providing: <ul style="list-style-type: none"> Additional manpower Additional resources Vehicles, Machinery & Equipment Relief material to the districts likely to be affected 	CRA
	Establishment of Lines of Communication	<ul style="list-style-type: none"> Activate alternative communication equipments i.e. satellite phones, HF/ VHF sets, Ham radio, VSAT in State EOC and ERCs, and District control rooms Establish communication links with ERCs and Search & Rescue Teams in all Municipal Corporations/ Districts and alert them to be in stage of readiness. Establish communication links with villages likely to be affected as per the contact details available in SDRN and Village Disaster Management Plans (V DMP). 	CRA
0 to (-) 24 Hours	Review of situation and reporting	<ul style="list-style-type: none"> Establish contact with IMD, CWC and the Defence Ministry of GoI for aerial / satellites imageries. After reviewing the satellite images, issue instructions and orders for emergency response to areas likely to be affected. 	CRA
	Management of EOCs for Flood Response	<ul style="list-style-type: none"> Take over full command of State EOCs. Instruct line departments to depute representatives at the State and District EOCs. Hold a meeting with leaders of emergency support functions (as detailed in Vol. 1 of the plan) and entrust them their tasks. 	CRA

		<ul style="list-style-type: none"> • Ensure that flood information is disseminated to all who are at danger. • Arrange emergency meeting with State Crisis Management Group to devise a plan of action. 	
		<ul style="list-style-type: none"> • Arrange dissemination of information through various means of communication such as social media, Radio, TV, Cable Network, SMS about floods to districts / areas which are likely to be hit. 	CRA
		<ul style="list-style-type: none"> • Impose restriction on all transport activities heading towards likely affected areas. 	Secretary Transport
		<p>Mobilize following teams:</p> <ul style="list-style-type: none"> • Evacuation • Emergency Medical Services • Search and Rescue <p>Mobilize following emergency response forces:</p> <ul style="list-style-type: none"> • Fire & Emergency Services 	CRA
		<ul style="list-style-type: none"> • NDRF/ SDRF • Village Disaster Management Teams • Police, Home Guards, Civil Defence, Aapda Mitra • State Reserve Police Force • Arm Forces (if required) • Air Force (if required) 	185
	Flood Response to the Areas (Likely to be Affected)	<ul style="list-style-type: none"> • Based on the warning issued by IMD/ CWC, pin point the districts and villages likely to be affected by floods and start the procedure for identifying safe places/shelters for evacuation in those villages. • Village wise data of safe sheltering for evacuation available on SDRN/ VDMPs should be referred and the District Collectors/Village level officers should be contacted to know the status of the shelters with the capacity of the shelter and other available facilities at the site. • Make transport arrangement for mobilization of all emergency response teams. 	CRA, Transport Dept., Dist. Collector, Municipal Commissioner

		<ul style="list-style-type: none"> • Ensure arrangements are in place to evacuate most vulnerable i.e., person with disability, pregnant women, etc., if needed. 	Revenue Dept., Social Justice Department
		<ul style="list-style-type: none"> • Ensure safety of tourists visiting flood affected places. 	Tourism Dept.
		<ul style="list-style-type: none"> • Cordon off likely affected areas for restricting entries of rail or road traffic. • Ensure law and order is maintained in areas likely to be affected. 	Home Dept., Dist. Collector, Municipal Commissioner
		<ul style="list-style-type: none"> • Ensure that all critical activities (mainly industrial production) in areas likely to be affected are shutdown. 	Line Depts. (PWD, Fire & Rescue Depart., Industries & Mines etc.)
		<ul style="list-style-type: none"> • Ensure dissemination of information to remote areas by all means. • Ensure that local help lines are opened and effectively managed for public information, guidance and rumour control. • Ensure that the information to public and media about the progress of heavy rain at periodic intervals is released. 	Dist. Collector, Municipal Commissioner, Information Dept.
		<ul style="list-style-type: none"> • Health Department to activate their Departmental flood Disaster Management • Plan and SOPs for Management of casualties 	Health Dept.
0 to (-) 12 hours	Review and Reporting	<p>Review and monitor following activities:</p> <ul style="list-style-type: none"> • Evacuation of people from likely to be affected areas • Positioning of Search and Rescue Teams • Positioning of mobile communication units • Positioning of quick medical response teams • Mobilization of restoration teams of respective departments • Requirement of armed forces in rescue and relief operations 	CRA, Information and Public Relations Dept.

		<ul style="list-style-type: none"> Dissemination of information to the vulnerable areas All preparedness measures to be taken by various authorities Keep in touch with National, SEOCS and District EOCs/Control Rooms Release information at appropriate time to media and public regarding response measures organized by the Government 	
Emergency Relief Management	Emergency Relief Management	<ul style="list-style-type: none"> Ensure that the Relief Management work in the likely affected areas / districts are well organized. 	CRA
		<p>Ensure that the arrangement for basic following amenities at evacuation/relief centres are made available:</p> <ul style="list-style-type: none"> Drinking water Food Clothing Sanitation and hygiene Lighting Medicines and Health Care 	CRA, Civil Supply Dept., Revenue Dept. & Dist. Collector, Municipal Commissioner, Water Supply Dept., TNEB, Health Dept.
		<p>Inform following agencies to be in a state of readiness for assisting in the flood response measures (if required):</p> <ul style="list-style-type: none"> Public sector agencies Private sector agencies NGOs CBOs Volunteer/ religious Organizations 	CRA
		<ul style="list-style-type: none"> Request for assistance (if needed) to MHA/National Disaster Management Authority 	CRA
		<ul style="list-style-type: none"> Make necessary arrangements for public information/guidance, public opinion and rumour control. 	Information and Public Relations Dept.
0 to (+) 24 hours	Disaster Declaration	<ul style="list-style-type: none"> Record the reports in detail with time, source of reports etc., and declare the area as disaster affected, if necessary, (depending upon the nature and intensity of impact) 	CRA, Dist. Collector

	Preliminary Assessment, Deployment of Emergency Response Teams and Dissemination of Information	<ul style="list-style-type: none"> • District Collector/s and Municipal Commissioners should send teams to the affected areas to take stock of the effects of Floods. • District Collector/s and Municipal Commissioners should send sector wise situation reports to: <ul style="list-style-type: none"> • State EOC/CRA • TNSDMA 	Dist. Collector, Municipal Commissioner
		<ul style="list-style-type: none"> • Deployment of following teams to Flood affected areas: <ul style="list-style-type: none"> • Emergency Communication Teams • Emergency Medical Services Teams • Search and Rescue Teams (With Equipment) • Preliminary damage and needs assessment teams 	CRA, Dist. Collector, Municipal Commissioner
		<ul style="list-style-type: none"> • Establish communication link with affected districts and towns by activating alternate communication equipments such as Satellite Phones, HF/VHF Sets, Ham Radio, V Set etc., in State/District EOCs and Taluks. • Arrange dissemination of information about occurrence of flood and areas that are affected by it to Media & Public 	CRA, Dist. Collector, Municipal Commissioner, Information Dept.
	Mobilization and Deployment	<ul style="list-style-type: none"> • Immediate mobilization of following units/teams to areas affected by flood <ul style="list-style-type: none"> • S & R Teams of Fire and Emergency Services • SDRF • Quick Medical Response Teams • Quick Damage & Loss Assessment Teams • Quick Need Assessment Teams • Road Clearance Teams 	CRA, Municipal Commissioner, Home Dept., Concern line Dept., DSP

	<ul style="list-style-type: none"> Teams for dignified management of the dead Teams for disposal of carcasses Teams for debris clearance Teams for maintaining Law & Order in the affected areas Arrange for S & R teams of Air Force (If required) 	
Measures for quick and organized response	<ul style="list-style-type: none"> State EOCs, DEOCs the Collectors/ Municipal Commissioners of the affected District(s)/ Municipal Corporation (s)should ensure that the following response activities are carried out immediately: 	CRA, Collector, DSP, Municipal Commissioner, Line Dept.
Clearance of access roads to reach at the sites of affected areas	<ul style="list-style-type: none"> To survey the access roads/routes leading to the affected areas and manage traffic for mobilization of equipments, machinery and volunteers. Identify alternate roads/routes for evacuation. Undertake repairing/restoration of damaged roads leading to the affected areas. Identify and declare unsafe buildings/structures in Flood affected areas. Evacuate people from unsafe buildings/ structures and shift them to relief camps/sites. 	PWD Dept., Transport Dept., Dist. Collector, Municipal Commissioner, Railways, CRA
Necessary Arrangements at evacuation/relief centres as per the Minimum Standard of Relief	<ul style="list-style-type: none"> To ensure that necessary arrangements at evacuation/relief centers is made with sufficient availability of: <ul style="list-style-type: none"> a. Food, b. Water, c. Blankets/Clothing d. Medicines e. Lighting f. Sanitation and hygiene etc. To ensure necessary security arrangements for the personals (Emergency responders/relief teams) who are working at Relief Centers and involved in distribution of Relief Materials. 	Revenue Dept., Civil Supply Dept., Collector, DSP, Municipal Commissioner, Water Supply Dept., Health Dept., TNEB, Power & Energy Dept., TWAD CMWSSB & Local Authorities, Home Dept.

		<ul style="list-style-type: none"> To ensure that law and order is maintained at evacuation/relief centers and in the affected areas as well. 	
	Ensure immediate health and minimization of outbreak of disease	<ul style="list-style-type: none"> To establish camp hospitals near the affected areas. To make transportation arrangements to shift seriously injured persons to nearest- <ol style="list-style-type: none"> Camp Hospitals, Taluk and District Hospitals, Regional and State Hospitals Ensure that the Hospitals are well prepared to deal with seriously injured persons. To ensure that the required medical assistance/aid and medicines are provided to the affected people at site as well as at evacuation/relief centers in the affected area and necessary records are maintained. Take sanitation and epidemic control measures for preventing any water borne disease. Keep adequate stock of essential medicines, first-aid etc. at taluk/ district hospitals Take steps to purify drinking water sources If required, take the help of doctors/paramedics from the list of doctors/paramedics available at the taluk/district level for immediate medical assistance. Assess need for fodder if required. Keep ready teams for carcass disposal (if required). 	Health Dept., Transport Dept. Animal Husbandry Dept.
	Information to public and media	<ul style="list-style-type: none"> Establish Media/Press Centre for media management and information dissemination Ensure that the information to media/general public about the response of the State Government is released in an organized manner. Organize media briefing twice a day at pre-determined intervals. 	Information Dept., CRA

	Other important work related to immediate response	<ul style="list-style-type: none"> • Prepare quick need assessment report for planning of relief operation. • Additional assistance may be asked for emergency response/relief from GoI- NDMA (If needed). • Maintain constant touch with National, District and Taluk EOCs and other control rooms. • Conduct Aerial survey of affected areas for taking a stalk of the situation. 	CRA
Time = 0 + 24 to 48 Hrs	Restoration of critical infrastructure / essential services	<ul style="list-style-type: none"> • Ensure that the essential services/critical infrastructure of the affected areas have been restored or alternative arrangement is made for ensuring safety of people and smooth management of emergency response. • Ensure that key administrative and lifeline buildings are brought back to operation quickly • Ensure following primary necessities are restored <ul style="list-style-type: none"> • Power • Water • Telecommunication • Roads • Bridges 	CRA, Line Depts., Dist. Collector, Municipal Commissioner
	Dignified Management of Dead	<ul style="list-style-type: none"> • Ensure following procedure is followed before disposal/handing over of dead bodies: <ul style="list-style-type: none"> • Photographs of the dead bodies are taken, • Identification of the dead bodies is done, • Post Mortem where ever necessary and possible is carried out, • Handing over dead bodies of persons known/identified to their relatives, • Disposal of unclaimed and unidentified dead bodies. 	Collector, DSP, Municipal Commissioner, Home Dept., Health Dept., Local Authorities

		<ul style="list-style-type: none"> • Animal Husbandry Department to ensure medical aid to cattle which are injured • Disposal of animal carcasses with the help of local bodies/health dept. 	Animal Husbandry Dept, Local Authorities, health dept.
	Public Information and Media Management	<ul style="list-style-type: none"> • Ensure that information about progress of rescue and relief is provided to media/public in an organized manner at least twice a day. • Establish Help Lines for facilitating communication between the victims and their relatives residing outside the affected area/s. • Establish Help Lines / Information Centers at strategic locations for providing information about persons evacuated to the relief centres/hospitals. 	CRA, Information and Public Relations Dept., Dist. Collector, Municipal Commissioner
	Miscellaneous rescue and relief works	<ul style="list-style-type: none"> • Assess the situation and take appropriate action to accelerate the Search & Rescue Operations. • Depute additional officers and supporting staff to flood affected areas from non-affected areas (if required) to accelerate the rescue and relief operations. 	CRA, Districts Collector, DSP, Municipal Commissioner
		<ul style="list-style-type: none"> • Ensure that the relief assistance received from outside is centrally received, stored and sent for distribution to flood affected areas according to their need and proper accounts are maintained about both receipt and distribution. 	CRA, Civil Supply Dept.
		<ul style="list-style-type: none"> • District Collector may oversee the functioning of relief centres and ensure adequate availability & supply of relief materials. 	Revenue Dept, Civil Supply Dept.
Time = 0 + 48 to 96 Hrs		<ul style="list-style-type: none"> • Arrange for procurement of additional relief material required for relief operations (on the basis of need assessment). • Mobilize additional relief material required for relief operations. • Maintain constant touch with State & Districts EOCs. 	CRA, Dist. Collector, Municipal Commissioner, Civil Supply Dept.

		<ul style="list-style-type: none"> Arrangement for transportation of injured from field hospital to base hospital Arrangement for transport of dead bodies to their native places. 	Revenue Dept., Health& Transport Dept
		<ul style="list-style-type: none"> Ensure maintenance of record, timely reporting and information management. Ensure maintenance of record and information database 	Line Depts., Dist. Collector, CRA
Time = 0 + 96 to 168 Hrs		<ul style="list-style-type: none"> Review the restoration of all the public and essential in flood affected areas Review and follow-up all necessary arrangements for emergency response & relief in the affected area/s. 	CRA
		<ul style="list-style-type: none"> After receiving the message of de-warning, ensure that people are moved back safely to their houses. 	CRA, Collector, DSP
		<ul style="list-style-type: none"> Organize a quick rapid visual survey of the affected areas (through a technical team of engineers) to ascertain the safety of the structures decide on giving the go-ahead to people to move back to their respective houses. 	CRA, Dist. Collectors, Municipal Commissioner, PWD Dept.
		<ul style="list-style-type: none"> Ensure relief disbursement, allotment of funds and grants to line department and district collectors for organizing emergency response, relief and evacuation arrangements. 	Revenue Dept.

4.7 Relief Measures

Short Term Measures	Action Taken
Setting up of Shelter/ relief camps as per the Minimum Standards of Relief adopted by GoTN	<ul style="list-style-type: none"> Disaster affected households shall be provided with necessary tools, equipment and materials for repair, reconstruction and maintenance for safe use of their shelter. Adequate numbers of buildings or open space should be identified where relief camps can be set up during emergency

	<ul style="list-style-type: none"> The temporary relief camps should have adequate provision of drinking water and bathing, sanitation and essential health-care facilities.
Distribution of food	<ul style="list-style-type: none"> Free distribution of foods shall be made to avoid hunger and malnutrition. Wherever possible, ration should be stored and dry rations should be distributed for home cooking.
Water	<ul style="list-style-type: none"> Availability of safe drinking water is very challenging particularly during floods. It must be ensured that affected people have adequate facilities and supplies to collect, store and use clear and safe water for drinking, cooking and personal hygiene.
Clothing	<ul style="list-style-type: none"> The people affected by the disaster shall be provided with sufficient clothing, blankets, etc. to ensure their safety and well-being.
Health, Sanitation and Hygiene	<ul style="list-style-type: none"> During post disaster phase, many factors increase the risk of diseases and epidemics because of overcrowding, inadequate quantity and quality of water, poor environmental and sanitary conditions, decaying biological matter, water stagnation and inadequate shelter & food supplies. There should be adequate supply of medicines, disinfectants, fumigants, personal protective equipments, diagnostic kits, portable oxygen cylinders, ventilators etc. to check outbreak of epidemics. It should be ensured that the medicines have not reached expiry date. Sanitation services are crucial to prevent an outbreak of epidemics in post disaster phase.
Impact of floods on vulnerable section of society	<ul style="list-style-type: none"> Children, pregnant women, elderly people, malnourished people, person with disability and people who are ill or immune-compromised, are particularly vulnerable when a disaster strikes, and take a relatively high share of the disease burden associated with emergencies. The most vulnerable members of the community are the elderly and the youngest as they require special assistance.

4.8 Interim Relief Measure

- Arrangements to be made for quick identification and maintenance of the records of disposal of dead bodies in the affected areas (Home Dept., Revenue Dept., Health Dept. and Local Authorities).
- Arrangements to be made to record the complaints of all persons reported missing. Follow up action in terms of verification of the report also needs to be made. (Home Dept.) Hence, Aapda Mitras assists in basic search & rescue operations and also provides help to the district administration for effective disaster response.
- District Magistrates and Sub-Divisional Magistrates to be empowered to exempt the requirement of identification and post-mortem in case of mass casualties. Revenue Dept may depute additional Sub-Divisional Magistrates to expedite disposal of the dead bodies. (Revenue & Home Dept.)

