TAMIL NADU STATE
DISASTER MANAGEMENT PLAN 2016

TAMIL NADU STATE DISASTER MANAGEMENT AUTHORITY
GOVERNMENT OF TAMIL NADU

TAMIL NADU STATE
DISASTER MANAGEMENT PLAN 2016

CONTENTS

Abbreviations

AAI	-	Airport Authority of India
AERB	-	Atomic Energy Regulatory Board
AF	-	Armed Forces
ASSZ	-	Andaman Sumatara Subduction Zone
BARC	-	Bhabha Atomic Research Center
BBB	-	Building Back Better
BBC	-	British Broadcasting Corporation
BDO	-	Block Development Officer
BIS	-	Bureau of Indian Standards
BMPTC	-	Building Material & Technology Promotion Council
BPR	-	Bottom Pressure Recorder
CBDM	-	Community Based Disaster Management
CBDRM	-	Community Based Disaster Risk Management
CBO	-	Community Based Organisation
CBRN	-	Chemical, Biological, Radiological and Nuclear
CII	-	Confederation of Indian Industry
CMG - DAE	-	Crisis Management Group - Department of Atomic Energy
CMP	-	Crisis Management Plan
CMWSSB	-	Chennai Metropolitan Water Supply and Sewerage Board
CRA	-	Commissioner of Revenue Administration
CSC	-	Common Service Centers
CWC	-	Central Water Commission
DCG	-	District Crisis Group
DDMA	-	District Disaster Management Authority
DDMP	-	District Disaster Management Plan
DEOC	-	District Emergency Operations Center
DM	-	Disaster Management
DRDO	-	Defense Research and Development Organisation
DRO	-	District Revenue Officer
DRR	-	Disaster Risk Reduction

E&F	-	Environment & Forest Department
EAP	-	Emergency Action Plan
ECS	-	Electronic Clearance System
ERC	-	European Research Council
EWS	-	Early Warning Center
GoI	-	Government of India
GSI	-	Geological Survey of India
GVK-EMRI	-	Ganapati Venkata Krishnanreddy - Emergency Management and Research Institute.
HADP	-	Hill Areas Development Programme
HFL	-	Highest Flood Level
HQ	-	Head Quarters
IAS	-	Indian Administrative Service
IAY	-	Indira Awas Yojana
ICT	-	Information and Communications Technology
IDRN	-	India Disaster Resource Network
IFS	-	Indian Forest Service
IITM	-	Indian Institute of Technology Madras
IMD	-	India Meteorological Department
INCOIS	-	Indian National Centre for Ocean Information Service
IOC	-	Intergovernmental Oceanographic Commission
IPS	-	India Police Service
ITEWC	-	Indian Tsunami Early Warning Center
LCG	-	Local Crisis Group
LED	-	Light Emitting Diode
MAH	-	Major Accident Hazard
MGNREGS	-	Mahatma Gandhi National Rural Employment Guarantee Scheme
MSIHC	-	Manufacture, Storage and Import of Hazardous Chemicals
MW	-	Mega Watts
NCC	-	National Cadet Corps
NCMC	-	National Crisis Management Committee

NDRF	-	National Disaster Response Force
NEC	-	National Executive Committee
NEOC	-	National Emergency Operations Center
NGO	-	Non - Governmental Organisation
NIOT	-	National Institute of Ocean Technology
NRHM	-	National Rural Health Mission
NRSC	-	National Remote Sensing Center
NSS	-	National Service Scheme
NSS	-	National Social Service
NYKS	-	Nehru Yuva Kendra Sangathan
ORS	-	Oral Rehydration Salts
PA	-	Public Addressing
PWD	-	Public Works Department
PWD (WRD)	-	Public Works Department (Water Resources Department)
RD&PR	-	Rural Development & Panchayat Raj Department
RMC	-	Regional Meteorological Centre
RTO	-	Regional Transport Officer
RTSP	-	Regional Tsunami Service Provider
SDMA	-	State Disaster Management Authority
SDMP	-	State Disaster Management Plan
SDO	-	Sub Divisional Officer
SDRF	-	State Disaster Response Force
SEC	-	State Executive Committee
SEOC	-	State Emergency Operations Center
SHG	-	Self Help Groups
SOP	-	Standard Operating Procedure
SP	-	Superintendent of Police
SSA	-	Sarva Shiksa Abiyan
TANGEDCO	-	Tamil Nadu Generation and Distribution Corporation
TEL	-	Tamil Nadu Explosives Limited
TN	-	Tamil Nadu

TNEB	-	Tamil Nadu Electricity Board
TNPCB	-	Tamil Nadu Pollution Control Board
TNSDMA	-	Tamil Nadu State Disaster Management Agency
TNWRD	-	Tamil Nadu Water Resources Department
TSP	-	Tamil Nadu Special police
TWAD	-	Tamil Nadu Water Supply and Drainage Board
UNESCO	-	United Nations Educational, Scientific and Cultural Organization
VAO	-	Village Administrative Officer
WPS	-	Water Purification System

Chapter I

PROFILE OF TAMIL NADU

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Profile of Tamil Nadu

1.1 Geographical Location

Tamil Nadu is the Eleventh largest state by area in the country. 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 is also bounded by the Eastern Ghats on the north, by the Nilgiris, and the Anamalai Hills, on the west, by the Bay of Bengal on the east, by the Gulf of Mannar and the Palk Strait on the southeast, and by the Indian Ocean on the south. It shares a maritime border with the country of Sri Lanka.

1.2 State at a Glance

Tamil Nadu has a population of 72 million (*population density of 555/sqkm*) out of which the proportion of rural population is 51.6% while that of urban is 48.40%. Over 50% of the State's population lives in the densely packed coastal districts, including approximately 9 million people in the state capital of Chennai. The state is ranked sixth among other states in India according to the Human Development Index in 2011. Tamil Nadu also ranks third in terms of Gross Domestic Product at the National Level, following Maharashtra and Uttar Pradesh. It grew at a rate of 9.3% during the Eleventh Plan (2011-12).

The coastal areas are not only densely populated but also constitute the economic hub of Tamil Nadu. Various economic activities along the coast, including fishing, agriculture, tourism, shipping and industry are important drivers of the overall state economy. Fishing alone provides livelihood to about 2,00,000 families. In particular, with its long coastline of 1,076 km and its 3 major and 17 non-major ports, Tamil Nadu has the capacity to handle almost one-quarter of all container traffic and one-fifth of India's total cargo traffic.

1.3 Physiography

The physiographical divisions of Tamil Nadu broadly consists of the coastal plains in the east; Kongu uplands and hills which proceeds westwards. The plains account for more than half the area of the state. Geomorphologically, three major units are recognised from west to east. The western part comprises the Western Ghats roughly trending North-South and marked by a continuous range of Hills, extending from Nagercoil in the south upto the Nilgiris Hills in the north and further northwards through Karnataka. The elevation of these Hills ranges between 1,275m and 2,637m above MSL and shown in Fig.2. The prominent Hills are Mahendragiri, Agasthiarmalai, Anaimalai, Palani and the Nilgiris. Doddabetta with an elevation of 2,637m is the highest peak in the Nilgiri Hills.

The east-west trending Palghat Gap is a prominent physiographic break in the Western Ghats. **The central part** of the state is a vast track of dissected pediments and pediplains. Residual Hills in this part viz., Shevaroy, Kalrayan, Chitteri, Kollimalai, Pachchaimalai and Javadi demarcate the extensions of fragments of Eastern Ghats, while Karandamalai, Sirumalai and Kodaikanal Hills form another set of residual Hills, further south. The eastern part of Tamil Nadu and Pondicherry and Karaikkal are marked by a coastal plain with associated landforms like vast tidal flats, continuous beach ridges, estuaries and lagoons and a narrow but fairly continuous beach. The area is drained by a number of Rivers such as Adayar, Palar, Cheyyar, Ponnaiyar, Vellar, Gadilam, Cauvery, Moyar, Bhavani, Amaravathi, Vaigai, Tambraparani etc.

1.4 Climate

The climate of Tamil Nadu is categorised as Tropical Monsoon. Due to its proximity to the sea, the summer not very hot and winters are not severe in most of the districts.

1.4.1 Temperature

The State experiences sunshine and moderate to high temperature throughout the year, with a maximum temperature of 43°C. But for the hilly regions, the state never records a minimum temperature below 18°C. The hot weather sets in and lasts until the middle of June. The highest temperature is often registered in May which is the hottest month in the state. The hot winds of the plains blow during April and May with an average velocity of 8–16 km/hour. The cold weather commences early in November and comes to an end in the middle of March.

1.4.2 Rainfall

The State receives a long term annual average rainfall of around 920.9mm; Winter, Summer, Southwest and Northeast Monsoon rainfall account for 3.4%, 13.9%, 34.9% and 47.8% respectively of the total rainfall.

The Western Ghats acting as a barrier deprive the State of the full blast of South-west monsoon winds. However, South West Monsoon has a precipitation of about 1/3rd of the normal rainfall received in Tamil Nadu which helps in taking up the rainfed cultivation. The State depends mainly on the Northeast Monsoon rains which are brought by the troughs of low pressure establishing in south Bay of Bengal between October and December. The following are the normal rainfall during the major season of State

High Rainfall Regions: It covers The Nilgiris, Palani hills in the west and the coastal belt of the Kancheepuram and Cuddalore districts in east and Kanniyakumari in south.

Medium Rainfall Regions: Western part of Cuddalore, Tiruvallur districts, whole of Vellore, Thiruvannamalai, eastern parts of the Salem, Western part of Thanjavur, Nagapattinam, eastern

and northern parts of Trichirappalli, eastern part of Madurai, Dindigul, northern part of Ramanathapuram, Sivaganga, Virudhunagar, Tirunelveli Coimbatore and Salem.

Low Rainfall Regions: Central and Southern parts of Ramanathpuram, Sivaganga, Virudhunagar, and Thoothukudi and Central part of Coimbatore, Central and Western parts of Madurai, Dindigul and the Southern half of Tiruchirapalli.

1.5 Geology

Crystalline rocks of Archaean to late Proterozoic age occupy over 80 per cent of the area of the Tamil Nadu, while the rest is covered by Phanerozoic sedimentary rocks mainly along the coastal belt and in a few inland river valleys. The hard rock terrain comprises predominatly Charnokite and Khondalite groups and their migmatitic derivatives, supracrustal sequences of Sathyamangalam and Kolar groups and Pennisular Geneissic Comples (*Bhavani Group*), intruded by ultramafic-mafic complexes, basic dykes, granites and syenites. The sedimentary rocks of the coastal belt include fluviatile, fluvio-marine and marine sequences, such as Gondwana Supergroup (Carboniferous to Permian and Upper Jurassic to Lower Cretaceous), marine deiments of Cauvery basin (*Lower Cretaceous to Paleogene*), Cuddalore/Panambarai Formation (Mio-Pliocene) and ssediments of Quaternary and Recent age.

1.6 Hydrogeology

The state nearly 73% of the total area of the State is occupied by a variety of hard & fissured crystalline rocks like charnockite, gneisses and granites. The depth of open wells varies from 6 to 30 m bgl, while the depth of borewells generally varies from 30-100 m bgl. The sedimentary formations consist of sand stones, limestones and shales whereas Quaternary 17 sediments in the State represented by Older alluvium and Recent alluvium and coastal sands. In the Cauvery delta of Thanjavur district, the artesian pressure head ranges between 4.5 to 17 mbgl with free flow up to 270 m^3 /hr. The yield of wells in the alluvium varies form 27 to 212 m^3 /hr. The yield of wells in the fissured formations varies from 7 to 35 m^3 /hr.

The Central Ground Water Board (CGWB) has assessed Ground Water potential in Tamil Nadu and reported that out of 386 units categorised as, Safe 136 (*35%*); Semi Critical 67 (*17%*); Critical 33 (*9%*) over exploited 139 (*36%*) and Salinity Affected 11(*3%*) (*CGWB, July 2014*)

1.7 Soil and Agro-Climatic Zone

The predominant soils of Tamil Nadu are red loam, laterite, black, alluvial and saline soils. The Agro-Climatic zone of Tamil Nadu has been divided into seven major zones and the zone wise classification, with, the soil type and rainfall, is as follows;

Table 1.1: Soil Distribution and Agro-Climatic Zones of Tamil Nadu

Sl.No	Agro Climatic Zones	Districts Covered	Soil Texture	Rain fall (mm)
1	North Eastern Zone	Kancheepuram, Tiruvallur, Cuddalore, Vellore, Villupuram and Tirunvannamalai	1. Red Sandy Loam 2. Clay Loam 3. Saline coastal Alluvium	1,105
2	North Western Zone	Dharmapuri, Krishnagiri, salem and Namakkal (Part)	1. Non Calcareous Red 2. Non Calcareous Brown 3. Calcareous Black	875
3	Western Zone	Erode, Coimbatore, Tiruppur, Theni, Karur (part), Namakkal (part), Dindigul, Perambalur and Ariyalur (part)	1. Red Loamy 2. Black	715
4	Cauvery Delta	Thanjavur, Nagapattinam, Tiruvarur, Trichy and parts of - Karur, Ariyalur, Pudukkottai and Cuddalore	1. Red Loamy 2.Alluvium	984
5	Southern Zone	Madurai, Sivagangai, Ramanathapuram, Virudhunagar, Tirunelveli and Thoothukudi	1. Coastal Alluvium 2. Black 3. Red Sandy soil 4. Deep red soil	857
6	High Rainfall Zone	Kanyakumari	1. Saline Coastal 2. Alluvium 3. Deep Red Loam	1420
7	Hilly Zone	The Nilgiris and Kodaikanal (Dindigul)	Lateritic	2,124

1.8 Drainage System

Drainage system of Tamil Nadu can be grouped into 17 river basins (*127 sub-basins*) a majority of which are water-stressed. Among the several rivers flowing through the state, Cauvery River, with 760 km of length, is the longest among all the rivers in Tamil Nadu. The total surface water potential of the state is 24,864 M cum. There are 17 major river basins in the State with 61 reservoirs and about 41,948 tanks. The 17 major River Basins Found in Tamil Nadu are Chennai, Palar, Varahanadhi, Ponnaiyar, Upper Vellar, Gadilam, Paravanar, Cauvery, Agniyar, Pambar&Kottakaraiyar, Vaigai, Gundar, Vaippar, Kallar, Thambaraparani, Nambiyar and Kodaiyar shown in Fig. 4. Most of the rivers which drain in Tamil Nadu originate from Western Ghats uplands and Eastern Ghats. Among the 17 basins Cauvery river Catchement is the wider.

1.9 Lakes / Reservoirs

Tamil Nadu has a total of 116 large dams out of which 89 dams are operated and maintained by Tamil Nadu Water Resources Department (TNWRD). Dams in Tamil Nadu are known for their multipurpose usability in the field of irrigation, production of hydro-electricity, fisheries, drinking water, etc. There are several dams in Tamil Nadu which contribute immensely in boosting the agricultural economy of the state. The locations of the dams also serve as some of the major tourist attractions with several reservoirs acting as fish breeding centers in the state.

1.10 Forests/Natural Vegetation

Tamil Nadu has an area of 22,877 sqkm 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. Reserved Forests comprise 84.75 %, Protected forests, 9.54 % and Unclassified Forests, 5.71 %. Major forest types occurring in the State are in Tropical Wet Evergreen, Tropical Semi-Evergreen, Tropical Moist Deciduous, Littoral and Swamp/Mangroves, Tropical Dry Deciduous, Tropical Thorn, Sub-Tropical Broadleaved and Montane Wet Temperate forests. The Nilgiris district is that about 56% of the total area of the district is under forest followed by Krishnagiri with 39.4%, Dharmapuri with 36.5%, Kanyakumari with 32.4% and Theni with 32.0%. Erode, Krishnagiri, Dharmapuri, Vellore, Coimbatore, Thiruvannamalai, The Nilgiris, Dindigul, Salem, Namakkal Thirunelveli and Theni Districts together accounted for 80.1% of the total forest area of the state.

1.11 Demography

According to the 2011 census, the total population stood at 7,21,47,030 persons with a sex ratio of 996 females per 1000 males. The officially recorded decadal growth rate of Tamil Nadu was 15.6 percent. It is significant to note that Kancheepuram district shows the highest decennial growth rate of 38.69% in the period 2001-2011. This district had also recorded the higher growth rate of 19.15% and 26.14% during the period 1991-2001 and 1981-1991 respectively. There are eight other districts, which show higher growth rates than the State average in 2001-2011. These are Tiruvallur (35.25%), Tiruppur (28.69%), Krishnagiri (20.67%), Coimbatore (19.06%), Madurai (17.95%), Villupuram (16.99%), Sivaganga (16.09%), and Dharmapuri (16.04%). The districts with very low growth rates in 2001-11 are The Nilgiris (-3.55%), Chennai (7.77%), Ariyalur (8.19%), Nagapattinam (8.41%), Thanjavur (8.42%), Thiruvarur (8.43%), and Thoothukudi (9.14%). The balance sixteen districts have decadal growth ranging from 10 to 16 percent.

1.12 Administrative Units

The state of Tamil Nadu covers an area of 1,30,058 Sqkm. The major administrative units of the state constitutes 32 districts, 85 revenue divisions, 285 taluks, 1,188 Firkas and 16,682 Revenue

Villages, 11 municipal corporations, one Greater Chennai Corporation 124 municipalities, 385 panchayat unions (Blocks), 528 town panchayats and 12,524 village panchayats

1.13 Urbanization

Tamil Nadu is one of the most developed states of India with 48.45% of its population living in urban areas. Except The Nilgiris, all districts in Tamil Nadu had a positive decadal growth in its urban population. Unlike previous decades, the rate of urbanization has not remained a concentrated phenomenon in the state. Few districts (viz. Kanyakumari, Thiruppur, Thiruvallur, Krishnagiri and Kancheepuram) have registered significantly higher (*more than 40 per cent*) decadal growth in its urban population. The State has several major urban agglomerations on the coast. Chennai, the capital City of Tamil Nadu is the fourth largest Metropolitan City in India, located on the Coromandel Coast of the Bay of Bengal.

1.14 Health

The state has a three-tier health system, comprising of Hospitals, Primary Health Centers, Health Units, Community Health Centers and Sub-Centers. In the last four years, 172 new Primary Health Centres were established besides upgrading 122 Primary Health Centres. The Infant Mortality Rate (IMR) which was 24 in 2010 has fallen to 21 in 2013. Tamil Nadu is the second lowest among the major States in India in this indicator.

1.15 Road Net work

Tamil Nadu has an extensive road network which covers about 153 km per 100 km2 area, which is higher than the country's average road network coverage of 103 km per 100sqkm area. Tamil Nadu has 28 National Highways running through it. The state is also an important terminus in the Golden Quadrilateral road link of the National Highways Authority of India (NHAI). The district centers are linked through 187 State Highways. Tamil Nadu is one of the first states in India to have 100 per cent metalled road connectivity even in the rural areas.

1.16 Railways Network

Tamil Nadu has a total railway track length of 5,952 km and there are 532 railway stations in the state. Tamil Nadu's railway network falls under the jurisdiction of the Southern Railways, which covers Tamil Nadu, Kerala, Puducherry and a part of Andhra Pradesh. It has six divisions, of which four are in Tamil Nadu. Chennai has also a well-established suburban railway network that connects it to the suburbs and the neighbouring cities. The Mass-Rapid-Transit System (MRTS) is an elevated line of the suburban railway in Chennai; it runs from the Chennai beach to the Velachery suburb, covers a distance of 25 km and has 21 stations. It is owned by the Southern Railways.

The state presently established Metro Rail to augment the transport system in Chennai in phased manner initially implementing two corrider about 45.1km distance from Washermanpet to Airport (23.1km) and Chennai Central to St.Thomas Mount (22km). Under corrider 2 part work from Koyambedu – Alandur has been completed and put into public service.

1.17 Airports

Tamil Nadu has international airports at Chennai, Trichirappalli and Coimbatore; it has domestic airports at Chennai, Coimbatore, Tuticorin, Salem and Madurai. The Chennai International Airport was the first in the country to get ISO 9001-2000 certification. Airport is well connected to other parts of India by air travel. Chennai, the state capital has one International airport of Tamil Nadu state. Chennai International Airport is considered among the third busiest airports of India after Delhi and Mumbai. It is also the second largest cargo hub after Mumbai. The Chennai International airport in Tamilnadu handles near about 12 million passengers and serve more than 25 airlines. The airport is connected to 19 countries and has more than 169 direct flights every week.

1.18 Harbour and Ports

Tamil Nadu has three major ports, at Chennai, Ennore and Tuticorin; and 15 minor ports.

Chennai port is second largest and third oldest port in India. It is considered as a big hub for cargo traffic, car, big containers in east coast of India. Chennai port is known for its Coastal breakwater, artificial, large seaport type of harbor.

Kamarajar Port located in Chennai (Tamil Nadu) was earlier known by Ennoreport. It is the twelfth major port in India, and is the first port which is owned by a public company.

V.O Chidambaranar Port also known as Tuticorin Port located in Tamil Nadu . It is the second largest port in Tamil Nadu and has fourth largest container terminal in India. It deals mainly in Fertiliser, Timber logs, iron ore, industrial coal, Copper concentrate. In 2013-14, the total traffic handled at Chennai, Ennore and V. O. Chidambaranar ports was 51,105 Million Tonnes, 27,337 Million Tonnes and 28,642 Million Tonnes respectively. (*https://community.data.gov.in/major-ports-in-india)*

CHAPTER II

STATE DISASTER MANAGEMENT PLAN - OVERVIEW

Chapter II

State Disaster Management Plan - Overview

2.1 State Disaster Management Plan (SDMP)

The objective of the State Disaster Management Plan is to devise a set of guidelines for State level disaster preparedness, prevention, mitigation and monitoring which will grow into becoming a well-defined protocol for disaster management that will be updated periodically. Every line department in the State will need to prepare their own Disaster Management Plans. At the District level, Disaster Management Plans will be drawn up under the supervision of the District Collector in consultation with all the concerned departments. The Emergency Support Functions of various departments will be listed out in the plan. An inventory of resources in the district will be listed out. All of this will converge into the State Plan and mesh into one another. While the State Disaster Management Plan will form the framework for the entire state, it will be fine-tuned further by requirements of individual district units and emergency situation.

2.2 Vision

To build a safer, disaster resilient Tamil Nadu by developing a holistic and multi-pronged strategy for Disaster Management that will harness the collective efforts of all stakeholders in any emergency.

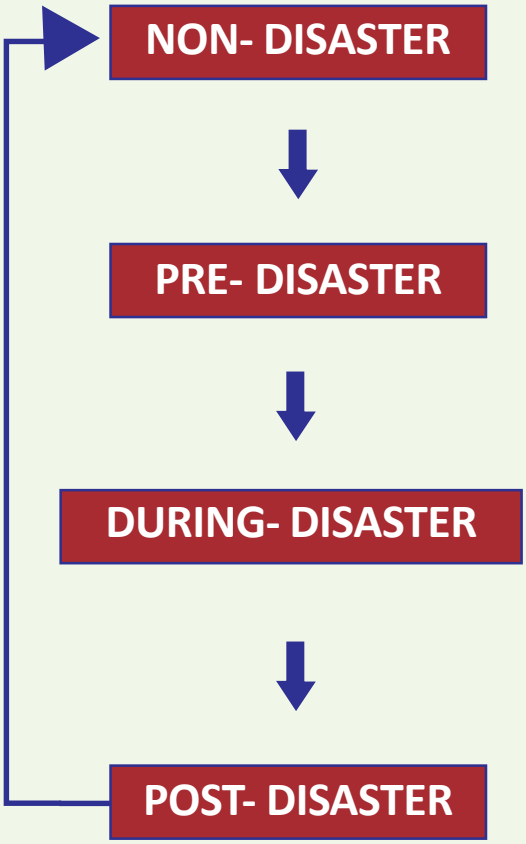
2.3 Aim of State Disaster Management Plan

The StateDisaster Management Plan aims to:

- Outline the vulnerability of different parts of the State to different types of disasters.
- Set in place in a phased manner - a robust and reliable forecasting and early warning systems with last mile connectivity.
- Specify minimum measures to be adopted for prevention and mitigation of disasters.
- Highlight the indispensable role of the community, NGOs and other non-governmental institutions in different phases of managing a disaster.
- Develop Standard Operating Procedures (SOP) for various possible disasters.
- Evolve an Incidental Command System for managing disasters in various administrative units.
- Define roles and responsibilities of different departments in responding to the different stages of a disaster.
- Propose the manner in which mitigation measures shall be integrated with development plans and projects of all departments.

2.4 Scope of the plan

The State Disaster Management Plan provides for an Approach that looks at the four possible phases of a disaster in an overlapping manner. Each phase requires a different orientation and different responses to the situation on hand. The four phases are depicted in the form of a diagram below and will provide the framework for the entire plan.



2.4.1 Non Disaster - by very definition would be when normalcy prevails and this setting provides the best possible opportunity to prepare to face any eventuality.During the Non-Disaster phase, existing and potential risks need to be identified and action taken to reduce potential casualties and damage from disasters.

2.4.2 Pre-Disaster - this phase is the narrow window when the impending disaster is going to happen and there is high possibility of panic or steps that would help tomitigate the impactof the disaster. During this phase, the focus is on steps necessary for safeguarding lives and assets of the area likely to be affected by taking appropriate action so as to reach out to potential damage areas in a prompt and coordinated manner.

2.4.3 During Disaster - when the disaster is running its course. This phase will test the preparedness and training being given to a community for a holistic and effective approach to attend to the immediate needs of the affected population in minimum time possible even while the disaster is on. Fast response, mobilization, organization of search and rescue, safety to life and property and other disaster mitigation steps will determine the effective response at this stage.

2.4.4 Post Disaster - when the disaster has struck and the impact of the disaster requires several urgent steps to restore normalcy - both in the immediate and long-term. This phase will work on building back the community so as to attain normalcy in the community utilizing both local resources and the government machinery in the most effective manner within the shortest possible time. Recovery,Rehabilitation and Building Back Better (BBB) are the key words.

2.5 Community Based Disaster Management (CBDM)

While planning to manage or tackle disasters, it is natural to assume that a Government run approach would be the norm. The fact remains that in every disaster, the local community is the first to respond along with any departmental team that is the first to arrive. Hence, disaster preparedness and response are to be seen as not solely the work of Government but also in harnessing the efforts of affected community, local volunteers, citizens, organizations and businesses.Every citizenhas an active and important role to play prior to, during and after major emergencies and disasters. Therefore, the Disaster Management Plan seeks to set in place a process that seeks to develop and implement a locally appropriate and locally “owned” strategy for disaster preparedness and risk reduction with the machinery and resources of the Governmental at all levels.

Local communities are usually the first to be involved in search and rescue activities as well as in providing emergency treatment and relief to their families, friends and neighbors. Therefore, Government ideally in partnership with other community organizations, can play an important role in improving the skills and knowledge of these “spontaneous” disaster responders by providing them with education and training in preparedness measures, basic rescue techniques, first aid and emergency treatment.

2.6 Community-based disaster management (CBDM) - Approaches

Community-based disaster management (CBDM) is an approach that is incorporated in the State Disaster Management Plan that will contribute to building the capacity of communities to assess their vulnerability to both natural and man-made hazards and develop strategies and resources necessary to prevent and mitigate the impact of identified hazards as well as respond, rehabilitate, and reconstruct following its onset.

Adequate awareness and preparedness of the community to respond to any such situation can be crucial in mitigating damage and suffering. Therefore, there is no better alternative to community and local level capacities for disaster response. The state and the districtadministration shall enhance the community's resilience against through various measures:

- As first responders, in providing necessary education and training to the community to enhance their capacity and resilience.
- Provide necessary resources and support for disaster risk reduction at the community level.
- Identifythe most vulnerable groups at risk.
- Prepare local specific risk mitigation and management plans with the support of the community.
- Constituting Disaster Management Committees and Teams at Village, Taluk/ Block, District and State levels and train them appropriately.
- Conduct annual mock drills / rehearsals at the community level.

Hence, theState Disaster Management Plan for Tamilnadu will work to harness local resources and manpower in the community while mobilizing Government machinery and resources in tackling a disaster. All line departments in Government will work to integrate their response with their immediate stakeholders and that of the local Community and this can also be done through training, knowledge and mock drillsduring non-disaster times.

A strong and resilient community with a pro-active State Government that will converge its resources to mitigate any disaster is the purpose of this Plan.

2.7 Agencies involved in Diasater Management

The Disaster management is cut cross all sectors and requires involment multiple decision to efcitively managing at the emergency situations as well as recovery and restoration phases. In order to have effective disaster management statergies in Tamil Nadu the following institutional arrangements are made.

2.7.1 State Disaster Management Authority (SDMA)

The Hon'ble Chief Minister is the Chairperson of the State Disaster Management Authority (SDMA). The SDMA is the apex body at the state level and takes policy decisions, laying guidelines and provides overall guidance for effective disaster management in the State. This also includes approval of the State and District plans, reviewing measures being taken for mitigation, capacity

building and preparedness by the departments of the State Government and issue guidelines whenever necessary. The Authority has been established with the following constitution

- Hon'ble Chief Minister – Chairperson, Ex-officio
- Hon'ble Minister for Revenue- Member
- Chief Secretary – Chairperson, State Executive Committee, Ex-officio
- Secretary – Revenue- Member
- Secretary – Finance- Member
- Secretary – Home - Member
- Special Commissioner and Commissioner of Revenue Administration- Member
- One Member from Anna University, Chennai
- One Member from Indian Institute of Technology, Chennai

At the departmental level, the Revenue Department of the State is the Nodal Department for controlling, monitoring and directing measures for organizing rescue, relief and rehabilitation.

2.7.2 The State Executive Committee (SEC)

The State Executive Committee comprises of following members:

S.No.	Officials	Designation
1.	Chief Secretary to Government	Chairperson
2.	Secretary to Government, Revenue	Member
3.	Secretary to Government, Finance	Member
4.	Secretary to Government, PWD	Member
5.	Secretary to Government, Highways	Member
6.	Secretary to Government, Home	Member

(*The Principal Secretary/Commissioner of Revenue Administration is a special invitee to all the meetings of SEC*)

The Chief Secretary who heads the state administration is the chairperson of the State Executive Committee (SEC) which functions to assist the Authority (SDMA) and monitors disaster management activities at the state level on a regular basis. The SEC is to provision of co-ordiante and monitor for implementation of the national policy, the national plan and the state plan; examine the vulnerabilty of different parts of the states to different forms of disaster and specific measures to be taken for the prevention and mitigation as follows:

DURING 'NON-DISASTER' PERIOD:

- Examine the vulnerability of different parts of the State to different forms of disasters and specify measures to be taken for their prevention or mitigation.
- Lay down guidelines for preparation of Disaster Management Plan (DDMP) by the departments of Government of the State and district authorities. (DDMP)
- Coordinate and monitor the implementation of the National Policy, the National Plan and State plan.
- Monitor the implementation of the guidelines laid down by the State Authority for integrating the measures for prevention and mitigation of disasters by the departments in their development plans and projects.
- Evaluate preparedness at all government and non-governmental levels to respond to any threatening disaster situation and give directions where necessary, for enhancing such preparedness.
- Promote general education, awareness and community training on the types of disasters to which different parts of the State are vulnerable and the measures that may be taken by each community to prevent, mitigate and respond to such disaster;
- Provide necessary technical assistance and advice to District Authorities and local authorities for carrying out their functions effectively;
- Advise the State Government regarding all financial matters in relation to disaster management and such other functions entrusted by the SDMA.

PRE-DISASTER/DURING DISASTER/POST DISASTER:

- Ensure that the Relief Commissioner/CRA is fully empowered to deal with the situation and that the State Emergency Operations Center is fully functional.
- Coordinate overall response in the event of any threatening disaster situation through the SEOC (see para 3.5)
- Monitor the overall implementation of State Disaster Management Plan (SDMP) and Crisis Management Plan (CMP) prepared by the line departments of the State Government and the District Disaster Management Plan during a disaster.
- Advise, assist and coordinate the activities of all the Departments, district authorities, statutory bodies and other governmental/non-governmental organizations engaged in disaster management;
- Provide liaison and assistance in support of the SEOC and in keeping the National Disaster Management Authority adequately informed.

2.7.3 Tamil Nadu State Disaster Management Agency (TNSDMA)

In order to implement, co-ordinate and monitor the activities of disaster management in the State, and to implement the decisions taken by the State Disaster Management Authority, an executive agency viz., Tamil Nadu State Disaster Management Agency [TNSDMA] has been established in the year 2013. The Agency strives to reduce the negative impact of all kinds of disasters through vibrant disaster management machinery so that loss of lives and damage to property and critical infrastructure is minimized. It coordinates with all departments and agencies to converge Disaster Risk Reduction with department-specific Disaster Management activities namely plans, policies, prevention, mitigation and post disaster activities. The SDMA declares an emergency situation in case of a State level disaster and also announces the conclusion of disaster management activities.

The Agency has been registered under the Tamil Nadu Societies Registration Act 1975 and has its own Memorandum of Association and Bye-laws. The Agency has its own Governing Council and Executive Council. The Governing Council consists of the Hon'ble Chief Minister of Tamil Nadu as Chairperson; Hon'ble Minister for Revenue and Chief Secretary to Government as Vice-Chairpersons; 14 Secretaries to Government as Members and Commissioner of Revenue Administration / State Relief Commissioner as Convener.

An Executive Council has been formed under the Chairmanship of the Commissioner of Revenue Administration / State Relief Commissioner with 9 other members. The Member Secretary of the Society holds the post of the Director (Disaster Management) and is the convener of the council.

2.7.4 District Disaster Management Authority

The District Disaster Management Authority is similar in functioning to the State level Authority and is the planning, coordinating and monitoring body at the district level. Headed by the District Collector, the DDMA plays the role of an anchor within the district for all disaster management activities both during the non-disaster period and when there is an actual disaster happening. Meetings are held periodically during the year to ensure that alertness and preparedness levels are maintained within the district. The Members of District Disaster Management Authority are:

(i) District Collector - Chairperson

(ii) District Panchayat Secretary – Co. Chairperson

(iii) Superintendent of Police (SP)

(iv) Personal Assistant (General) to the Collector District Revenue Officer (DRO) Chief Executive Officer

(v) Additional Collector Development

(vi) Joint Director (Health)

- The DDMA shall monitor the district preparedness throughout the year and particularly review non-disaster activities and preparedness of the departments to handle situations.
- DDMA is required to assess the situation and give directions to the department heads in the district for better handling of any disaster situation.
- The DDMA calls for outside support if necessary and will keep the SDMA/SEC informed about the handling of the situation
- Process requests for the NDRF/Army or any other specialized help requested by the government.
- During a disaster, the DDMA operates through the DEOC which is similar to the SEOC in functioning.

2.7.5 State Emergency Operation Centre (SEOC)

The State Emergency Operation Centre (SEOC) is a physical location and is currently an off-site facility which is functioning from the Commissioner of Revenue Administration Office, "EZHILAGAM" at Chepauk. It is an augmented control room with adequate communication facilities for information management during disasters. During a disaster, it is normally manned by various line departments of Government and other agencies, whose services are essentially required to tackle the disaster. The SEOC will be the command and control center in a disaster situation.

TNSDMA is in the process of developing a comprehensive communication network for effective disaster management, which includes emergency communication, operation and response management. The network is to extend to State, District and Taluk levels. This network includes the State Emergency Operation Center (SEOC) at Chennai with 32 District Emergency Operation Centers (DEOCs), and later with envisaged 284 Taluk Emergency Operation Centers. Each Center will function with multiple functions that will include that of serving as a command and control center to deal with the disaster at the local level.

In brief:

- The SEOC shall be the apex operational command and control center of the state during any disaster; SEOC will then act as a nerve center for coordination and management of disasters.
- Commissioner of Revenue Administration as Relief Commissioner shall be overall in charge of SEOC and serve as the liaison with the State Executive Committee and the State Disaster Management Authority;

- Nodal officers of all major line departments that are linked to managing a disaster will be represented at the SEOC by senior officers who will be authorized to take quick decisions at a short notice;
- The SEOC will have state-of-the-art communication facilities that will have connectivity on the one hand upto the District, Block & Village level; and on the other will be linked to the National Emergency Operations Center (NEOC) and other Disaster Warning facilities (National & State);
- The SEOC will coordinate with the NDRF, Armed Forces and others during the course of the disaster;
- Develop and disseminate public information warnings and instructions;
- Provide information to the media centre at different stages of the disaster that would help the public and all rescue and other units to act in a coordinated manner;
- Execute any other direction of the Government.
- Ensuring the proper functioning of the 24 X 7 toll free emergency number 1070

2.7.6 District Emergency Operation Centre (DEOC)

Similar to the SEOC, during a disaster or emergency, the District Emergency Operation Centre located in the office of the District Collector shall serve as a command and control center. The District Collector shall form a team that will function through the DEOC and will actively coordinate, mobilize, direct and maximize use of resources. The Revenue, Police, Rural Development, Municipal Administration, Health, Highways, Electricity and other line departments shall be well-represented. The communication system shall also include the Police VHF/Wireless sets in order to converge information. The SEOC shall discharge the following functions:

- Under the leadership of the District Collector, the DEOC shall be the main operational command and control center for the district during any disaster;
- Nodal officers of all departments shall be available on 'easy contact' basis to the DEOC for quick decision-making during emergencies;
- On receipt of information from SEOC/SEC or from any field office or Panchayat or from any other reliable sources, DEOC shall also keep the DDMA informed and also initiate early and effective response;
- DEOC shall issue necessary alerts as and when required to all authorities in the district depending on the situation;
- DEOC shall send regular status and appraisal reports to SEOC.

- Ensuring the proper functioning of the 24 X 7 toll free emergency number 1077

*** A list comprising of important Telephone Numbers to be used at the time of Disasters has been provided as Annexure - IV.**

2.7.7 Roles and Responsibilities of District Collector (In Chennai - to be exercised by the Commissioner, Greater Chennai Municipal Corporation)

All departments of the State Government, including the Police, Fire Services, Public Works, Irrigation, Rural Development and others shall work in a coordinated manner under the leadership of the District Collector during disasters, except in Greater Chennai where the Corporation Commissioner shall play the coordinating role. In other parts of the state where a Municipal Corporation is located, the Collector shall be the main coordinator. Hence, the overarching role of the District Collector (in Chennai - Corporation Commissioner) in handling the situation during a disaster is highlighted below.

- On taking charge, a District Collector shall hold a full-fledged session within ten days with all key members of the District department team heads to

(a) Take stock of the vulnerability of the district to different types of disasters

(b) To review the districts preparedness for tackling disasters

(c) To examine the Disaster Management Plan for the district and

(d) To Ensure a robust Decision Support System (online and offline communication system) is in place in the DEOC and connected with the Sub-Division, Taluk / Block and Zone (in Corporation) level.

- For nuclear emergency response, DSS is being developed at DAE. For nuclear emergency from Kalpakkam, the RDO office serves as the command centre.

- Access funds from the State Government for activities and ensure that a training calendar is in place for Disaster Management;

- Coordinate all disaster response activities with the DEOC and ensure that the Incident Response Teams are in place;

- Stay well-connected with Community leaders through the line departments and their respective stakeholders at the field level;

- Give directions for the release and deployment of resources available with any department of the Government, Local Authority, public / private sector etc. in the District;

- Ensure that the NGOs carry out their activities in an equitable and non- discriminatory manner;
- Ensure provision for accountability of personnel and a safe operating environment;
- Mobilize experts and consultants in the relevant fields to advise and assist as may deem necessary;

In the event of a Disaster - the District Collector is required to send a report immediately, to the SEOC that will indicate the severity of the disaster, action being taken; resources required in addition to the resources on hand; logistics for delivering relief and any other information found necessary. Thereafter, a daily situation report that will give a clear picture to the State administration needs to be sent.

2.8 Taluk/Block/Zone level Disaster Management Committee

A Disaster can effectively be handled only to the extent that adequate delegation has taken place and involvement of all wings of government are clear about their respective roles. A Taluk/ Block level disaster management committee is necessary and shall be formed under the direction of the District Collector. This Committee will monitor the development and implementation of taluk level disaster management plans.

2.9 Village/Ward Level Disaster Management Committee

This Committee is perhaps the most important to be formed and requires maximum involvement of the District Collector in ensuring that there is no bias in its constitution. Every disaster requires maximum involvement and wholehearted cooperation of the village/ward level citizens and there needs to be good representation. The Panchayat, VAO, local institutions, NGOs, youth clubs and the like should be encouraged by the administration to be involved in the event of an emergency. They are the first responders to garner disaster response and an effort will be taken to make the communities strong and vibrant in proactively tackling the disasters.

- This will include to play a key role in organizing training (first aid, search and rescue, extrication from damaged buildings, road clearance, firefighting)
- raising awareness (about hazards, risks, disaster response)
- community drills (annual drills for disaster response in the community)
- equipping the community with minimum resources (first aid kit, extrication equipment, lifejackets, lifebuoys, rope and the like)

- Awareness towards the safe drinking water to the community as it prevents Epidemic outburst.

then that community is bound to be strong and vibrant in proactively tackling the disaster.

2.10 Emergency Ambulance Service System:

Government of Tamil Nadu with the assistance of GVK-EMRI, provides free ambulance services to those in need of urgent medical assistance throughout the state. The state of the art fully equipped ambulances are being run to provide quality health services to the people of the state. The scheme has proved very effective in providing timely medical service and in saving lives. 24X7 emergency ambulance services are made available on dialing a single toll free emergency number '108'. During a disaster, they play a very important role as they are in easy access to any location in the state.

2.11 Departments & Directorates:

Each Department and its Directorate play an important role during a disaster situation and also initiates disaster response activities with the least possible delay. Some of the activities are listed below:

- Establishing a Control room by respective line departments with contact number and emails. The control room will direct and coordinate all activities related to Disaster Management pertaining to the respective departments. Appoint a nodal contact person for Disaster Management who will also be a part of the technical cell.
- Establish a Technical /Special Cell to take care of the following:
- Evaluate department specific DM plans prepared by various levels and wings
- Convergence of Mitigation measures into development activities or Projects of the department
- Monitoring the implementation

2.12 Fire & Rescue Services Department

Fire and Rescue Services Department of the Government of Tamil Nadu is entrusted with the task of firefighting 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 firefighting, this department also undertakes rescue activities and has saved hundreds of people, marooned in floods, and caught in the debris of fallen buildings, road and rail accidents and other natural and man-made disasters. On the Service side, the prime concern of the Department is to

save lives and property from the danger, damage and destruction caused by fire. Besides firefighting and helping to prevent fires, the other service functions of the department include offering emergency relief and rescue measures to victims not only of fire, but also of all types of natural and other calamities and mishaps such as floods, cyclones, landslides, building collapses, explosive accidents, railway accidents, major disasters, etc.

2.13 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. The District Collector on making an immediate assessment at the time of a disaster - may place the request to the Chief Secretary who then makes the official request to the Armed Forces.

2.14 National Disaster Response Force (NDRF)

For the purpose of a specialized response to a threatening disaster situation or a disaster that's happening, the National Disaster Management Act has mandated the constitution of a National Disaster Response Force (NDRF). These battalions are positioned at different locations across the Country. In Tamil Nadu, the NDRF is located at Arakonam, Vellore District, which maintains a close liaison with the designated State Governments and are available in the event of any disaster situation.

2.15 State Disaster Response Force (SDRF)

State Disaster Response Force (SDRF) team has been constituted with a strength of 80 Police Personnel comprising 1 Deputy Superintendent of Police, 3 Inspectors of Police, 6 Sub-Inspectors of Police and 70 Police Personnel from other ranks on OD basis from Armed Police, Chennai to TNCF. They have been trained in disaster management and rescue operations in consultation with National Disaster Response Force (NDRF).

The SDRF is trained on the lines of the NDRF to deal with any untoward situation. In the past the SDRF has also been effectively involved in conducting evacuation, rescue activities in disaster situation in the state. They are trained in disaster response techniques such as detection and location; Extrication and access; Fire Fighting; Medical and First Aid.

2.16 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 regulation of traffic, crowd control, maintenance of internal security, promotion of communal harmony, spread of awareness on health, hygiene, drug abuse, AIDS, road safety, etc.

2.17 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 help, aid and awareness to the victims. As this group is educated, highly motivated and disciplined, if given training, they can deliver good results during a disaster. They are trained in disaster response techniques such as detection and location; Extrication and access; Fire Fighting; Medical and First Aid.

2.18 National Cadet Corps (NCC)

There are 5 NCC Group Headquarters and 51 NCC units under the control of this Directorate. 5 NCC Group Headquarters are located in Chennai (2), Coimbatore, Madurai and Tiruchirapalli. 51 NCC units are located in various places of Tamil Nadu. They were trained in Formulation of SOPs/ Plans within the State, Establishment of Control Room, Check list of Warning Systems and Communication systems, Capacity Building of units and cadets and assist during the emergencies.

2.19 Coastal Security Group

Tamil Nadu has a coastline of 1,076 kms covering 591 fishing villages in 13 Coastal Districts. The Coastal Security Group was formed in 1994 by the Government of Tamil Nadu. The Coastal Security Group has been carrying out periodical exercises once in 6 months to identify the deficiencies and loopholes in the security preparedness along the coast. A mock coastal security exercise is conducted in co-ordination with the Indian Coast Guard and other stakeholder agencies once in six months to check the preparedness of security agencies to prevent/intercept intrusions from sea in the 13 coastal Districts 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.

2.20 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) CGRHQ Chennai.

2.21 Nehru Yuva Kendra Sangathan (NYKS)

It is an autonomous body under the Ministry of Youth Affairs and Sports with a nation-wide presence. With 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.

2.22 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.

2.23 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 effectively. Industrial associations are active throughout the state. The corporate social responsibility funds available with public and private sector can be dovetailed for mitigation efforts.

2.24 Airport Authority of India (AAI)

When a major disaster strikes, airports are quickly overwhelmed with tons of relief materials (like food, bottled water, medical supplies, cloths, tents, etc.) arriving from all over the world. This material is urgently needed to be in the field. In such cases, AAI may then appoint a senior officer at the airport for handling and distribution (which includes precise unloading, inventory, temporary storage, security and distribution) of relief material during the disaster situation. The State Relief Commissioner (CRA) will then provide for necessary arrangements to dispatch and accounting of relief material during emergency situation.

2.25 Indian Railways

Indian Railways is spread over a vast geographical length over 63,000 route kilometers in India. In the event of a disaster, Southern Railways can assists in the rescue and relief operations. Railways are often the 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 or state administration. The more effective the networking mechanism is, the better will the coordination be in times of difficulty.

2.26 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. The primary focus is to enable decision makers in public administration to find answers on availability of equipment and human resources required to combat any emergency situation.

- This database is to enable assessment of the level of preparedness for specific disaster related vulnerabilities.
- It is a nationwide district level resource database. Designated user of each district of the state has been given a unique username and password through which they can perform data entry, data updation on IDRN for resources available in their district.
- The IDRN network has the functionality of generating multiple query options based on specific equipment, skilled human resources and critical supplies with their location and contact details. The IDRN network will enable quick access to resources to minimize response time in emergencies.
- The system gives the location of specific equipment /specialist resources as well as the controlling authority for that resource so that it can be mobilized for response in the shortest possible time.

Within three months of the release of this Plan, each department that has primary responsibility for a particular type of disaster will need to prepare a Disaster Management Plan with all functional elements and submit to the TNSDMA. The TNSDMA shall then finalize the details and submit to the State Executive Committee. The draft report shall be sent to the DDMA for feedback and to assist them in the preparation of their Disaster Management Plan. The Plan then shall be updated every year.

2.27 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, NGO's and the community will need to be prepared and maintained. The Collector will supervise and coordinate the preparation and regular updating of this directory at the district level and send a soft copy to the TNSDMA.

- The TNSDMA and DDMA may develop a comprehensive resource inventory of NGO's, CBO's and organizations in disaster management and emergency response. Web-

enabled centralized database will need to be tapped. Networking will enable quick access to resources to minimize response time in emergencies. The system should give the location of specific equipment and resources as well as the controlling authority for that resource so that it can be mobilized for response in the shortest possible time.

- The database will need to be made available at the district and state levels and may 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 need to be prepared by each district and sent to the TNSDMA.

The District Collector will need to maintain an updated list of professionals like doctors, paramedics, civil and construction engineers, architects and town planners and send it to the TNSDMA every year for updating of the State list.

2.28 National Disaster Management Authority

The National Disaster Management Authority (NDMA) is the apex body in the Government of India and has the responsibility of laying down policies, plans and guidelines for Disaster Management and coordinating their enforcement and implementation for ensuring timely and effective response to disasters. The guidelines assist the central ministries, departments and states to formulate their respective plans. It also approves the National Disaster Management Plan prepared by the National Executive Committee (NEC) and plans of the central ministries and departments. It also oversees the provision and application of funds for mitigation and preparedness measures. . It also provides such support to other countries in times of disasters as may be determined by the national level.

2.29 National Institute of Disaster Management (NIDM)

The National Institute of Disaster Management (NIDM) was constituted under an Act of Parliament with a vision to play the role of a premier institute for capacity development in India and the region. The efforts in this direction that began with the formation of the National Centre for Disaster Management (NCDM) in 1995 gained impetus with its re designation as the National Institute of Disaster Management (NIDM) for training and capacity development. Under the Disaster Management Act 2005, NIDM has been assigned nodal responsibilities for human resource development, capacity building, training, research, documentation and policy advocacy in the field of disaster management

2.30 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 are of magnitude 3.0 and above on Richter scale are also reported and bulletins issued by the IMD to the State Government immediately.

2.31 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, supporting developmental and operational sectors like ports, fisheries, shipping, meteorology, environment, off shore and coastal zone management in addition to promoting advanced oceanographic research in the country.

The ocean parameters envisaged for dissemination include wind, wave, current, mixed layer depth, heat budget and maps on 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 higher magnitude capable of triggering a Tsunami is reported.

2.32 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 village level.

2.33 Building Material & Technology Promotion Council (BMPTC)

As part of Ministry of Housing & Urban Poverty Alleviation BMPTC is knowledge and demonstration hub for providing simple solutions aimed at common man in the field of sustainable building materials and appropriate and disaster resistant construction.

2.34 Bureau of Indian Standards (BIS)

The Bureau of Indian Standards (BIS) provides standards for construction in seismic zones, popularly known as Building Codes. The building construction in urban and suburban areas is regulated by the Town and Country Planning Acts and Building Regulations.

2.35 Indian Institute of Technology Madras (IITM)

Indian Institute of Technology Madras is one among the foremost institutes of national importance in higher technological education, basic and applied research. The Institute has sixteen academic departments and a few advanced research centers in various disciplines of engineering and pure sciences, with nearly 100 laboratories.

2.36 Anna University, Chennai

Anna University is facilitating the use of spatial and geo-spatial technologies for the planning and developmental activities pertaining to Agriculture, Land use management and Wasteland Development, Forestry, Disaster Mitigation, Climate Change, Ocean monitoring centre and National Institute of Ocean Technology (NIOT).

The Institute acts as a resource centre for providing technical inputs in Disaster management initiatives.

2.37 NGO

NGO's play a key role in Disaster situations and go a long way in plugging the gaps during emergencies as they often have good relationship with the local community. Here is why good, sincere and hard-working NGO's need to be involved in disaster mitigation activities.

- NGO's play a very important role in mobilizing communities and in initiating Disaster Risk Reduction activities.
- The strong linkages which NGO's have with grassroots communities can 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.
- In addressing the emerging concerns of climate change adaptation and mitigation, NGOs can play a very significant role in working with local communities and introducing innovative approaches based on the good practices followed in other countries.

NGO's can bring in financial resources from bi-lateral and multilateral donors for implementing pragmatic and innovative approaches to deal with disaster risk and vulnerability, and also by effectively integrating and converging the various government programmes, schemes and projects to create the required synergy in transforming the lives of at-risk communities.

CHAPTER III

HAZARD, VULNERABILITY AND RISK ASSESSMENT OF TAMIL NADU

Chapter III

Hazard, Vulnerability and Risk Assessment of Tamil Nadu

3.1 Disaster Risks in Tamil Nadu

Disaster risks in India are further compounded by increasing vulnerabilities. These include the evergrowing population, the vast disparities in income, rapid urbanisation, increasing industrialisation, development within high-risk zones, environmental degradation, climate change, etc. Clearly, all these point to a future where disasters seriously threaten India's population, national security, economy and its sustainable development. The DM plans will build in region and hazard specific management tools in the context of regional and multi-hazard vulnerabilities.

Tamil Nadu covers an area of 130, 058 sqkm and has a coastline of about 1,076 kms (*inclusive of the Union Territory of Puducherry*), which is about 15% of the total coastline of India. More than 40% of the population associated with fishing lives within 1km of the coast and 50% of them live within 2km of the coast. The geographical setting of Tamil Nadu makes the state vulnerable to natural disasters such as cyclones, floods and earthquake-induced tsunami. Cyclonic activities on the east coast (*Bay of Bengal*) are more severe than on the west coast, and occur mainly around September or between Oct-December Northeast Monsoon or Retreating Monsoon.

3.2 Hazards and Vulnerability

Tamil Nadu is also subjected to frequent annual flooding, including urban floods, monsoon floods of single and multiple events etc., Every year, on an average thousands of people are affected, a few hundred lives are lost, thousands are rendered homeless and several hectares of crops are damaged. The un-precedented 2004 Indian Ocean Tsunami has also affected the whole the coast of Tamil Nadu in destroying much of the marine biology and severely damaging the ecosystem. Crops, settlements, trees, birds, fishes, wildlife, and properties were destroyed. Precious coral reefs and mangrove areas were crushed by the huge Tsunami waves that devastated South India, an environmental and economic setback that could take years to reverse. Power and communication were totally disrupted. The damage to humans, especially women and children and animal life, was tremendous, resulting in emotional and mental trauma. Tamil Nadu is also prone to moderate damaging earthquake. The hilly regions of the State are also prone to Landslides, Earthquakes and Floods. Urban flooding is also becoming a growing concern in the State. The drought is becoming a recurrent event in almost all the districts in the State.

3.3 Potential Hazard Threat to the State

The State is prone to a number of natural and man-made hazards in different intensities. Some of the common natural and man-made disasters experienced in the State are as follows:

Table 3.1: Some of the common natural and man-made disasters in Tamil Nadu

Water and Climate Related	Geophysical Related	Chemical and Industrial	Accidents Related	Biologically Related
Drought, Thunder Storm and Lightning, Floods, Flash Floods and Cyclones	Earthquake, Landslide/ Debris flows/ mudslides	Industrial Fires Gas and Chemical Leakages	Forest fires, Electrical fires, Urban and Village fires, Building Collapses, Festival/Fair /Temple Stampedes,Road, Rail and Air based Accidents/ Boat capsizing, Fire Accident	Epidemics, Pest attacks, Food poisoning, Water Contamination, and Cattle epidemics

3.4 Tsunami - 2004

On December 26, 2004, India experienced the effects of a tsunami, caused by a series of earthquakes in the Bay of Bengal. The first and strongest earthquake occurred off the west coast of northern Sumatra, Indonesia at 6.29 AM Indian Standard Time on December 26, 2004 (magnitude and intensity 9.0 USGS), followed by one 81 kilometres west of Pulo Kunji Great Nicobar, India (7.3 USGS) some three hours later. 115 aftershocks were reported, of which the magnitude of 103 tremors was between 5.0 and 6.0 USGS and 12 were over 6.0 on the Richter scale.