- d)** Unclaimed/unidentified dead bodies to be disposed of with the help of pre identified voluntary agencies at the earliest after keeping their records. (Home Dept., Revenue Dept., Health Dept. & Local Bodies)
- e)** Additional manpower to be deployed in the affected areas for supplementing the efforts of the local administration (GAD). Hence for immediate disaster response youth volunteers like NCC, NYKS, Scouts and Guides, NSS, SDRF, Aapda Mitra, Community, CBO's, NGO's, Volunteers will be augmented and deployed for assisting the district administration.
- f)** Separate Cell to be established at state/district/ taluk level to coordinate with the NGOs and outside donor/aid agencies. (Revenue Dept.)
- g)** Information & Public Relation Dept to coordinate with the media to play a positive role in disseminating appropriate information to public and the government in order to facilitate the speedy recovery. (Information and Public Relations Dept.)
- h)** Regular meetings of stakeholders/departments should be recognised at state level for sharing information, developing strategies for relief operations.(CRA & Collector at district level)
- i)** Ensure promoting private participation in disaster management as they can contribute by providing volunteers or expertise. Also by providing aid in implementation of Risk Transfer arrangements including multi- hazard insurance for life and property. A wide range of corporate and nonprofits organizations assist in disaster-relief activities hence enhancing the capacity of society.

4.9 Assessment of Damage/Loss and Relief Needs

- a)** The Commissioner of Relief to issue instructions to the District Collectors to provide the Need Assessment Report. The Commissioner of Relief should consolidate the same and to prepare State's Need Assessment Report.
- b)** The Commissioner of Relief to issue instructions to the District Collectors to provide the Damage and Loss Assessment Report. The Commissioner of Relief to consolidate the same and to prepare State's Damage and Loss Assessment Report' which will be useful in planning and implementing the relief operations for disaster victims.
- c)** Adequate manpower, vehicles, stationery etc. should be provided to supplement the efforts for need/ loss assessment. (Commissioner of Relief & Revenue Dept.)
- d)** The relief need assessment report should be provided by the Collectors. (CRA & Collectors)
- e)** Identification and demolition of dangerous structures in the affected areas to minimize further loss of life and injuries. (RD & PR Dept., PWD, Revenue Dept and Urban Local Bodies)
- f)** Arrangements for distribution of gratuitous relief and cash doles. (Revenue Dept., RD&P R Dept., UD & UH Dept. and Collectors)
- g)** Arrangements to be made for survey of human loss and distribution of ex-gratia relief to the families of deceased persons. (Revenue Dept.)
- h)** Teams to be formed and dispatched to the affected areas for detailed assessment of houses and property damage assessment. (Revenue Dept. and Local authorities)

5 - ACTION PLAN FOR URBAN FLOOD

5.1 Introduction

The submergence of usually dry area by a large amount of water that comes from sudden excessive rainfall, an overflowing river or lake, melting snow or an exceptionally high tide are defined as urban floods.

Urban flooding is significantly different from rural flooding as urbanization leads to developed catchments which increases the flood peaks from 1.8 to 8 times and flood volumes by up to 6 times. Consequently, flooding occurs very quickly due to faster flow times, sometimes in a matter of minutes. Urban flooding is caused by the combination of meteorological, hydrological, and human factors. Due to land-use changes, flooding in urban areas can happen very rapidly with large flow. The challenges of Urban Floods Disaster Management tend to be considerably different from that of flooding in other areas.

There has been an increasing trend of urban flood disasters in Tamil Nadu over the past several years whereby major cities in Tamil Nadu have been severely affected. The most notable amongst them are Ahmedabad in 2001, Surat in 2006, and Vadodara in 2019.

Apart from heavy rainfall during monsoons, there are other weather systems also that bring in a lot of rain. Sudden release or failure to release water from dams can also have severe impact. In addition, the urban heat island effect has resulted in an increase in rainfall over urban areas. Global climate change is resulting in changed weather patterns and increased episodes of high intensity rainfall events occurring in shorter periods of time. Cities/towns located on the coast, on river banks, upstream / downstream of dams, inland cities and in hilly areas can all be affected.

Unplanned development and encroachments of sprawling habitations alongside rivers and watercourses have meddled with the natural streams and watercourses resulting into increasing episodes of urban flood.

5.2 Urbanization and Flood Risk

Clogging of storm-water drains because of silting, accumulation of non-biodegradable wastes and construction debris along with reduced infiltration due paving of surfaces which decreases ground absorption and increases the speed and amount of surface flow. Flash flood Water of Heavy rainfall concentrates and flows quickly through urban paved area and impounded in to low lying area raising the water level

Rapid urbanization combined with a lack of efficient waste disposal systems has left several water bodies in the cities in poor condition. Further, Blocked waterways and reduced width and depth of canals, along with construction reduce the permeability of the ground.

5.3 Issues in urban flood

Encroachments are major problem in many cities and towns. Habitats started growing into towns and cities alongside rivers and watercourses. As a result of this, the flow of water has increased in proportion to the urbanization of the watersheds. Ideally, the natural drains should have been widened (similar to road widening for increased traffic)

to accommodate the higher flows of stormwater. But on the contrary, there have been large scale encroachments on the natural drains and the river flood plains. Consequently the capacity of the natural drains has decreased, resulting in flooding. Improper disposal of solid waste, including domestic, commercial and industrial waste and dumping of construction debris into the drains also contributes significantly to reducing their capacities. It is imperative to take better operations and maintenance actions

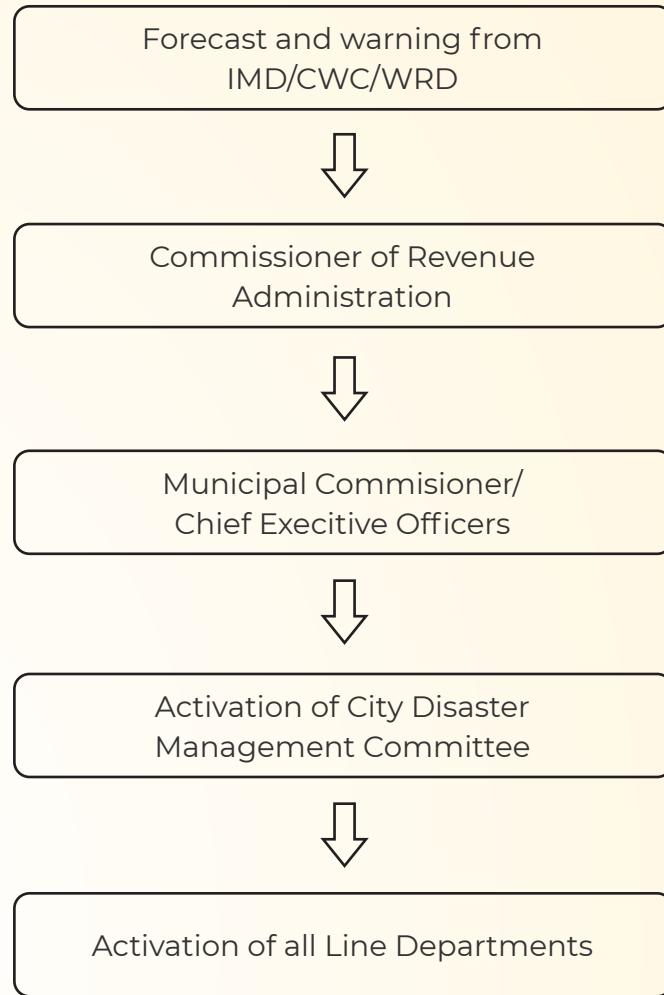
Increasing trend of urban flooding is a universal phenomenon and poses a great challenge to urban planners the world over. Problems associated with urban floods range from relatively localised incidents to major incidents, resulting in cities being inundated from hours to several days. Therefore, the impact can also be widespread, including temporary relocation of people, damage to civic amenities, deterioration of water quality and risk of epidemics.

5.4 Flood Forecasting and Warning

Flood forecasting and warning (FF and W) is an important measure for minimising loss of lives and properties and assists the authorities concerned, for prompt and effective response during and after floods. Urban Flood forecasting requires more understanding of land use land change pattern, meteorological and hydrological conditions. Flood warning systems need to be communicated to the communities at risk by converting forecast information into practice and by sending warning dissemination to people.

- Information regarding heavy rainfall or water release from IMD or irrigation respectively is conveyed to the concerned department / official / control rooms / community members using telecommunication, wireless message, by fax or in written by DEOC at district/corporation level.
- While in the city the route has to be finalized for early warning, accordingly early warning task force leading by fire brigade personnel, spreads the message of alert in respective low lying areas
- Preparation of warning messages, describing what is happening, predictions of what will happen and expected impact and the same must be disseminated properly.
- Interpretation of the predictions and other flood information to determine flood impacts on vulnerable communities

When early warning is declared the head of departments, nodal officers and administrative heads will enforce their own DM plan in action and response activities will be carried out accordingly.



Flow chart for Early Warning and Plan Activation

5.5 Trigger Mechanism: Plan Activation

The response system will be activated on the occurrence of a heavy rain. The Commissioner of Revenue Administration (CRA) will activate all the Departments for emergency response including the State EOC. He will issue instructions to include the following detail

- Specify exact resources required
 - The type of assistance to be provided
 - The time limit within which assistance is needed
 - The state, district or other contact persons/agencies for the provision of the assistance
- The state EOC and other control rooms at the state level as well as district control rooms will be activated with full strength. The State Government will publish a notification in the official gazette, declaring such area to be disaster-affected area under DM Act 2005. Once the situation is totally controlled and normalcy is restored, the CRA declares End of Emergency Response and issues instructions to withdraw the staff deployed in emergency duties. The roles and responsibilities are mentioned as below

5.6 Standard Operating Procedures (SOP)

Time Frame	Task	Activity	Responsibility
Time = 0 – 72 Hrs.	Warning Receipt and Dissemination	<ul style="list-style-type: none"> • Inform CRA/ DIR DM, CS/PS (Revenue), CEO (TNSDMA), Crisis Management Group, Hon. CM, Hon. Minister (R&DM), NDMA, Ministers and Secretaries of all line depts. as per the warning of IMD • Inform & instruct relevant Municipal commissioner/ Chief Executive Officer to activate control room at full strength • DEOC to be activated for additional support • Alert state response teams for deployment • Remain in constant touch with control rooms at National & State Level. • Instruct and alert heads of departments of the key line departments to activate their departmental plan and SOPs for Urban flood response 	IMD, CWC, Housing & Urban Dev. Dept., SEO
	Inter departmental Coordination	<ul style="list-style-type: none"> • Instruct all State Government officers and employees in the State to report to their respective Head for emergency duties (Only if the warning is of a level 2 disaster or as per the decision taken in the meeting of the Crisis Management Group headed by Chief Secretary) – Activate IRS • Alert the Municipal Commissioner and Chief Officers of the safer areas to be prepared for providing the following to the district nearby likely affected towns/ cities: <ul style="list-style-type: none"> • Additional manpower • Additional resources • Machinery & Equipment • Relief material 	CRA/ DIR DM, Municipal Commissioner, Housing & Urban Dev. Dept., Line Dept.

	Establishment of Lines of Communication	<ul style="list-style-type: none"> Activate alternative communication equipments i.e. satellite phones, HF/VHF sets, Ham radio, VSAT in SEOC and DEOCs. Establish communication links with SEOCs and Search & Rescue Teams in all Municipal Corporations and alert them to be in stage of readiness Establish communication links with villages likely to be affected as per the contact details available in SDRN 	CRA/ DIR DM, Municipal Commissioner, Housing & Urban Dev. Dept.
Time = 0 – 48 Hrs	Review of situation and reporting	<ul style="list-style-type: none"> Get the latest weather report from IMD for rainfall data After reviewing the weather report issue instructions and orders for emergency response to areas likely to be affected 	IMD, CWC, Revenue Dept./ CRA
	Management of EOC, and Urban Flood Response	<ul style="list-style-type: none"> Take over full command of SEOCs. Instruct line departments to depute representatives at the State and District EOCs Hold a meeting with leaders of task forces and entrust them their tasks Arrange emergency meeting with State Crisis Management Group to devise a plan of action Arrange dissemination of information through various means of communication such as Radio, TV, Cable Network, and SMS about Cyclone Warning to districts/areas which are likely to be hit by Cyclonic Storm. Alert teams to remain in readiness- Evacuation, Emergency Medical Services, Search & Rescue, Fire & Emergency Services, NDRF, Police, Home Guards, SRPF, Army, Air Force Impose restriction on all transport activities heading towards flood affected areas. 	CRA, Municipal Commissioner, Housing & Urban Dev.Dept., Information and Public Relations Dept. Line Dept.

	Urban Flood Response (Likely to be Affected)	<ul style="list-style-type: none"> Based on the warning issued by IMD, CWC demarcate the cities and towns likely to be affected by floods and start the procedure for identifying safe places/shelters for evacuation Prepare route maps for safe place and evacuation shelters City/ town wise data of safe shelters for evacuation available on SDRN should be referred and the municipal commissioner /chief officer should be contacted to know the status of the shelters with the capacity of the shelter and other available facilities at the site 	IMD, CWC, Municipal Commissioner, Housing & Urban Dev.Dept., Revenue Dept., Transport Dept. and Dist. Collectors
		<ul style="list-style-type: none"> Make transport arrangement for mobilization of all emergency response teams Make logistic arrangements for response teams 	Municipal Commissioner, Housing & Urban Dev. Dept.,
		<ul style="list-style-type: none"> Cordoning off flooded areas for restricting entries of rail or road traffic Ensure law and order is maintained in areas likely to be affected 	Home Dept., Dist. Collectors, Line Dept.
		<ul style="list-style-type: none"> Ensure that all critical activities (mainly industries) in areas likely to be affected are shutdown 	Education Dept., Municipal Commissioner
		<ul style="list-style-type: none"> Ensure that the schools and colleges are closed in areas likely to be affected by floods Ensure availability & serviceability of flood shelters issued in schools/universities/institutions) 	Municipal Commissioner, Housing & Urban Dev. Dept., Information and public relations Dept.
		<ul style="list-style-type: none"> Ensure dissemination of information to affected area Ensure that local helplines are opened and effectively managed for public information, guidance and rumour control Ensure that the information to public and media (AIR/ Doordarshan/ print/ FM) about the status of urban flood at periodic intervals is released 	Tamil Nadu State Disaster Management Authority

		<ul style="list-style-type: none"> Activate Departmental Disaster Management Plan and Departmental SOPs for Management of casualties Ensure availability of QRT & essential medicines 	Health Dept.
		<ul style="list-style-type: none"> Issue alert/warning through SMS by establishing liaison with service providers Ensure safety & serviceability of critical communication towers through respective service providers Ensure establishment of alternate communication links like HF, VHF, HAM, Satellite Phones, etc. 	Telecom Service Provider Municipal Commissioner
Time = 0 - 24 Hrs	Review of Situation and Reporting	<ul style="list-style-type: none"> Establish contact with IMD, in order to receive latest update on rainfall data After reviewing the weather report issue instructions and orders for emergency response to areas likely to be affected areas 	Revenue Dept./ CRA, Information and public relations Dept.
	Emergency Response Management	<ul style="list-style-type: none"> Review and monitor – evacuation from to be affected areas; positioning of search & rescue teams, mobile communication units, quick medical response teams; dissemination of information to vulnerable areas; preparedness measures to be taken by various authorities Keep in touch with all the EOCs/ Control rooms Release information at appropriate time to media and public regarding response measures organized by the Government 	Revenue Dept., CRA, Municipal Commissioner, Home Dept., Information Dept. and Dist. Collector

		<ul style="list-style-type: none"> Inform the public residing in areas likely to be affected to evacuate through various means such as SMS, AIR, FM Radio, Doordarshan, etc. Start evacuation from the likely affected areas through Police support, if necessary 	
	Emergency Relief Management	<ul style="list-style-type: none"> Ensure that the Relief Management work planned in the areas likely to be affected by the floods are well organized Inform following agencies to be in a state of readiness for assisting in the urban floods response measures (if required): <ul style="list-style-type: none"> Public sector agencies Private sector agencies NGOs, CBOs Volunteer Organizations Request for help (if needed) to MHA/National Disaster Management Authority 	CRA/ Revenue Dept., Municipal Commissioner
		<ul style="list-style-type: none"> Ensure that the arrangement for basic amenities(shown below) at evacuation/relief centres are made by the respective departments following the minimum standards of relief: <ul style="list-style-type: none"> Drinking water Food Clothing Sanitation and hygiene, Lighting Medicines and other Health Care 	CRA, Food & Civil Supply Dept., Municipal Commissioner, Revenue Dept. TWAD Board, TNEB, Health Dept.
		<ul style="list-style-type: none"> Make necessary arrangements for public information/guidance, public opinion and rumour control 	Information and public relations Dept., Municipal Commissioner

		<ul style="list-style-type: none"> Impose restrictions for transportation in threatened areas 	Transport Dept., Municipal Commissioner, Dist. Collector, Home Dept.
Time = 0 Hrs	Disaster Declaration	When flood starts affecting city/ town the Municipal Commissioner should send a communication to the State Govt. to declare the area as disaster affected, if necessary, (depending upon the nature and intensity of impact)	CRA, Municipal Commissioner
	Preliminary Assessment, Deployment of Emergency Response Teams and Information Dissemination	<ul style="list-style-type: none"> Send teams to the affected areas to take stock of the effects of floods due to heavy rain. Send sector wise situation reports to: <ul style="list-style-type: none"> State EOC/CRA TNSDMA Respective DEOC 	Municipal Commissioner
		<ul style="list-style-type: none"> Deployment of following teams to flood affected areas: <ul style="list-style-type: none"> Emergency Communication Teams Emergency Medical Services Teams Search and Rescue Teams (With Equipment) Preliminary damage Assessment Teams Need Assessment Teams 	CRA, Municipal Commissioner, Dist. Collector
		<ul style="list-style-type: none"> Establish communication link with affected cities/ town by activating alternate communication equipments such as Satellite Phones, HF/VHF Sets, Ham Radio, V Set etc., in State/District EOCs and Taluk Control Rooms Arrange dissemination of information about occurrence of urban floods and areas that are affected by it to media & public. 	CRA, Municipal Commissioner
			Information and public relations Dept.