Tamil Nadu
IMPACT OF TSUNAMI – AT A GLANCE

Districts affected	13
Villages/hamlets affected	418
Lives lost	7995
Children orphaned by Tsunami	197
Women Widowed	561
Persons missing	846
Injured persons	3960
Houses damaged	118,000
People evacuated	0.49 Million
Population affected	1.078 Million
Cattle loss	16,082
Fishing vessels damaged / lost	51,078
No. of families livelihood affected	0.3 million
Agricultural lands damaged	8800 ha
Roads damaged	455 kms
Power lines damaged	608 kms
Damaged ports/fish landing centre	12

Source: GoTN

The earthquakes set off giant Tsunami tidal waves of 3 to 10 meters in height, which hit the southern and eastern coastal areas of India and penetrated inland up to 3 kms, causing extensive damage to lives and property in the Union Territory (UT) of the Andaman & Nicobar Islands, and the coastal districts of Andhra Pradesh, Kerala and Tamil Nadu and the UT of Pondicherry crippling the coastal economy. Approximately 2,260 kms of the coastal area besides the Andaman & Nicobar Islands were affected.

Women were most unprepared to save themselves and their children. Among 7,995 persons who died in Tamil Nadu, a majority of them were women and small children. Around 197 children were rendered orphans and 561 women were widowed. When the waves lashed against the coastal districts of Tamil Nadu, there was no early warning mechanism, which could have alerted and provided enough time for an emergency evacuation. In Nagapattinam alone the highest figures of orphans (179) and widows (294) were reported from this district.

3.5 Cyclone/Flood Disasters Experences in Tamil Nadu

The coastal areas of Tamil Nadu are highly vulnerable to cyclones. According to the National Institute of Disaster Management, 13 districts of Tamil Nadu are vulnerable to high or very high cyclonic impact and flooding. During the period 1891 - 2000, it is recorded that 62 cyclonic storms crossed the Tamil Nadu coast. In the last decade alone, the coasts have encountered 7 severe and very severe storms. The notable amongst them are Nagapattinam (1977, 40 deaths and Nov 1991, 200 deaths), Cuddalore (80 deaths, 1972,) Tuticorin (Nov. 1992, 300 deaths).

3.6 Deep Depression

The State receives nearly 48% (440.4mm) of the precipitation from the Northeast Monsoon during the period October to December. Typically, rainfall during this season is in multiple spells, following formation of systems of low pressure area over the Bay of Bengal, which may intensify to deep depression and cyclones, when accompanied by high speed winds. The year 2015, the Northeast Monsoon commenced late on 28.10 2015, but three synoptic weather systems formed over Bay of Bengal causing floods in Tamil Nadu:

(1) Deep Depression over Bay of Bengal between 8th November and 10th November, 2015,

(2) Low pressure area over South West Bay of Bengal between 12th November and 18th November 2015 and

(3) Low pressure over South West Bay of Bengal between 28th November and 4th December 2015.

Tamil Nadu experienced unprecedented quantum of rainfall during November and early December 2015 due to these three systems, causing devastating floods in many parts of the State.

The Metropolitan City of Chennai along with the adjoining districts of Kancheepuram and Tiruvallur and the coastal district of Cuddalore were badly affected. During November month, Chennai received 101.8 cms rainfall, which is the highest recorded rainfall since 1918. The State experienced unprecedented heavy rainfall in four spells, affecting 22 districts of the State and worst affected districts are Tiruvallur, Chennai, Kancheepuram and Cuddalore.

Significantly, Chennai witnessed the extraordinary and unprecedented heaviest rainfall in the last 100 years (1914), which caused massive flooding in many parts of Chennai. The rains and subsequent overflow of the Adyar River and Cooum River had caused severe flooding. Road access had been cut off in several districts, and the runway at Chennai airport was flooded and had been closed for 3 days.

The total loss of human life reported in Tamil Nadu was 347. A total of 3888 cattle was lost and 17.64 lakh people have been rescued and approximately 72,000 people evacuated to the camps. The flood also witnessed the impacts of for all types of sects, however the people in the lower rung being the worst affected. Many households have lost all their personal and domestic durable assets

The Government of India has declared Chennai a National Disaster zone and the military, the National Disaster Response Force (NDRF) support and carried out rescue operations in the city. The NGO's and Volunteers has been also played a vital role in providing relief to the affected people.

3.7 Man-made Disasters – Experience in Tamil Nadu

The state is also prone to various man-made hazards, including frequent fire in habitations, big malls, cracker units etc., Rail and Road Accidents , Bomb blast, Building collapse, minor industrial and chemical hazards, pollution, boat capsizing, biological hazards (health, agriculture and livestock), Nuclear and Radiation hazards (CBRN), man hole hazards, bore well accidents etc.,

- **Building Collapse at Moulivakkam, Kancheepuram District :** After heavy rain on Saturday, June28, 2014 an under-construction building at Moulivakkam, a suburb of Chennai collapsed at 5.30pm trapping many constructions workers under the debris. The Rescue Operations were conducted Tamil Nadu Fire and Rescue force along with National Disaster Response Force NDRF from Arakkonam base managed the rescue operations

- **Fire Disaster :** On 16th July 2004, a devastating fire broke out in a private school in Kumbakonam, causing the deaths of 93 children. The school in Kumbakonam was located in a three storey building in a congested street. All safety norms were flouted by the school. The fire which broke out in the kitchen spread to the thatched roof. 125 primary school children were trapped in a classroom on the first floor. The fire soon spread to the dry thatched roof which gave way and collapsed on the children. Sixty- seven children died instantly, 16 children died in hospital and another 21 children sustained grave injuries.

3.8 Vulnerability of Tamil Nadu

The State is vulnerable to disasters of different types with varying intensity as noted below:

3.8.1 Coastal Vulnerability

There are 13 coastal Districts, 25 coastal blocks and 561 fishing villages in the coastal areas. The coastal ecosystems are now encountering problems ranging from pollution, siltation and coastal erosion to that of flooding, saltwater intrusion and storm surges. The Tamil Nadu coast comprises the Coromandel Coast from Pulicat Lake in the north to Point Calimere in southern most, and the Gulf of Mannar, which extends up to the tip of Kanyakumari, which is the southernmost point of the Indian Peninsula. The Cyclones and the Tsunami of 2004 had a devastating impact along the coast.

High Erosion Zones along the Tamil Nadu coast include the districts of Kanyakumari, Tirunelveli, parts of Tuticorin, Ramanathapuram, Pudukkotai, Thanjavur, Thiruvarur, Nagapattinam, Cuddalore, Villupuram, Kancheepuram, Chennai and Thiruvallur. The state has prepared shoreline change maps for each district.

3.8.2 High Wind Vulnerability

The Districts of Nagapattinam, Thanjavur, Madurai, Salem, Tiruchirappalli, Kancheepuram, Rameswaram, Ramanadhapuram and Chennai are vulnerable to high wind velocity. Tamil Nadu falls into three categories of the wind zones:

- VeryHigh risk zone - 76-117 Km/Hour
- High damage risk zone - 63-74 Km/Hour
- Moderate damage risk zone - 31-39 KM/Hour

When winds combine with rains there has been much destruction in these districts.

3.8.3 Cyclone / Heavy Rainfall Vulnerability

On an average, the State encounters one or two cyclonic events in the Northeast monsoon period. Even during the non-cyclonic phase, the State receives copious rainfall as a result of formation of low pressure/depressions in the Bay. The low pressure/depressions so formed lasts for at least three to four days, bringing intense rains causing large scale flooding and inundation in the vulnerable areas.

3.8.4 Floods Vulnerability

Floods in the State are mainly associated with cyclones and heavy rains. On an average, over the past several years, over 5000 houses have been damaged annually due to rains, storm surge and local flooding. The coastline of Tamil Nadu at the time of depression, experiences heavy flooding. For instance, in the years 1997 to 2005 even though there were no cyclonic storms, heavy rainfall caused severe floods in most of the coastal areas and affected the districts of Chennai, Kancheepuram, Tiruvallur,

Cuddalore, Thanjavur, Nagapattinam, Thiruvarur, Pudukottai, and Tiruchirappalli. The average estimate is that in Tamil Nadu 0.45 million hectares of land is prone to floods.

3.8.5 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 concurrent sea level. The northern regions of Thanjavur, Cuddalore, and Chennai have lower storm surge heights of around 3 meters.

3.8.6 Seismicity Vulnerability

The East – West Cauvery fault Tirukkavilur – 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. The latest Seismic zoning map of Bureau of Indian Standards classifies Tamil Nadu into two categories - Zone II and Zone III, which are under Low risk and Moderate risk including many districts in the state namely Chennai, Thiruvallur, Vellore, Coimbatore, Dharmapuri, Salem, Tirunelveli, Kanyakumari and The Nilgiris. Chennai, the state capital falls under seismic zone III.

3.8.7 Landslide / Mud flow Vulnerability

Landslides occur during the seasonal rains the Nilgiris Hill Range and some of the major ones that have occurred are the Runnymede landslide, the Glenmore landslide, the Conoor landslide, the Karadipallam landslide and the Marapalam landslide. Besides The Nilgiris, other districts in the state that have had the problem of landslide are Salem, Erode, Coimbatore, Vellore and Dindigul (Kodaikanal hills).

3.8.8 Drought Vulnerability

Low rainfall coupled with the erratic behavior of the monsoon in the state makes Tamil Nadu the most vulnerable to drought. Drought can have a devastating impact and can affect a large population. Drought variability has a direct and significant impact on food production and the overall economy. Drought is more recurrent during June to September months in Tamil Nadu. Traditionally, the districts which are severely prone to drought hazard are Dharmapuri, Madurai, Coimbatore, Ramanathapuram, Salem, Tiruchirapalli, Tirunelveli and Kanyakumari.

3.8.9 Tsunami Vulnerability

The Tsunami that struck the Tamil Nadu coastal areas in December 2004 resulted in large-scale damage to life and property. The Table below indicates damage across 13 districts that were exposed to the Tsunami.

District wise Tsunami Disaster and its Impact of Tamil Nadu

Sl. No.	Districts	Human Loss	Cattle Loss	No. Injured
1	Chennai	206	2	16
2	Cuddalore	610	949	259
3	Kancheepuram	130	4	27
4	Kanniyakumari	799	1,187	754
5	Nagapattinam	6,065	12,821	2,367
6	Pudukottai	15	0	0
7	Ramanathapuram	20	0	2
8	Thanjavur	37	0	20
9	Tiruvallur	29	220	0
10	Tiruvarur	29	0	3
11	Tirunelveli	4	899	6
12	Tuticorin	3	0	0
13	Villupuram	48	0	46
	Total	**7,995**	**16,082**	**3,500**

3.8.10 Fire Risk 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, with 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.

Also, there are two explosive manufacturing industries located in Tamil Nadu. The Tamil Nadu Industrial Explosives Limited (TEL) near Katpadi in Vellore district and the Cordite Factory located in Aruvankadu, in the Nilgiris District where the vulnerability factor is high.

Forest fires are also a major problem in Niligiris, Salem, Theni and Dharmapuri. The 2004 fire accident that occurred in a Kumbakonam school leading to 93 deaths is a tragedy that reminds us that fire related disaster can occur anywhere in the state.

3.8.11 Chemical, Biological, Radiological and Nuclear (CBRN)

Tamil Nadu also has a number of Industries which are vulnerable to natural as well as man-made disasters. There are 123 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 Ramnathapuram districts have industries that are dealing with potentially hazardous materials and hence have the vulnerability factor.

3.8.12 Nuclear Plants possible Radiation Vulnerability

Tamil Nadu has two Nuclear power plants namely, Madras Atomic Power Station at Kalpakkam two units of 220 MW each and the Koodankulam nuclear power station with an 1000 MW unit in Tirunelveli district.Kudankulam has one 1000 MWe reactor operating and another 1000 MWe reactor is under commissioning.

3.8.13 Heat Wave Vulnerability

A Heat Wave is a period of abnormal 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 waves impacts are Vellore, Thiruvannamalai, Krishangiri, Dharmapuri, Salem, Namakkal, Tiruppur, Coimbatore, Erode, Karur, Tiruchirapalli, Ariyalur, Perambalur, Sivaganga, Virudhunagar, Theni, Dindigul and Madurai.

3.9 Physical Vulnerability

Physical vulnerability relates to the physical location of people, their proximity to the hazard zone and standards of safety maintained and relates to the technical capacity of buildings and structures to resist the forces acting upon them during a hazard event. During cyclones large scale damage to non-engineered buildings, semi-engineered buildings, life-line structures like lighting poles, transmission line structures are likely to arise. Damage also occurs due to increased density of houses, construction of houses in vulnerable areas, use of poor quality materials as substitutes and the like which then leads to major building collapse which leaves much collateral damage. Such disasters can happen in any district and considering the large number of high-rise buildings.

3.10. Vulnerability Analysis

For each district

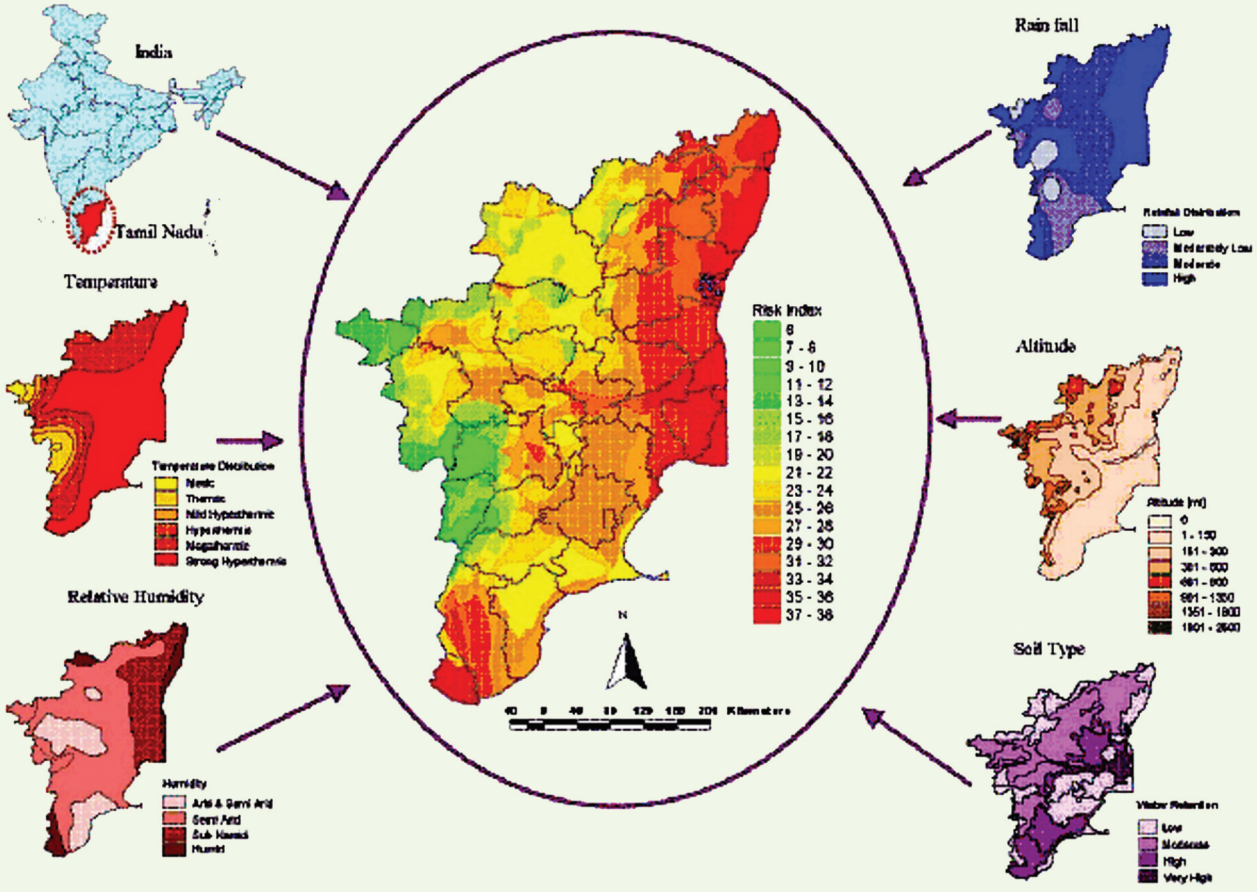
The impact of a hazard becomes a disaster only when an interface with vulnerability occurs, in terms of vulnerable structures, people or the environment. As a pilot project a Hazard, Vulnerability and Risk Assessment study is being conducted in Tiruvallur and Cuddalore Districts under the 13th Finance Commission grants of Government of India and is nearing completion. While this may serve as a template, it is necessary for each district to prepare a basic vulnerability and risk assessment report on the basis of the information already available. Such a report will enable a district to develop a sound Disaster Management Plan that will be based on an assessment that has factored in all the ground realities.

For the state

The Commissioner of Revenue Administration - Relief Commissioner will develop a composite disaster risk and vulnerability profile of the urban agglomerations based on which suitable Urban Disaster Management Plans will be prepared to deal with all types of Disasters that can affect Urban areas. However, this State level plan will be developed from the District Disaster Management Plan and will combine the Hazard, Vulnerability and Risk Assessment studies of all Districts. An Urban Disaster Management Expert Group will then be constituted for Mainstreaming Urban Disaster Mitigation into Development activities.

The flood hazard of the State will also be gradually assessed comprehensively by way of analysis of flood return periods, topographic mapping and height contouring around river systems together with estimates of the capacity of hydrology system and catchment area, analysis of precipitation records to estimate probability of overload and other scientific methods. An analysis of the flood proofing methods currently in place and their lacunae will also be carried out for identification of flood hazard. This will require major inputs from the field level and line departments.

MULTI HAZARD INDEX



CHAPTER IV

PREVENTIVE MEASURES

Chapter IV

Preventive Measures

A long-term disaster management approach requires that planning activities for development should include robust mitigation practices. Government of Tamil Nadu would ensure that the planning activities of the state administration and local authorities take into account disaster risks and provide for suitable preventive and mitigation measures. Tamil Nadu is prone to multi hazards, higherthan the the other states. There are 28 types of Disasters out of 33 identified by the High Powered Committee (HPC) of Government of India falling into 5 sub-groups. These 28 types of common natural and manmade disasters experienced in the State as follows:

- **Hydro-metereological Related Disasters (8):** Cyclones, Droughts, periodical Floods/ Urban Floods, Hailstrom, Cloud burst, Heat wave, Coastal Erosion, Thunder and lightening.
- **Geologically Related Disasters (3):** Landslide, Earthquake, and Tsunami
- **Chemical and Industrial & Radiological Disasters (3)**: Industrial Fires, , Gas & Chemical Leakages, Nuclear Disaster
- **Accidents Related Disasters (10):** Forest fires, Electrical fires, Building Collapses, Urban fires/Village, Oil Spills, Serial Bomb blasts, Festival fire, Stampedes, Road / rail accidents, Aircraft, and Boat capsizing
- **Biologically Related Disasters (4):** Pest attacks, Food poisoning, waterborne diseases, and Cattle epidemics.

4.1 Early Warning and Dissemination Systems

Disaster early warning is a major element of disaster risk reduction. Early action can often prevent a hazard turning into a human disaster by preventing loss of life and reducing the economic and material impacts. To be effective and sustainable they must actively involve the communities at risk.

4.1.1 Nodal Agencies for Early Warning

The Following Nodal agencies in the Government of India are mandated for early warning of different natural hazards.

Table 4.1: Name of the Nodal Agencies for Disaster Early Warning dissemination

Disasters	Agencies
Cyclone/Hydro-meteorological	India Meteorological Department
Earthquake	India Meteorological Department
Floods	Central Water Commission
Drought	Ministry of Agriculture
Landslides	Geological Survey of India
Tsunami	Indian National Centre for Ocean Information Services

Tamil Nadu State Disaster Management Agency will coordinate with central agencies. These agencies shall be responsible for keeping track of developments in respect of specific hazards assigned to them and inform the designated authorities / agencies at National, State and District levels about the impending disasters. All these agencies would develop guidelines for early warning of disasters.

4.2 Setting up of the Emergency Operation centers

In order to monitor the natural disasters round the clock, a Permanent Control Room is established in the Office of the Commissioner of Revenue Administration / State Relief Commissioner with all the necessary infrastructure facilities including desktop computers, direct permanent telephone numbers, two way communication system of VHF/ HF facilities, Amateur Radio (HAM radio), FAX and HOTline Telephones between India Meteorological Department and State Control Room to contact 13 coastal districts and 19 non coastal districts. A toll free public utility services toll free telephone number 1070 for State control room has been installed in the Office of the State Relief Commissioner for receiving and communicating information on various disaster related incidents by the general public. The District Control room public utlity service toll free telephone number 1077 at the Control Room in the district functions under the control of the Collector under the overall supervision of Personal Assistant (General) (PAG's) to the Collector.

The TN State Emergency Operation Centre/Control Room functions under the overall control of the Commissioner of Revenue Administration/State Relief Commissioner and operatinns managed by the Director, Disaster Management The control room acts as a fulcrum in the matters related to

preparedness and relief measures, based on the communication received from the IMD, Government of India, NDMA, Ministry of Home Affairs and from the general public.

Mechanism of Communication: The TNSEOC acts as a nerve center for Coordination and management of disasters. For information flow, besides its own toll free number 1070 for the state EOC and 1077 for district EOC the SEOC shall be connected to the existing network of emergency 108, Police & Fire and Chennai corporation complaints service Number 1913. The calls received from various parts of the state will be recorded and diverted to the concerned departments or Districts for immediate action as per the TNSEOC protocol. The TNSEOC shall have direct connection with IMD/RMC and adequate communication facilities to get connected with the early warning networks of all nodal agencies at the national and state level. The TNSEOC as centralized coordination mechanism shall provide direction and control on the following:

- Receive and process alerts and warning from nodal agencies and other sources and communicate the same to all designated authorities.
- Provide data and information to SEC for taking appropriate decisions and to monitor emergency operations
- Provide and facilitate coordination between the Districts and other EOCs situated in the State.
- Provide inventory of resources and requisitioning additional resources during the disaster phases.
- Provide and issue disaster specific information/data to all concerned
- Consolidate analysis and damage loss and needs assessment data.
- Forwarding of consolidated reports to all designated authorities.

In order to ensure voice data and video transfer the SEOC shall have fail proof network with NIC, Police, Fire, IMD and other major emergency responders. All District Emergency Operation Centre/ control rooms will be connected with the SEOC. The district control rooms will be connected with the subdivision and block level nodes. It is being proposed to strengthen the emergency management systems at the Sub-divisional and Taluk levels also. Towards this end, it is proposed to provide emergency equipment to the Sub-divisional/ Taluk offices, which will be used during times of emergencies.

Hotline between India Meteorological Department and the State Emergency Operation Centre (EOC) is established. Dissemination to the districts is done through telephone, e-mail and fax. IP

phones are also available, which connects the State with the district headquarters, taluks and blocks of the State. Wireless radio network; both high Frequency and very high frequency are available in the State.

4.3 State Disaster Response Force (SDRF)

The State Disaster Response Force (SDRF) has been constituted and stationed at Commando Force Headquarters, Adyar. 70 Police personnel were trained by NDRF and they have been trained with the following techniques.

- Detection and location
- Extrication and Access
- Search and Rescue
- Medical First Aid

These companies will be provided with state of art equipment and communication systems.

4.4 Emergency Health Response

Emergency Ambulance Service System: Tamil Nadu Govt. has signed an MOU with Hyderabad based GVK-EMRI to provide free ambulance services to the patients in different parts of the state. The state of the art fully equipped ambulances is being run under "108" Emergency Ambulance System and providing quality health services to the people of the state. Assistance can also be obtained at this number within twenty minute for emergencies such as fire, police apart from medical. The response center equipped with latest technology and infrastructure is located at Chennai. This facility will be linked with SEOC & DEOC for responding to all calls related to Disaster Management.

4.5 Creation of Tamil Nadu IAG Platform

The plan recognizes the critical role to be played by Non-Government Organizations in mobilizing the communities and in linking urban local bodies with corporate sector entities for initiating DRR related activities. The plan endeavors to utilize the linkage of NGOs with grass root communities for creating awareness on disaster risk vulnerabilities and capacity building for preparedness, mitigation and response. In order to ensure and promote synergetic actions for effective disaster risk reduction Tamil Nadu IAG platform has been created in the state. This forum shall function in consultation with TNSDMA and DM Cell of Revenue Department to address the humanitarian needs and livelihoods. The establishment of IAG was fascilitated by Tamil Nadu Tsunami Resource Center, which was very active immediate after the Indian Ocean Tsunami 2004. This system will be revived for better coordination with community organization.

4.6 State Policy on Disaster Management

Recognizing the fact that the Disaster Management is a multi-agency function the Government of Tamil Nadu published a State Disaster Management Policy in the year 2004 which was updated in the year 2013. It gives a overall picture of Disaster Management in the State. TNSDMA have issued guidelines and funding to the nodal departments for undertaking capacity building, training, and preparation of DMPS, IEC activities etc.

4.7 Ensuring Public private partnership

TNSDMA will enter into an agreement with major project developers to support preparedness, relief, recovery, rehabilitation and reconstruction initiatives of the Govt. District wise inventory of resources available with projects will be provided to SEOC & DEOC's. Regular meetings will be held involving Project authorities, DDMA & NGOs and HOD's of Nodal departments to assess the coordination and readiness of resources. It will be mandatory for the project authorities to present their disaster management plans to SDMA

4.8 Mitigation and Prevention Plan

The State Government will frame prevention plan for efficient execution of the State Disaster Management Plan, the Plan will be organized as per the following four stages of the Disaster Cycle.

Non Disaster - Mitigation (L0): During Non-Disaster phase, the plan has to be used to identify the existing and potential risks and to reduce potential causalities and damage from disasters.

Pre Disaster - Preparedness (L1): During Before Disaster phase, the plan urges to build the capacities of all Stakeholders for safeguarding their lives and assets by taking appropriate action in the face of any disaster and to ensure that response agencies are able to reach out to potential damage areas in a prompt and coordinated manner.

During Disaster - Response (L2): During any Disasters, this plan paves a holistic and effective approach to attend the immediate needs of the affected population in minimum time possible.

Post Disaster – Relief (L3): After any disaster strikes the state, the plan guides the State administration to build back better to attain the normalcy of the community as well as the government machinery in an effective manner.

4.8.1 Mitigation Plan

The primary objective of mitigation efforts would be:

- To identify, delineate and assess the existing and potential risks and to work towards reducing potential causalities and damage from disasters.

- To substantially increase public awareness of disaster risk to ensure safer environment for communities to live and work.
- To reduce the risks of loss of life, infrastructure, economic costs, and destruction that result from disasters.

In view of the prevailing risk and the vulnerabilities perception, the mitigation measures proposed have been categorized under following seven major groups:

1) Risk assessment
2) Construction work
3) Repair and maintenance
4) Research and technology transfer
5) Training and capacity building
6) Land Use Planning and Regulations
7) Resources for Mitigation

Since vulnerability & Risks varies from area to area and so is the capacity & capability to respond hence mitigation plan has been evolved by taking into considered local specificities. Mitigation strategies also envisage higher level of community involvement and participation.

In rural areas, characterized by inadequate infrastructure and poverty groups, all mitigation efforts will be backed up by a strong and committed programme of social development for the communities. Constant re-examination, of development policies and programmes, leading to equity and social justice, will be ensured for the successful implementation of mitigation efforts that are being proposed.

The role of training, education, and information dissemination will constitute the key intervention for ensuring the implementation and sustainability of the mitigation strategies.

The SEC, with inputs from the technical institutions and experts will plan and coordinate all the mitigation activities at the state level. All the concerned departments will develop and implement their respective mitigation plans. The departments nodal officers will coordinate the mitigation activities and appraise the SEC about also be responsible for communicating the status of the department's efforts formation time.

4.8.2 Components of Mitigation Plan

Component 1: Risk Assessment and Vulnerability Analysis

The Commissionrate of Revenue Administration, Department of Disaster Management and Mitigation will be the prime department responsible for upgrading risk assessment and vulnerability analysis of state and district level. Special focus will be given to areas highly vulnerable to disasters triggered by climate change. The department will engage the local bodies, NGO's and local community in order to develop a realistic ground based assessments by working with Panchayat and the District Administration, the District Disaster Management Authority will periodically hold meetings to review local vulnerabilities or any symptoms of early warning indicative of potential disaster.

- Improve understanding of the locations, potential impacts, and linkages between hazards, vulnerability, and measures needed to protect life safety and health.
- Provide updated information about hazards, vulnerabilities, and mitigation processes to state and local agencies.

The various studies and assessment for vulnerable districts of Tamil Nadu (HVRA Atlas) that is being prepared through Anna Institute of Management.

Component 2: Construction work

Building bylaws

The techno-legal regime for the state will incorporate appropriate construction related codes and building by-laws of the State , which will be revised from time to time. Adequate zoning laws such as flood plain regulation ,etc will be put in place to regulate development away from unsafe locations.

Infrastructure and Housing Repair and Maintenance

Lifeline buildings represent critical infrastructure for the state, such as schools and hospitals. The Public works department will be the primary agency responsible for conducting structural assessment, retrofitting and renovation of lifeline buildings. Existing development programmes will be examined to incorporate disaster resistant technologies in all existing and new public buildings. Similarly in order to reduce the potential risk to other constructions, strengthening of micro level protection features will be identified and taken on priority in areas with recurrent threat of floods, and other water related disasters along major drainage basins in the State.

Maintenance

All the departments will ensure that mitigation measures are incorporated into repairs, major alterations, new development, and redevelopment practices, especially in areas subject to substantial risk from hazards. For the rural areas, the Rural Development and Panchayat Raj Department will ensure that mitigation measures are incorporated in all its rural development programmes such as MGNREGA.

Undertaking regular safety audit of structures such as check dams and water storage tanks constructed as part of development programmes for ensuring the safety of people from potential threat.

For the urban areas, the Urban Development Department will coordinate with the district authorities to ensure that mitigation measures are included in all development programmes.

Component 3: Research and Technology Transfer

All the agencies will strive to carryout research to

- Develop and promote adoption of cost-effective infrastructure technologies to minimize the risks.
- Identify and interact with research institutions to evolve mitigation strategies.
- Identify, recognize and incorporate, after suitable scientific validation, community based traditional coping capacities against natural disasters.

4.8.3 Training and Capacity Building

Training and Capacity Building of Government Officials

At the State level, disaster management will be added as a topic for all induction & foundation courses to be conducted by the state level training institutes and all other training institutes in the state. Special attention will be given to the departments to incorporate modern and latest technical aspects of handling the disasters in an effective and efficient manner.

At the district level, training programmes will be conducted in coordination with NGOs, and government training / research institutions. It is proposed to the State government to establish a separate training institute for Disaster management, which can impart training to the government officials of all levels.

Community Level Training and Public Awareness Activities

The community awareness and training activities will basically be carried out in the form of training programmes through NGOs, Private Sector, and Government Training Institutions. Apart from spreading awareness of disasters, the focus will essentially be on community capacity building.

Primary agencies for community level training and public awareness are:

- State Institute of Rural Development
- Anna Institute of Management
- State Council of Educational Research and Training
- Tamil Nadu Fire and Rescue Services
- NGO
- Private sectors

Mobilizing Community Efforts for Mitigation Measures

The community will be encouraged to reduce the impact of the next disaster. Demonstration modal housing units indicating various technology features and options will be built by the Government/NGOs/Community. Priority will be given for buildings like Panchayat, primary health centres, community centre, schools etc. The objective of such activity will be to encourage local communities to undertake and adopt appropriate measures at individual, household or community level to avoid loss of life, damage to property and crop.

Land Use Planning and Regulations

CMDA & the Directorate of Town and Country planning will be the primary agencies to encourage new development to occur in locations avoiding or minimizing exposure to hazards or enhance design requirements to improve resiliency in future disasters. These departments would also ensure proper enforcement of existing regulations and Acts and revision of existing laws.

Incentives and Resources for Mitigation

It is proposed to create a State Disaster Mitigation Fund to implement the above stated mitigation strategy. The fund will be used to provide incentives to developmental projects where mitigation measures have been adopted. Leveraging of funds from other developmental schemes also needs to be taken into account. The State Disaster Management Authority will be the authority in-charge of the State Disaster Mitigation Fund.

4.8.4 Culture of Prevention

Through an organised mechanism all departments shall propagate and endeavor to create.

- Culture of Preparedness
- Culture of Quick Response
- Culture of Strategic Thinking
- Culture of Prevention

Effective Trigger Mechanism

Trigger Mechanism concept envisaged as an "emergency quick response mechanism" which, when activated prior to or during a disaster simultaneously sets into motion required prevention and mitigation measures with minimum loss of time. Operation of Trigger Mechanism with clear delineation of duties & functions including identification of key personnel will be put in place as effective mitigation strategy. Adequate delegation of authorities has been assured to act in the first critical 24-28 hours without loss of time in planning or seeking clearance/approval/direction from superiors. Standard Operating Procedures (SOP's) will be evolved with meticulous details for effective operation of the Trigger Mechanism.

CHAPTER V

PREPAREDNESS MEASURES

Chapter V

Preparedness Measures

5.1 Preparedness Measures

Disaster preparedness refers to measures taken to prepare for and reduce the effects of disasters. That is, to predict and—where possible—prevent them, mitigate their impact on vulnerable populations, and respond to and effectively cope with their consequences. Disaster preparedness is best viewed from a broad perspective and is more appropriately conceived of as a goal, rather than as a specialised programme or 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 minimise the effects of a disaster on their lives.

A comprehensive disaster preparedness strategy would therefore include the following elements:

1. Hazard, risk and vulnerability assessments	2. Response mechanisms and strategies	3. Preparedness plans
4. Coordination	5. Information management	6. Early warning systems
7. Resource mobilisation	8. Public education, training & rehearsals	9. Community-Based disaster preparedness

5.2 Hazard, Risk and Vulnerability Assessments (HVRA)

All planning and implementation of disaster preparedness measures should be based on an assessment and prioritisation 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 should:

- 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
- Assess the ability of those sectors to withstand and cope with the effects of hazardous phenomena

5.3 Response mechanisms and strategies

There are many preparedness mechanisms and strategies that will strengthen and increase the effectiveness of an emergency response. These include development or formation of:

- evacuation procedures (*including how to disseminate these procedures to the public*)
- search and rescue teams (*including plans for training them*)
- assessment teams (*including plans for training them*)
- an assessment process and information priorities for an emergency response
- measures to activate special installations, such as emergency or mobile hospital facilities
- procedures for activating distribution systems
- preparations for emergency reception centres and shelters
- procedures for activating emergency programs for airports, harbours and land transport
- preparations for storing or making arrangements for rapid acquisition of emergency relief supplies and equipment

5.4 Preparedness planning

The concept of preparedness planning is very important for those involved in disaster management. During an actual emergency, quick and effective action is required. This action often depends on having made and implemented preparedness plans. If appropriate action is not taken or if the response is delayed, lives may be needlessly lost. In a preliminary plan, even though the details of a disaster remain uncertain, it can identify emergency shelter sites, plan and publicise evacuation routes, identify emergency water sources, determine chains of command and communication procedures, train response personnel and educate people about what to do in case of an emergency. All of these measures will go a long way to improving the quality, timing and effectiveness of the response to a disaster.

Disaster preparedness planning involves identifying organisational resources, determining roles and responsibilities, developing policies and procedures and planning preparedness activities aimed at ensuring timely disaster preparation and effective emergency response. The actual planning process is preliminary in nature and is performed in a state of uncertainty until an actual emergency or disaster occurs. The aim of preparedness planning is to identify assignments and specific activities covering organisational and technical issues to ensure that response systems function successfully in the event of a disaster.

5.5 Capacity Building

The SEC will ensure that all concerned departments implement their respective preparedness / contingency plans encompassing the following:

- Micro-Hazard zonation for each hazard.
- Display of warning boards for general public in sensitive area.
- Inventory of human and material resources available with Government, Private and Civil Society.
- Training, Capacity Building of the State Search and Rescue Task Forces
- Training, Capacity Building of the State First Aid Task Forces
- Training and capacity building of Civil police, Fire Brigades, NCC, CBOs.
- Medical Preparedness- nominate/ designate hospitals, doctors and paramedics to cover emergency health management.
- State, District, Block & Village level mock drills and rehearsals.
- Public Awareness generation and community evacuation training.
- Community based disaster management (CBDM).
- Ensure that GP, Block and Districts develop and maintain its disaster management plans.
- Inventory of Lifeline buildings such as of schools, hospitals, administration buildings and assess their safety and take measures for improving safety.
- Knowledge management
- Budgetary allocations

- Yearly- Updating of the state plan. In case of a disaster the plan will be reviewed right after that.

5.6 Community and local level preparedness

The plan recognises the fact that in the event of disaster communities are the first responders and hence there is no better alternative to community and local level capacities for disaster response. In order to enhance communities' capacity to take action to help themselves in the absence of necessary outside response for days the plan envisages creating necessary awareness about hazards, risks and response. Areas which would be specifically addressed for community preparedness are-

i) Medical first aid

ii) Search and rescue extrication from damaged buildings

iii) Road clearance

iv) Fire fighting

Plan also envisages equipping community at Panchayat level by ensuring the provision of medical supply, communication such as radio, TVs, extrication equipment. Panchayat will be encouraged to establish local early warning systems in higher vulnerable areas and for holding community level disaster response drills. Development of response capacity at Panchayat level for first response would help in avoiding desperate situation.

5.7 Sustainable Development Practices and Climate Change

Disasters have also negative impacts on environment as they affect natural resources. Therefore, considering society, economy and environment as three main components of sustainable development, disasters have negative impacts on them and hence negative impact and delay on sustainable development. Sustainable development and use of new technologies will be a must in the implementation of this plan. Priority would be given for promoting understanding of climate change adaptation strategies, energy efficiency and natural conservation.

5.8 State Disaster Response Force (SDRF)

State Disaster Response Force (SDRF) team has been constituted with a strength of 80 Police Personnel comprising 1 Deputy Superintendent of Police, 3 Inspectors of Police, 6 Sub-Inspectors of Police and 70 Police Personnel from other ranks on OD basis from Armed Police, Chennai to TNCF. They have been trained in disaster management and rescue operations in consultation with National Disaster Response Force (NDRF).

The SDRF is trained on the lines of the NDRF to deal with any untoward situation. In the past the SDRF has also been effectively involved in conducting evacuation, rescue activities in disaster

situation in the state. They are trained in disaster response techniques such as detection and location; Extrication and access; Fire Fighting; Medical and First Aid.

Department of Home in Consultation with SDMA shall be primarily responsible for taking preparedness measures and building response capacity as per their vulnerability to various natural disasters and constitute State Disaster Response Forces on the pattern of NDRF.

5.9 Fire and Emergency Services

The Fire Services in the States will be strengthened and made multi-hazard response outfit. These will be appropriately equipped depending upon their location and the disasters they will be tackling.

5.10 Home Guard and Civil Defence

Home Guard and Civil Defence volunteers will be enrolled for voluntary services in accordance with the provisions of the Civil Defence Act. The services of Home Guard and Civil Defence volunteers would be utilized during response to disasters.

5.11 Role of National Cadet Corps (NCC), National Service Scheme (NSS) and Nehru Yuva Kendra Sangathan (NYKS)

Potential of these youth based organisations will be optimised to support all community based initiatives and DM training would be included in their programmes. Special training campaign will be launched to strengthen their capacities.

5.12 Pre-Contract for Essential Commodities

The Civil Supplies and Consumet Protection Department will ensure storage and availability of essential commodities including medicine in the vulnerable districts. Necessary provisions will be made for, to enter pre-contract with the suppliers of essential commodities, medicines, tents etc. on an annual basis for supply of these items at pre-decided rates within stipulated time framework.

5.13 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 in a manner that the teams are in a position to be deployed 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 identified teams at the district and sub-divisions would be decided in advance as per need and disaster.

5.14 Animal Care

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

5.15 Social Inclusion - Needs of Special Vulnerable Groups

When addressing the preparedness and relief requirements of the disaster victims, focus would be placed on the special needs of the vulnerable population that is, children, women, aged and the disabled. Socio-cultural needs would be accounted for in all phases of disaster management planning. A specific strategy for addressing the risk reduction needs of these vulnerable groups will be developed by every line department.

5.16 Mock Drills

Search and Rescue Teams at State Levels will carry out mock drills on various disasters situation annually. For floods/flash floods these will be carried before the monsoon period. For earthquakes, landslides etc., such drills will be done periodically. At the district and State levels, mock exercises will be carried out for assessing and evaluating preparedness machinery including manpower and equipment.

5.17 Responsibilities of Departments in preparation for Disaster Management

The State Executive Committee will need to ensure that all line departments that are either likely to be affected in any disaster or will need to be involved in tackling a disaster are fully prepared with up-to-date contingency plans that will not be restricted to this but shall include the following:

- Each Department shall have their own Departmental Disaster Management plan
- Micro-Hazard zonation for each hazard will be taken up.
- Display of warning boards for general public in sensitive areas.
- Inventory of human and material resources available within the department at the local, district and state level is kept up-to-date and as broad based as possible.

- Training, Capacity Building of the key members of the department
- Medical Preparedness - nominate/designate hospitals, doctors and paramedics and , emergency health management systems
- State, District, Block and local level mock drills and rehearsals.
- Public Awareness generation and community training.
- Community Based Disaster Risk Management (CBDRM).
- Inventory of Lifeline buildings such as schools, hospitals, administration buildings - to assess their safety and initiate measures for improving safety.
- Knowledge management of Disaster management skills
- Budgetary allocations for various mitigation, planning and preparedness activities.
- Yearly updating of the state plan. In case of a disaster, the plan will need to be reviewed immediately thereafter.
- Documentation of success stories, lessons learnt overall and review of the outputs of the plan.

5.17.1 Revenue Department

- 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 their capacity and check upon their suitability for accommodating people.
- 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.

- Coordinate Village/Habitation level mock drills with the assistance of the Rural Development department and Police.
- 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.
- 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 Disaster Response Fund and Minimum standards of relief is placed at Annexure-II and III.

5.17.2 Transport Department

- Develop a plan for mobilization of vehicles at short notice and to dovetail it into the disaster management plan for the department;
- Carry out survey and report condition of all highway systems at state and district level;
- Prepare an inventory of vehicles, trucks, buses, jeeps, tipper lorries and tractors of government and private agencies district wise and provide the list to the SEOC and DEOC;
- Issue standing instructions to the State transport department for providing buses for evacuation and relief;
- It is the primary agency for dealing with road accidents and in bringing in policies in this area.

5.17.3 Police Department

- Prepare an operational Plan for responding to any type of disaster.
- Impart training to the members of the Police Force in first aid, evacuation, rescue and relief operations.

- To conduct Search and Rescue training to local volunteers and motivate youth and college students to participate; with the trained group, to constitute district wise 'Search & Rescue' Teams.
- Prepare an inventory of all manpower and equipment available to be utilized in managing a disaster.
- Identify the 'Risk' areas for different disasters and instruct the existing police installations located in those areas for keeping themselves in high alert for undertaking emergency rescue, evacuation and relief operations.
- Hold quarterly mock drills on disaster preparedness and response and involve local community and volunteers.
- Keeping police vehicles and other transport in readiness for deployment.
- Review maintenance of equipment and machinery that will be utilized during a disaster.
- Ensure the availability of adequate warning mechanism for evacuation.
- Installation of radio communication at the DEOC and at the affected site, during disaster.
- Identify alternative routes for possible hot spots.

5.17.4 Fire and Emergency Services

The Fire Services in the States will be strengthened and made multi-hazard response outfit. The Fire and Rescue Service will perform the following functions:

- Organise public fire education programmes.
- Create and sustain awareness of the hazards of fire and other emergencies
- Heighten the role of the individual in the prevention of fires and other disasters.
- Provide technical advice for building plans in respect of machinery and structural layouts to facilitate escape from fire, rescue operations and fire management.
- Inspect and offer technical advice on fire extinguishers.
- Co-ordinate and advice on the training of personnel in firefighting to the departments / institutions in the State.
- Offer rescue and evacuation services to those trapped by fire or in other emergency situations and
- Train and organize Emergency volunteer squads at community level

5.17.5 Public Works Department (PWD)

It is the primary agency for maintenance of public infrastructure ranging from Buildings, Major irrigation Tanks, Dams and has the expertise to take up Flood prevention works.

- Department of Public Works takes precautionary steps for the protection of government property against possible loss and damage during a disaster.
- Formulates guidelines for safe construction of public buildings.
- Prepare source lists with specifications and position of heavy construction equipment in the state.
- Organize periodic training of engineers and other construction personnel on disaster resistant construction technologies.
- Establish communication with State Emergency Operations Center (SEOC), DEOC and departmental HQ within the division and state.
- Create an inventory of Earth moving machinery available with each division and with private contractors; Boats that could be used in times of floods and major inundation.
- Create linkage and communication with power project authorities and identify resources available with them.
- Officers at SDO level should be familiar with pre-disaster precautions and during/ post-disaster procedures for road clearing and have a clear idea of alternative safe evacuation routes; Routes strategic for evacuation and relief should be identified and marked in close coordination with police and DEOC.
- Undertake rapid visual inspection of critical buildings and structures of the state government (including hospital buildings) by a specialized team and identify structures which are endangered requiring retrofitting or demolition.
- Emergency tool kits to be organized for each division.

5.17.6 Agriculture / Horticulture Department

- This department will need to prepare a composite Disaster Management Plan for drought related disasters.
- The department is the Primary agency for assessment of crop damages.
- Organize the distribution of seeds, seedlings, fertilizer and implements to affected farmers;

- Arrange for keeping stock of certified seeds, fertilizers and pesticides.
- Establish communication with TNSDMA, DDMA, and District Control Room and Agriculture Universities.
- Check available stock of equipment and materials which are likely to be most needed during disasters like floods and drought. Suggest a variety of seeds and cropping pattern, which can reduce losses and risks to farmers.
- Determine the type of damage, pests or disease affected crops.
- Setting up extension teams for crop protection and accordingly ensure that extra supplies and materials be obtained.

5.17.7 Fisheries Department

- During floods boats are most effective way of mass rescue and relief operation and fishermen are naturally prepared to assist during these contingencies.
- In the coastal areas, where any danger to country boats of fishing crafts is apprehended, issuing warning to the fishermen and the Boat owners to be alert about the possible damages.
- Instruct the fishermen to carry with them transistors and mobile phones so that they can know about the weather forecast and return to the shore safely in time.
- Instruct to take away the nets, boats from the affected areas and keep in a safer place.
- To keep the list of swimmers in respect of the District and Taluk level
- To keep ready a good number of private boats / catamarans with crew and good swimmers, equipped with nylon rope etc. The catamarans and boats are to be transported to the marooned places by Lorries which can be arranged with the help of Regional Transport Officer for rescue services.

5.17.8 Animal Husbandry Department

- It is the primary agency for animal epidemics; fodder assessment disposal of dead animals - and will advise the DDMA on these matters.
- The department will identify areas likely to be affected in the event of a disaster and incorporate it into the Disaster Plan of the department. Identify disaster prone areas, livestock population at risk, requirement of medicine, vaccines, equipment, disinfectants and other materials will feature in this.

- Prepare inventory of human recourses along with their contact number (Veterinary Doctors, Para Vets, and helpers).
- Identify shelters for animals.
- Prepare a list of water borne diseases that are preventable by vaccination. Publicize the information about common diseases afflicting livestock and the precautions that need to be taken.
- Stock emergency medical equipment which may be required during and post disaster.
- Capacity building of all veterinary hospital staff in dealing with likely damages and effects in the aftermath of disaster.
- Prepare kits for veterinary diseases, which could be provided to veterinary doctors at the block level and extension officers at the village level. The kits may also be provided to village level veterinary volunteers.

5.17.9 Rural Development Department

- It is the primary agency to implement vulnerability reduction projects to alleviate poverty and improve people's livelihoods.
- Capacity building of rural population for managing disasters and incorporating Disaster management measures in rural development schemes where the bulk of the funding is towards improving the quality of life of the rural poor.
- Work on mock drills at the community level particularly in populations that are vulnerable.
- Develop a state level disaster management plan for the department and update it annually.
- Encourage disaster resistant technological practices in buildings and infrastructure.
- Analyze the training needs of the department's personnel, which will include its officials and elected representatives.
- Conduct Village Panchayat level mock drills as part of preparedness;.
- Assist in establishing village disaster management teams.

5.17.10 Health and Family Welfare Department

- They are the primary agency for Health related disasters and Epidemics which plays a major role in all disasters in ensuring that health concerns that are an indirect fall-out of any disaster are adequately addressed.
- Ensure that disaster management plans are developed for health centers and hospitals and that these places are well prepared to deal with a sudden rush of patients at the time of a disaster; Check stocks of equipment and drugs which are likely to be most needed in disaster management.
- Ensure that all hospital staff are well informed about possible disasters in the district -likely damages and effects - and information about ways to protect life, equipment and property.
- Equip all Casualty departments and Trauma care centers to deal with large numbers, in event of a disaster.
- Ensure adequate availability of Emergency Health Kits in high risk areas ;
- Train volunteers on emergency preparedness programmes such as first aid and preventive measure against diseases in disaster prone areas.
- Prepare a list of medical and Para-medical personnel in disaster prone areas and make available to DEOC.
- Establish and operate an early warning system for health threats based on routine health information. Review and update precautionary measures and procedures.
- To facilitate mobilization of generators to the hospitals and this will help the hospital administration to maintain uninterrupted power supply during the disasters.

5.17.11 Department of Environment & Forests

- Primary Agency responsible for Forest fires and disasters related to forest areas.
- Primary agency for research and development on Climate Change impact and adaptation activities for the state.
- Prepare a department disaster management plan.
- Forest Fire prone areas should be identified and extra vigilance be ensured in such cases.
- Organize community awareness programs and create task forces for forest fire fighting.

5.17.12 Municipal Administration & Water Supply Department

- Develop a disaster management plan for the department, including the identification of location of camps for different type of disasters, existing locations that can be used as shelters, inventories of agencies that can be used for establishment of tents.
- To conduct regular training for staff on minimum standards for shelter, relief camps and tent structures.
- The department should facilitate all corporations and Municipalities to develop city Disaster Management Plan and to ensure regular updation of the plan.

5.17.13 Department of Civil Supplies and Consumer Protection

- Develop a plan that will ensure timely distribution of food to the affected population. Plan for food storage locations and maintain a stock of food relief items for any emergency.
- Act as a Nodal agency for collection, Storage and distribution of food and other relief materials during emergencies.
- The Department may closely monitor supply of Diesel / Petrol to bunks during the disaster.
- Fair price outlets for vegetable need to be quickly setup in the affected area.
- Identify and delineate vulnerable areas -Prepare departmental contingency plan.
- Make an inventory of storages & godowns and assess and ensure the safety of storage places.
- Constitute district wise/ vulnerable zone wise response teams and delineate roles and responsibilities.
- Estimate the quantity and nature of the supplies required district / vulnerable zone wise.
- Ensure that all ration shops in vulnerable areas are fully stocked.
- Fair Price Shops located in low lying areas vulnerable to flood due to monsoon and cyclone will be identified and steps will be taken to shift them to higher locations.
- Essential Commodities especially rice and wheat will be safely stored with water proof gunny bags stored in full storage capacity of Fair Price Shops to meet any emergency during flood.

- Liftment and movement of PDS commodities will be watched daily and it will be ensured that no godown or FPS shall go without stock.
- New ration cards will be issued to those people who have lost their ration cards and necessary arrangements will be made to enable the cardholders to get essential commodities through fair price shops.
- In the Tamil Nadu Civil Supplies Corporation godowns, three months stock of rice and wheat will be kept as buffer stock especially in the 14 coastal districts during monsoon season.
- Also sufficient number of gunny bags will be stored in the godowns of Tamil Nadu Civil Supplies Corporation for emergency utilization.
- Additional allocation of PDS Kerosene be mobilized from GOI by taking internal arrangement and additional quantity of PDS kerosene will be made available to 14 coastal districts for the supply of kerosene to affected families during flood. Further the additionally allotted quantity of kerosene will be lifted by the Kerosene wholesaler in advance and kept as reserve stock.

5.17.14 Information and Public Relations Departments

- Disseminate Disaster Management information and warnings to the public such as would enable safety measures being taken and panic lessened.
- Media coordination; Ensure that proper and adequate information is provided to the media.
- Develop a disaster management plan for the department on its roles and strategy for dealing with responsibilities; Prepare guidelines / policy for necessary action by mass media on reporting disasters.
- Conduct education and awareness for local communities.
- Popularize the techniques for preparedness and survival during a pre-disaster, disaster and post-disaster period through television, radio and other publicity media.
- Setup a media center to dissipate information to Press and Media during disasters of higher magnitude.

5.17.15 Tamil Nadu Generation and Distribution Corporation (TANGEDCO)

- Develop a disaster management plan for the department.
- Carry out survey of condition of all power supply lines at state and district level.
- Review and update precautionary measures and procedure and review with staff the precautions that have been taken to protect equipment.
- Ensure that alternate power supply arrangements for emergency supply are available for critical facilities.
- Stock spare parts for usage during crisis.
- Protect Power Stations from disaster
- Take a call on disconnection of electricity supply to prevent electrocution incidences.
- Make deployment teams which can be quickly moved to area where disaster has struck.

5.17.16 Labour Welfare Department

- Issue disaster management guidelines to all the industries and ensure on-site and off-site plans for all industries.
- Prepare and disseminate guidelines for labour security and safety.
- Prepare and disseminate public awareness material related to chemical accidents.
- Revise, update and implement rules and regulations for industrial safety and hazardous waste management.
- Ensure that Local Crisis Groups are formed and are functional in places were Major Accident Hazard Industries are located.

5.17.17 School Education Department

- Develop a state disaster management plan for the department.
- Preparing curriculum related to disaster management and to introduce at varied levels in the subjects taught.
- As students can get hurt easily with falling objects, the institutions should need to do their own safety audit.
- Coordinate with local authority and carry out mock drills once in a year to ensure safety for the children who are studying.

- Awareness campaigns amongst students and teachers.
- Arrange for training of teachers and students of disaster prone areas about the steps to be taken at different stages of disaster and organise them, in coordination with volunteers and inspire them for rescue, evacuation and relief works.
- To encourage all schools to prepare school Disaster Management plan in compliance with NDMA guidelines.
- Involve Scout and Guides and NCC units in the school in disaster related training and awareness.

5.17.18 Department of Higher Education

- Develop a state disaster management plan for the department;
- All activities similar to that of the School Education department will need to be carried out here.
- Rescue clubs have been outlined in the Capacity building chapter. Depending upon the degree to which this is successful, it will tantamount to a massive youth trained force that is well equipped to deal with most disasters at ground zero.

5.17.19 Tamil Nadu Water Supply and Drainage Board (TWAD)

- Identify flood prone areas and activate flood monitoring mechanism.
- Often in a flooded area, there will be a shortage of good drinking water. This need has to be made good.
- Collect all the information on weather forecast and the water levels of all water storage area.
- Draw a schedule for chlorination and other required bacteriological analysis for ensuring safe public water supply.
- Keep in readiness essential tool kits and protection material at critical places for emergency deployment.
- Materials likely to be damaged by rains, such as cement bags, electric motors, office records etc. should be covered with plastic even though stored inside.
- A standby water supply plan should be available in the event of damage or pollution of the regular supply sources in disaster prone areas.

- Make an inventory provision to acquire tankers, Containers and Storage tanks and establish other temporary means of distributing water on an emergency basis.
- Prepare plans for water distribution to all transit and relief camps, affected villages and cattle camps and ensure proper execution of these plans.