Time = 0+ 24 Hrs	Mobilization and Deployment	<ul style="list-style-type: none"> • Remain in constant touch with IMD for updates on weather forecast for the coming hours and plan accordingly • Immediate mobilization of following units/teams to areas affected by floods • S & R Teams of Fire and Emergency Services • Quick Medical Response Teams • Quick Damage & Loss Assessment Teams • Quick Need Assessment Teams • Road Clearance Teams • Teams for disposal of dead bodies • Teams for disposal of carcasses • Teams for dewatering • Teams for maintaining Law & Order in the affected areas • Team for restoration of water and power supply • Arrange for S & R teams of Air Force (If required) 	IMD, CRA, Municipal Commissioner, H&UD Dept., Dist. Collector, Key line Dept.
	Clearance of Access Roads to Reach at The Sites of Affected Areas	<ul style="list-style-type: none"> • To survey the access roads/routes leading to the affected areas and manage traffic for mobilization of equipments, machinery and volunteers. • Identify alternate roads/routes for evacuation of affected people • Undertake repairing/restoration of damaged roads leading to the affected areas. • Identify and declare unsafe buildings/structures in urban floods affected areas. • Evacuate people from unsafe buildings/structures and shift them to relief camps/sites • Divert/stop transport activities (Rail + Road) heading towards flood affected areas 	PWD Dept., Transport Dept., Municipal Commissioner, H&UD Dept.

	Necessary Arrangements at Evacuation/ Relief Centres	<ul style="list-style-type: none"> To ensure that necessary arrangements at evacuation/ relief centers is made sufficient availability as per the Minimum Standards of Relief by GoTN To ensure necessary security arrangements for the personnel (Emergency responders/relief teams) who are working at Relief Centers and involved in distribution of Relief Materials To ensure that law and order is maintained at evacuation/relief centers and in the affected areas as well Arrange for a logistic plan and warehouse for receipt and management of relief material 	Revenue Dept., Civil Supply Dept., Municipal Commissioner, Collectors, Water Supply Dept., Health Dept., TNEB, Energy & Petro. Dept., CMWSSB, TWAD & Local Authorities, Home Dept.
	Immediate Health and Minimization of Disease Out-break	<ul style="list-style-type: none"> To establish relief camp hospitals near the affected areas To make transportation arrangements to shift stranded persons to nearest-camp Hospitals, City, Taluk and District Hospitals, Regional and State Hospitals Ensure that the Hospitals are well prepared to deal with emergencies like outbreak of water borne diseases Ensure that the required medical assistance/aid and medicines are provided to the affected people at site as well as at evacuation/relief centers in the affected area and necessary records are maintained Take sanitation and epidemic control measures for preventing any water borne disease Keep adequate stock of essential medicines, first-aid etc. at taluk/ district hospitals Take steps to purify drinking water sources If required, take the help of doctors/paramedics from the list of doctors/paramedics available at the city/taluk/district level for immediate medical assistance 	CRA / DIR. DM, Health dept., Municipal Commissioner, Collector, Port & Transport Dept., Tourism Dept.,

		<ul style="list-style-type: none"> • Assess need for fodder if required • Keep ready teams for carcass disposal (if required) 	Animal Husbandry Dept.
	Information to Public and Media	<ul style="list-style-type: none"> • Establish Media/Press Centre for media management and information dissemination • Ensure that the information to media/general public about the response of the State Government is released in an organized manner • Organize media briefing twice a day at pre-determined intervals 	Information and Public Relations Dept., CRA, Municipal Commissioner
	Other Important Work Related to Immediate Response	<ul style="list-style-type: none"> • Prepare quick need assessment report for planning of relief operation • Additional assistance may be asked for emergency response/relief from GoI-NDMA (If needed) • Prepare situation report and circulate it twice a day in the morning and evening to key Government functionaries • Maintain constant touch with National, District, City and EOCs and other control rooms • Remain in constant touch with IMD for updates on weather forecast for the coming days and plan accordingly • Conduct aerial survey of affected areas for taking a stalk of the situation 	CRA, Municipal commissioner, District collector
		<ul style="list-style-type: none"> • Activate evacuation & relief centers according to needs/situation • Maintain record of persons admitted at evacuation/relief centres 	Revenue Dept. CRA, Municipal Commissioner, Collector
Time = 0 + 24 to 48 Hrs	Review of Situation and Reporting	<ul style="list-style-type: none"> • Establish contact with IMD, CWC, for constant updates regarding rainfall data /weather condition and plan accordingly 	CRA, Municipal Commissioner, Collector

	Restoration of Critical Infrastructure/ Essential Services	<ul style="list-style-type: none"> • Ensure that the essential services/critical infrastructure of the affected areas have been restored or alternative arrangement is made for ensuring safety of people and smooth management of emergency response. • Ensure that key administrative and lifeline buildings are brought back to operation quickly. • Designate and deploy senior officers (as per the need) to worst affected area/s to oversee rescue/relief operation. 	CRA, Line Depts., Municipal Commissioner, Dist. Collectors, Line dept. Energy & Petro.Dept.
		<ul style="list-style-type: none"> • Ensure following primary necessities are restored • Power supply • Water supply • Communication Roads & Bridges 	TANGEDCO, TWAD / CMWSSB, Ports and Transport
	Dignified Management of the Dead	<ul style="list-style-type: none"> • Ensure following procedure is followed before disposal/handing over of dead bodies: <ul style="list-style-type: none"> a. Photographs of the dead bodies are taken, b. Identification of the dead bodies is done, c. Post Mortem where ever necessary and possible is carried out, d. Handing over dead bodies of persons known/identified to their relatives, e. Disposal of unclaimed and unidentified dead bodies. 	Revenue Dept., Municipal Commissioner, Dist. Collector, Home Dept., Health Dept., Local Authorities
		<ul style="list-style-type: none"> • Ensure medical aid to injured cattle • Disposal of animal carcasses with the help of local bodies/health dept. 	Animal Husbandry Dept.
	Public Information and Media Management	<ul style="list-style-type: none"> • Ensure that the information about progress of rescue and relief is provided to media/public in an organized manner at least twice a day • Establish help lines for facilitating communication between the victims and their relatives residing outside the affected area/s 	CRA, Information and Public Relations Dept., Municipal Commissioner, Dist. Collector

		<ul style="list-style-type: none"> Establish Information Centers at strategic locations for providing information about persons evacuated to the relief centres/hospitals 	
	Miscellaneous Rescue and Relief Works	<ul style="list-style-type: none"> Assess the situation and take appropriate action to accelerate the Search & Rescue Operations Depute additional officers and supporting staff to affected areas from non-affected areas (if required) to accelerate the rescue and relief operations 	CRA, Municipal Commissioner, District Collector
		<ul style="list-style-type: none"> Ensure that the relief assistance received from outside is centrally received, stored and sent for distribution to flood affected areas according to their need and proper accounts are maintained about both receipt and distribution 	CRA, Civil Supply Dept.
Time = 0 + 48 to 96 Hrs	Continuous Rescue and Relief Works	<ul style="list-style-type: none"> Remain in constant touch with IMD for updates on weather forecast for the coming days and plan accordingly Arrange for procurement of additional relief material required for relief operations (on the basis of need assessment) Mobilize additional relief material required for relief operations Maintain constant touch with State & Districts EOCs 	CRA, Municipal Commissioner, Civil Supply Dept.
		<ul style="list-style-type: none"> Arrangement for transportation of injured from field hospital to base hospital Arrangement for transport of dead bodies to their native places Ensure maintenance of record, timely reporting and information management Ensure maintenance of record and information database 	Revenue Dept., Health Dept., Transport Dept., Line Depts., Home Dept.

Time = 0 + 96 to 168 Hrs	Continuous Rescue and Relief Works	<ul style="list-style-type: none"> • Remain in constant touch with IMD for updates on weather forecast for the coming days and plan accordingly • Review the restoration of all the public and essential buildings/ structures in flood affected areas • Review and follow-up all necessary arrangements for emergency response & relief in the affected area/s 	CRA
		<ul style="list-style-type: none"> • On receiving the message from IMD about rainfall and inform the concern municipal Commissioner / Collector 	CRA, IMD
		<ul style="list-style-type: none"> • Organize a quick rapid visual survey of the affected areas (through a technical team of engineers or drones) to ascertain the safety of the structures decide on giving the go-ahead to people to move back to their respective houses 	CRA, Municipal Commissioner, Dist. Collectors, PWD Dept.
		<ul style="list-style-type: none"> • After receiving the message of de- warning, ensure that people are moved back safely to their houses 	CRA, Municipal Commissioner, Collector

6 - ACTION PLAN FOR INDUSTRIAL AND CHEMICAL DISASTERS

6.1 Introduction

Race to the top Tamil Nadu is looking to become a hub for the chemicals and petrochemicals industry - Indian chemical industry is currently at \$ 170 billion and is expected to touch \$ 300 billion by 2025. Tamil Nadu accounts for 6 % of the national production of chemicals, when compared to Gujarat's 60 %. The State has 2,588 chemical manufacturing factories Chemicals and petrochemicals exports from Tamil Nadu came at \$ 913.77 million in FY 2017-18 Chemicals and petrochemicals is a focus area for attracting global investors.

The chemical and petrochemical industries present in Tamil Nadu include refineries, chemical and petrochemical complexes, alkali plants, soda ash plants, chemical fertilizer plants and agro chemicals. The growth of chemical industries has led to an increase in the risk of occurrence of incidents associated with hazardous chemicals (HAZCHEM) and hazardous materials (HAZMAT). These events occur due to mishaps or failures in industry and negligence in following international codes and standards for chemical handling which affects the industrial functioning, and productivity. While the common causes for chemical accidents are deficiencies in safety management systems or human errors, natural calamities or sabotage may also trigger such accidents. Chemical/ industrial accidents are significant and have long term impact on the community and environment. It leads to injuries, pain, suffering, loss of lives, damage to property and environment.

6.2 Sources of Chemical Disasters

Chemical accidents may originate in:

1. Manufacturing and formulation installations including during commissioning and process operations; maintenance and disposal.
2. Material handling and storage in manufacturing facilities, and isolated storages; warehouses and godowns including tank farms in ports and docks and fuel depots.
3. Transportation (road, rail, air, water, and pipelines).

6.3 Causative Factors Leading to Chemical Disasters

Chemical disasters, in general, may result from:

1. Fire
2. Explosion
3. Toxic release
4. Poisoning
5. Combinations of the above.

6.4 Initiators of Chemical Accidents

A number of factors including human errors could spark off chemical accidents with the potential to become chemical disasters.

These are:

a. Process and Safety System Failure

1. Technical errors: design defects, fatigue, metal failure, corrosion, etc.
2. Human errors: neglecting safety instructions, deviating from specified procedures, etc.
3. Lack of information: absence of emergency warning procedures, non-disclosure of line of treatment, etc.
4. Organizational errors: poor emergency planning and coordination, poor communication with public, noncompliance with mock drills/exercises etc. which are required for ensuring a state of quick response and preparedness.

b. Natural Calamities

The Tamil Nadu state is prone to natural disasters, which can also trigger chemical disasters.

c. Terrorist Attacks/Sabotage

Vulnerability to chemical disasters is further compounded by likely terrorist and warfare activities which include sabotage and attack on HAZCHEM installations and transportation vehicles.

6.5 Authority

Enforcement and monitoring of chemical safety and emergency management involves various central ministries/departments viz. MHA, MoEF, MoLE, MoA, MoP&NG, MoC&F, MoSRT&H, MoC&I, DEA, MoF etc. The MoLE, MoEF and MoSRT&H are responsible for enacting regulations.

6.6 Flow of Information (Communication)

A procedure has to be laid out to communicate the accident / attack to the DEOC by giving details such as location of incident, chemical(s) involved, severity of incident, casualties (if any), etc. The person in-charge at DEOC shall then inform the first three responders i.e. Police, Fire & Emergency Services and Medical Department. He will then inform the District Collector. The District Collector, in turn, would inform the Tamil Nadu State Disaster Management Authority (TNSDMA) and the CRA about the incident and ask for additional help in terms of resources and manpower (if at all required) after assessing the situation on site.

The TNSDMA would then inform the CEO of TNSDMA about the incident along with other relevant details on hand. The first responders, after reaching the site, will secure more information about the incident and try to establish communication with the concerned agencies/ departments for deploying resources/ personnel as per the need of the situation.

6.7 Regulatory Framework

This plan derives its authority from the following acts and rules:

a. Acts

- i. The Factories Act, 1948, as amended in 1976 and 1987
- ii. The Environment (Protection) Act, 1986
- iii. The Disaster Management Act, 2005
- iv. The Public Liability Insurance Act, 1991 as amended in 1992
- v. The National Environment Tribunal Act, 1995
- vi. The Explosive Act, 1884
- vii. The Petroleum Act, 1934
- viii. The Electricity Act, 2003
- ix. Dock Workers (Safety, Health & Welfare) Act, 1986.

b. Rules

- i. The Tamil Nadu Factories Rules 1950 under the Factories Act, 1948 as amended in 1995
- ii. The Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 as amended in 1994, 2000 and 2004.
- iii. The Public Liability Insurance Rules, 1991 as amended in 1992.
- iv. The Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996.
- v. Explosive Rules, 2008.
- vi. Central Motor Vehicles Rules, 1989.
- vii. Hazardous Wastes (Management, Handling and Trans-boundary Movement) Rules, 2008.

6.8 Trigger Mechanism for Industrial (Chemical) Disasters

The occupier / manager of the establishment responsible for releasing or discharging a hazardous chemical will notify incident the appropriate local control room and DEOC. Industry can additionally report to local control rooms of mutual aid partners, 108, and local fire and police departments, as per the local emergency response plans.

On getting the first hand information about an emergency/disaster, the in-charge of the DEOC should immediately inform the District Collector and the first three responders i.e. Police, Fire & Emergency Services and Medical Services. District Collector along with Dy. Director Industrial Safety and health and two experts will join him/her.

The notification should specify the location of the incident, the type of chemical released/ used (if known), possible consequences and provide written reports on actions

taken and on health effects. The District Collector should then inform the SEOC, and the CEO, TNSDMA about the incident.

The SEOC will then issue alert or direct all the Emergency Responder Agencies at the State and District level for providing their services immediately. The SEOC will immediately take decision to deploy SRTs in the affected area/s.

During the initial stages of the emergency, it is likely that the reports may be unclear and conflicting. Therefore, the first responders conducting the on-site assessment should secure reliable sources of information to allow an objective assessment of the situation. The assessment should include casualty, material damages, and the likely health consequences. It should also suggest antidotes and treatment regimens for those affected by medical care if the type/nature of chemical released/used during the disaster is known.

The CRA, after analyzing the information received from the District Collector and the first responders would then decide on mobilization of additional resources, medical aid and rescue equipment as required through various sources. The CRA should also instruct the Fire & Emergency/Rescue Services and Hospitals of the neighbouring districts to be on alert in case their services are needed.

The Team Commander of the ERT should cordon off the affected area. He should instruct the neighbouring population to stay away from the site. He should instruct the medical unit to detect the substances used during the attack through the available equipment/kit. He should also decide the place for establishing the decontamination unit at an appropriate location in consultation with doctors and paramedics. The Search & Rescue unit of the ERT should rescue and evacuate the affected people to a safe location.

6.9 Response for Industrial (Chemical) Disasters

Response measures are those which are taken instantly prior to, and following, an Industrial & Chemical disaster aimed at limiting injuries, loss of life and damage to property and the environment and rescuing those who are affected or likely to be affected by it.

TNSDMA will ensure that the functions and responsibilities of the chemical facility operators and response organisations are clearly defined and understood by all stakeholders. The Central Crisis Group and the Dy. Director Industrial Safety and health will also determine the actions that need to be performed by each organisation during an emergency and whether it has the necessary resources and capabilities needed for the purpose.

For the fastest response, it is very important that the person who is receiving the information shall immediately pass on to the first responders, District Collector and other members. If he receives, further information after making the first call, he will convey that also in same order. Alternatively, if the information is more relevant to any particular department, he will first pass that information to its head.