5.17.21 INSTITUTIONAL (Education, Industry, Health, etc) PREPAREDNESS

"The plan recognizes that in the event of Disaster, institutions such as colleges, factories, commercial establishments, hospitals have to respond quickly to ensure safety of the inmates. The plan envisages creating awareness about the hazardness, risks and response. The plan will facilitate preparation of Disaster Management Plan for each institution and also to establish linkages with State / District Disaster Management Authorities for better coordination during disaster with specific reference to rescue and relief operations. The institutions will be encouraged to establish Early Warning Systems and develop preventive strategies and this will be sensitized on preparedness measures required to avoid desperate situations".

5.17.22 Knowledge Management

Knowledge Management Systems are vital for disaster detection, response planning, and management. These systems aid in early warning, and provide decision support for disaster response and recovery management through the integration and collaboration form different organizations and agencies.

The State Disaster Management Plan aims to propose the implementation of Knowledge Management System for the support of Humanitarian Assistance (HA)/Disaster Relief (DR) in Tamil Nadu in terms of creating situation awareness and support decision makers to make the right decision in the timely manner. The proposed KMS will be adopted the KM framework and process from the previous lessons learnt.

There is a need to create a network of knowledge institutions in the field of DM, to share their experiences and knowledge. The DDMA would forge ties with National and State level knowledge institutions and UN Agencies and other national and international volunteer agencies dealing with emergency response to utilize their experience and knowledge for DM in the district.

In acknowledgment of the need for a knowledge sharing platform on DM, and to facilitate interaction and dialogue with related areas of expertise, the SDMA / DDMA websites within the State and district website would be created. It will connect all Government Departments, statutory agencies, research organizations/institutions and humanitarian organizations to share collectively and individually their knowledge and technical expertise. ICT would be utilized to disseminate knowledge to the stakeholder so that they can benefit from it.

Knowledge Networking is foreseen as an initiative to establish networks and partnership among prime government agencies, policy makers, disaster managers and specialists from allied fields of engineering, architecture, planning, seismology, hydrology, agriculture and social science to exchange information and working together to reduce the risk of disaster. The initiative is aiming to connect all government departments, statutory agencies, research organizations/institutions to share collectively and individually their expert know-how's. The exchange is facilitated through physical interaction, workshops, documentation of experiences, sharing on World WideWeb Portal, etc.

5.17.23 Coordination and Implementation

In view of the multi departmental and multiple stake holder participation in disaster management, there is a imminent requirement for effective and efficient coordiantion of various efforts under taken management of the disasters. The SDMA at the State level, DDMA in the District level will be primarily responsible for ensuring coordination among all the agencies involved. The SDMA and DDMA will extensively use the knowledge networks that will be put in place to meet the requirements of Disaster management.

CHAPTER VI

DISASTER RESPONSE

Chapter VI

Disaster Response

The Revenue Administration, Disaster Management and Mitigation Department (RADM&MD), 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 undertakes all activities relating to Disaster Management and Mitigation besides managing relief and rehabilitation activities of any disaster in the State. The Principal Secretary/Commissioner of Revenue Administration is also the Relief Commissioner of 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 diasters 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 involed in providing relief, rescue and rehabilitation in recent times.

6.1 Disaster Response

Disaster Response measures are those which are taken instantly prior to, and following, a 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 disaster. Response process begins as soon as it becomes apparent that a disastrous event is imminent and lasts until the disaster is declared to be over.

Since response is conducted during periods of high stress in a highly time-constrained environment and with limited information and recourses (in majority of the cases), it is by far, the most complex of four functions of disaster management.

Response includes not only those activities that directly address the immediate needs, such as search and rescue, first aid and shelters, but also includes systems developed to coordinate and support such efforts. For effective response, all the stakeholders need to have a clear perception/ vision about hazards, its consequences and actions that need to be taken in the event of it.

The Revenue Department of the State is the Nodal Department for controlling, monitoring and directing measures for organizing rescue, relief and rehabilitation. All other concerned line departments should extend full cooperation in all matters pertaining to the response management of the disaster whenever it occurs. The State EOC, ERCs and other control rooms at the State level as well as district control rooms will be activated with full strength.

Primary tasks during this phase would be:

- Proper need assessment through village response
- Deployment of resources to all affected sections in an equitable manner
- Besides food, cloth and shelter facilities such as public health and sanitation is to be provided in shelters or camps.
- Ensuring total transparency in the distribution of relief material
- Putting in place an objective method of assessing damage

The major response measures which have to be undertaken cutting across different types of disasters are listed below for guidance of the concerned agencies.

The emergency support functions deal with the first response whenever a disaster strikes. The major areas of emergency response activities and the respective responsible agencies are listed below.

S.No.	Emergency Response Activities	Responsible Agency
1	Activation of Trigger mechanism	SDMA , DDMA
2	Risk Communication	RADM&M dept., SEOC , DEOC, DIPR, Media and tele communication networks
3	Evacuation of People	RADM&M, Urban and local bodies, Police, Home Guards, Fire and Rescue services, SDRF, NDRF, Armed Forces, Volunteers, "108" ambulance, community and others
4	Shelter arrangement for rescued people	RADM&M, Urban and Local bodies.
5	Traffic control and diversions	Traffic Police , Home Guards , Volunteers
6	Cordoning off the disaster affected areas	SDRF , NDRF, Police , Home Guards and Volunteers
7	Law and Order maintenance	Police and Home Guards
8	Search and Rescue operation	Fire and Rescue Services, SDRF, NDRF, Police etc.,
9	Provision of First Aid / Trauma Management	Health department, Local bodies and RED Cross
10	Relief camps and basic amenities in shelters	RADM&M, Health Department & Local bodies
11	Identification of dead and injured	RADM&M, Police, Health department and local bodies
12	Arrangement of medical support for causalities	Health Department
13	Impact & Resource Assessment	RADM&M, Urban and local bodies, Experts
14	Clearance of the disaster affected areas	RD, PWD, Highways & Urban Local bodies
15	Prevention of epidemics & organizing health camps	Health Department and local bodies
16	Need based Establishment of Temporary Shelters	RADM&M and local bodies
17	Mobilizing Resources for relief & restoration	RADM&M, Civil supplies, RD&PR and Urban Local bodies
18	Clearance of debris / Solid waste	SDRF, F&RS, PWD, Highways Department and local bodies
19	Restoration of Communication & Road networks	PWD, High ways, Urban / Rural Local bodies, RD&PR, TANGEDCO
20	Provision of Water	TWAD,CMWSSB and local bodies
21	Restoration of Electricity	TANGEDCO
22	Resumption of Transportation	Road Transport and High ways
23	Food Arrangements	RADM&M , Civil supplies and local bodies
24	Provision of Relief supplies	RADM&M , Civil supplies, RD&PR and Urban Local bodies
25	Temporary mortuary / Dead body disposal	Health, RADM&M and local bodies
26	Evacuation and shelter arrangement for cattle/Livestock	Animal Husbandry Department, Blue Cross, Local bodies and Volunteers
27	Carcass disposal	Animal Husbandry
28	Back to normalcy	RADM&M, all line departments

CHAPTER VII

RECONSTRUCTION, REHABILITATION AND RECOVERY PROGRAMME

Chapter VII

Reconstruction, Rehabilitation and Recovery Programme

Reconstruction and rehabilitation activities come under the post-disaster phase. Currently, the activities in this phase are primarily carried out by the local bodies (*Gram Panchayats, District, Taluk, Municipal Corporations, and Municipalities etc*.) and various Government departments and boards. However, their activities in this phase shall be in accordance with the reconstruction and rehabilitation plans framed by TNSDMA, in conjunction with implementing authorities.

The reconstruction and rehabilitation plan is designed specifically for the worst case scenario. It is activated in case of a disaster in which the capacity of State and District authorities have been overwhelmed and require assistance from the Central Government for re-establishing normalcy in the State.

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

- Providing and erecting temporary housing to the victims and displaced persons.
- Facilitating and providing claims and grants as per the relief manual.
- Providing counseling to the victims
- Providing and facilitating medical support for 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 adapting improvised technologies for safe construction.

The approach to the reconstruction process will be aimed at converting adversity into opportunity. Incorporating disaster resilient features to ***' Build-Back-Better '*** will be the guiding principal. The choice of technology will be based on its likely impact on physical, social-cultural or economic environment of the communities in the affected areas or in their neighborhood.

The key activities in this phase are as below;

7.1 Detailed damage assessment

While a preliminary damage assessment is carried out during disaster phase, a detailed assessment will be conducted before commencing reconstruction and rehabilitation activities.

The relevant Government departments and local authorities will initiate detailed assessment at their respective level for damages sustained in housing, industry/services, infrastructure, agriculture, health / education assets in the affected regions.

7.2 Assistance to restore houses and dwelling units

The GoTN may, if needed, will formulate a policy of assistance to help the affected to restore damaged houses and dwellings in commensurate the nature and quantum of damages. This will neither be treated as compensation for damage, nor as an automatic entitlement.

7.3 Relocation

The GoTN believes that need-based considerations and not extraneous social factors driven relocation of affected community. The local authorities, in consultation with the affected communities and under the guidance of TNSDMA, will 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:
- Gaining consent of the affected population
- Land acquisition
- Urban/ rural land use planning
- Customizing relocation packages
- Obtaining due legal clearances for relocation
- Getting the necessary authorization for rehabilitation
- Livelihood rehabilitation measures for relocated communities, wherever necessary

7.4 Finalizing reconstruction & rehabilitation plan

The effectiveness of any reconstruction and rehabilitation is based on detailed planning and careful monitoring of the relevant projects. TNSDMA will oversee reconstruction and rehabilitation work and ensure that it takes into account the overall development plans for the State. TNSDMA will approve reconstruction and rehabilitation projects based on:

- Identification of suitable projects by relevant departments;
- Project detailing and approval by the relevant technical authority.

7.5 Funds Generation

Reconstruction & rehabilitation projects are fairly resource intensive. These projects have been financed in the past primarily through the state exchequer. In the recent past, funds have also been raised from international agencies. GoTN shall finalise the fund generation mechanism, including the covenants and measures that govern fund inflow and disbursement and usage. This includes:

- Estimation of funds required based on detailed damage assessment reports and consolidation of the same under sectoral and regional heads;
- Contracting with funding agencies and evolving detailed operating procedures for fund flow and corresponding covenants.

7.6 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.

7.7 Project Management Unit (PMU)

Since rehabilitation and reconstruction effort typically involves the co-ordinated efforts of several entities, the GoTN shall encourage the respective entities to strengthen program management capabilities to ensure that synergies across and within entities are managed efficiently. In addition, it is also necessary to constantly monitor the activity to ensure that the project is executed on time, in accordance with the technical specifications and to the satisfaction of the beneficiaries. TNSDMA, in conjunction with relevant Government departments, will monitor the reconstruction activity that is carried out by various implementation agencies. Typical implementation activities would include:

- Disaster proofing and retrofitting of houses
- Creation/ Retrofitting of structures – including roads, bridges, dams, canals etc that may have been destroyed/ damaged due to the disaster
- Restoration of basic infrastructure facilities, for example, ports, airports, power stations etc.
- Creation of health centers, first aid centres, trauma care centres, hospitals, groups of doctors and surgeons etc.
- Restoration of the industrial viability of the affected area.
- Restoration of livelihood.
- Exploring avenues for public-private partnership

7.8 Information, Education and Communication Technology (IECT)

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 awareness and buy-in for the ongoing activities. Hence, TNSDMA and relevant Government departments, district administration and local authorities shall undertake:

Media management / Public Relations: To ensure accurate communication of the reconstruction and rehabilitation measures being taken to various stakeholders

Community management: This includes communicating to the affected communities with a view to apprising them of the efforts being made for their relocation/ rehabilitation/ reconstruction

Feedback mechanisms: Using the communication network to get feedback on reconstruction and rehabilitation measures.

7.9 Dispute Resolution Mechanisms

TNSDMA, in conjunction with relevant agencies, shall institutionalize mechanisms to address beneficiary grievances at various levels, as well as explore innovative ways of dispute minimization like involving the community in reconstruction initiatives. Appropriate mechanism with penalties for dealing with false claims will be evolved to prevent misuse of assistance.

CHAPTER VIII

DISASTER / RISK MANAGEMENT STRATEGIES

Chapter VIII

Disaster / Risk Management Strategies

Nine major types of disasters have been identified in order to provide an understanding that is necessary to tackle the situation effectively. There is often a commonality of issues faced in a disaster and this indicates that with minimum appropriate preparedness it is possible to manage disasters effectively.

8.1 Cyclones

The coastal area of Tamil Nadu are highly vulnerable to cyclones. According to the National Institute of Disaster Management, all the 13 coastal districts of Tamil Nadu are vulnerable to high/ very high cyclonic impact and flooding. Several cyclonic storms with some causing large casualties are on record. The Rameswaram cyclone, the Nisha cyclone, the Thane cyclone the NIlam Cyclonic storm and the Northeast Monsoon related Deep Depressions with massive rainfall are recent events in this category that have caused much destruction. The 2015 Flood related disasters caused by the highest amount rainfall recorded in a century led to major devastation and deluge in Chennai and its neighboring districts.

The most destructive features associated with land falling Tropical Cyclones are the (1) Strong gale force winds (2) Storm surges and (3)Torrential rains . The storm surge which raises the water level in the eye of the cyclone is the worst effect of tropical cyclone and accounts large number of deaths. Strong winds combined with gentle slope of the sea floor can increase the surge height. The houses very close to the shoreline are at risk. The strong winds may also uproot trees which may injure and kill people and damage houses, vehicles, and property. Uprooting of trees and electric posts can also expose the community to face the risk of injury and electrocution.

8.1.1 Pre-Disaster - Cyclones

Level 1 (Watch): 48 to 72 hours before expected landfall

- Early warning information is normally provided by Regional Meteorological Centre. District Administration may need to be aware of and keep track of other standard weather bulletins. The DEOC will need to monitor the situation on an hourly basis.
- DDMA will need to inform all Heads of Departments and the coastal community through the jurisdictional Fisheries and Revenue Department staff and advise them not to venture into the sea for fishing activities. For the public open loudspeaker announcements may be used. Press / Audio – Visual media and Social media may be used to sensitize the community.

- The Fisheries Department while assessing the situation will need to keep track of the number of fishermen in the sea and monitor their return. In case of missing persons, Coast Guard may be informed for assistance to track them down. Maximum efforts at this stage to be taken to ensure that none of the fishermen be in the sea 24 hours before the expected landfall or sometime even prior to that as the sea becomes rough.
- The Fire and Rescue Services, Police, Home Guards and Medical team will need to be alerted on the directions given by the DDMA to be in readiness for emergency operations.
- Transport arrangements will need to be made for evacuation if the status of the threat is enhanced.
- Officials should be deputed to shelters to assess the facilities and arrange for proper lighting, water supply both for drinking and washing, adequate toilet facilities, as per number of people that can be accommodated.
- RTO will need to play a lead role in arranging for private buses and trucks/lorries for transport not only of people but also of relief materials to the identified shelters.
- The people residing in the possible flooding areas that had been drawn up during non-disaster time should now be advised to move to safe places. Children in particular should be advised to avoid low lying areas, refrain from crossing through water bodies and channels.
- Heavy rain can result in overflow of dams and lakes. The PWD and the Block office will need to place their staff on high alert to ensure round-the-clock monitoring of flood levels in water bodies under their control and ensure release of water in accordance with existing flood manuals.
- This phase will test the effectiveness of the connectivity of the district administration with that of the communication system in the coastal hamlets.
- To Check/assure the non-submergence of Water supply sources
- To assure the electricity supply either by TNEB or by Genset
- Securing sand bags to prevent breaches at appropriate places
- To check the availability of Tree cutting machines
- To clean the storm water drains.

8.1.2 Level 2: (Alert) 24 to 48 hrs before expected landfall

- When the approximate position of the cyclone system is located at a distance of 500 km from the coast, the DDMA will need to meet frequently to review the situation as per the status of the IMD forecast.
- In the event of the cyclone moving north and the threat reducing, the IMD will provide information on the expected wind speeds for the district. If the influence of the cyclone is in the peripheral zone of the storm, immediate action is not required.
- Whether the storm intensifies or otherwise, the review of disaster preparedness will need to be made by the DDMA at periodical intervals with the constant watch on fresh bulletins from IMD.
- The Rescue and Relief teams should be stationed by this time to familiarize themselves with the terrain and the settlements they are to assist.
- As it is advisable to switch off the power supply during landfall to avoid electrocution related accidents due to snapping of overhead supply lines: Generators would need to be kept ready to be used for relief operations and in relief camps.
- Announcements to be made - to close windows and have them secured; loose material to be secured by suitable methods. Sandbags to be stacked on roofing that needs to secured. High speed winds can lead to more destruction.
- Arrangements for additional Ambulance help will need to be made.
- Arrangements should be made for free flow of traffic by imposing one-way traffic where necessary.
- Bulldozers and other Earthmoving equipment needed for clearing roads affected by fallen trees will be moved to appropriate places close to coastal villages but not on the roads identified for evacuation - to avoid obstruction of evacuating vehicles.
- If the cyclone is upgraded as Super Cyclone or Very Severe Cyclonic Storm, the assistance of the military may be sought.
- During cyclone the existing communication networks will invariably collapse. Each officer will need to know his/her role in advance.
- Battery operated Megaphones are quite useful for making announcements.

- As the Police department has a stand- alone communication system - excellent coordination will need to be in place to serve as effective back-up.
- The mobile companies be advised to stock appropriate quantity of diesel to run the generators to operate the mobile towers.

8.1.3 Level 3: (Warning) 12 to 24 hours before expected landfall

This warning is issued when the cyclone is located at a distance of 200 km from the coast.

- The DDMA/DEOC in consultation with the SDMA/SEOC will need to order for the evacuation of people depending on the intensity of the Cyclone. The advisories from Government of India / NDMA may also to be taken into consideration. Vulnerable people should be evacuated first including elderly, disabled, children, women, widow and the shelter to which they are heading should be informed to their family members and neighbors.
- Local volunteers and youth may assist in listing out the names of the people evacuated and the location where they are accommodated. The official in-charge of the shelter will need to alert the control room if the shelter is fully accommodated.
- The eye of the cyclone is generally 30 to 65 km in diameter; the spiraling winds may influence a region of up to 50 to 60 km.
- Evacuation will need to be completed in about 12 hours as the wind speed is expected to be very high when the eye wall reaches the shore. The duration of very high winds may be for 6 hours and in the location of landfall it is normal to have unusually calm weather whereas the adjoining villages are being devastated by winds.
- Proper patrolling is necessary at this stage to avoid looting and arson by anti-social elements.
- The officials in-charge of the relief shelters will need to ensure that food packets and water are made available in the relief camps and if possible arrange milk for infants and children.
- Diapers, mats, women dignity kits and bleaching powder will also be provided in the shelters.
- The medical team will need to be available to provide for minimum medical care at the camps with necessary medicines.
- Sufficient numbers of boats are to be kept ready near low lying area already identified.

8.1.4 Level 4: (Lookout) 0 to 12 hours

- The lookout is issued when the cyclone system is within a distance of 200 km from the coast.
- Floods are the main cause of fatalities due to the cyclone - all instructions on avoiding flooding will need to be reiterated.
- Sufficient number of Boats should have been mobilized and located in easy access to spots which have a history of flooding.

The wind velocity will increase during this period and reach a maximum. If the wind speed reduces suddenly, it does not mean that the cyclone has dissipated. It is also possible that in the same location the eye of the storm is making landfall. The wind will once again become destructive and attain high speed after an interval which will depend on the forward motion of the cyclone. The time of lull in the wind may last up to six hours.

8.1.5 Cyclone De- Warning Stage

- When the system weakens or is not going to affect coastal area under alert, a de-warning message will be issued.

8.1.6 Post Disaster

- After the Cyclone, it becomes necessary to assess the Damage and each department will need to follow the guidelines given to it.
- A committee may be formed to identify missing person, dead and injured and assess the damage of properties, loss or injured of livestock, loss of crops, agricultural lands, etc for providing suitable relief.
- Removal of debris; Clearing the fallen trees; Restoring power lines; Restoration of basic Infrastructure - All of this requires a massive effort and will need special mobilization of extra manpower.
- Teams for Disposal of Dead Bodies and Disposal of Carcasses will need to be organised on war-footing where the casualties have been high.
- Spoilt foodstuffs that are dumped on the road will need to be disposed.
- Air dropping of food and essential commodities in the inaccessible areas of cyclone and rain affected may need to be considered by the District Administration.

- Food Arrangement where accessible will need to be arranged. Cooked or dry food will need to be provided at the Shelters.
- Sufficient clothing and blankets will need to be provided to the affected people to ensure their dignity, safety and well-being.
- Warm and inner clothes and additional clothes will need to be provided to Children, sick, elders, women and widows.
- Immediate restoration on roads to motor able condition.
- Keeping ready the Earth moving machineries like JCB, Tractors etc.,

8.1.7 Non Disaster period

- Strengthening and upgradation of the existing cyclone forecasting system is necessary to upgrade the preparation for cyclones. An effective warning dissemination system for ports, beaches, salt workers and fishermen will need to be set in place. Cyclone risk assessment studies in all thirteen coastal districts will need to be done to strengthen mitigation measures.
- Cyclone shelters and buildings identified as shelters in the area should be assessed for its safety considering the expected wave heights and its adequacy with reference to the population in the village
- Encouraging communities to build habitations at least 1000 meters away from the coastline to avoid storm surge is necessary to mitigate the effects of future cyclones. The community should be sensitized in ICZMP regulations.
- Raising and nurturing of the bio-shield - shelter belt plantations and mangrove regeneration - will go a long way in limiting the destructive path of the cyclone.
- People in town as far as 50 km from shoreline may be vulnerable to wind and flood hazard due to heavy rains and so these pockets should be identified and a list drawn up.
- Each Block/Municipality should be required to prepare a list of addresses from where Generators can be hired.
- Lists of Owners with Bulldozing and Earthmoving equipment should be available with each BDO/Municipal Commissioner.

8.2 FLOODS

8.2.1 Introduction

Floods are often a result of heavy rains associated with the natural course of surplus water flow being hindered by encroachments, unplanned development and the like. 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 issues Daily Flood Bulletins to all designated Authorities/Agencies of the Central Government and State Governments/ District Administration 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)

8.2.2 Pre - Disaster

- Effective early warning shall be given when a decision has been taken to release water from a reservoir/dam.
- Public Address System/sirens and other methods shall be planned for all habitations that are in the course of the river.
- All the sirens/hooters should be connected by laying cable or other modern techniques/ systems so that they will ring simultaneously at the press of a button.
- Flood warning mechanism should be ensured. Activate flood warning to vulnerable communities and stakeholders.
- Evacuation of vulnerable people to safe areas and pre-designated shelters to be done.
- If Flood risk is reduced, a Flood de-warning may be issued in consultation with PWD(WRD)
- Boats become an essentiality on account of the flooding and hence need to be sourced from various sources. The problem is more acute when the flooding occurs inland.

8.2.3 During Disaster

- In case Flood occurs, rescue and relief activities shall be initiated immediately (to be read along with Chapter 6) Police/Fire - Rescue teams/Ambulances will need to be pressed into service. Citizen Rescue and swimming teams will need to be put to work.

8.2.4 Non-Disaster:

The District Collector must arrange for a full-fledged review of PWD tanks and dams separately to ensure that the flood level release protocol is fully understood by the officers themselves. Maintenance issues of the lakes and dams will also need to be looked along with surplus run off.

8.2.5 Declaration of Stages of Flood

The standard phrases that are used in declaring the stages of the flood situation are as follows:

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

8.2.6 Reservoir Operations:

Non - Disaster period:

- The Reservoir Operation Manual prescribing the Standard Operating Procedure (SOP) for release of water, prepared by the PWD units operating and maintaining projects after being periodically updated will need to be made available to the SEOC.
- The SEOC/DEOC will need to monitor the levels in all reservoirs - big and small - and maintain a position of alert to ensure that there is no system failure in monitoring.
- A similar procedure should be followed in all hydroelectric projects including run of river mode projects and clear cut hierarchy declared to the SEOC/DEOC on the protocol/ SOP for decision making on release of water and flood levels through the water course.
- A computerized reporting system may be devised to monitor the water discharge system in all the projects across the state so that there is adequate coordination amongst the various projects to avoid any kind of mishap.
- A robust warning system will need to be installed in the water discharge route that will caution the public about releases and flood levels reaching the danger mark.

- All the vulnerable points along the course of the waterway should be restricted in such a manner that it may be closed in the event of a flood level warning.
- Safety audit of all the projects should be got done through an independent agency.
- An Emergency Action Plan (EAP) for each dam is a crucial activity to minimize the loss of life and property and damage in the event of occurrence of any emergency situation.
- Periodical checking of the stability of bund/working of sluice gates have to be carried out without compromise

Inspirational Success practices during the Floods 2015

- Hon'ble Chief Minister of Tamil has spearheaded the disaster mitigation efforts in the State. During the unprecedented floods, the Hon'ble Chief Minister personally supervised evacuation of people living in low lying areas, setting up of relief camps, provision of food, safe drinking water and sanitation facilities, bring quick normalcy with regard to road traffic, power supply and communication network, assessment and release of funds for crop damages, enumeration and relief package to damaged huts and inundated houses, conduct of special camps etc.,
- Hon'ble Ministers and Senior I.A.S. Officers were deputed to the flood affected areas for vigorous coordination and monitoring.
- 6 teams of the State Disaster Response Force, 6 teams of the Coastal Security Group, 1,400 personnel of the fire and rescue department, 30,000 personnel of the Tamil Nadu Police and 45,000 staff drawn from the government departments were deployed. In all, more than 80,000 persons from the Government's side were involved in round the clock rescue and relief operations.
- Six helicopters of Air Force and two helicopters each of Navy and Coast Guard participated in rescue operations in marooned areas and airdropping of food material and drinking water.
- Nearly 23.51 lakhs persons were rescued and evacuated in 7244 relief camps and were provided with food, drinking water, medical care and other basic amenities.
- 31,320 Medical Camps were conducted and 32.46 Lakhs of people were treated in these camps. 690 metric tons of Milk powder was distributed to the families with young children in the relief camps. Nearly 5 Lakhs Sanitary napkins were distributed to women and Diapers were also provided to the children in the relief camps.

- 8025 Special Camps were conducted by Animal Husbandry Department for providing medicines, vaccination and fodder the Cattle.
- 37,707 students who have lost their text books, note books etc., have been issued text books, note books and one set of school uniforms.· 470 heavy duty pumps, 71 super sucker machines, 49 Fire and Rescue Department vehicles, 82 JCBs/ Poclains, 111 jet-rodding machines and 200 desilting machines were deployed to pump out the water or to cut open channels to dewater areas.
- 100% electricity distribution was restored in the affected area within three days.
- 90 fixed shops and 13 mobile shops have been opened by the Co-operative Societies to ensure adequate availability of Vegetables to the public.
- Chennai Petroleum Company Limited Refinery at Manali and depots of Oil Marketing Companies which faced major flooding were brought back in to normalcy within two days.
- To the extent of 75 per cent of the Telecommunication facilities were restored within three days.
- 32,000 sanitary workers including 7,000 sanitation and conservancy workers were drawn from various parts of the State to clear the flood debris and garbage in Chennai city.
- To prevent outbreak of diseases bleaching powder and other disinfectants were spreaded in the streets and half a kilo of bleaching powder was provided to each household to enable them to disinfect inundated houses. · To assure safety of potable water, double the usual dosage of chlorination was done at the source.
- 30 dedicated medical teams were deployed for disease surveillance and adequate quantities of medicine to last 3½ months were stocked to tackle the situation.
- 9.5 Lakhs farmers were provided Rs.407.57 Crore relief for crop damages in 3,88,371 Hectares
- 4,159 personnel were engaged for enumerating the affected families and ex-gratia reliefs of Rs. 5,000 to hut dwellers, and inundated were provided. The relief amount of Rs.1483.77 crore was credited to the bank account of the beneficiary through Electronic Clearing Service (ECS)
- 10 kg of rice, one saree and a dhoti were provided to the families who have lost their clothing, utensils and other household articles due to inundation of their huts.

- Special camps were organised for issue of certificates / documents viz., patta, educational certificates, Aadhar card, voter ID cards, bank pass books, RC books, driving licences etc. to persons who lost them in the floods. In total 1,29,147 applications were disposed through these camps.

8.3. TSUNAMI

8.3.1 Introduction

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). ITEWC has also been designated as the Regional Tsunami Service Provider (RTSP) to provide tsunami warnings to countries on the Indian Ocean Rim by the Intergovernmental Oceanographic Commission (IOC) of UNESCO.

When an earthquake occurs in a Tsunami genic 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. The information on the occurrence of a tsunami genic earthquake is also transmitted to the State Government. The levels of disaster can be confirmed based on the real time wave buoy and Bottom Pressure Recorder (BPR) data from the EWS. An earthquake with magnitude of 6.5 to 7.0 has lesser potential to generate Tsunami and earthquakes with magnitude more than 7.1 can generate large tsunami.

8.3.2 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. The status of hazard is modified according to the travel time. The expected wave height is also modified by the pressure and wave height data from the BPR and Wave buoy on real-time basis. Based on the data from BPR and the tsunami wave buoy, if the passage of tsunami is not detected or even if it passes and the

wave was insignificant and may not cause destruction even on a minor scale, the warning is cancelled and "*A Tsunami All Clear Bulletin*" is issued. The All Clear bulletin is also issued when all the waves, picked up by the tsunami wave buoy, reach the coast with or without destruction. The status of hazard will be modified according to the travel time. The expected wave height is also modified by the pressure and wave height data from the BPR and Wave buoy on real-time basis.

Any Tsunami originating in the Banda ache, Sumatra (***Andaman – Sunda*** *sub plate*) will take more than 60 minutes to reach Tamil Nadu. Hence, the alert is first issued and there is time for action. However, for regions like Andaman and Nicobar the time interval is very limited.

8.3.3 INCOIS and issue of bulletins

Over a period of four to five hours as many as six bulletins may be issued by INCOIS.

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. If the earthquake is in the subduction zone and has a magnitude of more than 6.3 and the depth of focus is less than 100 km, the bulletin is issued. The bulletin identifies the areas under warning and threat based on pre-run numerical models from which the expected wave height is estimated.

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 the tsunami passes the EWS instrumental setup i.e. BPR. Based on the water level and pressure data, the origin of the tsunami is confirmed in the Fourth Bulletin. The sea level data is crucial for confirming whether a tsunami has originated or not. The IV Bulletin is very important for regions like Tamil Nadu which are far from the tsunami genic source. If the threat is upgraded to **warning** status evacuation will have to 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 run-up is recorded when the tsunami reaches the near source regions and the magnitude of the tsunami is confirmed. If the run-up is insignificant in the near source regions, the warning is downgraded. When the earthquake is strike slip, without vertical displacement, it will not generate a significant tsunami. The threat is PASSED for individual zones.

The **Final - "ALL CLEAR" bulletin** is issued when water level from multiple gauges confirm that a tsunami has not been generated or if the tsunami has formed 120 minutes after the first wave or significant tsunami pass the tide gauges giving provision for subsequent waves.

8.3.4 Notification Phase

The Early Warning System setup by IMD and INCIOS under the Ministry of Earth Sciences, GoI, disseminates the information on the origin of the Cyclone and Tsunami as early as possible. In the case of a Cyclone, the formation of the cyclone may be made known even over 48 hrs before it strikes the coast but for Tsunami the time given is only 90 to 150 minutes. The notification of the hazard should be made taking into consideration the time interval left to prepare.

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. If earthquake of magnitude 6.5 and above occurs in ASIA-PACIFIC Region, ENS system initiates alarm. The information about the magnitude and location (latitude and longitude) will be displayed. A map feature is also available to identify the exact location of the earthquake.

8.3.5 Pre - Disaster:

- An earthquake with serious magnitude anywhere in and around the Bay of Bengal is good reason for the entire coastal region/districts to be on alert for the possibility of a tsunami.
- All coastal habitations should be warned if a tsunami is to strike. This will require a full-fledged warning system which can be triggered from a central location in each district. The DEOC will need to ensure that this is working during Non – Disaster period.
- The steps to be followed to mitigate the disaster due to tsunami are similar to those that are followed for that of Cyclones - hence the instructions to mitigate cyclonic effect disasters are relevant and should be followed.
- Natural Bio-shields will help break the impact of the tsunami.

Since tsunami is a disaster that has very little warning period, it demands the fastest response.

8.4 Drought

Drought is an universally acknowledged phenomenon associated with scarcity of water and is in all climatic zones. It is still largely unpredictable and varies with regard to the time of occurrence, duration, intensity, and extent of the area affected from year to year. It is a temporary condition

caused by significantly less rainfall for an extended period of time, usually during a season when substantial rainfall is normally expected over the area. The deficiency in the rainfall is measured relative to the long-period average of rainfall over the area. The severity of the drought can also be aggravated by other climatic factors such as high temperature, high wind and low humidity. With this background, Drought is broadly perceived in different ways.

1. **Meteorological drought:** When actual rainfall over an area is significantly less than the climatological mean.
2. **Hydrological drought:** When there is marked depletion of surface water causing very low stream flow and drying of lakes, reservoirs and rivers.
3. **Agricultural drought:** When inadequate soil moisture produces acute crop stress and affects productivity.
4. **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.

8.4.1 Pre Disaster and During Disaster:

- A Block-wise Drought Management plan will need to be prepared by the Agriculture department.
- Agriculture department will need to provide seeds for drought resistant crops and any other assistance. Soft loans, subsidies and micro credit may need to be arranged.
- Weekly monitoring of the season and crop condition from June onwards till the end of the season will be needed to make the required crop corrections.
- Drinking Water may need to be provided to the affected pockets with Lorries.
- Existing water sources such as ponds and small tanks may need simple treatment of bleaching powder to keep the water pure and free from contamination.
- The thrust will also have to be on employment generation schemes that will provide cash liquidity in the hands of the people to survive drought.

8.4.2 Non Disaster:

- Strengthening of storage levels of dams, reservoirs and canals for surface irrigation and percolation ponds and check dams will help to mitigate this disaster. This will also include effective desisting and clearing of encroachments in the supply and surplus run channels.
- Enforcement of laws regulating ground water levels is necessary before this disaster strikes.
- Agriculture department will need to play a major role in choice of drought resistant crops, improved techniques of irrigation and advising the farmer on crops that are likely to destroy livelihoods even if found successful initially.
- Popularizing rain-water harvesting techniques will need to be a priority.
- Advanced technologies of irrigation will need to be promoted such as drip and sprinkler irrigation and water harvesting for agricultural requirements. This will bear benefits in the long-term.
- In residential areas, water recycling for gardening purposes will ensure more economical use of water and promote water conservation. Similar to the insistence of rain water harvesting technology being incorporated in building plan approvals, the concept of water recycling technologies being integrated in building plans will need to find approval.
- Ensuring that parks and public spaces use recycled water will help to promote a culture of water conservation.
- In the long-term, a culture of respecting the water bodies that the state has and preservation and maintenance of the same is essential to keep Tamil Nadu a Drought free state.

8.5. Heat Waves

Extreme positive departures from the normal maximum temperature result in a heat wave during the summer season. The rising maximum temperature during the pre-monsoon months continues till June and in very rare cases till July over the north-western parts of the country. In recent years, heat wave casualties have increased. In India the heat wave took 3028 lives in 1998 and more than 2000 lives in 2002. In Odisha, heat wave caused 2042 deaths in 1998 and more than 1200 deaths in 2002 in southern India. In India it is estimated that heat-wave caused 22562 deaths from 1992 to 2015 in various states. Heat waves, apart from causing potential fatal condition among people may also cause death of wildlife, birds, poultry and animals in zoos in India.

8.5.1 Early Warning and Indicators of heat-wave

In response to the devastating mortality and morbidity of recent heat-wave events, many countries have introduced heat-wave early warning systems. 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. India Meteorological Department has developed criteria for heat waves based on the temperature at stations and is issuing weather warning forecasting on the level of Heat waves likely to prevail in the regions for 5 days at a time. The Regional Meteorological Centre (RMC) in Chennai has been publishing weather projections for Tamil Nadu on its website, keeping people informed with regular updates of projections of average temperatures for a week ahead for every district in the state. Such information can provide timely warning to the public to take adequate precautions to prevent being affected by the heat wave and thus mitigate the disaster.

8.5.2 During Disaster

- Healthcare professionals will need to advise on heat-related illnesses to reduce mortality and morbidity.
- Public need to be made aware on how to be protected against extreme heat wave conditions.
- Do's and Don'ts on heat-related illnesses must be widely publicized in press, television and social media.
- Educational institutions may need to rework the timings to lessen exposure to the heat wave.
- Local schools and colleges will need to equip teachers with knowledge on heat protection tips.
- Awareness needs to be built constantly - LED screens in public places can display temperatures and rolling forecasts.
- Stockpiling of ORS is necessary in Primary Health Care Centers.
- Making good drinking water available to the public in Bus Stands and other public places is necessary. Public minded citizens, Clubs, Associations, Educational Institutions, religious places and the like may be encouraged to provide simple shelters in public places that will have drinking water

8.6.Landslides

8.6.1 Introduction

The major landslides in Tamil Nadu are mostly found in the Nilgiris, parts of Eastern Ghats, Yelagiri and Shervory hills. Debris flows, mudslides or debris avalanches are common types of fast-moving landslides and generally occur during periods of intense rainfall. Disruption of traffic is a common phenomenon.

Background: Geological Survey of India issues alerts and warnings in the following categories:

1) **Category I:** Landslides of large dimensions that are located 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.

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

3) **Category III:** Landslides which are fairly large and affect infrastructural installations such as strategic and important highways and roads, rail routes and other civil installations like various appurtenant structures of hydroelectric and irrigation projects.

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

8.6.2: Indicators of Landside

The appearance of acute cracks, minor slips and scarps through which water seeps could lead to landslide. Water seeping in through the cracks, appearing as a stream, may see plants in the area being deprived of water. Large quantities of water flowing through the cracks have been reported before major slides. This indicator is key as it is known to occur three or four days before the slide and the other conditions may exist for several months before the rain that triggers it. Bending of trees, electric posts and other structures apart from sudden cracks in buildings are also indicators.

8.6.3 Awareness Activity

- Considering the indicators, the local Community holds the key in mitigating the disaster as they are the ones to first notice the possibility of a landslide. Community Level Teams need to be organized and trained to observe these changes/indicators and inform the authorities immediately. Evacuation may become necessary at a short notice.
- Awareness sessions will need to be held in educational institutions and localities to help people be alert to changes that are happening in their vicinity.

8.6.4 Pre-Disaster

- The season for heavy rainfall in hilly regions and districts will require advance planning by the District Administration to mobilize departments such as Forests, Police, Highways, Revenue, Development, HADP, Health, PWD and others and form them into teams in preparedness for this season. Teams deployed in advance at this stage will also help to identify locations that will need attention to prevent landslides.
- Landslides are known to disrupt traffic in a serious way. Hilly regions are exposed to this and it can lead to major inconvenience with several Kilometers of piled up traffic. Vulnerable locations will need to be identified and preventive measures such as retaining walls and other measures taken during the non-rainy season.
- Earthmoving equipment, Power saws and other heavy equipment that can be utilized to cut through concrete will need to be kept available at decentralized locations for the teams to use.
- The DDMA will need to assess the availability of equipment in the district to tackle these types of disasters. Power saws if not available in sufficient quantities will need to be procured.

8.6.5 Phase I. Notification Phase

Heavy rainfall during a short spell of time with significant antecedent rainfall triggers landslides. Landslides are often sudden.

- District Administration may keep hillsides prone to possibility of landslides under watch.
- The Fire and Rescue Department should be in preparation with their machinery and equipment for rescue.
- Medical preparedness is an important component of Disaster Management and hence, the team and ambulances should be in readiness and an advisory will be sent to Health authorities of the district.

8.6.6 Phase II: Response - During Disaster and Post Disaster

Landslides blocking traffic:

- If a landslide occurs on hilly roads, traffic will be disrupted and earthmoving equipment and power saws will need to be rushed to the spot and the debris cleared. Traffic pile-up will need immediate attention as traffic diversions will need to be organized at a good distance from the incident spot by the Traffic Police.

- Such landslides will result in people being stranded on the road amidst inclement weather. They may need food and water which should be arranged if the traffic disruption is likely to be prolonged.

Landslides in residential areas:

- Prompt and effective response system to limit the damage to life is essential when the alarm is set. DEOC will need to move as many people as possible out of the area and provide shelter (pl see Chapter Common Issues for more detailed steps for Disasters)
- Search and rescue teams will need to be activated immediately to undertake search and rescue activities. People may be trapped under the debris and for their rescue heavy equipment will be needed.
- The community level team is normally the first to respond and they should be fully supported and involved until the district administration teams arrive for search and rescue.
- The Health Department will need to deploy ambulances to the site for transporting those critically injured.
- The DEOC will make information available on location, magnitude of damage caused, fatalities, the number of houses damaged to the Fire and Rescue Department so as to commence rescue operations.
- The magnitude of the event should be assessed by DEOC based on information from India Meteorological Department. If the rainfall is exceeding the threshold, landslides may happen in several locations on the same day. If several landslides are expected or occurring, additional rescue forces will need to be mobilized from adjoining districts.
- The State Government may then decide on requesting the Army for assistance.
- A 'Missing persons counter' should be made available, for the community to report to. This will reduce the level of confusion as some may have just been displaced in the course of the disaster. This Counter should be manned 24 X 7. A list of missing people should be prepared at the end of the event and compared with the bodies extricated. The Community team will provide assistance as they will be able to identify those who are injured, dead and also those who are on the list but alive and well.
- People displaced due to houses affected by the landslide should be evacuated to safety shelters and arrangements made for food, water and clothing.

- Houses in the vicinity of the event should be assessed for their stability. People from houses facing threat should be evacuated and moved to safe shelters.
- The Police while maintaining law and order will need to assist the Fire and Rescue teams and the local Community in transport of injured. Regulating traffic to avoid disruption and keeping spectators at bay is an important activity as this will ensure that all disaster relief vehicles are able to access the spot of the disaster. The Home Guards will need to assist the Fire and Rescue Personnel and Police.
- Proper PA system should be made available in the vicinity for better crowd management.

8.6.7 Non- Disaster

- Districts that have the threat of landslides will need to develop landslide hazard, vulnerability and risk zone maps that will serve as a guide for the future teams that have to deal with the issue.
- Training programs be organised for professionals such as civil engineers and geologist for landslide mapping, investigation techniques, analysis and observational practices.
- Creating awareness in the community regarding safety measures in areas that are prone to landslides is necessary.
- Revisiting land use management in Hill areas where landslides have occurred will be essential to reduce damage.

8.7 EARTHQUAKE

8.7.1 Introduction

An Earthquake is a sudden event and gives hardly any time to react. Early warning or prediction of an earthquake is not easy. Preparing for an emergency situation in advance will save precious lives, infrastructures and facilities. Death and destruction happen due to falling of buildings, infrastructure or other hanging / flying objects.

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. The IMD estimates the earthquake source parameters on the occurrence of earthquake and disseminates information to all the concerned agencies responsible for relief and rehabilitation measures. The SEOC will provide the information to the districts likely to be affected. In Tamil Nadu, three seismological network stations are available and the details are as follows;

Locations of seismological monitoring centers

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

The Anna University, Chennai also monitors seismological events from four different locations namely:

1) Ranipettai Engineering College, Wallajah

2) Bharathidasan Institute of Technology, Tiruppattur

3) Idhaya Engineeering College, Chinna Salem

4) Periyar Maniammai Engineering College, Hosur

8.7.2 Non-Disaster and Pre-Disaster

As there is no warning time for an earthquake and these two phases merge into one.

- Precautionary steps in construction related activities are the only way to mitigating earthquake related disasters.
- Vulnerability and Risk Assessment will need to be done in earthquake prone areas and accordingly zoned and the district administration made aware of the same. The vulnerability and risk assessment map should then be made available to DDMA / TNSDMA.
- Awareness is necessary among different stakeholders ranging from the communities involved, Builders, contractors, government officials and others.
- The stability of existing buildings will need to be assessed.
- Earthquake resistance features need to be promoted in such zones by the Town planning departments. Training sessions need to be organized for Builders, Contractors and Real Estate promoters until such a time that it has been fully assimilated in the community.
- Building Technologies that have been successful in countries exposed to frequent earthquakes need to be promoted[1]

- A permanent exhibition center will need to be created in such zones to provide a model approach to construction that the average citizen can relate to. A model home - to indicate the style of construction at different stages - could also serve to bring greater awareness.
- Large buildings such as Community halls, Marriage halls, Malls, Theatres and the like will need design compatibility with earthquake resistant structures.
- Educational institutions for Architects, both public and private, will need to be directed to incorporate design elements of earthquake resistant technology into their syllabi.

8.7.3 During the Disaster

- Occurrence of the earthquake will need to be disseminated in all available means and the DEOC shall take extra efforts to do so.
- The only option in an event of an earthquake happening is to leave the building immediately and move into an open space where one does not have to be threatened by falling objects. This should be announced in the media by SEOC / DEOC .

8.7.4 Post Disaster

- Search and Rescue measures and Post disaster Relief as outlined in Chapter 6 are relevant in dealing with the situation.

8.8 CHEMICAL INDUSTRIAL DISASTER

8.8.1 Introduction

All Major Accident Hazard (MAH) Industries are expected to prepare an Onsite Emergency Plan under MSIHC Rules. Three different groups are visualized in evolving a proper Offsite Emergency/ Disaster Management Plan. They are:

- Local Crisis Group
- District Crisis Group
- State Crisis Management Group

Although the regional, state and national agencies can provide assistance in an emergency, the response to a chemical disaster is primarily local. LCG is the Local Crisis Group available at the industrial cluster level, whereas DCG is the District Crisis Group and is the next level of response. Often, LCGs are not available in which case the DCG level is the immediate level of response.

8.8.2 Composition of Local Crisis Group and District Crisis Group

The LCG is normally headed by the Revenue Divisional Officer as Chairperson with Director of Industrial Safety and Health as the Member Secretary and other members including the Fire Officer, Inspector of Police and others. The District Level Crisis Group (DCG) will be headed by the District Collector as Chairperson and the Inspector of Factories as Member Secretary and others Members such as Superintending Engineer TNEB, District Fire Officer, Controller of Explosives, Superintendent of Police, Joint Director Health, Commissioner of Municipal Corporation, District Environmental Engineer TNPCB, Regional Transport Officer and a few others which will include representatives from the industry.

8.8.3 Functions of Local Crisis Group

- It is the body at the industrial pocket to deal with chemical accidents and coordinates efforts in planning, preparedness and mitigation;
- To prepare the local emergency plan for the industrial pocket that they are located in;
- To ensure dovetailing of the local emergency plan with that of the District off-site emergency plan;
- Rigorous training of personnel involved in chemical accident management;
- Educate the public about the steps to be taken in case of an emergency;
- Conduct at least one mock drill once in every year;
- A periodical report to the district crisis group regarding mock drills and preparedness;
- To respond to all public enquires on the subject.

8.8.4 The District Level Group has the following responsibilities

- Apex bod3y in the district to deal with any major chemical accident and to provide guidance. Assist in the preparation of the district offsite Emergency Plan.
- Review all the onsite plans prepared by the occupier of MAH units.
- Assist District Administration in the management of chemical accidents.
- Ensure continuous information flow from the District to Central and State crisis groups regarding accident situation and mitigation efforts.
- Forward a report of the chemical accident within 15 days to the State Crisis Group.
- Conduct at least one full scale mock drill of a chemical accident at a Site each year and forward a report on the strength and weakness of the plan to the State crisis group.

8.8.5 Levels of Emergency

- 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.

8.8.6 Non - Disaster

The tasks involved in reducing the risks of chemical disasters are given below:

- Risk assessment; categorizing industries hazard wise i.e., Highly Hazardous , hazardous, less hazardous;
- Develop worst case scenario models for Identifying the high risk areas ranging from habitations, infrastructure, development;
- Safety Mechanism to be examined for transportation of hazardous chemicals in the area;
- Hazardous substance safety measures of a well-controlled environment to be developed and maintained;
- Planning permission of any factory or industry should consider the land use planning in view of hazard, risk and vulnerabilities involved so as to ensure that safety is the prime factor;
- Demarcating "Green area" and remove vulnerable habitations in and around such industries;
- Ensuring the building of robust structures to withstand mishaps (fires, explosions, and toxic releases, Chemical spillage or spills);
- Regular structural safety inspections and audit that will check on the safety of storage points Infrastructure and pipe lines of chemical/gas or oil installations;

- Existing constructions and infrastructure to be retrofitted to manage high wind velocity, earthquake, and tsunami;
- Involving industries in reduction of toxic exposure through minimizing use and storage volumes wherever possible;
- Implement risk management programs designed to minimize opportunities for releases to occur, and mitigate any release that does occur at the source with fail safe systems(passive), and install secondary active mitigation systems (like water curtains), flairs and vent stacks.
- Implement land-use restrictions to provide minimum safe distances from sources to public and sensitive receptors. This is especially critical for a zone where even a rapid and qualified response may not be able to save lives.
- Planning for a combination of shelters and evacuation programs in a complimentary manner. A “key-hole” sheltering concept is ideal and is such that the population within a plume shelter and adjacent populations are evacuated. Both concepts require public warning systems that initiate the community action plan immediately and are either automatic or initiated through a formal system.
- Maintaining basic emergency capability to respond to everyday emergencies such as fire and medical. A strong emergency response (fire, police, medical) is an essential building block to build chemical emergency response capability. Maintaining a rapid (timely) and qualified (well trained and equipped) chemical emergency response capacity to control and reduce the quantity of hazardous chemical leaked and duration of such leak. This requires an extremely effective trigger mechanism for an immediate response.
- Establishing plans, developing public warning systems, and conducting public outreach and training on evacuation and shelter in place is essential. The public needs to be trained on the actions expected of them based on the warning systems.
- The CII in tandem with the departments concerned need to coordinate and prepare on-site and off-site emergency plans to manage chemical and industrial disasters.
- Conducting of mock drills as per the regulations and updating the plan.

8.9. Management of Contamination

8.9.1 Contamination of Water Supply

The management of incidents of CBRN contamination of water supply provides for a model SOP as given below which needs to be followed.

8.9.2 Incident Reporting

Any breach of security or suspected event of accidental or intentional contamination will need to be communicated to the Executive Engineer and others in charge of the water facility through the quickest possible means. The local police, law enforcement and intelligence agencies will also need to be informed and physical quarantine done of the contaminated site. The incident would also need to be reported to SEOC witha request for any help as assessed.

8.9.3 Site Characterization

The water supply incharge along with law enforcement agencies should visit the site and carry out on-site inspection for the identification of physical evidence to confirm the incident. Police & Law enforcement agencies would collect and preserve physical evidence for further investigation and necessary action. Water facility in charge will also need to make an initial hazard assessment based on available evidence to determine the need for specialized men, material, techniques or equipment to deal with the problem. Based on the findings of the initial site evaluation, both inflow and outflow of water supply should be stopped immediately.

8.9.4 Preliminary Screening

Specifically trained public health personnel should be deployed for sample collection and spot-testing. The sample would be collected from the nearest point. A sample collected would be divided into two, one for spot testing and another for laboratory testing. The first set would be subjected to spot testing by prescribed methods. Once the incident and nature of contamination is established, the same would be communicated to the district administration in precise and clear language for activating their crisis management plan. Following a positive screening, second half of the sample would be immediately sent to pre identified reference laboratories in consultation with TNSDMA

8.9.5 Risk Communication

The District administration will then need to make a public announcement of a contamination event in clear and precise language along with requisite precautions to be taken. All care will need to be taken to avoid an undue panic situation.

8.9.6 Alternate Supply

The concerned Executive Engineer in association with district administration would also need to make alternate water supply arrangements. In the absence of alternate supply, water would need to be decontaminated through reverse osmosis. The mobile water purification van developed by DRDO will be of help for which NDMA will need to be contacted.

8.9.7 Decontamination

Supply lines and storage facilities will need to be decontaminated using appropriate and available technology such as Reverse Osmosis, Carbon Columns and other Water Purification Systems (WPS) suitable for purification of water contaminated by CBRN agents. The State Pollution Board has the necessary expertise to advice on this issue.

TWAD Board should be the nodal agency for decontamination process since it is the premier agency having necessary expertise to advice on this issue than the Pollution Board.

8.9.8 Restoration of supply

Following repair and decontamination of facilities, a fresh water sample will need to be retested and certified for public consumption.

8.10 Nuclear and Radiological Emergency Scenarios

8.10.1 Introduction

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.

8.10.2 Preparedness for Radiological Emergency

- Any unusual event relating to the loss of source or excessive exposure to a person or contamination will be informed to Atomic Energy Regulatory Board and CMG-DAE, and the nearest Emergency Response Center.There are 3 such ERCs viz. At Kalpakkam, Kudankulam and Manavalakurichi.

- The user industry/facility, along with experts/professionals from DAE units/AERB, will promptly provide expert services in radiation protection to assist the local officials and first responders in mitigating an emergency from a radioactive source or for searching and sealing of the lost source.

8.10.3 Preparedness for Radiological Dispersal Device

The tasks to be undertaken by TNSDMA / DDMA in consultation/coordination with DAE, DRDO and AERB and with assistance from MHA, involve inter alia, preparedness in the following main areas, viz.:

1. The affected persons and area will have to be monitored for contamination levels.
2. The first responders have to be suitably equipped to measure the radiation levels and have the necessary kit to protect them.
3. There will also be a need to monitor a large number of persons after an RDD explosion and handle large amounts of radioactive wastes arising out of a change of clothing, showering or washing.
4. A list of the agencies to be contacted by the public in case of a suspected presence of radioactivity will need to be made available to all citizens.

8.10.4 Mock Drills

Conduct of mock drills at the nuclear facilities for plant, on-site, and off-site emergencies every quarterly, annually and once in two years is necessary. It will test the effectiveness of the response plans including evacuation process, shelter management and communication.

8.10.5 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.

The following procedure shall be followed in such situations:

- The field functionary at ground zero shall inform the District Emergency Operation Centre (DEOC)/ the Commissioner of Police in Chennai and the SEOC. Immediately thereafter, personnel from the AERC will determine the source of the radioactive

emission and its strength and report the same to the Commissioner of Police. In non-Metropolitan Area, the District Collector will inform the SEOC for carrying out the function. The SEC shall convene a meeting under the chairmanship of the Chief Secretary and chart the plan of action.

- The TNSDMA shall inform the National Emergency Operation Center (NEOC) and if required, coordinate with DAE-CMG and Bhabha Atomic Research Center (BARC) for specialized support team from the 22 ERCs.
- The District Collector/Commissioner of Police of Chennai shall ensure full activation of the DEOC.
- Health Secretary shall place medical and para-medical teams if required at the disposal of the Incident Commander.
- SEOC/DEOC shall also coordinate immediate evacuation of potentially affected civilians with the District Collector and other line departments.
- Team for Rapid Assessment of damage shall be deployed.
- The Chemical Biological Nuclear and Radiological team (CBRN) shall be formed and deployed to ground zero

Note: Chemical Biological Nuclear and Radiological (CBRN), teams will need to be to be set up in the SEOC.

Considering the nature of a Nuclear Emergency either possible due to transport of Nuclear material or an incident in a Nuclear Plant, the TNSDMA will eventually develop a well-defined protocol that can be activated at the time of an Emergency in coordination with the AERB and the senior management of the two Nuclear Plants. Preparation for such an eventuality can also create unnecessary panic and hence needs to be handled carefully in a sensitive manner.

*The people centered advisory, Do's and Don'ts during various disasters has been detailed in Annexure-I

CHAPTER IX

MAINSTREAMING CONCERNS INTO DEVELOPMENTAL PLANS / PROGRAMS AND PROJECTS

Chapter IX

Mainstreaming concerns into Developmental Plans / Programs and Projects

Mainstreaming Disaster Management 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 the hazard.