6.10 Standard Operating Procedures (SOP)

Sr. No.	Task	Activity	Responsibility
1.	Disaster Declaration and Plan Activation	<ul style="list-style-type: none"> • Declare an off-site emergency in consultation with CRA and activate an off-site emergency plan • Establish immediate communication with DEOC, SEOC, TNSDMA and CRA 	Collector
2.	Mobilization & Deployment	<ul style="list-style-type: none"> • Arrange an immediate deployment of various ERTs in affected sector(s). (Police, Fire, S&R, Medical, etc.) • Based on the emergency monitoring teams from off- site areas initiate counter measures (such as sheltering and medical help) • Arrange an evacuation of the affected/ likely to be affected workers and population to safer places • Activate systems of the State machinery to meet the necessary requirements of the public in the camp till the people are in a position to go back to their homes after the affected areas are cleared and declared safe • Deploy QRMTs/ MFRs consisting of physicians, triage officer, nurses and paramedical staff <ul style="list-style-type: none"> • To ensure that necessary arrangements at evacuation/ relief centers is made with sufficient availability of: <ul style="list-style-type: none"> i) Food, ii) Water, iii) Blankets/Clothing iv) Medicines v) Lighting vi) Sanitation and Hygiene, etc. • To ensure necessary security arrangements for the personnel (Emergency responders/ relief teams) who are working at relief centers and involved in distribution of relief materials • To ensure that law and order is maintained at evacuation/relief centers and in the affected areas 	Collector, Municipal Commissioner, DISH, Home Dept., Health Dept., Industry/ Industrial Association CRA, Civil Supply Dept., Collectors, Municipal Commissioner, DISH, Water Supply Dept., Health Dept., TNEB, Energy & Petrochemical Dept, TWADB & Local Authorities, Home Dept.

3.	Addressing Health Related Issues	<ul style="list-style-type: none"> Ensure that the required medical assistance/ aid and medicines/ antidotes are provided to the affected people at site as well as at evacuation/ relief centers in the affected area and necessary records are maintained Ensure that the hospitals are well prepared to deal with seriously injured persons Keep adequate stock of essential medicines, antidotes, first-aid etc. at taluk/district hospitals. If required, take the help of doctors/ paramedics from the list of doctors/ paramedics available at the taluk/district level for immediate medical assistance 	Health Dept.
4.	Information to public and media	<ul style="list-style-type: none"> Make an arrangement for providing useful, timely, correct, consistent, and appropriate information to the public and media in the event of a chemical disaster. 	Collector, Municipal Commissioner
		<ul style="list-style-type: none"> Ensure that the information to media/ general public about the coordinated response is released in an organized manner. 	DISH, CRA, Information and public relations
5.	Disposal of Dead bodies	<ul style="list-style-type: none"> Ensure following procedure is followed before disposal/handing over of dead bodies: <ul style="list-style-type: none"> Photographs of the dead bodies are taken, Identification of the dead bodies is done, Post Mortem wherever necessary and possible is carried out, Handing over dead bodies of persons known/identified to their relatives Disposal of unclaimed and unidentified dead bodies 	Collector, Municipal Commissioner, Revenue Dept., Health Dept., Home Dept., Local Authorities, Industry, Industry/ Industrial Association
		<ul style="list-style-type: none"> Animal Husbandry Department to ensure medical aid to cattle that are injured. Disposal of animal carcasses with the help of local bodies/health dept. 	Animal Husbandry Depts., Local Authorities, health dept.

Roles and Responsibility of Some of The First Responders during Chemical Attack / Emergency			
			Home Dept.
1	Police	<ul style="list-style-type: none"> Control and divert the traffic near the affected areas Ensure law and order at the incident site during chemical emergency/ disaster and at evacuation centres too. Provide security in evacuated areas Give warning, carry out SAR operation and carry out relief & rehabilitation operation too In case of Chemical attack: Secretary, Home and Director General of Police (DGP) will direct the participation of Police in the emergency response. Secretary, Home and DG, Police will constitute an integrated command. Secretary, Home and DGP will report to the CEO TNSDMA immediately upon the receipt of information about the disaster. DGP will establish contact with the District Police Control Room immediately. He will get a situation estimate and assess the operational requirements for the police. DGP will issue an alert to the DIG and the surrounding districts. He will direct all the police officials and forces in adjacent Districts to be deployed if necessary. The DIG will ensure that the police forces required for traffic management, evacuation and law and order are available with the District Administration. DGP will review the dissemination of warning and the need for evacuation. He will help the Fire & Emergency Services and the Deputy Director, Industrial Safety and Health with Police Wireless sets so that there is continuous communication among the first responders in the emergency situation. 	
		<ul style="list-style-type: none"> DGP will ensure that the police force will not enter the area under disaster without the permission of the Fire & Emergency Services and Health officials. In case of big explosion and fire, the DGP will assess the situation and suggest a Plan of Action based on his assessment of the immediate causation. 	

		<ul style="list-style-type: none"> The DGP will order deployment of the police force for evacuation of the people from the zone of the danger. The DGP will send instructions for the cordoning off of the area. People should not be allowed access anywhere close to the site of the disaster. The DGP will review the traffic management in the area. The primary aim would be to ensure the transportation of the injured to the hospital, easy access for emergency responders and safe evacuation of the people from the danger zone. The DGP will also issue directives that all the Private and Public Transport (trains and buses) be diverted from the disaster area. The DGP will contact the DIG and ask him to organize the deployment of police force from other Districts, based on the need assessment. The DGP will also contact the Central Industrial Security Forces and other paramilitary forces to seek their deployment, if needed. The DGP will supervise law and order situation. He will take all the possible precautions to ensure that public order is maintained and no one takes undue advantage of the situation. 	
2	Fire and Search & Rescue	<ul style="list-style-type: none"> Reach at the site soonest possible and assess the situation (information about the chemical leak/spill, the action taken and current status) In case of fire, start fire fighting with suitable medium and also take care of surrounding storages/ tanks to be over heated so that reduce the chances of domino effect. In case of chemical leak, try to terminate the release/ stopping of leak with the use of proper PPE Search and identify the risk and nullify the sources of leak/toxic release. If any unclear or unidentified substance or source is identified or Detected the team should send them immediately to the laboratory for further investigation / analysis 	Fire and Rescue Services (F&RS) Municipal Corporation, TNIDC

		<ul style="list-style-type: none"> • Secretary, Industries will coordinate redeployment of GIDC Fire Tenders from other places, as required • Secretary, Industries will also coordinate with the Private and Public Sector industries for deployment of their Fire Brigades to the site of the disaster. • The SCG, in consultation with the District Collector and other local officials will ensure that CFO, Fire & Emergency Services, Dy. Director - Industrial Safety and Health, Officer in charge Police and Health Personnel all work closely with full coordination • Ahmedabad, Vadodara, Valsad, Surat, Rajkot and Jamnagar are the main providers of Fire Services in the state. The DEOC will decide upon the deployment of Fire Services, based on distance and accessibility. • To search and evacuate the affected population from the site of the incident. 	
3.	Medical Services	<ul style="list-style-type: none"> • The Secretary - Health, Commissioner of Health, and emergency medicine experts will provide the necessary expertise and specialized services to the CEO TNSDMA • The CEO TNSDMA will consider the level of exposure on the basis of situation estimate received from the District Administration. It will consider the intrinsic toxic potential of the chemical, its concentration, the duration of exposure and the health status of the people exposed • Based on the information upon the level and extent of contamination, the CEO TNSDMA will decide on the issue of alert and warning to the people in the affected areas through the All India Radio, Doordarshan and Cable TV and social media. • The CEO TNSDMA will contact the Civil Surgeon and the District Health Officer of the concerned district and ask them to deploy all the necessary medical facilities including doctors, nurses, medicines and ambulances • The CEO TNSDMA will alert major hospitals in the area and ask them to be in readiness for receiving patients 	Dept. of Health and Family Welfare

		<ul style="list-style-type: none"> In case the nature of contamination requires much greater intervention, the CEO TNSDMA will inform the CCG and ask for the necessary medical assistance of experts, doctors and equipments. The relevant agency for emergency medicine in the Government of India is the Directorate General of the Health Services (DGHS) in the Ministry of Health and Family Welfare. The DGHS has set up the Emergency Medical Relief Cell for dealing with these contingencies 	
		<ul style="list-style-type: none"> The CEO TNSDMA will review the diagnostic support services: clinical laboratory, blood banks, radiology, pathology, pharmacy, paramedics, Red Cross, NGOs and volunteer personnel. It will seek all the steps to organize the necessary medical help through the deployment of doctors, paramedics, and provision of blood and medicines, as required The CEO TNSDMA will review the administrative support required for the situation, which includes communications, transport of the victims and of the personnel, feeding of the personnel and patients, and supplies The CEO TNSDMA will collect information on the number of deaths and persons injured; the nature of injuries and the likely long-term consequences The CEO TNSDMA must assess the medical needs of the area on the basis of likely long-term consequences and take steps to equip local medical facilities for treating people on a long- term basis. The CEO TNSDMA must also make financial provision for spending on long-term treatment. Psychosocial care for the victims of disaster by the team of experts. 	

6.11 Post Disaster Responsibilities

Once the situation at the site is under control, fire has been extinguished; the emission of vapours to the atmosphere has been effectively checked, the following actions have to be performed by various sub-teams of the SRT and the respective line departments as well as the District Administration.

6.11.1 Search & Detection of Leak / Toxic Release

The Search & Detection Team would identify the risk and nullify the sources of leak / toxic release. If any unclear or unidentified substance or source is identified or detected, the team should send them immediately to the laboratory for further investigation / analysis. The team should also preserve the samples from the site of the incident such as sand, water, air and other infected substances for further investigation which could aid in strengthening the case later on.

Technical expertise of TNPCB, Fire & Emergency Services and the Health Department may be used by the Search & Detection Team in carrying out the activities if required.

6.11.2 Structural Inspections after Fires or Explosions

A major explosion could damage or destroy numerous buildings and any nearby bridges or tunnels. Similarly large fires can have major effects on buildings and other infrastructure facilities over a vast surrounding area. In either case, residents / owners of the partially damaged buildings will want to know if the structures are safe to occupy while they await repairs. Questions pertaining to the safety of highway or railway bridges must also be resolved quickly to avoid traffic complications. It must be ensured that the inspection personnel have special precautions (i.e. chemical protective gear) in addition to normal safety equipment for cases where the structure may still be contaminated by hazardous residues.

Fire & Emergency Services personnel along with the structural experts from the PWD Department shall be responsible for inspecting the structural integrity of damaged buildings, bridges or other structures in the aftermath of a fire or explosion.

6.11.3 Search, Rescue and Evacuation

After getting the go ahead from the technical personnel responsible for ensuring structural safety of the buildings in and around the incident site, the Search & Evacuation Team should carry out their job and evacuate the affected population from the site of the incident. They should brief the Information Officer about the rescue and evacuation status (including the place of temporary shelter) to ensure that no rumours are spread to avoid any panic amongst the general public. The team, with the help of Police personnel should also stop general public from moving towards the danger zone. The Team should provide guidance to people regarding evacuation route, first aid and decontamination area. They should also help the Medical Team in rushing the victims to nearby hospitals.

6.11.4 Post Incident Testing for Contamination

De-contamination Team would be responsible to decontaminate the affected area, population, members of SRT and equipment used during the operation on the site of the incident. In addition, the Team should also be responsible for erecting the decontamination chambers for the affected population. After the operation is completed in all respects, the Team should ensure that the site is totally decontaminated from the toxic substances. The team should also ensure that the water that was used for decontamination is properly discharged preferably to a sewerage system outlet and safely disposed. Technical personnel

from the TNPCB, Fire & Emergency Services and the nearby industrial units as well as the personnel from the Medical Team should help the De-contamination Team to carry out their duty. Further, the Team shall also check crops, water (ground & surface), homes, stored foods and animals for possible chemical contamination.

6.11.5 Providing Medical and First Aid to the Victims

The Medical Team should provide first aid to the victims of the incident. If need arises, the team should also help the hospital staff of the hospital where the victims would be transported from the incident site. They should monitor the level of triage of the victims through checking their breathing and pulse. They should also decide on the type of decontamination (either wet or dry) depending upon the substances/ chemicals used during the disaster. The team should also identify the trauma cases and counsel them appropriately.

6.11.6 Counselling and Rehabilitation of Victims

The psychological impact of a chemical disaster manifests as psychosocial trauma including psychological reactions, post-traumatic stress disorder and other psychological ailments in displaced disaster victims which need to be addressed. Counseling by psychologists and psychiatrists for those suffering from mental trauma is an essential element of medical rehabilitation.

6.11.7 Provision of Alternate Water Supplies

There are a number of circumstances under which a potable water supply may become unfit for human consumption for a time and require replacement. This is most commonly accomplished by bringing in supplies of bottled water and / or tankers / trailers capable of carrying water. The district Administration must ensure the availability of potable water for consumption of affected population as well as first responders engaged at the incident site.

6.11.8 Re-Entry into Evacuated Areas

Based on the assessment of the situation at the site, the District Collector would take a decision on the termination of emergency. However, before taking this decision, several other actions need to be ascertained such as restoration of electricity, gas and water supplies in the affected areas/ buildings, transport arrangements for bringing the affected population back from the temporary shelters, restoration of law & order in the affected area/s, etc. through the concerned Teams/ departments.

6.11.9 Responsibility of the Other Statutory Authority

The designated authority under various statutes like Indian Boiler Act, Factory Act, E.P. Act, Explosive Act, Static and Mobile Pressure Vessel Act, etc. shall perform post emergency activities prescribed and also as directed by District Collector under Disaster Management Act, 2005.

a. Immediate Financial Relief to Victims

Under the Public Liability Insurance Act, 1991, MoEF has published the list of chemicals and threshold qualities beyond which the occupier or owner must take third-party PLI for providing relief to accident victims as per the direction of the collector. The Act also provides for an Environment Relief Fund (ERF) and enables payment of relief over and above the insured amount. The occupier or owner should pay an amount equal to the PLI premium to the ERF and deposit the same with the insurer. At state level TNPCB is responsible to ensure compliance with PLI Act and at district level the collector and regional officer of TNPCB are responsible. This act provides for immediate access to relief funds so that the compliance with Act should be verified and strengthened. It is already recommended that the maximum liability under the Act (currently Rs 5 cores) should be substantially enhanced.

b. Restoration and Regeneration of Ecosystem

The potential of chemical accidents to cause severe environmental damage has been realized on a number of occasions such as at Seveso, Bhopal, Mexico City (LPG disaster), Chernobyl, and Alaska (Exxon Valdez). For the remediation of the affected environment, it is essential to assess the environmental impacts which include determining the quantitative and qualitative nature of impact and ascertaining the components of the environment most at risk from chemical accidents. This assessment is dependent on certain factors such as the chemicals involved, pollutant concentrations in the environment, environment media polluted by the accident, topography, and meteorology. After assessing the impact, the government can choose the appropriate recovery strategy.

7 - ACTION PLAN FOR BIOLOGICAL AND PUBLIC HEALTH EMERGENCY

7.1 Introduction

Biological emergency is one caused due to natural outbreaks of epidemics or intentional use of biological agents (viruses and microorganisms) or toxins through dissemination of such agents in ways to harm human population, food crops and livestock to cause outbreaks of diseases. This may happen through natural, accidental, or deliberate release of microorganisms into food, water, air, soil or into plants, crops, or livestock. Apart from the natural transnational movement of the pathogenic organisms, their intentional use as weapons of biological warfare and bioterrorism are anthropogenic hazards in the recent times

Handling exotic pathogens warrants suitable infrastructure, notably, high containment laboratories of bio-safety levels 3 and 4; recruitment of highly committed, dedicated and trained professionals; continuous availability of diagnostic reagents; enhancement of skills at various echelons of health professionals in early identification of such infections, investigation of outbreaks and institution of specific control measures. Natural outbreaks of disease may become epidemics and assume disastrous proportion if not contained in the initial stages. Epidemics can result in heavy mortalities in a short time, with a drop in the overall economic activity.

As large number of people now travel within and across national/international boundaries, the likelihood of fast global spread of epidemics has increased dramatically making localized outbreaks turn into national epidemics and global pandemics. As our society is in a state of flux, novel pathogens emerge to pose challenges not only at the point of primary contact but also in far removed locations. The increased interaction between humans and animals has increased the possibilities of zoonotic diseases emerging in epidemic form.

7.2 Disaster Declaration

The Disaster Management Act, 2005 provides for the State Government to declare any area where disaster have occurred or likely to occur as disaster affected area on the recommendations of the State Relief Commissioner or the District Collector. The purpose of the declaration is to organize effective response in mitigating the ill impacts.

7.3 Disaster warning

Preparation of warning messages, describing what is happening, predictions or future probabilities of what will happen and expected impact and the outcome must be disseminated properly for better preparedness. The parameters for preparedness include planning, capacity building, well established medical facilities, trained doctors and paramedical staff, workshop for rescue, rescue maps and flowchart indications in buildings. These preparedness parameters help in reducing the morbidity and mortality. Highly vulnerable groups such as elderly, young children, persons with disability, outdoor workers and slum residents should be provided specific messages in timely manner.

7.4 Response Mechanism

Response measures are those which are taken instantly prior to and following epidemic/ medical emergency/ disaster aimed at limiting injuries, loss of life and damage to property and the environment and rescuing those who are affected or likely to be affected by it.

State Executive Committee (SEC) will ensure that the functions and responsibilities of the epidemic facility operators and response organizations are clearly defined and understood by all stakeholders. The SEC will also determine the actions that need to be performed by each organization during an emergency and whether it has the necessary resources and capabilities needed for the purpose.

7.5 Trigger Mechanism: Plan Activation

The response system will be activated on the occurrence of an eminent disaster/ epidemic. Commissioner of Revenue Administration (CRA) will activate all the Departments for emergency response including the State EOC. He will issue instructions to include the following details:

- Specify exact resources required
- The type of assistance to be provided
- The time limit within which assistance is needed
- The state, district or other contact persons/agencies for the provision of the assistance
- Activation of all concerned line departments

The state EOC and other control rooms like Police, Health and other relevant control rooms at the state level as well as district control rooms should be activated with full strength. The State Government may publish a notification in the official gazette, declaring such area to be disaster- affected area under DM Act 2005. Once the situation is totally controlled and normalcy is restored, CRA declares End of Emergency Response and issues instructions to withdraw the staff deployed in emergency duties. The SOP for the same is as below:

7.6 Standard Operating Procedure (SOP) for Biological and Health Emergency

Sr. No	Task	Activity	Responsibility
1	Warning Receipt and Dissemination	<ul style="list-style-type: none"> • Inform CRA, ACS/PS(Revenue), CEO (TNSDMA), Hon. CM, Hon. Minister (DM), NDMA, Ministers and Secretaries of all line depts. as per the warning of MoH&FW and Health Dept. • Inform & instruct District Collectors to activate District Control Room at full strength • Remain in constant touch with control rooms at National & State Level. 	Health & Family Welfare dept In charge - SEOC

		<ul style="list-style-type: none"> Instruct and alert Secretary of departments of the key line departments to activate their departmental plan and SOPs for immediate response 	
2	Disaster Declaration and Plan Activation	<ul style="list-style-type: none"> Declare an emergency in consultation with CEO TNSDMA and activate an emergency plan Establish immediate communication with District Emergency Operation Centre (DEOC), State Emergency Operation Centre (SEOC) and TNSDMA 	CRA Health & Family Welfare dept Collector
3	Inter departmental Coordination	<ul style="list-style-type: none"> Instruct all State Government officers and employees in the State to report to their respective Head for emergency duties (Only if the warning is of a level 2 disaster or as per the decision taken in the meeting of the Crisis Management Group headed by Chief Secretary) Alert the District Collectors of districts not largely affected to be prepared for providing the following to the districts likely to be affected: <ul style="list-style-type: none"> Additional manpower Additional resources Machinery & Equipment Relief material/Kits 	CRA Health & Family Welfare dept Line depts. Collectors
4	Establishment of Lines of Communication	<ul style="list-style-type: none"> Establish communication links with areas likely to be affected as per the contact details available in SDRN and hospitals 	CRA / DIR DM Collectors, Municipal
		<ul style="list-style-type: none"> If required, impose restriction on all transport activities to avoid contagious effect. Setting up arrangements for the movement of citizens stranded- <ul style="list-style-type: none"> Abroad Inter/intra state Inter/intra district 	Collector Municipal Commissioner Health Dept Home Dept MoEA

	Transportation	<ul style="list-style-type: none"> Activate systems of the State machinery to meet the necessary requirements of the public in the camp till the people are in a position to go back to their homes after the affected areas are cleared and declared safe. 	Port & Transport Dept. Airline authorities Railways TNSTC / TNSETC
	Mobilization and Deployment	<ul style="list-style-type: none"> Deploy QRMTs/ MFRs consisting of physicians, triage officer, nurses and paramedical staff To ensure that necessary arrangements at evacuation/ relief centres is made with sufficient availability of: <ul style="list-style-type: none"> i) Food ii) Water iii) Blankets/Clothing iv) Medicines v) Quarantine facilities vi) Isolation facilities vii) Lighting viii) Sanitation and Hygiene, etc. To ensure necessary security arrangements for the personnel (Emergency responders/relief teams) who are working at relief centres and involved in distribution of relief materials To ensure that law and order is maintained at evacuation/relief centres and in the affected areas as well Immediate mobilization of following units/teams 	CRA, Collectors, Municipal Commissioner DSP Civil Supply Dept., DISH, Water Supply Dept., Health Dept., TNEB, Energy and Petrochemical Department GWSSB & Local Authorities, Home Dept.
		<ul style="list-style-type: none"> Quick Medical Response Teams Quick Need Assessment Teams Teams for disposal of dead bodies Teams for maintaining Law & Order in the affected areas Quick First Aid Team 	

7	Addressing Health Related Issues	<ul style="list-style-type: none"> • Ensure that the required medical assistance/ aid and medicines/ antidotes are provided to the affected people at site as well as at evacuation/ relief centre / quarantine / isolation centres in the affected area and necessary records are maintained • Ensure that the hospitals are well prepared to deal with seriously affected persons • Keep adequate stock of essential medicines, vaccines, first-aid etc. at taluk/district hospitals. • If required, take the help of doctors/ paramedics from the list of doctors/ paramedics available at the taluk/ district level for immediate medical assistance 	Collectors, Municipal Commissioner Health Dept.
8	Response of Line Dept	<ul style="list-style-type: none"> • Activate Departmental Disaster Management Plan and Departmental SOPs for Management of casualties • Ensure availability of QRT & essential medicines 	Collectors, Municipal Commissioner Health Dept.
		<ul style="list-style-type: none"> • Issue alert/ warning through mass media by establishing liaison with service providers • Ensure safety & serviceability of critical communication towers through respective service providers. 	Telecom service providers DST
9	Review of Situation and Reporting	<ul style="list-style-type: none"> • Review and monitor –mobile communication units, quick medical response teams; dissemination of information to vulnerable/ hotspots/containment zone areas; preparedness measures to be taken by various authorities 	Revenue Dept./ CRA Secretary, Health Dept Collector Municipal commissioner
		<ul style="list-style-type: none"> • Keep in touch with National, And District control rooms • Release information at appropriate time to media and public regarding response measures organized by the Government 	Information Dept. PIB

10	Emergency Relief Management	<ul style="list-style-type: none"> • Ensure that the Relief Management work planned in the areas affected are well organized • Inform following agencies to be in a state of readiness for assisting in the response measures (if required): <ul style="list-style-type: none"> • Public sector agencies • Private sector agencies • NGOs, CBOs • Volunteer Organizations • Request for help (if needed) to MHA/ National Disaster Management Authority 	CRA/ Revenue Dept. Collector
		<ul style="list-style-type: none"> • Ensure that the arrangement for basic amenities at evacuation/relief centres are made by the respective departments: <ul style="list-style-type: none"> • Drinking water • Food • Clothing • Sanitation and hygiene • Lighting • Medicines and other Health Care 	CRA Collector Municipal commissioner Food & Civil Supply Dept., Revenue Dept. Water Supply Dept., TNEB, Health Dept.
		<ul style="list-style-type: none"> • Make necessary arrangements for public information/guidance, public opinion and rumour control 	Collector Municipal commissioner Information Dept.
		<ul style="list-style-type: none"> • Impose restrictions for transportation in majorly affected areas 	Transport Dept. and Dist. Collector, Home Dept.
12	Preliminary Assessment, Deployment of Emergency Response Teams and Information Dissemination	<ul style="list-style-type: none"> • Send sector wise situation reports to: • State EOC / CRA • TNSDMA 	District Collector

		<ul style="list-style-type: none"> Deployment of following teams Emergency Communication Teams Emergency Medical Services Teams Medical response team 	CRA, Dist. Collector, Municipal Commissioner Health dept
15	Immediate Health and Minimization of Disease Outbreak	<ul style="list-style-type: none"> To establish camp hospitals To make transportation arrangements to shift seriously affected persons to nearest-camp Hospitals, Taluk and District Hospitals, Regional and State Hospitals immediately. Ensure that the Hospitals are well prepared to deal with affected persons Ensure that the required medical assistance/aid and medicines are provided to the affected people at site as well as at evacuation/relief centers in the affected area and necessary records are maintained Take sanitation and epidemic control measures for preventing any water borne disease Keep adequate stock of essential medicines, first-aid etc. at taluk/ district hospitals Take steps to purify drinking water sources If required, take the help of doctors/ paramedics from the list of doctors/ paramedics available at the taluk/ district level for immediate medical assistance 	Health Dept., Dist. Collector, Municipal Commissioner 108 EMRI Services Port & Transport Dept.
16	Information to Public and Media	<ul style="list-style-type: none"> Establish Media/Press Centre for media management and information dissemination Ensure that the information to media/ general public about the response of the State Government is released in an organized manner Organize media briefing twice a day at pre- determined intervals 	Health Dept., Information and Public relations Dept., CRA

17	Other Important Work Related to Immediate Response	<ul style="list-style-type: none"> • Prepare quick need assessment report for planning of relief operation • Additional assistance may be asked for emergency response/relief from GoI-NDMA (If needed) • Prepare situation report and circulate it twice a day in the morning and evening to key Government functionaries • Maintain constant touch with National, District and Taluk EOCs and other control rooms • Remain in constant touch with Health Dept for updates on current for the coming days and plan accordingly 	CRA Health Dept
18	Dignified Management of Dead	<ul style="list-style-type: none"> • Activate evacuation & relief centres according to needs/situation • Maintain record of persons admitted at evacuation/relief centres 	Revenue Dept. Collector, CoR
19	Public Information and Media Management	<ul style="list-style-type: none"> • Ensure following procedure is followed before disposal/handing over of dead bodies: • Photographs of the dead bodies are taken, • Identification of the dead bodies is done, • Post Mortem where ever necessary and possible is carried out, • Handing over dead bodies of persons known/identified to their relatives, • Disposal of unclaimed and unidentified dead bodies. 	Dist. Collector, Municipal Commissioner, DSP Health Dept., Local Authorities
19	Public Information and Media Management	<ul style="list-style-type: none"> • Ensure that the information about progress of epidemic spread/contain is provided to media/public in an organized manner at least twice a day • Establish help lines for facilitating communication between the victims and their relatives residing outside the affected area/s • Establish Information Centres at strategic locations for providing information about persons evacuated to the relief centres/hospitals 	Health Dept, CoR, Dist. Collector, Municipal Commissioner, Information Dept.

20	Miscellaneous Rescue and Relief Works	<ul style="list-style-type: none"> • Assess the situation and take appropriate action to accelerate the relief providing services. • Depute additional officers and supporting staff to enhance the diagnostic facility, treatment and discharge of affected person. 	CRA, Districts Collector, Municipal Commissioner Revenue Dept, H & UD Dept, Health Dept.
		<ul style="list-style-type: none"> • Ensure that the relief assistance received from outside is centrally received, stored and sent for distribution proper accounts are maintained about both receipt and distribution 	CRA, Collector, Municipal Commissioner
		<ul style="list-style-type: none"> • District Collector/Municipal Commissioner may oversee the functioning of relief centres and ensure adequate supply of relief materials (medical logistics) 	Collector, Municipal Commissioner Revenue Dept, Civil Supply Dept., Health Dept.
21	Continuous Rescue and Relief Works	<ul style="list-style-type: none"> • Arrange for procurement of additional medical supplies and relief material required for relief operations (on the basis of need assessment of Medical Logistics) • Mobilize additional medical supplies and relief material required for relief operations • Maintain constant touch with State & Districts EOCs 	CRA, Dist. Collectors, Civil Supply Dept., Health Dept.
		<ul style="list-style-type: none"> • Arrangement for transportation of affected persons from field hospital to base hospital • Arrangement for transport of dead bodies to their native places • Ensure maintenance of record, timely reporting and information management 	Revenue Dept, Health Dept., Transport Dept., Line Depts.
22	Continuous Monitoring	<ul style="list-style-type: none"> • Ensure data collection from each district regarding the number of patients admitted/dead from both Government hospital/private hospitals. • Ensure that continuous monitoring is carried out. • Prepare data analytics and documentation on daily basis. 	Health Dept. Collector, Municipal Commissioner CRA

24	Setting up of testing facility and laboratories	<ul style="list-style-type: none"> Arrangement of laboratories for the purpose of increased testing Identifying, supply chain and inventory management of other reagents for protection, detection, and medical management. 	Health dept. ICMR
25	Diagnostic Kits, Biomedical Equipments & PPE	<ul style="list-style-type: none"> Arrangement of Rapid Diagnostic Kits Ensure that stockpiling of medicines, personal protective equipments like gloves, masks, Head Gears etc. are stocked up. Arrangement of diagnostic kits, ventilators, oxygen cylinders, antibiotics, vaccines, biomedical equipments etc Ensure adequate medical logistics in case of surge capacity. 	Health dept.
26	Biosafety and biosecurity measures and environmental measures	<ul style="list-style-type: none"> Ensure Strict compliance with Bio safety and bio security provisions in hospitals Ensure Environmental monitoring to prevent further spread of diseases. Monitoring of water supply and sewage systems to prevent the dispersal of biological agents that can cause epidemics Ensure regular surveillance 	Health dept. Collectors Municipal Commissioner Dept. of Drinking Water and Sanitation
27	Assessment of Situation	<ul style="list-style-type: none"> Regular and periodic monitoring of the situation Ensure updates from research & academic institutions/universities working in the field of medicine for better decision making. Ensure continuous updates and consultation with National/international organisations like ICMR, AIIMS, NIE, IIPH, WHO, UNICEF 	Health dept. Collectors, Medical Councils
28	Other alternate Medicines and stockpiling medical facilities	<ul style="list-style-type: none"> Ensure that alternative medicines like homeopathy, herbal and Ayurvedic are used, if required. 	Health dept. Office of Director, AYUSH Revenue dept.
29	Concurrent study	<ul style="list-style-type: none"> To study and research of the pandemics and of biological agents, vaccines and other relevant drugs. Research on biological hazard and its impact in the state/country. 	Health dept. Research institute of National and State level

8 - ACTION PLAN FOR NUCLEAR AND RADILOGICAL DISASTERS

8.1 Introduction

The growth in the application of nuclear science and technology in the fields of power generation, medicine, industry, agriculture, research and defence has led to an increase in the risk of occurrence of Nuclear and Radiological emergencies.

Any radiation incident resulting in or having a potential to result in exposure and/or contamination of the workers or the public in excess of the respective permissible limits can lead to a nuclear/radiological emergency.

As on date, twenty two power reactors and eight research reactors are in operation in India, Eight power reactors are under construction and plans exist to set up thorium-based reactors to meet the ever-increasing energy needs. Further, India is also one amongst the seven declared nuclear weapon states which uses nuclear technology for strategic purposes.

However, nuclear emergencies can still arise due to factors beyond the control of the operating agencies; e.g., human error, system failure, sabotage, earthquake, cyclone, flood, etc. Such failures, even though of very low probability, may lead to an on-site or off-site emergency. To combat this, proper emergency preparedness plans must be in place so that there is minimum loss of life, livelihood, property and impact on the environment.

8.1.1 Koodankulam Nuclear Power Plant

Koodankulam Nuclear Power Plant is the largest nuclear power station in India, situated in Koodankulam in the Tirunelveli district. Construction on the plant began on 31 March 2002, but faced several delays due to opposition from local fishermen. KKNPP is scheduled to have six VVER-1000 reactors built in collaboration with Atoms troy export, the Russian state company and Nuclear Power Corporation of India Limited (NPCIL), with an installed capacity of 6,000 MW of electricity.

Unit 1 was synchronized with the southern power grid on 22 October 2013 and since then, has been generating electricity at its warranted limit of 1,000 MW. The original cost of the two units was ₹ 13,171 crore, but it was later revised to ₹ 17,270 crore (US\$2.6 billion). Russia advanced a credit of ₹ 6,416 crore (US\$0.97 billion) for both the units. Unit 2 attained criticality on 10 July 2016 and was synchronised with the electricity grid on 29 August. In 2015, Nuclear Power Corporation Ltd (NPCIL) announced a price of ₹ 4.29/kW·h (6.4 ¢/kW·h) for energy delivered from Koodankulam nuclear power plant.

The ground-breaking ceremony for construction of units 3 & 4 was performed on 17 February 2016. Due to technology changes, inflation and insistence of the supplier and operator for additional liability insurance the construction cost of units 3 & 4 amounted to twice the cost of units 1 & 2 and was later revised to be ₹39,849 crore (US\$5.38 billion). A budget of ₹49,621 crore (US\$6.7 billion) has been approved for construction of Units 5 & 6.

8.1.2 Madras Atomic Power Station (MAPS) located at Kalpakam

Madras Atomic Power Station (MAPS) located at Kalpakam about 80 kilometres (50 mi) south of Chennai, India, is a comprehensive nuclear power production, fuel reprocessing,

and waste treatment facility that includes plutonium fuel fabrication for fast breeder reactors (FBRs). It is also India's first fully indigenously constructed nuclear power station, with two units each generating 220 MW of electricity. The first and second units of the station went critical in 1983 and 1985, respectively. The station has reactors housed in a reactor building with double shell containment improving protection also in the case of a loss-of-coolant accident. An Interim Storage Facility (ISF) is also located in Kalpakkam.

The facility is also home to India's first large scale fast breeder reactor of 500 MWe called the Prototype Fast Breeder Reactor operated by BHAVINI and will also be the site of first two FBR-600 commercial fast breeder reactors.

8.2 Scope of the Action Plan

The scope of this document is from receiving of emergency intimation to the immediate response action.