Every development plan in the state would require incorporating elements of impact assessment, risk reduction, and adoption the '***Do No Harm***' approach. Measures such as urban planning and zoning, upgradation of building codes their enforcement, adoption of disaster resilient housing designs and flood proofing, response preparedness planning, insurance, establishment of early warning systems generating community awareness, creating technical competence and promoting research among engineers, architects, health experts will be taken on priority.

9.1 Inclusion of Disaster Risk Reduction (DRR) in Development Planning

The current level of urbanization is likely to increase. Urbanization is inevitable and growing at a fast pace, urban settlements are bound to be confronted with problems of greater magnitude in terms of shelter options, cramped living spaces, problems of transportation, access to facilities, services etc and above all the climate change, mainstreaming Disaster Risk Reduction (DRR) issues in Development Plans etc are to be interlinked vertically and horizontally for fail safe infrastructures in Tamil Nadu.

The Major challenges which will be addressed are as follows:

9.1.1 Technical

- Risk Identification & Assessment
- Vulnerability Assessment
- Identification and optimum utilization of local resources.
- Monitoring the DMP plans of all Projects
- Integration of development plans with Disaster Management Plan

9.1.2 Regulatory

- Development of Law
- Up-gradation of Building Bylaws
- Building Inspection and compliance of BIS
- Soil Improvement measures
- Disaster Risk assessment as part of project planning
- Mandatory geological &geotechnical examination of all engineering programmes

9.1.3 Organizational

Achieving Greater Integration between State, District, Taluk, Block & Panchayat level governance through:

- Sensitizing professionals and people about DRR issues. Sensitization community and NGO's towards disaster mitigation and projecting DRR as a new challenge for all ULBs and PRIs.
- Creating an enabling environment through capacity building of stakeholders,
- Use of information on hazard potential, incorporating earthquake resistant features in buildings and infrastructure and undertaking flood control measures, Integrating disaster vulnerability into land-use planning,
- Implementing regulatory measures in industrial zones such as Land use plans, zonal development and layout plans
- Facilitating setting up of Disaster Management Cells in Industrial belts through Industrial Associations
- Generating preparedness and emergency management capacity at all levels.
- Manage and enhance the capacity of ULBs for Minimization the hazard risks and Establishing institutional framework
- Facilitating structural and non-structural interventions

9.1.4 Disaster Risk Reduction Initiatives

- Mapping hazard prone areas at the block level in respect of earthquake, floods, landslides, drought, urban flood and other man made & environmental hazards.

- Devising appropriate zoning regulation.
- Implementation and enforcement of zoning regulations and building bye laws
- Vulnerability Assessment of buildings
- Feasibility study for retrofitting of residential and lifeline buildings
- Adoption of villages and communities by private project proponents for disaster preparedness and capacity building.

9.2 The Legal Context

The DM Act mandated the DDMA 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 therefore" and to "review the development plans of the different departments of the State and ensure that prevention and mitigation measures are integrated therein".

Under Section 38 (2) (e) of the Act the State Government is to ensure that the integration of measures for prevention of disaster or mitigation have been incorporated by the departments of the Government of the State in their development plans and projects. The State Government is further to ensure integration of measures to reduce or mitigate the vulnerability of different parts of the State to different disasters in the state development plan {38 (2) (f}.

9.3 Mainstreaming DRR into Development

Purpose of Mainstreaming

Mainstreaming Disaster Risk Reduction will have the following objectives.

- To make certain that all the development programmes and projects that originate from or funded by the Government are designated with consideration for reducing the risks.
- To make certain that all the development programmes and projects that originate from or are funded by the Government do not inadvertently increase vulnerability to disaster in all sectors: social, physical, economic and environment.
- To make certain that all the disaster relief and rehabilitation programmes and projects that originate or are funded by the Government are designed to contribute to development aims and to reduce future disaster risk.
- To make certain that area specific plan (prone to disasters) are prepared so as to enable convergence of all future development programmes and projects to reduce the risks.

DRR refers to the measures used to reduce direct, indirect and intangible disaster losses. The measures may be technical, economic or social. DRR encompasses the two aspects of a disaster reduction strategy: '*mitigation*' and '*preparedness*'. Mitigation refers to measures aimed at reducing the risk, impact or effects of a disaster or threatening disaster situation, whereas, preparedness refers to the measures undertaken to ensure the readiness and ability of a society to forecast and take precautionary measures in advance of imminent threat, and respond and cope with the effects of a disaster by organising and delivering timely and effective rescue, relief and other post-disaster assistance.

'Mainstreaming DRR' means completely institutionalizing DRR within the development and recovery agenda. Accordingly, the following broad objectives of mainstreaming DRR into Development will be encouraged:

- Ongoing schemes and projects of the Ministries and Departments of GoI and GoTN, as well as of all Government agencies and Institutions, including Public Sector Undertakings, will be selectively audited by designated government agencies for ensuring that they have addressed the disaster risk and vulnerability profiles of the local areas where such schemes and activities are being undertaken.
- At conceptualization or funding stage itself, the developmental schemes will be designed with consideration of any potential hazardous impact associated with it and incorporate measures for mitigation of the same.
- All the developmental schemes will be pragmatic, incorporating the awareness of local disaster risk and vulnerability, and ensuring that the schemes have addressed these concerns and included specific provisions for mitigating such disaster concerns; and
- DDMA's will ensure that all the disaster relief and recovery programmes and projects that originate from or are funded by any agency satisfy developmental aims and reduce future disaster risks.

Several ongoing programs will need to incorporate Disaster Risk Reduction components and that includes Tamil Nadu Village Habitations Improvement Scheme which aims to provide minimum basic infrastructure facilities for all habitations; the solar-powered greenhouse scheme; the Rural Building Maintenance and Renovation Scheme; Housing schemes which include the Indira Awas Yojana; Mahatma Gandhi National Rural Employment Guarantee Scheme; Pradan Mantri Gram Sadak Yojana and several other schemes. A brief look at some of these schemes and what integrating and convergence of Disaster Risk Reduction will entail is outlined below:

9.3.1 Indira Awas Yojana (IAY)

Inclusion of measures such as application of Hazard resistant design in construction of IAY houses; appropriate sites for IAY housing as to avoid disaster prone locations; Development of model disaster resistant design for lAY houses and Capacity Building of Rural masons on safe construction.

9.3.2 Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS)

Utilisation of MGNREGS funds to reduce the vulnerability of Panchayat as against natural hazards such as landslide, drought, forest fire, cloudburst, flash floods, earthquake and others; Giving priority to works which reduce the vulnerability of areas over works which enhance the vulnerability of the area to natural hazards; Identifying works that are available taking into account the hazard profile and offering continuous employment opportunities in the event of disasters to ensure livelihood security.

9.3.3 Pradhan Mantri Gram Sadak Yojana

The Master Plan for rural roads, the district rural road plan and identification of core network under the planning process of this scheme would need to explicitly address the disaster risk reduction concerns and accord priority to connect vulnerable habitations.; The technical guidelines should explicitly provide for suitable protection and inclusion of disaster risk concerns explicitly - provision of cross drainage, slope stabilization, protection works - especially in flood and landslide prone areas.

9.3.4 Sarva Shiksa Abiyan

Development of a Policy paper on school safety; Introducing school safety as a part of the guidelines of SSA which is currently focusing on inclusive development; Developing structurally safe model designs for schools; Introducing School Safety in the Teacher's Training Curriculum; Training of Rural Engineers appointed under SSA Scheme as well as the SSA State Coordinators; and Training of masons in rural areas.

9.3.5 Rajiv Awas Yojana

As slum dwellers often become the most vulnerable community during disasters such as floods, fire, high wind speed - Rajiv Awas Yojana which is focusing on developing slum free cities and capacity Building and community mobilization can work towards community level disaster preparedness through this program. The Housing schemes to be implemented in cities need to incorporate hazard resistant features.

9.3.6 National Rural Health Mission

The Health department will need toensure that the Village Health Plan and the District Health Plan addresses the disaster risk reduction concerns in vulnerable habitations and vulnerable districts; Provide training to health workers on disaster health preparedness and response; Strengthen Disease Health Surveillance system in rural areas; Ensure the structural safety of PHCs and other health care service delivery centers in rural areas; Arrange for training of doctors and hospital staff on mass casualty management and emergency medicine that are likely to occur during a disaster.

9.3.7 Coastal Disaster Risk Reduction Project (CDRRP)

As savings were anticipated from the funds assisted by World Bank under ETRP and with a view to utilize the savings, the ETRP was restructured to include the reduction of vulnerability of coastal communities. Though there were some works pending, the ETRP was closed on 31.12.2011. Simultaneously, all the erstwhile ETRP are being continued under State Fund vide G.O. Ms. No.179, Revenue (DM 4.1) Department, dated 29.05.2012. In order to take up risk reduction initiatives, a new Coastal Disaster Risk Reduction Project has been proposed with the intention to include new capacity building initiatives in risk reduction / mitigation and the unfinished works of ETRP with World Bank assistance for a period of five years. Additionally laying underground of electricity cables of TANGEDCO in the most vulnerable coastal Districts of Cuddalore and Nagapattinam and Vellankanni has been included. The appraisal of the project was held in March and the agreement with World Bank signed in June 2013.

The Project encompass the components, viz. Vulnerability Reduction through infrastructures such as permanent houses, evacuation shelters and routes, and resilient electrical networks, Sustainable Fisheries, Capacity building in Disaster Risk Management ,Implementation Support and Contingency Emergency Response and the project components are at various stage of progress.

9.3.8 Mainstreaming Disaster Management in Educational Institutions

The education sector plays a critical role to develop a sense of social and civic responsibility towards preparedness and also to build capacities to meet emergencies to develop into responsible citizens of the future. In order to inculcate within them an ethos of prevention and preparedness, large-scale awareness and knowledge generation needs to be emphasized within the formal and informal systems of education in schools and colleges.

- The Universities functioning in the State will need to incorporate disaster management and disaster resistant development practices as specific components in professional and technical education curricula like medicine, nursing, engineering, environmental sciences, architecture & town and country planning. A committee of experts in the field will need to advise the education departments on the matter.

- The State Disaster Management Authority, in consultation with the Department of Higher Education and eminent experts in the field will develop specific guidelines for incorporating disaster education in professional and technical curricula.

The list given above is indicative and needs to be extrapolated to ALL programs in ALL departments

9.4 Approaches for Mainstreaming

The following approaches of mainstreaming disaster management into the development process and development plans will be adopted.

1. Structural Measures
2. Non Structural Measures
3. Disaster Mitigation Projects
4. Integration and Convergence of Development Projects.

9.5 Mainstreaming DRR – A multidimensional task

9.5.1 Carrying out of cross-sectorial risk analysis

Cross - sectorial risk analysis needs to be carried out at State, local as well as regional level. Ongoing schemes across the sectors will be critically revisited and wherever possible the development aspects of these schemes will be integrated for a better result. This will be done in a futuristic mode with immediate, medium and long term planning.

9.5.2 Private-Public Partnership

In the present scenario, it is visualized that more and more unorganized and organized private sectors would play a major role in developmental activities. It is important to foster collaboration with the private sector in a Public-Private partnership to address the implementation of DRR in development initiative. This partnership could play a key role in communication, infrastructure, market, health and many other areas.

9.5.3 Research and development

It is one of the major elements of mainstreaming disaster mitigation/reduction into development. R&D capacity in earthquake, flood, drought, climate change, industrial, nuclear disasters and many other fields must identify areas and strategies how to identify risk at the early stage in a holistic manner and minimize it by suitably integrating mitigation measures into the development model.

9.5.4 Mainstreaming of Gender

Promoting gender sensitive disaster risk reduction measures are:

- Ensure gender sensitive economic decision-making, land ownership and use, natural resource management, and human and social development in order to increase the capacity of women and men to live more safely in hazards prone environments.
- Increase access of women to economic resources, transportation and housing.
- Ensure that the voices of women survivors and responders are heard when decisions are made, relationships forged and agendas set.
- Engage women as equal partners in disaster risk management and include women's organizations in broad-based community disaster coalitions.
- Utilize women's resources, including their leadership skills, informal and formal community networks, family, community and environmental knowledge and professional and technical expertise.
- Develop context specific guidelines for disaster response for key groups of women such as pregnant and lactating women, unaccompanied girl, minors etc.

9.5.5 Mainstreaming Disaster Management in all training programs

Initiatives will be taken to ensure intensive training and retraining for building up of human resources, especially to improve disaster awareness, safety and capabilities of disaster managers.

9.5.6 Civil Defense

Civil Defense will act as a major force in emergency response and it will be the integral part of the Incident Command and Emergency Response System of the State. The State will strengthen and upgrade the facility of the Civil Defense according to the vulnerability of the State due to various hazards. Department of Civil Defense will incorporate disaster mitigation, prevention and preparedness in their regular budget submitted to the state government department. Home department will in turn be responsible for developing and building capacity of the State Civil Defense system. Department of Home of the state will constitute a committee on revamping Civil Defense. The Committee will also look into the role of NSS, NCC and Nehru Yuva Kendra (NYK) for integrating them into emergency response mechanism.

9.5.7 Volunteers

Voluntary groups will be identified and trained to support the government effort at the time of disaster, in a coordinated manner so that efficient response and speedy relief is afforded to the affected people.

Volunteering assumes further importance in a disaster situation because very often, the government machinery does not have the required credibility, both with the public as well as with the media. Hence, if a volunteer group involves itself in a systematic, effective and well-coordinated manner, there would be a sense of transparency in the operations and even political interference would be minimized.

9.5.8 Recognition of best efforts

Recognition of efforts is one of the best incentives that promotes and attracts many to emulate the best practice in implementing DRR in development. It also acts as a stimulant for the recipients to carry on the good work and innovate ways the efforts will have far reaching results across the society.

CHAPTER X

FINANCIAL ARRANGEMENTS

Chapter X

Financial Arrangements

10.1 Approach

With the change of paradigm shift in DM from the relief-centric to proactive approach of prevention, preparedness, mitigation, response, relief, rehabilitation and reconstruction, the effort would be made to mainstream and integrate disaster risk reduction and emergency response in the development process, plans and programmes of the Government at all levels. This would be done by involving all the stakeholders including Government Organizations, research and academic institutions, private sector, industries, Civil Society Organization and community. SDMA and DDMA will ensure mainstreaming of disaster risk reduction in the development agenda of all existing and new developmental programmes and projects which shall incorporate disaster resilient specifications in design and construction. Due weightage will be given to these factors while allocating resources.

As per the section (49) of the Disaster Management Act, 2005, every department of the state government shall make provisions in their annual budget for carrying out the activities and programmes set out in their disaster management plans. The planning department will be advised to make necessary budget allocation for meeting the disaster management requirement.

10.2 Fourteenth Finance Commission

The Fourteenth Finance Commission (FFC) has acknowledged the present arrangements as regards financing of Disaster Management with reference to the National Calamity Contingency Fund and the Calamity Relief Fund and the funds envisaged in the Disaster Management Act, 2005 (Act 53 of 2005) and has recommended that up to 10 percent of the funds available under the SDRF can be used by a State for occurrences which State considers to be 'Disasters' within its local context and which are not in the notified list of disasters of the Ministry of Home Affairs. The FFC has also recommend to expedite the development and scientific validation of the Hazard, Vulnerability and Risk Profiles of States.

As per Commission's recommendation, the contribution to the SDR Fund should be shared between the Centre and States in the ratio of 75:25 for general category States .

10.3 Responsibilities of the State Departments and Agencies

It is mandatory and incumbent on departments to identify specific budget heads to cover activities identified as disaster management specific to the departments.

All State Government Departments, Boards, Corporations, PRIs and ULBS will prepare their DM plans, including the financial projections to support these plans. The necessary financial allocations will be made as part of their annual budgetary allocations, and ongoing programmes. They will also identify mitigation projects and project them for funding in consultation with the SDMA/DDMA to the appropriate funding agency. The guidelines issued by the NDMA vis-a-vis various disasters may be consulted while preparing mitigation projects.

10.4 State Government Funding

As stated in the section (48) of the DM Act 2005, the State Government shall establish for the purposes of the Act the following funds:

a) State Disaster Response Fund: This fund will be constituted and made available to the SEC for meeting the expenses for emergency response, relief and rehabilitation.

b) District Disaster Response fund: This fund will be constituted and made available to the District Disaster Management Authority for meeting the expenses for emergency response, relief and rehabilitation.

c) State Disaster Mitigation Fund: This fund will be constituted and made available to the SEC for meeting the expenses on mitigation activities.

d) District Disaster Mitigation Fund: This fund will be constituted and made available to the District Disaster Management Authority for meeting the expenses on mitigation activities.

10.5 Central Government Funding

The National Disaster Responsse Fund (NDRF) have been made available to the National Executive Committee (NEC) to be applied towards meeting the expenses for emergency response, relief and rehabilitation in accordance with the guidelines laid down by the Central Government in consulation with the National Authority.

10.6 Fund assistance for Natural Calamities-2015-16

For meeting expenditure on Natural Calamities in Tamil Nadu funds have been allotted by State and Central Government to a tune of Rs. 1, 812.78 crores during the year 2015-16. Expenditure has been incurred on notified calamities in the state during the during the year. Due unprecedent heavy rain during the Northeast Monsoon (*Oct-December, 2015*) and to meet the heavy loss to lives and properties, GoTN have realesed Rs. 1299.61 crores over and above the SDRF/NDRF fund sanctioned.

The Disaster Management activities in the State are carried out under the direct supervision of the Hon'able Chief Minister, Finance Minister, Revenue Minister, Chief Secretary, Finance Secretary, Revenue Secretary and State Relief Commissioner.

The relief measures are implemented and monitored at the State Level by the Commissioner of Revenue Administration in his capacity as State Relief Commissioner and the Director, Disaster Management in TNSDMA. The District Collector ensure that the relief measures reach to the affected communities at last mile scale.

Apart from the above specified, there are a number of funds that may be generated by means of;

- Project funds from Government of India
- State special funds
- State Development fund
- Departmental specific project funds
- Project fund/ soft loans from International agencies

CHAPTER XI

REVIEW AND UPDATION OF PLANS

Chapter XI

Review and Updation of Plans

The State Disaster Management Plan is a "*living document*" capturing the profile of Disasters which are dynamic in nature to ensure that all the stake holders revise their strategies based on emerging needs. In order to incorporate new stratergies, the SEC will review and update the State level and District level plans annually taking into consideration

- Changing profiles of Disasters
- Technological upgradations
- Updates on human resources
- New and Emerging trends and issues
- Ongoing projects and programs
- The resource requirements