8.3 Nuclear and Radiological Emergency/Disaster Scenarios

- a. An accident taking place in any nuclear facility of the nuclear fuel cycle including the nuclear reactor, or in a facility using radioactive sources, leading to a large-scale release of radioactivity in the environment.
- b. An accident in a nuclear fuel cycle facility where an uncontrolled nuclear chain reaction takes place inadvertently leading to bursts of neutrons and gamma radiation (as had happened at Tokaimura, Japan).
- c. An accident during the transportation of radioactive material.
- d. The malevolent use of radioactive material as Radiological Dispersal Device (RDD) by terrorists for dispersing radioactive material in the environment.
- e. A large-scale nuclear disaster resulting from a nuclear weapon attack (as had happened at Hiroshima and Nagasaki in Japan) which lead to large loss of lives and destruction of large areas and properties.

8.4 Authority

- f. The Department of Atomic Energy (DAE) has been identified as the nodal agency in the country for providing the necessary technical inputs to the national or local authorities for responding to any nuclear or radiological emergency in the public domain.
- g. The Ministry of Home Affairs (MHA) is the nodal ministry in such emergencies. For this purpose, a Crisis Management Group (CMG) has been functioning since 1987 at DAE.
- h. In the event of any radiological or nuclear emergency in the public domain, the CMG is immediately activated and will co-ordinate between the local authority in the affected area and the National Crisis Management Committee (NCMC). The CMG comprises of senior officials drawn from various units of DAE like the Nuclear Power Corporation of India Ltd. (NPCIL), Bhabha Atomic Research Centre (BARC), Heavy Water Board (HWB) and the Directorate of Purchase and Stores (DP&S). It also includes a senior official from the regulatory authority, the Atomic Energy Regulatory Board (AERB).

Each member is backed by an alternate member, so that the CMG can be activated at a very short notice. Several resource agencies from BARC also back up the CMG. They can provide advice and assistance in the areas of radiation measurement and protection and medical assistance to radiation affected personnel.

- i. For an effective response to any major nuclear emergency, an immediate communication 18 Emergency Response Centres (ERCs) have been established across the country, by BARC and DAE.,For Tamil Nadu, Kalpakam and Koodankulam are the ERCs.
- j. In case of Tamil Nadu, the ERC at Tamil Nadu and other national resources such as the Armed Forces etc. shall deal with the situation. The role of the State Government and its agencies such as the Tamil Nadu State Disaster Management Authority (TNSDMA) will only be supportive and be at the directions of the CMG.

8.5 Regulatory Body

- a. AERB is the nuclear regulatory authority in India which, as per the legal framework of Atomic Energy Act, 1962, has the mandate for issuance of licenses to nuclear and radiation facilities upon ensuring compliance with the applicable standards and codes.
- b. It is emphasized that the AERB, which oversees nuclear and radiological safety in the country, has the powers to not only license the operation of a facility but also the power to order partial or full shutdown of any facility that violates its guidelines.
- c. The AERB has been playing a very crucial role in the prevention of nuclear/radiological accidents by ensuring that proper safety design features and operating procedures in all nuclear and radiation facilities are in place.

8.6 Trigger Mechanism

The trigger mechanism prescribes the manner in which the disaster response system shall be automatically activated after receiving early warning signals of a disaster happening or likely to happen or on receipt of information of an incident.

As a basic regulatory requirement, emergency preparedness exists at Kalpakam and Koodankulam to respond to any on-site emergency in their areas. But to handle radiological emergencies arising from a transport accident or from movement/handling of—orphan sources (radioactive sources that have lost regulatory control) or due to malevolent acts like explosion of a Radiological Dispersal Device (RDD), Radiation Exposure Device (RED) or Improvised Nuclear Device (IND) any time or anywhere in the State, a network of 18 number of Emergency Response Centres (ERCs) has been established by Bhabha Atomic Research Center (BARC) (for Tamil Nadu the ERC are in Kalpakam and Koodankulam) and Department of Atomic Energy (DAE). This network is basically meant for responding to such emergencies and also for providing timely advice and guidance to the first responder at the State and National level. The Kalpakam and Koodankulam ERCs are equipped with radiation monitoring instruments, protective gear and other supporting infrastructures. Various units of Nuclear Emergency Response Teams (ERTs), consisting of personnel from different DAE units are also being raised. The centralized agency called the management activities not only by activating these ERC and ERTs but also by mobilizing the resources from all DAE facilities at the time of crisis.

8.7 Line of Communication and Responsibility for the State

Nuclear disaster is a situation where chances of receiving any early warning are very low. In such a situation where no early warning signals are available, the primary objective of the trigger mechanism is to mount immediate isolation. The following procedure shall be followed in such situations:

- k. For metropolitan areas, the Incident Commander for all nuclear hazards shall be the Commissioner of Police. For other areas it will be the District Magistrate (DM).
- l. The field functionary at ground zero shall inform the District Emergency Operation Centre (DEOC), the Commissioner of Police in a metropolitan area and the District Magistrate of the incident. DEOC / District Magistrate/ Commissioner of Police shall inform the State Emergency Operation Center (SEOC), Emergency Response Centers (ERCs), the Commissioner of Revenue Administration (CRA) and TNSDMA.
- m. Immediately thereafter, personnel from the AERC will determine the source of the radioactive emission and its strength (**Annexure 5, IAEA-EPR-FIRST RESPONDERS 2006**) and report the same to the Commissioner of Police. In non-Metropolitan Area, the District Collector will inform the TNSDMA, Emergency Response Centers for carrying out the function.
- n. The CRA or TNSDMA shall convene an immediate meeting of the Crisis Management Group under the chair of Chief Secretary.
- o. CRA shall inform National Emergency Operation Center and if required coordinate with Bhabha Atomic Research Center (BARC) for specialized support team from the 18 ERCs.
- p. The Commissioner of Police in a metropolitan area and the District Collector in others shall review the situation and activate coordination, command and control.
- q. Director of Public Health (DPH) shall place medical and para-medical teams if required at the disposal of the Incident Commander.
- r. The Fire Brigade as well as personnel/ vehicles/ equipments from Department of Fire and Rescue will report to the Incident Commander.
- s. Commissioner of Revenue Administration (CRA) shall also coordinate immediate evacuation of potentially affected civilians with the CP, Municipal Commissioner and Collector.
- t. Team for Rapid Assessment of damage shall be deployed.
- u. Chemical Biological Nuclear and Radiological team (CBRN) shall be formed and deployed to ground zero by the incident commander, i.e. Commissioner of Police in metropolitan areas and by the District Collector in other areas.

8.7.1 Response Mechanism

Response measures are those which are taken instantly prior to and following a Nuclear & Radiological emergency aimed at limiting injuries, loss of life and damage to property and the environment and rescuing those who are affected or likely to be affected by it.

National Executive Committee (NEC) will ensure that the functions and responsibilities of the nuclear facility operators and response organizations are clearly defined and understood by all stakeholders. The MHA and the NEC will also determine the actions that need to be performed by each organization during an emergency and whether it has the necessary resources and capabilities needed for the purpose. The advice of National Crisis Management Committee (NCMC) will also be sought in this matter.

8.7.2 Emergency at Nuclear Facility

In plant emergency, the consequences of the accident are expected to be limited to the plant facility only.

The Site Emergency, wherein the consequences of an accident are not expected to cross the site boundary, that is, the Exclusion Zone - which means that even under this condition, there is no radiological emergency in the public domain.

The off-site Emergency which assumes the highly unlikely possibility of radiological releases in the public domain and detailed response plans have been drawn up even for this hypothetical scenario at each site. The initial safe distances suggested in **Radiological Emergencies (IAEA 2006)** are given in Annexure 15. The local District Administration, the Crisis Management Group, DAE and the NCMC get involved in this type of Emergency.

8.8 Standard Operating Procedure (SOP) for Nuclear and Radiological Disasters

Emergency	Activity	Responsibility
Off-Site Emergency	<ul style="list-style-type: none"> • Declare an off-site emergency in consultation with Site Director. • Activate an offsite emergency control centre. • Establish immediate communication with ERC, StateGovernment and the CMG, DAE. • Arrange an immediate deployment of various Emergency Response Teams in affected sector(s). • Based on the emergency monitoring teams from off-site areas initiate counter measures (such as sheltering and prophylaxis) of different grades. 	Collector
	<ul style="list-style-type: none"> • Arrange an evacuation of the public to safer places. • Activate systems of the State machinery to meet the necessary requirements of the public in the camp till the people are in a position to go back to their homes after theaffected areas are cleared and declared safe. • Deploy QRMTs/MFRs consisting of physicians, triage officer, RSO, nurses and paramedical staff. 	Collector, Municipal Commissioner, ERC, Home Dept., Health Dept.,

	<ul style="list-style-type: none"> To ensure that necessary arrangements at evacuation/relief centres is made with sufficient availability of: <ol style="list-style-type: none"> Food Water Blankets/Clothing Medicines Lighting Sanitation and hygiene etc. To ensure necessary security arrangements for the personnel (emergency responders/ relief teams) who are working at relief centres and involved in distribution of relief materials. To ensure that law & order is maintained at evacuated, relief centres and affected areas 	CRA, Civil Supply Dept., Collectors, Municipal Commissioner, Water Supply Dept., Health Dept., TNEB, Energy & Petrochemicals Dept., TWAD Board & Local Authorities, Home Dept.
	<ul style="list-style-type: none"> Make an arrangement for providing useful, timely, correct, consistent, and appropriate information to the public in the event of a nuclear or radiological emergency. Ensure that the information to media/ general public about the coordinated response is released in an organized manner. 	Collector, COR, Info. Dept., Municipal Commissioner
	<ul style="list-style-type: none"> Immediately activate and co-ordinate between the local authority in the affected area and the NCMC. 	CMG
Nuclear/ Radiation emergency	<ul style="list-style-type: none"> Recognize the existence of an abnormal situation. Identify and characterize the source and its origin. Initiate a quick and reliable monitoring methodology to detect the onset of an accident/emergency condition and assess its magnitude. Communicate the situation to fire fighting and medical services, police, civil defence, transport, and other agencies. Estimate the dose via the relevant pathways (Dose Limits for exposures to ionizing radiations for occupational workers given in Annexure 17) 	ERC, DEA, AERB, CMG, Dist. Collector, CP, Municipal Commissioner
	<ul style="list-style-type: none"> Support decision making on protective measures for the population and the environment. If required, distribute iodine tablets at the earliest (iodine prophylaxis). 	

	<ul style="list-style-type: none"> • Respond quickly to the situation and mobilise resources at short notice. • Initiate countermeasures at the earliest (for relief and rescue operations on the basis of actual radiation dose levels prevailing in different zones). • Make sure immediate measures need to be taken as the situation develops. • Ensure that the actions taken by the various agencies are well coordinated. 	Dist. Collector, Municipal Commissioner, Health dept., ERC, CRA,
	<ul style="list-style-type: none"> • Send prior information (in respect of dos and don'ts) to those likely to be affected by the accident/emergency.These include: • Evacuation/ temporary relocation of the affected population, if required. • Withdrawal and substitution of supplies of food and drinking water (based on actual measurement of contamination found in food and drinking water). • Animal Husbandry and Agriculture Department personnel to ensure radiological protection following a nuclear emergency. • Initiation of the recovery phase at an appropriate time. 	CRA, Home Dept., State EOC, Civil Supply Dept., Animal and Husbandry dept., Information dept.
'Criticality' Accidents	<ul style="list-style-type: none"> • Critical Situation in a nuclear facility is a situation of national emergency. In case of Tamil Nadu, the ERC at Tamil Nadu and other national resources such as the Armed Forces etc. shall deal with the situation. The role of the State Government and its agencies such as the Tamil Nadu State Disaster Management Authority will only be supportive and be at the directions of the Crisis Management Group set up by the Union /Central Government. 	ERC, CMG,NEC, DAE
Transportation of Radioactive Materials	<ul style="list-style-type: none"> • On discovery of any such accident, the District Magistrate in a district or the Commissioner of Police in a metropolitan area, shall inform the following – • ERC at Kalpakam & Kudankulam • SEOC at Chennai • Commissioner of Revenue Administration 	Collector or CP
Radiological Dispersal Device	<ul style="list-style-type: none"> • Mobilize and operate incident command • Oversee victims triage emergency response centres/ health authorities 	CMG, Dist. Collector,

	<ul style="list-style-type: none"> • Remove contaminated clothes and place these in a sealed plastic bag • Take a shower to wash off dust and dirt. This will reduce total radiation exposure • If radioactive material was released, local news broadcasts will advise people where to report for radiation monitoring and for blood and other tests to determine whether they were in fact exposed and steps to be taken to protect their health 	
Loss or Theft of Radioisotopes/ Radioactive Material	<ul style="list-style-type: none"> • It is the user's responsibility to maintain an inventory of all sources at all times so in case of loss or theft of a radioactive source, the matter needs to be reported to the police, CMG and AERB immediately. • Theft of sources should be dealt jointly by law and order enforcement agencies and radiation protection experts. 	Home Dept., Dist. Collector

9 - ACTION PLAN FOR FIRE

9.1 Introduction

Fires can start due to human activities or from natural causes. Forest fires can start from either natural causes or human activity or from a combination of both. The most common fires are the residential and non-residential structural fires caused usually by human activities. Most industrial and chemical fires are triggered by human activity. They are sometimes caused by human errors, faulty designs, or mechanical failures. Fire can also be the secondary effect of a disaster like earthquake. Secondary fires after a disaster like earthquakes constitute a substantial and heavy risk. Damage to natural gas systems during an earthquake can lead to major fires and explosions. Damages to electrical systems during a disaster can ignite major fires. Varying risk scenarios need different types of equipment. The risk varies with geographical location such as hilly area, coastal-area, desert-area, and with different types of residential (medium/ low-rise/ high-rise) buildings, industrial, commercial area, or a combination of these. There is a considerable need for skill upgradation of the staff and modernization of the entire fire service system.

9.2 Types of Fire

Fires are classified in the following categories:

- **Class A Fires:** Involving combustible materials of organic nature, such as wood, paper, rubber and many plastics etc. where the cooling effect of water is essential for extinction of fires.
- **Class B Fires:** Involving flammable liquids, petroleum products or the like, where a blanketing effect is essential
- **Class C Fires:** Involving flammable gases under pressure including liquefied gases, where it is necessary to inhibit the burning gas at fast rate with an inert gas, powder or vapourising liquid for extinguishers
- **Class D Fires:** Involving combustible metals, such as magnesium, aluminium, zinc, sodium, potassium, etc. when the burning metals are reactive to water and water containing agents and in certain cases to carbon dioxide, halogenated hydrocarbons and ordinary dry powders. 1- NDMP Plan,2019

9.3 Prevention From Fire

Fire extinguishers are the most common type of firefighting equipment being installed at office facilities, warehouses and sales offices. They should be selected based on the type of fire hazard, as depicted below:

- Class A fires – Water, foam, ABC dry powder and halocarbons
- Class B fires – Foam, dry powder, clean agent and carbon dioxide
- Class C fires – Dry powder, clean agent and carbon dioxide extinguishers
- Class D fires – Extinguishers with special dry powder for metal fires

9.4 Declaration of Disaster

The Disaster Management Act, 2005 provides for the State Government to declare any area where any disaster has occurred as disaster affected area on the recommendations of the State Relief Commissioner or the District Collector. The purpose of declaration of disaster is to organize effective response and mitigating the earthquake effects. Such a declaration provides wide powers and responsibilities to the Commissioner of Revenue Administration (CRA) and the District Collectors in order to handle the incident effectively.

9.5 Institutional Mechanism

Fire service comes under the 12th schedule of the Constitution dealing with Municipal functions. At present, fire prevention and firefighting services are organized by the concerned States and Union Territories (UTs), and Urban Local Bodies (ULBs) in the Country. Directorate of National Disaster Response Force and Civil Defence (NDRF & CD, Fire Cell), Ministry of Home Affairs (MHA) renders technical advice to the States, UTs, and central ministries on fire protection, prevention, and legislation.

In view of the short comings in the fire services in different states of the country and the need to upgrade it, GoI in 1956 formed a Standing Fire Advisory Committee (SFAC) under the MHA with a mandate to examine the technical problems relating to fire services and to advise the GoI for speedy development and upgradation of fire services all over the country which was renamed as Standing Fire Advisory Council (SFAC) in 1980. This council has representation from each state fire service, as well as representation from Ministry of Home Affairs (MHA), Ministry of Defence (MoD), Ministry of Road Transport and Highways (MoT), Ministry of Communications and Information Technology (MoC) and Bureau of Indian Standards (BIS).

Disaster Management Act, 2005 mandated Tamil Nadu State Disaster Management Authority to carry out mitigation and preparedness activities against any hazard including Fire and build the capacity of the state towards the same.

At the top level, the Chief Secretary will act as the Chief of Operations and will be supported by the Commissioner of Revenue Administration (CRA) through the Branch arrangements at the State Emergency Operations Centre (SEOC) & the District Emergency Operation Centre (DEOC) at the district level. In case of fire affecting larger community, the role of the Sub-Divisional Magistrate, comes into prominence under the guidance of District Magistrate and Collectors.

9.6 Trigger Mechanism

State Government has started Department of Fire and rescue services is the prime agency of the government to prevent, handle and mitigate the negative effects of fires, accidents, floods, landslides and other disasters. In a world where hazards are constantly on the rise due to rapid urbanization, industrialization, threat of terror and the landmass of the Indian sub-continent falling within the earthquake map of the world. Thus, the department of the State will be the nodal department for formulating, controlling, monitoring and directing measures for Fire incident preparedness, organizing rescue, relief and rehabilitation. All other concerned departments should extend full cooperation in all matters pertaining to the management of the fire whenever it occurs.

The occurrence of a fire may be reported by the Fire and Emergency services to the Commissioner of Relief by the fastest means. The State Crisis Management Committee (SCMC) under the chairmanship of the Chief Secretary should be activated immediately on the occurrence of any major fire incident.

Besides these, the SEOC also receives reports on the fire from district and taluk levels. On receipt of the information, the SEOC verifies the authenticity of the reports and will inform the real situation to concerned authorities.

9.7 Standard Operating Procedure (SOP)

S.No	Task	Activity	Responsibility
1.	Disaster and Plan Activation	<ul style="list-style-type: none"> • Activate fire emergency plan in consultation with SCG • Activate DCG • Establish immediate communication with, DEOC, SEOC, TNSDMA and CCG 	Director – Fire & Rescue Services Collector, Municipal Commissioner
2.	Mobilization & Deployment	<ul style="list-style-type: none"> • Arrange an immediate deployment of various ERTs in affected sector(s). (Police, Fire, S&R, Medical, etc.) • Based on the emergency monitoring teams from affected areas initiate counter measures (such as sheltering and medical help) • Arrange an evacuation of the affected/ likely to be affected people, workers and population to safer places • Activate systems of the State machinery to meet the necessary requirements of the public in the camp till the people are in a position to go back to their homes after the affected areas are cleared and declared safe • Deploy QRMTs/ MFRs consisting of physicians, triage officer, nurses and paramedical staff 	Director – Fire & Rescue Services Collector, Municipal Commissioner, Home Dept., Health Dept., Industry/ Industrial Association
	Fire Fighting	<ul style="list-style-type: none"> • Rush immediately to the site of Fire • Extinguishing the fire • Ventilation for dousing the fire • Search & Rescue the affected persons • Containment of the Fire 	Director – Fire & Rescue Services Chief Fire Officer, Regional Fire Officer

	Evacuation	<ul style="list-style-type: none"> • To ensure that necessary arrangements at evacuation/ relief centers is made with sufficient availability of: <ul style="list-style-type: none"> i) Food ii) Water iii) Blankets/Clothing iv) Medicines v) Lighting vi) Sanitation and Hygiene, etc. • To ensure necessary security arrangements for the personnel (Emergency responders/relief teams) who are working at relief centers and involved in distribution of relief materials • To ensure that law and order is maintained at evacuation/relief centers and in the affected areas as well 	Civil Supply Dept., Home Dept. Collectors, Municipal Commissioner, Water Supply Dept., Health Dept., TNEB, Power & Energy Dept., & Local Authorities, Regional Fire Officer
		<ul style="list-style-type: none"> • On the directions of Incident Commander(IC), the ESF Team Leader will perform evacuation. He will instruct the team to initiate evacuation of the areas expected to be exposed to more threat in future • The QRT shall move along with adequate material and resources to carry out evacuation. People will be directed to move towards safer areas identified by technical experts • The team leader will designate in-charge of relief centers and keep in touch with them for regular head count and care of evacuees 	Collector, Municipal Commissioner, Home Dept, Fire & Emergency Services, Civil Defense, Revenue Dept., Regional Fire Officer
		<ul style="list-style-type: none"> • Police, Fire, Civil Defence & Home Guard (CD & HG) and other government employees may have to go door to door to ensure that residents have been alerted about the fire 	
4.	Information to public and media	<ul style="list-style-type: none"> • Make an arrangement for providing useful, timely, correct, consistent, and appropriate information to the public and media in the event of a fire incident • Ensure that the information to media/ general public about the coordinated response is released in an organized manner. 	Municipal Commissioner, Collector, Commissioner of Info., Fire & Emergency Services

5.	Dignified Management of the Dead	<ul style="list-style-type: none"> • Ensure following procedure is followed before disposal/handing over of dead bodies: <ul style="list-style-type: none"> a. Photographs of the dead bodies are taken, b. Identification of the dead bodies is done, c. Post Mortem wherever necessary and possible is carried out, d. Handing over dead bodies of persons known/identified to their relatives • Disposal of unclaimed and unidentified dead bodies 	Collector, Municipal Commissioner, Health Dept., Revenue Dept., Home Dept., Local Authorities
Roles and Responsibility of Some of The First Responders during Fire			
1	Police (Law and Order)	<ul style="list-style-type: none"> • Control and divert the traffic near the fire affected areas • Ensure law and order at the incident site during fire emergency / disaster and at evacuation centres too. 	Home Dept.
		<ul style="list-style-type: none"> • Provide security in evacuated areas • Give warning to the people living in the nearby areas. Secretary, Home and Director General of Police (DGP) will direct the participation of Police in the emergency response and will constitute an integrated command. • Issue an alert to the DIG and the surrounding districts. Direct all the police officials and forces in adjacent Districts to be deployed if necessary. Ensure that the police forces required for traffic management, evacuation and law and order are available with the District Administration. • Review the dissemination of warning and the need for evacuation. Assist the Fire & Emergency Services with Police Wireless sets so that there is continuous communication among the first responders in the emergency situation. • In case of big explosion and fire, assess the situation and suggest a Plan of Action based on assessment of the immediate causation. 	

		<ul style="list-style-type: none"> Order deployment of the police force for evacuation of the people from the zone of the danger. 	
	Search & Rescue	<ul style="list-style-type: none"> Reach at the site as soon as possible and assess the situation (information about the chemical leak/spill, the action taken and current status) Start fire-fighting with suitable medium and also take care of surrounding storages/tanks to be over heated so that reduce the chances of domino effect. Secretary, Fire & Rescue Services will coordinate redeployment of Fire Tenders from other places, as required. The SCG, in consultation with the District Collector / Municipal corporation and other local officials will ensure that all the first responders work closely with full coordination Search and identify the risk and nullify the sources of fire incident. If any unclear or unidentified substance or source is identified or detected, inform the higher authorities. 	Collector, Municipal Corporation, Fire & Rescue Services
	Medical Support	<ul style="list-style-type: none"> Provide the necessary expertise and specialized services to the SCG Deploy all the necessary medical facilities including doctors, nurses, medicines and ambulances in the affected areas 	Health & Family Welfare Department, Commissioner of health,
		<p>Alert major hospitals (both government & private) in the area and ask them to be in readiness for receiving patients</p> <ul style="list-style-type: none"> Collect information on the number of deaths and persons injured; the nature of injuries and the likely long-term consequences Assess the medical needs of the area on the basis of likely long-term consequences and take steps to equip local medical facilities for treating people on a long-term basis. 	Civil Surgeon, District/ Municipal Corporation Hospitals
		<ul style="list-style-type: none"> Primary Incident report to be prepared and submitted the higher authorities Detailed investigation report of the incident to be prepared and submitted to the higher authorities 	Fire & Rescue Services

RESPONSIBILITY FRAMEWORK FOR PREPAREDNESS AND RESPONSE:

PREPAREDNESS AND RESPONSE					
S. No.	Emergency Function	State Agencies	State / Districts / Ministries/ Departments and their Responsibilities	District	Responsibility - District
1	Communication	Lead Agencies: DIPR Support Agencies: SDMA, RADM SEO, all other relevant Depts.	Detailed plans for fail safe communication with all the early warning agencies (such as IMD, CWC, etc.) and Control Rooms (Central/ State) for getting accurate information at regular intervals Restoration of emergency communication in disaster affected areas Emergency response teams to be in place with detailed technical plans to restore communication after the occurrence of a disaster Provide a dedicated radio frequency for disaster communications Mobile communication units fitted with V-SAT terminals, VHF repeaters, reserve WT VHF Sets, portable mobile towers, etc. Contingency plans including pre-disaster contracts with suppliers – government and private – for easy availability of resources at the time of emergency Operational plan for establishing temporary telecommunication facilities in the affected areas jointly with the State Government	Lead Agencies: DIPR Support Agencies: State/UT, DDMA, DEOC, all other relevant Depts.	Fail safe communication plan is prepared with all early warning agencies Logistic section of the state level IRT coordinates with central agencies to provide effective communication support to the field level IRTs for response. State and district EOCs are equipped with satellite phones/ VHF/ HF as a backup to the landline All communication equipment, especially the satellite phones are in good working condition 24x7 on all days through regular testing Plans for communication including telephone and HAM is prepared for smooth coordination with the field level IRTs Establish protocols and responsibilities for coordinating with central agencies and various service providers

PREPAREDNESS AND RESPONSE				
S. No.	Emergency Function	State Agencies	State / Districts / Ministries/ Departments and their Responsibilities	Responsibility - District
			<p>Secure, fail-safe communication network among Central, State and other Control Rooms for exchanging reliable and authentic information about the affected areas, and resource mobilization</p> <p>Prepare, update and maintain a State wise list of HAM Operators who could be contacted and deployed at the site of emergency when all other modes of communication fail</p> <p>Inter-Operability (the ability of emergency responders to communicate among jurisdictions, disciplines, and levels of government using a variety of frequency bands, as needed and as authorized) of mobile service providers</p>	<p>Plans for communication including telephone and HAM is prepared for smooth coordination with the field level IRTs</p> <p>Establish protocols and responsibilities for coordinating with central agencies and various service providers</p> <p>Prepare, update and maintain a District wise list of HAM Operators who could be contacted and deployed at the site of emergency</p> <p>Have binding agreements with telecom service providers to restore damaged facilities and set up temporary facilities on emergency basis</p> <p>Ensure Inter - Operability among different telecom service providers</p>
2	Cultural Heritage Sites, their Precincts and Museums – Protection & Preservation	Lead Agencies: MOCU	Facilitate the development of comprehensive plan for emergency response including evacuation, immediate response protocols and procedures, etc.	Lead Agencies: ARHD

PREPAREDNESS AND RESPONSE				
S. No.	Emergency Function	State Agencies	State / Districts / Ministries/ Departments and their Responsibilities	District Responsibility – District
		Support Agencies: MHUA, MTOU, MOLJ	Mobilizing specialised support Assist in cataloguing and documenting damages	<p>Support Agencies: SDMA, DMD DDMA, SEOC, SDRF, F&ES, ULBSS, PRIs, CUD, TOD, SPWD</p> <p>Creating an emergency team that includes the management, administrators and state of the site or precinct as well as representatives from local stakeholders</p> <p>Identification of evacuation routes, spaces that may act as temporary refuge areas, and displaying these routes and spaces in a clear manner as signage, maps, printed literature, etc., for wide distribution</p> <p>Identification of various kinds of emergency supplies and equipment and their storage for ease of access should be undertaken.</p>
3	Public Health & Animal Husbandry	Supporting Agencies: RADM, Public Health, Animal Husbandry	If necessary, assist the state government to contain any public health challenges beyond the capabilities of the state administration	<p>Support Agencies: State/UT, DDMA, JD Public Health, Animal Husbandry Police,</p> <p>Use of recommended safety kits and personal protection by the staff deployed in carcass disposal so that they are not infected</p> <p>Take measures for dispersal of financial relief as per norms.</p>

PREPAREDNESS AND RESPONSE				
S. No.	Emergency Function	State Agencies	State / Districts / Ministries/ Departments and their Responsibilities	District Responsibility – District
4	Drinking Water/ Dewatering Pumps/ Sanitation Facilities	Lead Agency: MAWS, RD&PR RADM Support Agencies: CMWSSB, TWAD, CMA, DOTP, DRD, DPH	Promote strict compliance with minimum standards of relief as per Section 12 of DM Act 2005 Assist the respective state government in providing disaster-affected areas with clean drinking water and to prevent the spread of water borne diseases Assist affected state to address the public health needs to prevent and mitigate a sudden outbreak of epidemic, water and food contamination as well as other public health-related problems in the aftermath of a disaster Arrangements with vehicle manufacturers for vehicle mounted RO Systems with integrated power source and pouch facility with a condition that system should be in place usually within 6 hours of placing order. Easy availability of chlorine tablets to the State Government on demand Arrangements with companies for providing vehicle mounted heavy duty dewatering pumps with a condition to make them available usually within 12 hours of request	Lead Agencies: MAWS, RD&PR Provide disaster-affected areas with clean drinking water and to prevent the spread of water borne diseases Provide emergency water supplies when there is scarcity of potable water Respond to the public health needs to prevent and mitigate a sudden outbreak of epidemic, water and food contamination as well as other public health-related problems in the aftermath of a disaster Dept. of Water Resources and Drinking Water and Sanitation works with the logistic section of the state level IRT to provide effective services to the field level IRTs Necessary arrangements are made for supplying drinking water through tankers

PREPAREDNESS AND RESPONSE				
S. No.	Emergency Function	State Agencies	State / Districts / Ministries/ Departments and their Responsibilities	Responsibility – District
			<p>Facilitate the quick availability of hygienic portable toilets through pre-disaster agreements/ contracts with suppliers</p> <p>Facilitate the quick availability of packaged drinking water through pre-contracts with suppliers</p> <p>As per request from State/UT, assist in organizing emergency water supplies when there is scarcity of potable water</p>	<p>Support Agencies: DDMA, PO RD, Public Health, CMA Urban & Rural Local Bodies</p> <p>Necessary arrangements are made for supplying chlorine tablets</p> <p>Arrangements with vehicle mounted RO Systems with integrated power source and pouch facility with a condition that system should be in place usually within 6 hours of placing order</p> <p>Arrangements with companies for providing vehicle mounted heavy duty dewatering pumps with a condition to make them available usually within 6 hours of request</p> <p>Availability of hygienic portable toilets and bleaching powder through pre-disaster agreements/ contracts with suppliers</p>
5	Early Warning	Lead Agencies: See Table 8-1 for different disasters notified by GOI	<p>Issue forecasts, alerts, warnings</p> <p>Provide early warnings (where possible) to reduce loss of life and property.</p> <p>Disseminating warnings and information to all Central Ministries/ Departments/ Agencies and State Government</p>	<p>Lead Agencies: DDMAs</p> <p>To disseminate early warning signals to the district administration, local authorities, and the public at large in the areas likely to be affected by a disaster so as to reduce loss of life and property</p> <p>Dissemination of warnings and information up to the last mile.</p>

PREPAREDNESS AND RESPONSE				
S. No.	Emergency Function	State Agencies	State / Districts / Ministries/ Departments and their Responsibilities	District Responsibility – District
6	Evacuation of People and Animals	Lead Agency: SDMA	<p>On request, support the affected state government in evacuation of people and animals from areas likely to be affected by major disaster</p> <p>Special Situations: Evacuation of fishermen from the high seas in case of a cyclone</p>	<p>Support Agencies: State/UT, SDMA, RD, SEO, DDMA, all other relevant Depts.</p> <p>Lead Agencies: DDMAs</p> <p>Quick assessment of evacuation needs such as the number of people and animals to be evacuated and mode of evacuation</p> <p>Special attention to evacuation of PWD</p> <p>Mobilize transport and resources for evacuation</p> <p>Identify and prepare sites for temporary relocation of affected people and animals</p> <p>Identify requirements of resources for evacuation such as helicopters, aircrafts, high speed boats and ships to be provided to the affected state government</p>

PREPAREDNESS AND RESPONSE				
S. No.	Emergency Function	State Agencies	State / Districts / Ministries/ Departments and their Responsibilities	District Responsibility – District
		Support Agencies: NDRF, Central Forces TNDRF, Fire & Rescue Services Police	Support Agencies: Line Departments	Request for central resources, if needed Coordinate with central agencies to mobilize required resources Monitor the situation Earmark resources/ units/ battalions of SDRF for quick deployment Prepare handbook/manuals and SOP for evacuation for people and animals.
7	Fodder for Livestock in Scarcity-hit Areas	Lead Agency: Animal Husbandry	When required, mobilize fodder and cattle feed to meet shortages, as in drought or scarcity conditions Facilitate transport of fodder from storage facilities or distant areas to the scarcity-hit areas Enlist PSUs and private agencies for providing fodder and other support	Lead Agency: AHD Support Agencies: DDMA, Animal Welfare Organizations Organize collection centres for fodder and cattle feed Enlist PSUs and private agencies for providing fodder and other support

PREPAREDNESS AND RESPONSE				
S. No.	Emergency Function	State Agencies	State / Districts / Ministries/ Departments and their Responsibilities	Responsibility – District
8	Food & Essential Supplies	Lead Agencies: Food Civil Supplies and Consumer Protection Dept Civil Supplies Corporation	<p>Facilitate the following:</p> <ul style="list-style-type: none"> Availability of adequate and appropriate food supplies to the disaster-affected areas Food grains Ready-to-eat/ pre-cooked food/ meals Transport with essential supplies at strategic location. MOU with suppliers to provide required quantities of family packs of essential food provisions Supply of provisions to meet the needs of infants/ small children Counselling for lactating mothers Prepare FCI storage facilities to supply required food grains as per requirement of disaster affected areas. 	<p>Lead Agencies: Civil Supplies Corporation JR Cooperatives Revenue</p> <p>Depending upon the requirement, coordinate with the relevant Central Ministry to make sure that the supplies reach the site on time.</p> <p>Cooked food / meals, family packs of essential food provisions.</p> <p>Deploy a dedicated team at the local level to receive the supplies, maintain log (manual or computerized), and distribute them at required locations</p> <p>Ensure food storage facilities have sufficient stocks and are located in relatively risk-free locations</p> <p>Supply of provisions to meet the needs of infants/ small children</p> <p>Counselling for lactating mothers</p>

PREPAREDNESS AND RESPONSE				
S. No.	Emergency Function	State Agencies	State / Districts / Ministries/ Departments and their Responsibilities	District Responsibility – District
9	Fuel	Lead Agencies: SDMA, Public sector Oil Companies	Petrol pumps are functional and adequate petrol, oil and diesel are available to Government for relief, rescue and general public Adequate supply of petrol, diesel, kerosene and LPC Gas in the affected areas in close coordination with the State Government for general public as well as emergency responders/equipment Quick mobilization of fuel in hilly areas to avoid delays caused by complex supply chain to such areas	Lead Agency: DDMA Support Agencies: Public sector Oil Companies Assess and make the requirement of fuel clear with the Central Ministry and coordinate the delivery of fuel through local Arrangements.
10	Housing and Temporary Shelters	Lead Agencies: SDMA, RADM Support Agencies: TNHB, TNUHDB	Ensure strict compliance with minimum standards of relief as per Section 12 of DM Act 2005 Assist the respective state government in the task of providing temporary, safe, hygienic and secure living spaces to meet the needs of people in disaster-affected areas Providing shelters/ tents to the affected population Setting up of relief camps and catering to the needs of the responders Prior and long-term tie-up with prefab shelter manufacturers/ suppliers, and	Lead Agency: DDMA Support Agencies: TNHB, PWD, RD& PJ DOTP Municipalities Municipal Corporations Ensure strict compliance with minimum standards of relief as per Section 12 of DM Act 2005. Ensure sufficient availability of tankers/ other vehicles for local transportation through the relevant Dept. Establish mechanism for stocking the fuel at strategic locations with relevant agencies Logistic section of the state level IRT must coordinate with Railways to provide effective services to the field level IRTs for response

PREPAREDNESS AND RESPONSE				
S. No.	Emergency Function	State Agencies	State / Districts / Ministries/ Departments and their Responsibilities	Responsibility - District
			<p>tent manufacturers to provide shelters at the site usually within 24 hours of placement of orders</p> <p>Establish regional logistic facilities (covering 5 major regions in the country) that are well-coordinated with the corresponding NDRF regional unit to maintain stocks of temporary shelters, tents and other non-food resources</p>	<p>Alternate places for establishment of facilities as mentioned in the IRS guidelines such as relief camp, base, camp etc. are identified in advance and included in the local DM Plan.</p> <p>Identify shelter suppliers for supply of tents/ shelters up to the village level and have MoUs for supply at short notice (usually less than 24 hours) as per requirement.</p> <p>Stockpile tents, tarpaulins and temporary shelter material in regional warehouses/ stores/ ERCS.</p> <p>Depending upon the requirement, coordinate with the relevant Central Ministry to make sure that the tents/ shelters reach the site on time.</p> <p>Deploy a dedicated team at the local level to receive the tents/ shelters</p> <p>Maintain logs (manual or computerized) of all material movements and details of distribution to required locations</p>

PREPAREDNESS AND RESPONSE					
S. No.	Emergency Function	State Agencies	State / Districts / Ministries/ Departments and their Responsibilities	District	Responsibility – District
11	Livestock and Other Animals: Veterinary Care, Rehabilitation and Ensuring Safety and Ensuring Safety and Ensuring Safety	Lead Agency: SDMA AH & FWD Director Animal Husbandry	<p>Support the setting up of livestock camps/ shelters for animals in distress due to disasters, including drought</p> <p>Support for care of animals in the camps/ shelters.</p> <p>Assist State/UT in the proper management, and running of livestock camps/ shelters</p> <p>Assist in proper rehabilitation of animals.</p> <p>Supplement the needs of State/UT to provide veterinary care to disaster-affected livestock, including drought-hit areas.</p>	Lead Agency: AHD Support Agencies: DDMA, JD AH Dept Animal Welfare Organizations	<p>Include provisions for evacuation, safety, and rehabilitation of animals in SDMP</p> <p>Set up of livestock camps/ shelters for animals in distress due to disasters, including drought</p> <p>Organize proper care of animals in the camps/ shelters</p> <p>Ensure proper management and running of livestock camps/ shelters</p> <p>Proper rehabilitation of animals</p> <p>Provide veterinary care to disaster-affected livestock, including in drought-hit areas</p>
12	Management of the Dead	Lead Agencies: SDMA RADM Police Support Agencies: DPH, Urban & Rural Local Bodies		<p>Provide guidance and support depending on the type of disaster and challenges faced by the state government</p> <p>Provide clarity when required in following the recommended international practices as prescribed in relevant NDMA guidelines and international norms such as those of the IRC</p>	Lead Agency: DDMA, Police & DPH

PREPAREDNESS AND RESPONSE				
S. No.	Emergency Function	State Agencies	State / Districts / Ministries/ Departments and their Responsibilities	District Responsibility - District
13	Media Relations	Lead Agencies: SDMA RADM DIPR SEOC Agencies: Departments with hazard-specific responsibilities	<p>Collect, process and disseminate information about an actual or potential disaster situation to all stakeholders so as to facilitate response and relief operations; update information on disaster and disaster victims; maintain contacts with mass media; inform public regarding the impact of disaster and the measures taken for the welfare of the affected people</p> <p>Ethical guidelines for disaster coverage by media as per accepted global standards respecting dignity and privacy of the affected communities and individuals and work with media to adopt the guidelines through self-regulation as well as oversight by relevant regulatory institutions</p> <p>Mechanisms for broadcasting warnings, do's and don'ts etc. to media and public before (if applicable), during and after the disasters</p> <p>Proper schedule for media briefing (once/twice/ thrice daily depending on the severity of the disaster) and designate a nodal officer for interacting with media on behalf of the Government</p>	<p>Lead Agency: DDMA & PR</p> <p>Support Agencies: PRO DEOC, & Line Department</p>

PREPAREDNESS AND RESPONSE				
S. No.	Emergency Function	State Agencies	State / Districts / Ministries/ Departments and their Responsibilities	District Responsibility - District
14	Medical Care	DPH, Lead NGOs Social Welfare	<p>Lead Agencies: SDMA Health & Family Welfare Department</p> <p>Assess medical emergency needs (if central assistance is required) Medical assistance to the affected state in response to its request for post-disaster emergency medical care</p> <p>Mobile Field Hospitals similar to the military field units that has trauma-care for the disaster-affected and serve as a temporary substitute for the collapsed local general medical and surgical facilities in the disaster zone</p> <p>Gradual improvement of the field hospital to conform to global standards</p> <p>Mobile medical care units with OT facility, power sources, dedicated trained staff of doctors, and paramedics who could be immediately summoned at the time of emergency</p> <p>Support Agencies: DPH RADM</p>	<p>DPH And their field functionaries trained in Psychosocial Support Social welfare Depts Local Volunteers</p> <p>Lead Agencies: DDMA DPH</p> <p>Tie-up with the companies for easy availability of common medicines during the emergency situations</p> <p>Support Agencies: Urban & Rural Local Bodies</p> <p>Hygienic conditions are prevalent at all times in various facilities established as well as hospitals to curb the spread of diseases</p>

PREPAREDNESS AND RESPONSE				
S. No.	Emergency Function	State Agencies	State / Districts / Ministries/ Departments and their Responsibilities	District Responsibility - District
			<p>Timely technical support to the State Governments for restoration of damaged hospitals as well as infrastructure</p> <p>Ensure strict compliance with minimum standards of relief as per Section 12 of DM Act 2005</p> <p>Develop specialized facilities to handle chemical, biological, radiological and nuclear emergencies</p> <p>Strengthening of emergency departments in all hospitals under the central administration</p> <p>Mobilize Psycho-Social Support and Mental Health Services (PSSMHS) professionals, para-professionals and trained community level workers</p> <p>Assist state government in providing PSSMHS</p>	<p>Establishment of sound protocols for coordination between state's health Dept. and the central agencies</p> <p>Ensure strict compliance with minimum standards of relief as per Section 12 of DM Act 2005</p> <p>Plan for surge capacity in all the major hospitals in the state</p> <p>Develop specialized facilities to handle chemical, biological, radiological and nuclear emergencies</p> <p>Strengthening of emergency departments of all major hospitals in the state</p> <p>Deploy PSSMHS professionals, para-professionals and trained community level workers</p> <p>Identify those requiring immediate PSSMHS and organise PSSMHS</p>
15	Power	Lead Agencies: SDMA Energy Dept	Assistance to the respective state government in repairing power infrastructure; restore power supply in the disaster-affected areas; help power	Lead Agency: DDMA TNEB

PREPAREDNESS AND RESPONSE				
S. No.	Emergency Function	State Agencies	State / Districts / Ministries/ Departments and their Responsibilities	District Responsibility - District
		Support Agencies: TANGEDCO TANTRANSCO	<p>companies in establishing emergency power supply</p> <p>Arrangements of alternate sources of power such as generator sets, solar lanterns, portable tower lights, etc. until resumption of normal power supply</p> <p>Arrangements with suppliers for emergency supplies usually within 24 hours of placement of order</p> <p>Technical support to the State Government for restoration of power supply as well as infrastructure on request.</p>	<p>Support Agencies: State/UT, Urban & Rural Local Bodies</p> <p>services to the field level IRTs for response</p> <p>Pre-disaster arrangements for quick restoration of power supply with alternate mechanisms to critical facilities usually within 6 to 12 hours of placement of order</p> <p>Pre-disaster agreements with central and neighbouring state governments for technical support in restoration of power supply and infrastructure</p> <p>Mobile power supply units or other arrangements with power generation companies for quick deployment at the site during emergency</p>
16	Public Health	Lead Agencies: SDMA RADM HFWD DPH	<p>Assess public health (if central assistance is required)</p> <p>Helping to implement public health IRS</p> <p>Respond to biological emergencies</p> <p>Operating epidemiological surveillance systems</p> <p>Providing laboratory support</p> <p>Managing information systems</p>	<p>Lead Agencies: DDMA</p> <p>Activating Public Health IRS</p> <p>Assess public health needs in coordination with central agencies as per situation</p> <p>Coordinate with central agencies in case of biological emergencies</p> <p>Coordinate with central agencies for epidemiological surveillance</p>

PREPAREDNESS AND RESPONSE					
S. No.	Emergency Function	State Agencies	State / Districts / Ministries/ Departments and their Responsibilities	District	Responsibility - District
17	Relief Employment	Support Agencies: MOD, CAPF, MOR	Providing risk communication Support public health logistics (drugs and vaccines), non-pharmaceutical interventions Support immunisation, disinfection, vaccination and vector control measures	Support Agencies: DPH, RD, Urban & Rural Local Bodies	Manage public health logistics (drugs and vaccines), non-pharmaceutical interventions Carry out immunization, disinfection, vaccination and vector control measures
18	Relief Logistics and Supply Chain Management	Lead Agencies: RD & PR	Provide projects to employ people seeking work in drought affected areas as a relief measure Provide financial support for such schemes	Lead Agencies: DRD MLBE, MOJS, MDWS, MAFW	Provide opportunities for unskilled work in public works for people seeking work in drought affected areas as a relief measure Ensure quick and prompt payment of wages Carry out health check-up of those seeking work Draw from various funds including Disaster Response Fund to implement the employment schemes
				Lead Agencies: SDMA Home Department Transport Corporations SDMA	Establish a mobilization center at the airport/railway station for the movement of relief supplies within the state. Deploy special transportation for the movement of relief supplies within the state

PREPAREDNESS AND RESPONSE			
S. No.	Emergency Function	State Agencies	State / Districts / Ministries/ Departments and their Responsibilities
Responsibility - State		District	Responsibility - District
	Public Dept Food & Consumer Protection Dept Health & Family Welfare	Make a rapid assessment of emergency relief needs in consultation with the affected state government Establish a mobilisation centre at the airport/railway station for the movement of relief supplies Deploy special transportation for the movement of relief supplies Coordinate transportation of material from different parts of the country, and coordinate and provide relief supplies from neighbouring states	Support Agencies: DDMA Make arrangements to receive and distribute relief and emergency supplies received from different parts of the country Coordinate transportation (air, rail, road, water) with Central ministries/departments/agencies Arrange alternative means of transportation to reach relief supplies to the affected locations if normal transport cannot reach Coordinate transportation (air, rail, road, water) for other Central ministries/departments/agencies Locate, procure and issue resources to Central agencies involved in disaster response, and supply to the affected state Adopt alternative means of transportation to reach relief supplies to the affected state/district

PREPAREDNESS AND RESPONSE				
S. No.	Emergency Function	State / Districts / Ministries/ Departments and their Responsibilities	District	Responsibility - District
		Responsibility - State		
19	Search and Rescue of People and Animals	<p>Lead Agencies: SDMA RADM Civil Supplies</p> <p>Support Agencies: NDRF TNDRF TNFRS Public Dept RADM Police TNDRF</p>	<p>Fail safe communication between early warning agencies and EOC of Central and State/ District, Central Min.</p> <p>Adequate NDRF support in a state of readiness to move at a short notice</p> <p>Deploy Quick Response Teams (QRT)</p> <p>Deploy Quick Medical Response Teams (QMRT)</p> <p>MoU with suppliers for medicines, vaccines, disinfectants, blankets, tarpaulins, tents, boats, inflatable lights, torches, ropes, etc. with a condition that they will be supplied at short notice (usually within 24 hours) from the placement of order</p> <p>SOPs for sending rescue/ relief material from other adjoining States to the affected state immediately</p> <p>Support of Armed Forces and CAPF as per requirement</p> <p>Coordinate with the state government and district administration for deployment of QRTs and QMRTs</p> <p>SAR in coastal and marine waters</p>	<p>Lead Agencies: DDMA</p> <p>Support Agencies: State/UT, RADM Civil Supplies DPH & Line Depts DDMA</p> <p>Various positions of IRTs (State, District, Sub-division and Tehsil) are trained and activated for response at their respective administrative jurisdiction</p> <p>SDRF teams are trained, equipped and ready to move at a short notice to the affected areas</p> <p>Strategic stationing of state-of-the-art equipment for search, rescue and response with dedicated trained manpower</p> <p>MoU is in place with suppliers for blankets, tarpaulins, tents, inflatable lights, torches, ropes, etc. with a condition that they will be supplied quickly at short notice (usually within 24 hours)</p> <p>Nodal officer selected for coordination is in regular touch with MIHA/NDMA for additional requirements (including help from other Central Ministries)</p> <p>Deploy Quick Response Teams (QRT)</p> <p>Deploy Quick Medical Response Teams (QMRT)</p>

PREPAREDNESS AND RESPONSE				
S. No.	Emergency Function	State Agencies	State / Districts / Ministries/ Departments and their Responsibilities	District Responsibility - District
20	Transportation	Lead Agencies: SDMA Home Highways RD& PR Transport	<p>Adequately address the post-disaster transportation needs to ensure that the emergency response and recovery efforts are carried out in a timely manner; restore the public transport; resumption of the movement of essential goods</p> <p>Pool heavy duty earth moving machineries, tree cutters, fork lifters and other required equipment either at strategic locations or centralized</p>	<p>Lead Agencies: DDMA</p> <p>Support Agencies: RADM Health & Family Welfare Police Highways PO DRD Urban & Rural Local Bodies</p> <p>Within and near Airports: AAI works with the logistic section of the state level IRT to provide effective services (Ground Support Unit) and also provide Nodal Officer for coordination of the relief operations</p> <p>Restoration of Airport at the earliest involving specialised response force of the central government</p> <p>Coordination with state and district administration to provide air support</p> <p>Cater to the needs of transporting affected people if required</p>

PREPAREDNESS AND RESPONSE				
S. No.	Emergency Function	State Agencies	State / Districts / Ministries/ Departments and their Responsibilities	District Responsibility - District
			<p>Availability of diesel locos and drivers in disaster-affected areas where power is disrupted/ shut as a preventive measure; maintain a live roster of such emergency support systems which can be mobilized at very short notice by periodic review of readiness</p> <p>Establishment of emergency services group within the railways having stay with experience of working in disaster situations</p> <p>Contingency plan is in place to deploy rail coaches as makeshift shelters if required</p> <p>Activation of railway hospitals/ mobile rail ambulances to shift/ treat injured patients in consultation with the Health Ministry</p> <p>Easy availability of heavy equipment available with the Railways for search and rescue.</p> <p>Plan is in place for quick restoration of airport runway and restoration of air traffic for facilitation of transport of relief teams/ supply / equipment, stranded passengers etc.</p> <p>Control room gets activated for smooth coordination in receiving and dispatching resources and equipment in close coordination with the State Government</p>	

PREPAREDNESS AND RESPONSE			
S. No.	Emergency Function	State Agencies	State / Districts / Ministries/ Departments and their Responsibilities
			Responsibility – State
			Availability of trained manpower for making night landing during emergencies Availability of Air Ambulances at strategic locations with trained manpower and equipment in close coordination with the Health Dept.

Note: The emergency functions are listed alphabetically and do not imply any sequence or order of priority. Many of these are executed concurrently and not sequentially.

RADM -Disaster Management Department: The state government department acting as the nodal department for disaster management.

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