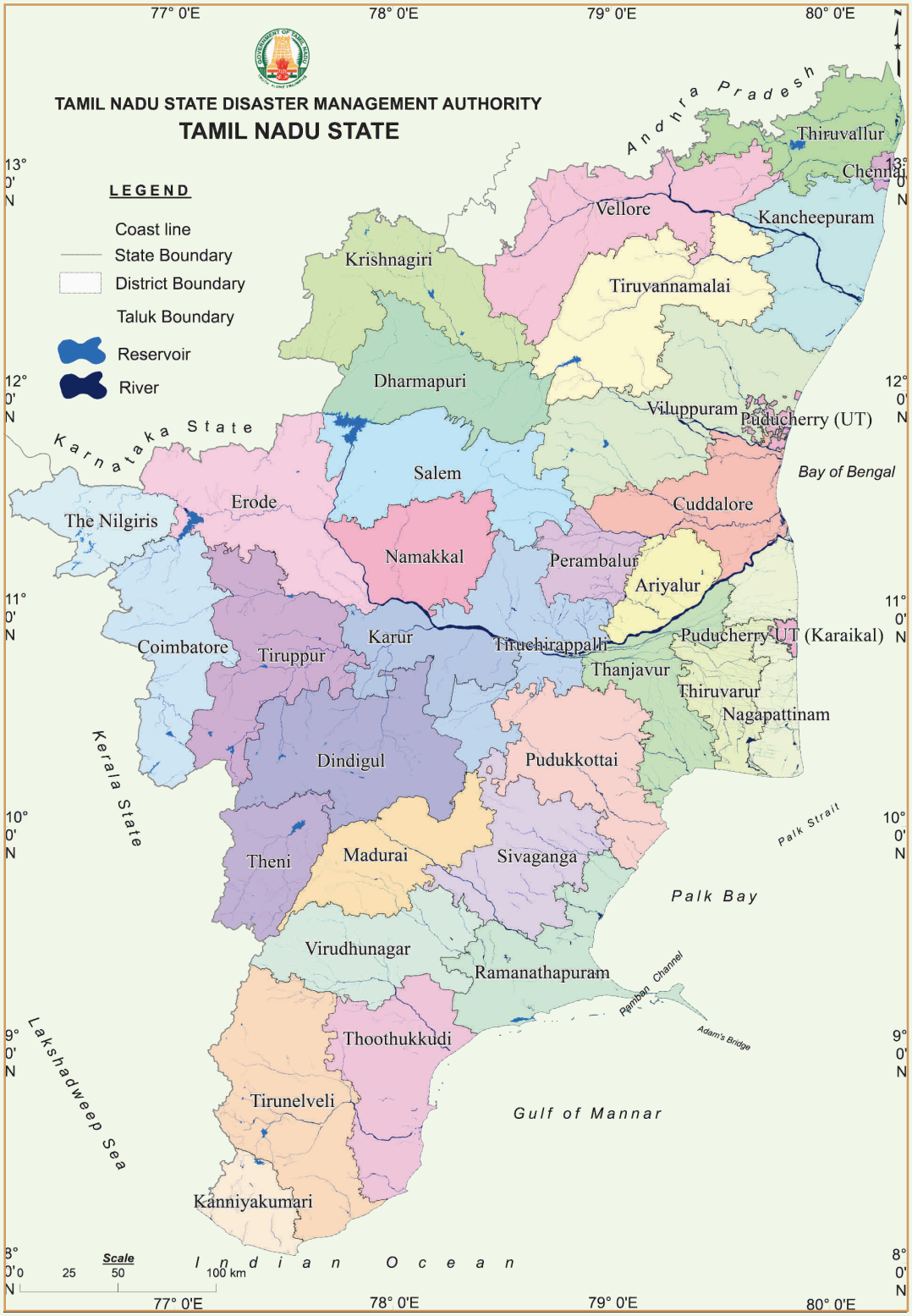
CHAPTER XII

MAPS RELATED TO THE STATE OF TAMIL NADU

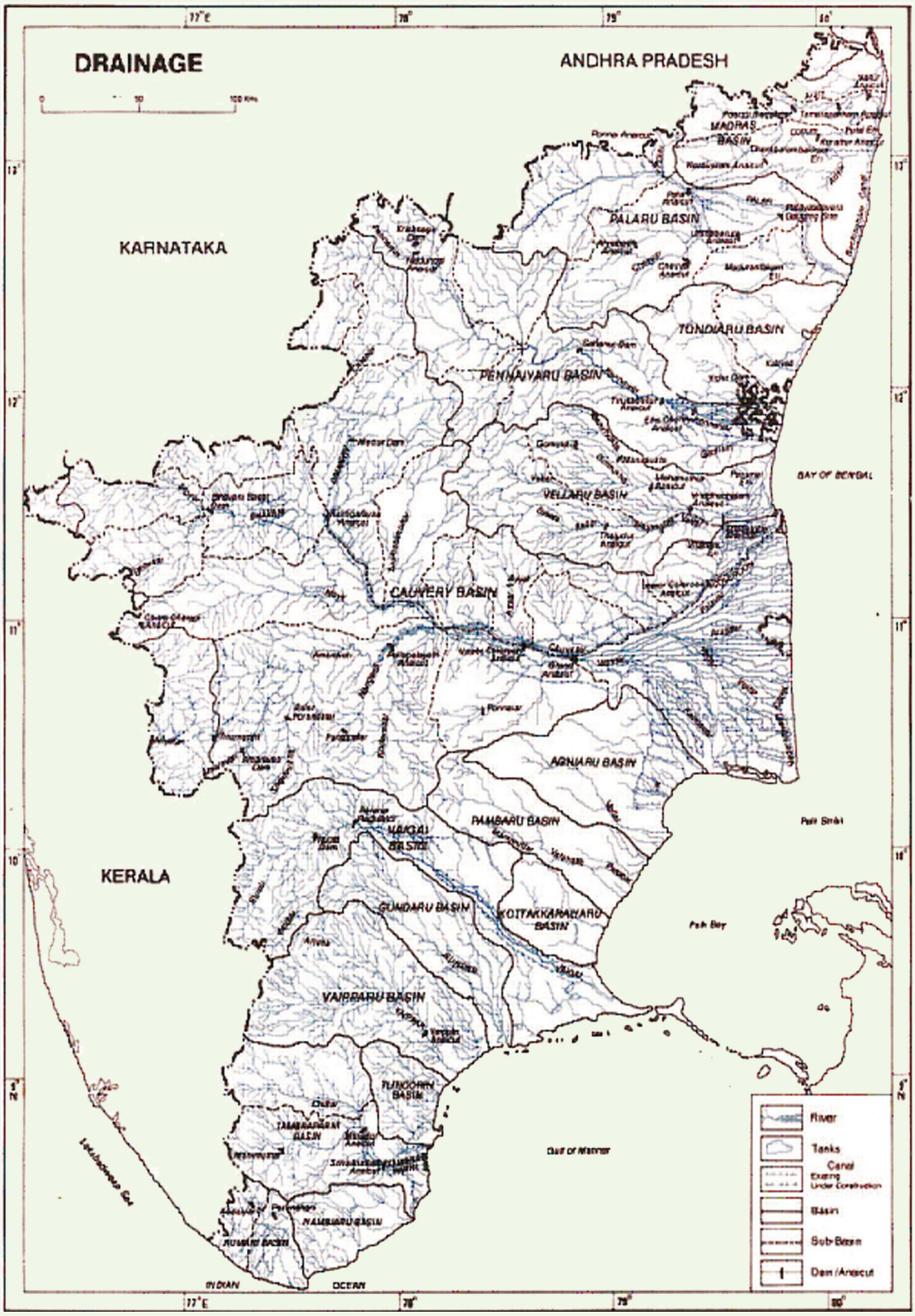
Chapter XII

Maps related to the State of Tamil Nadu

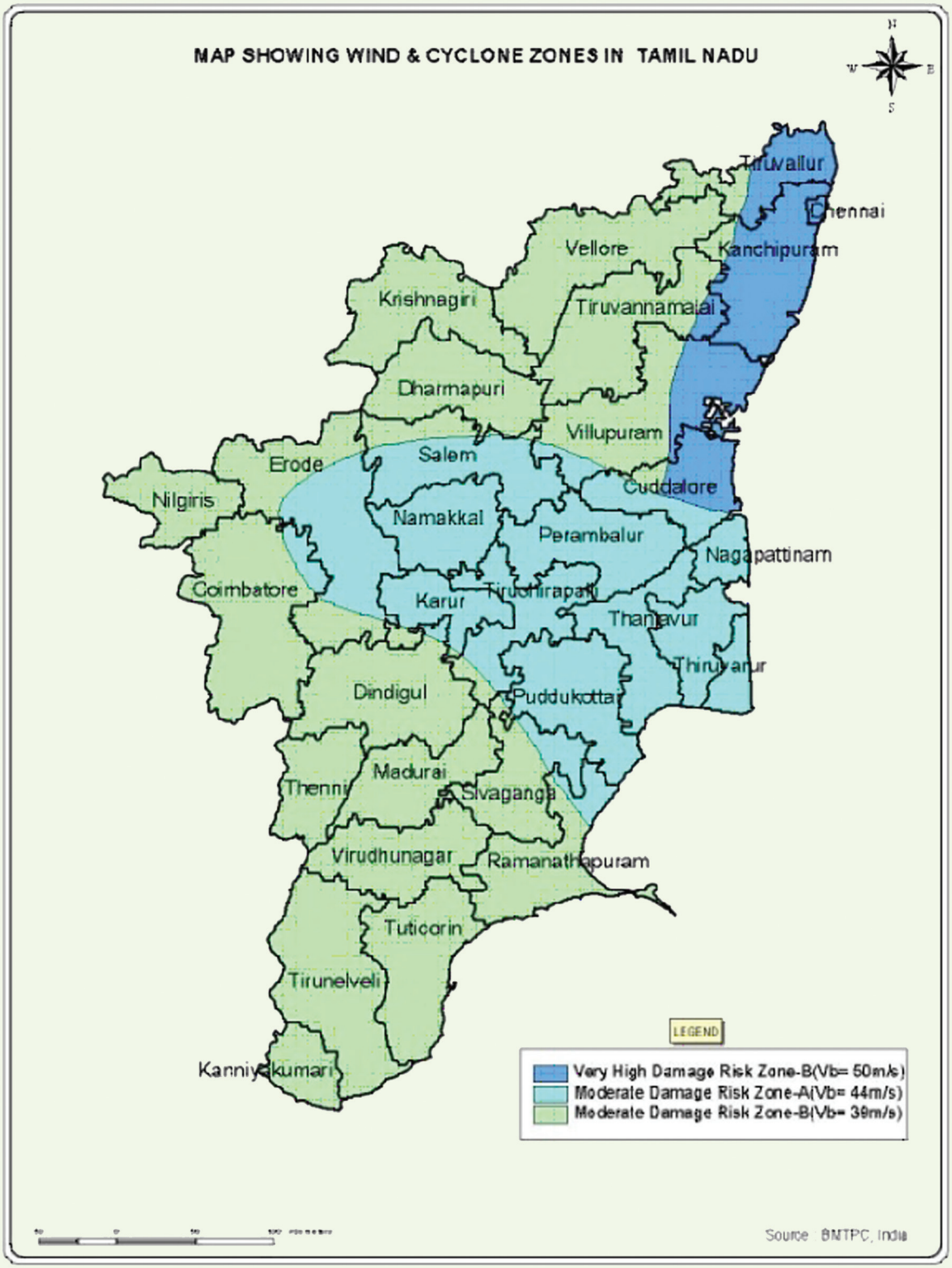
Administrative Divisions of Tamil Nadu



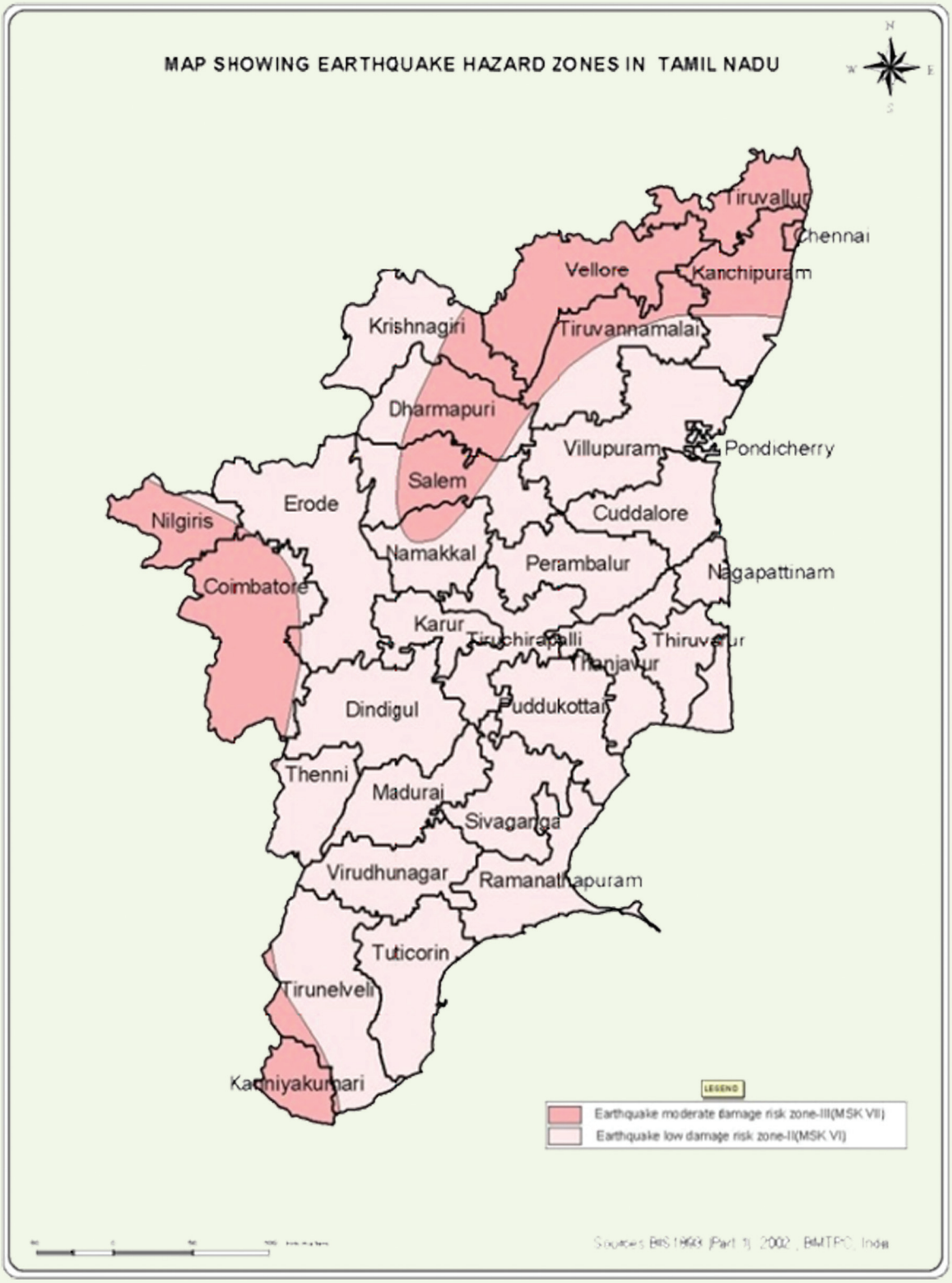
Drainage System of Tamil Nadu



Wind & Cyclone Zones in Tamil nadu



Earthquake Hazard Zones in Tamil nadu



ANNEXURE - I

PEOPLE CENTERED ADVISORY

Annexure - I

People Centered Advisory

(Do's and Dont's during disasters)

CYCLONE

Before the Cyclone season:

- Check the house; secure loose tiles and carry out repairs of doors and windows
- Remove dead branches or dying trees close to the house; anchor removable objects such as lumber piles, loose tin sheets, loose bricks, garbage cans, sign-boards etc. which can fly in strong winds
- Keep some wooden boards ready so that glass windows can be boarded if needed
- Keep a hurricane lantern filled with kerosene, battery operated torches and enough dry cells
- Demolish condemned buildings
- Keep some extra batteries for transistors
- Keep some dry non-perishable food always ready for use in emergency

Necessary actions

The actions that need to be taken in the event of a cyclone threat can broadly be divided into :

- Immediately before the cyclone season
- When cyclone alerts and warnings are communicated
- When evacuations are advised
- When the cyclone has crossed the coast

When the Cyclone starts

- Listen to the radio (All India Radio stations give weather warnings).
- Keep monitoring the warnings. This will help you prepare for a cyclone emergency.
- Pass the information to others.
- Ignore rumors and do not spread them; this will help to avoid panic situations.
- Believe in the official information

- When a cyclone alert is on for your area continue normal working but stay alert to the radio warnings.
- Stay alert for the next 24 hours as a cyclone alert means that the danger is within 24 hours.

When your area is under cyclone warning get away from low-lying beaches or other low-lying areas close to the coast

- Leave early before your way to high ground or shelter gets flooded
- Do not delay and run the risk of being marooned
- If your house is securely built on high ground take shelter in the safe part of the house. However, if asked to evacuate do not hesitate to leave the place.
- Board up glass windows or put storm shutters in place.
- Provide strong suitable support for outside doors.
- If you do not have wooden boards handy, paste paper strips on glasses to prevent splinters. However, this may not avoid breaking windows.
- Get extra food, which can be eaten without cooking. Store extra drinking water in suitably covered vessels.
- If you have to evacuate the house move your valuable articles to upper floors to minimize flood damage.
- Ensure that your hurricane lantern, torches or other emergency lights are in working condition and keep them handy.
- Small and loose things, which can fly in strong winds, should be stored safely in a room.
- Be sure that a window and door can be opened only on the side opposite to the one facing the wind.
- Make provision for children and adults requiring special diet.
- If the centre of the cyclone is passing directly over your house there will be a lull in the wind and rain lasting for half an hour or so. During this time do not go out; because immediately after that, very strong winds will blow from the opposite direction.
- Switch off the electrical mains in your house.
- Remain calm.

When Evacuation is instructed

- Pack essentials for yourself and your family to last a few days. These should include medicines, special food for babies and children or elders.
- Head for the proper shelter or evacuation points indicated for your area.
- Do not worry about your property
- At the shelter follow instructions of the person in charge.
- Remain in the shelter until you are informed to leave

Post-cyclone measures

- You should remain in the shelter until informed that you can return to your home.
- You must get inoculated against diseases immediately.
- Strictly avoid any loose and dangling wires from lamp posts.
- If you have to drive, do drive carefully.
- Clear debris from your premises immediately.
- Report the correct losses to appropriate authorities.

FLOODS

What to do before a flood

To prepare for a flood, you should:

- Avoid building in flood prone areas unless you elevate and reinforce your home.
- Elevate the furnace, water heater, and electric panel if susceptible to flooding.
- Install “Check Valves” in sewer traps to prevent floodwater from backing up into the drains of your home.
- Contact community officials to find out if they are planning to construct barriers (levees, beams and floodwalls) to stop floodwater from entering the homes in your area.
- Seal the walls in your basement with waterproofing compounds to avoid seepage.

If a flood is likely to hit your area, you should:

- Listen to the radio or television for information.
- Be aware that flash flooding can occur. If there is any possibility of a flash flood, move immediately to higher ground. Do not wait for instructions to move.
- Be aware of streams, drainage channels, canyons, and other areas known to flood suddenly. Flash floods can occur in these areas with or without such typical warnings as rain clouds or heavy rain.

If you must prepare to evacuate, you should:

- Secure your home. If you have time, bring in outdoor furniture. Move essential items to an upper floor.
- Turn off utilities at the main switches or valves if instructed to do so. Disconnect electrical appliances. Do not touch electrical equipment if you are wet or standing in water.

If you have to leave your home, remember these evacuation tips:

- Do not walk through moving water. Six inches of moving water can make you fall. If you have to walk in water, walk where the water is not moving. Use a stick to check the firmness of the ground in front of you.
- Do not drive into flooded areas. If floodwaters rise around your car, abandon the car and move to higher ground if you can do so safely. You and the vehicle can be quickly swept away.

TSUNAMI

Do's & Don'ts

- You should find out if your home, school, workplace, or other frequently visited locations are in tsunami hazard areas along sea-shore.
- Know the height of your street above sea level and the distance of your street from the coast or other high-risk waters. (Local administration may put sign boards).
- Plan evacuation routes from your home, school, workplace, or any other place you could be where tsunamis present a risk.
- If your children's school is in an identified inundation zone, find out what the school evacuation plan is.

- Practice your evacuation routes.
- Use a Weather Radio or stay tuned to a local radio or television station to keep informed of local watches and warnings.
- Talk to your insurance agent. Homeowners' policies may not cover flooding from a tsunami. Ask the Insurance Agent about the benefits from Multi-Hazard Insurance Schemes.
- Discuss tsunamis with your family. Everyone should know what to do in a tsunami situation. Discussing tsunamis ahead of time will help reduce fear and save precious time in an emergency. Review flood safety and preparedness measures with your family.

If you are in an area at Risk fromTsunami

- You should find out if your home, school, workplace, or other frequently visited locations are in tsunami hazard areas.
- Know the height of your street above sea level and the distance of your street from the coast or other high-risk waters. (Local administration may put sign boards). Also find out the height above sea level and the distance from the coast of outbuildings that house animals, as well as pastures or corrals.
- Plan evacuation routes from your home, school, workplace, or any other place you could be where tsunamis present a risk. If possible, pick areas (30 meters) above sea level or go as far as 3 kilometres inland, away from the coastline. If you cannot get this high or far, go as high or far as you can. Every meter inland or upward may make a difference. You should be able to reach your safe location on foot within 15 minutes. After a disaster, roads may become blocked or unusable. Be prepared to evacuate by foot if necessary. Footpaths normally lead uphill and inland, while many roads parallel coastlines. Follow posted tsunami evacuation routes; these will lead to safety. Local emergency management officials can advise you on the best route to safety and likely shelter locations.
- If your children's school is in an identified inundation zone, find out what the school evacuation plan is. Find out if the plan requires you to pick your children up from school or from another location. Telephone lines during a tsunami watch or warning may be overloaded and routes to and from schools may be jammed.
- Practice your evacuation routes. Familiarity may save your life. Be able to follow your escape route at night and during inclement weather. Practicing your plan makes the

appropriate response more of a reaction, requiring less thinking during an actual emergency situation.

- Use a Weather Radio or stay tuned to a local radio or television station to keep informed of local watches and warnings.
- Talk to your insurance agent. Homeowners' policies may not cover flooding from a tsunami. Ask the Insurance Agent about the benefits from Multi-Hazard Insurance Schemes.
- Discuss tsunamis with your family. Everyone should know what to do in a tsunami situation. Discussing tsunamis ahead of time will help reduce fear and save precious time in an emergency. Review flood safety and preparedness measures with your family.

If you are visiting an area at Risk from Tsunami

- Check with the hotel or campground operators for tsunami evacuation information and find out what the warning system is for tsunamis. It is important to know designated escape routes before a warning is issued.
- One of the early warning signals of a tsunami is that the sea water recedes several meters, exposing fish on shallow waters or on the beaches. If you see the sea water receding, you must immediately leave the beach and go to higher ground far away from the beach.
- Protect Your Property
- You should avoid building or living in buildings within 200 meters of the high tide coastline.
- These areas are more likely to experience damage from tsunamis, strong winds, or coastal storms.
- Make a list of items to bring inside in the event of a tsunami.
- A list will help you remember anything that can be swept away by tsunami water.
- Elevate coastal homes.
- Most tsunami waves are less than 3 meters. Elevating your house will help reduce damage to your property from most tsunamis.
- Take precautions to prevent flooding.
- Have an engineer check your home and advise about ways to make it more resistant to tsunami water.

- There may be ways to divert waves away from your property. Improperly built walls could make your situation worse. Consult with a professional for advice.
- Ensure that any outbuildings, pastures, or corrals are protected in the same way as your home. When installing or changing fence lines, consider placing them in such a way that your animals are able to move to higher ground in the event of a tsunami.

What to Do if You Feel a Strong Coastal Earthquake

If you feel an earthquake that lasts 20 seconds or longer when you are in a coastal area, you should:

- Drop, cover, and hold on. You should first protect yourself from the earthquake damages.
- When the shaking stops.
- Gather members of your household and move quickly to higher ground away from the coast. A tsunami may be coming within minutes.
- Avoid downed power lines and stay away from damaged buildings and bridges from which Heavy objects might fall during an aftershock.
- If you are on land
- Be aware of tsunami facts. This knowledge could save your life! Share this knowledge with your relatives and friends. It could save their lives!
- If you are in school and you hear there is a tsunami warning,
- You should follow the advice of teachers and other school personnel.
- If you are at home and hear there is a tsunami warning.
- You should make sure your entire family is aware of the warning. Your family should evacuate your house if you live in a tsunami evacuation zone. Move in an orderly, calm and safe manner to the evacuation site or to any safe place outside your evacuation zone. Follow the advice of local emergency and law enforcement authorities.
- If you are at the beach or near the ocean and you feel the earth shake,
- Move immediately to higher ground, DO NOT wait for a tsunami warning to be announced. Stay away from rivers and streams that lead to the ocean as you would stay away from the beach and ocean if there is a tsunami. A regional tsunami from a local earthquake could strike some areas before a tsunami warning could be announced.

- Tsunamis generated in distant locations will generally give people enough time to move to higher ground. For locally-generated tsunamis, where you might feel the ground shake, you may only have a few minutes to move to higher ground.
- High, multi-storied, reinforced concrete hotels are located in many low-lying coastal areas. The upper floors of these hotels can provide a safe place to find refuge should there be a tsunami warning and you cannot move quickly inland to higher ground.
- Homes and small buildings located in low-lying coastal areas are not designed to withstand tsunami impacts. Do not stay in these structures should there be a tsunami warning.
- Offshore reefs and shallow areas may help break the force of tsunami waves, but large and dangerous wave can still be a threat to coastal residents in these areas.
- Staying away from all low-lying areas is the safest advice when there is a tsunami warning.
- If you are on a boat,
- Since tsunami wave activity is imperceptible in the open ocean, do not return to port if you are at sea and a tsunami warning has been issued for your area. Tsunamis can cause rapid changes in water level and unpredictable dangerous currents in harbours and ports.
- If there is time to move your boat or ship from port to deep water (after a tsunami warning has been issued), you should weigh the following considerations:
- Most large harbours and ports are under the control of a harbor authority and/or a vessel traffic system. These authorities direct operations during periods of increased readiness (should a tsunami be expected), including the forced movement of vessels if deemed necessary. Keep in contact with the authorities should a forced movement of vessel be directed.
- Smaller ports may not be under the control of a harbor authority. If you are aware there is a tsunami warning and you have time to move your vessel to deep water, then you may want to do so in an orderly manner, in consideration of other vessels.
- Owners of small boats may find it safest to leave their boat at the pier and physically move to higher ground, particularly in the event of a locally-generated tsunami.

- Concurrent severe weather conditions (rough seas outside of safe harbor) could present a greater hazardous situation to small boats, so physically moving yourself to higher ground may be the only option.
- Damaging wave activity and unpredictable currents can affect harbours for a period of time following the initial tsunami impact on the coast. Contact the harbor authority before returning to port making sure to verify that conditions in the harbor are safe for navigation and berthing.

What to do after a Tsunami

- You should continue using a Weather Radio or staying tuned to a Coast Guard emergency frequency station or a local radio or television station for updated emergency information.
- The Tsunami may have damaged roads, bridges, or other places that may be unsafe.
- Check yourself for injuries and get first aid if necessary before helping injured or trapped persons.
- If someone needs to be rescued, call professionals with the right equipment to help.
- Help people who require special assistance— Infants, elderly people, those without transportation, large families who may need additional help in an emergency situation, people with disabilities, and the people who care for them.
- Avoid disaster areas.
- Your presence might hamper rescue and other emergency operations and put you at further risk from the residual effects of floods, such as contaminated water, crumbled roads, landslides, mudflows, and other hazards.
- Use the telephone only for emergency calls. Telephone lines are frequently overwhelmed in disaster situations. They need to be clear for emergency calls to get through.
- Stay out of a building if water remains around it. Tsunami water, like floodwater, can undermine foundations, causing buildings to sink, floors to crack, or walls to collapse.
- When re-entering buildings or homes, use extreme caution. Tsunami-driven floodwater may have damaged buildings where you least expect it. Carefully watch every step you take.
- Wear long pants, a long-sleeved shirt, and sturdy shoes. The most common injury following a disaster is cut feet.

- Use battery-powered lanterns or flashlights when examining buildings. Battery-powered lighting is the safest and easiest to use, and it does not present a fire hazard for the user, occupants, or building. DO NOT USE CANDLES.
- Examine walls, floors, doors, staircases, and windows to make sure that the building is not in danger of collapsing. Inspect foundations for cracks or other damage. Cracks and damage to a foundation can render a building uninhabitable.
- Look for fire hazards. Under the earthquake action there may be broken or leaking gas lines, and under the tsunami flooded electrical circuits, or submerged furnaces or electrical appliances. Flammable or explosive
- materials may have come from upstream. Fire is the most frequent hazard following floods.
- Check for gas leaks. If you smell gas or hear a blowing or hissing noise, open a window and get everyone outside quickly. Turn off the gas using the outside main valve if you can, and call the gas company from a neighbor's home. If you turn off the gas for any reason, it must be turned back on by a professional.
- Look for electrical system damage. If you see sparks or broken or frayed wires, or if you smell burning insulation, turn off the electricity at the main fuse box or circuit breaker. If you have to step in water to get to the fuse box or circuit breaker, call an electrician first for advice. Electrical equipment should be checked and dried before being returned to service.
- Check for damage to sewage and water lines. If you suspect sewage lines are damaged under the quake, avoid using the toilets and call a plumber. If water pipes are damaged, contact the water company and avoid using water from the tap. You can obtain safe water from undamaged water heaters or by melting ice cubes that were made before the tsunami hit. Turn off the main water valve before draining water from these sources. Use tap water only if local health officials advise it is safe.
- Watch out for wild animals, especially poisonous snakes that may have come into buildings with the water. Use a stick to poke through debris. Tsunami floodwater flushes snakes and animals out of their homes.
- Watch for loose plaster, drywall, and ceilings that could fall.
- Take pictures of the damage, both of the building and its contents, for insurance claims. Open the windows and doors to help dry the building.

- Shovel mud before it solidifies.
- Check food supplies.
- Any food that has come in contact with floodwater may be contaminated and should be thrown out.
- Expect aftershocks. If the earthquake is of large magnitude (magnitude 8 to 9+ on the Richter scale) and located nearby, some aftershocks could be as large as magnitude 7+ and capable of generating another tsunami. The number of aftershocks will decrease over the course of several days, weeks, or months depending on how large the main shock was.
- Watch your animals closely. Keep all your animals under your direct control. Hazardous materials abound in flooded areas. Your pets may be able to escape from your home or through a broken fence. Pets may become disoriented, particularly because flooding usually affects scent markers that normally allow them to find their homes. The behavior of pets may change dramatically after any disruption, becoming aggressive or defensive, so be aware of their well-being and take measures to protect them from hazards, including displaced wild animals, and to ensure the safety of other people and animals.

HEAT WAVES

Heat Wave conditions can result in physiological strain, which could even result in death.

To minimize the impact during the heat wave and to prevent serious ailment or death because of heat stroke, you can take the following measures:

Do's & Dont's

- Avoid going out in the sun, especially between 12.00 noon and 3.00 p.m.
- Drink sufficient water and as often as possible, even if not thirsty
- Wear lightweight, light-colored, loose, and porous cotton clothes. Use protective goggles, umbrella/hat, shoes or chappals while going out in sun.
- Avoid strenuous activities when the outside temperature is high. Avoid working outside between 12 noon and 3 p.m.
- While travelling, carry water with you.
- Avoid alcohol, tea, coffee and carbonated soft drinks, which dehydrates the body.
- Avoid high-protein food and do not eat stale food.

- If you work outside, use a hat or an umbrella and also use a damp cloth on your head, neck, face and limbs
- Do not leave children or pets in parked vehicles
- If you feel faint or ill, see a doctor immediately.
- Use ORS, homemade drinks like lassi, torani (rice water), lemon water, buttermilk, etc. which helps to re-hydrate the body.
- Keep animals in shade and give them plenty of water to drink.
- Keep your home cool, use curtains, shutters or sunshade and open windows at night.
- Use fans, damp clothing and take bath in cold water frequently.

TIPS FOR TREATMENT OF A PERSON AFFECTED BY A SUNSTROKE

- Lay the person in a cool place, under a shade. Wipe her/him with a wet cloth/wash the body frequently. Pour normal temperature water on the head. The main thing is to bring down the body temperature.
- Give the person ORS to drink or lemon sarbat/torani or whatever is useful to rehydrate the body.
- Take the person immediately to the nearest health centre. The patient needs immediate hospitalization, as heat strokes could be fatal.

Acclimatization

People at risk are those who have come from a cooler climate to a hot climate. You may have such a person(s) visiting your family during the heat wave season. They should not move about in open field for a period of one week till the body is acclimatized to heat and should drink plenty of water. Acclimatization is achieved by gradual exposure to the hot environment during heat wave

LANDSLIDES

We cannot stop disaster but minimize its impact by preparing ourselves better for landslides. Following are the precautionary measures for landslides in the form of do's and don'ts as given below:

Do's & Dont's

- Prepare tour to hilly region according to information given by weather department or news channel.
- Move away from landslide path or downstream valleys quickly without wasting time.
- Keep drains clean,
- Inspect drains for - litter, leaves, plastic bags, rubble etc.
- Keep the weep holes open.
- Grow more trees that can hold the soil through roots,
- Identify areas of rock fall and subsidence of buildings, cracks that indicate landslides and move to safer areas. Even muddy river waters indicate landslides upstream.
- Notice such signals and contact the nearest Tehsil or District Head Quarters.
- Ensure that toe of slope is not cut, remains protected, don't uproot trees unless re-vegetation is planned.
- Listen for unusual sounds such as trees cracking or boulders knocking together.
- Stay alert, awake and active (3A's) during the impact or probability of impact.
- Locate and go to shelters,
- Try to stay with your family and companions.
- Check for injured and trapped persons.
- Mark path of tracking so that you can't be lost in middle of the forest.
- Know how to give signs or how to communicate during emergency time to flying helicopters and rescue team.

Don'ts

- Try to avoid construction and staying in vulnerable areas.
- Do not panic and loose energy by crying.
- Do not touch or walk over loose material and electrical wiring or pole.
- Do not built houses near steep slopes and near drainage path.

- Do not drink contaminated water directly from rivers, springs, wells but rain water if collected directly without is fine.
- Do not move an injured person without rendering first aid unless the casualty is in immediate danger.

EARTHQUAKE

Do's & Don'ts

What to Do Before an Earthquake

- Repair deep plaster cracks in ceilings and foundations. Get expert advice if there are signs of structural defects.
- Anchor overhead lighting fixtures to the ceiling.
- Follow BIS codes relevant to your area for building standards
- Fasten shelves securely to walls.
- Place large or heavy objects on lower shelves.
- Store breakable items such as bottled foods, glass, and china in low, closed cabinets with latches.
- Hang heavy items such as pictures and mirrors away from beds, settees, and anywhere that people sit.
- Brace overhead light and fan fixtures.
- Repair defective electrical wiring and leaky gas connections. These are potential fire risks.
- Secure water heaters, LPG cylinders etc., by strapping them to the walls or bolting to the floor.
- Store weed killers, pesticides, and flammable products securely in closed cabinets with latches and on bottom shelves.
- Identify safe places indoors and outdoors like,
- Under strong dining table, bed
- Against an inside wall

- Away from where glass could shatter around windows, mirrors, pictures, or where heavy bookcases or other heavy furniture could fall over
- In the open, away from buildings, trees, telephone and electrical lines, flyovers and bridges
- Know emergency telephone numbers (such as those of doctors, hospitals, the police, etc)
- Educate yourself and family members

Have a disaster emergency kit ready

- Battery operated torch with extra batteries
- Battery operated radio
- First aid kit and manual
- Emergency food (dry items) and water (packed and sealed)
- Candles and matches in a waterproof container
- Knife
- Chlorine tablets or powdered water purifiers
- Can opener.
- Essential medicines
- Cash and credit cards
- Thick ropes and cords
- Sturdy shoes

Develop an emergency communication plan

- In case family members are separated from one another during an earthquake (a real possibility during the day when adults are at work and children are at school), develop a plan for reuniting after the disaster.
- Ask an out-of-state relative or friend to serve as the 'family contact' after the disaster; it is often easier to call long distance. Make sure everyone in the family knows the name, address, and phone number of the contact person.

Help your community get ready

- Publish a special section in your local newspaper with emergency information on earthquakes. Localize the information by printing the phone numbers of local emergency services offices and hospitals.
- Conduct week-long series on locating hazards in the home.
- Work with local emergency services and officials to prepare special reports for people with mobility impairment on what to do during an earthquake.
- Provide tips on conducting earthquake drills in the home.
- Interview representatives of the gas, electric, and water companies about shutting off utilities.
- Work together in your community to apply your knowledge to building codes, retrofitting programmes, hazard hunts, and neighborhood and family emergency plans.

What to Do During an Earthquake

Stay as safe as possible during an earthquake. Be aware that some earthquakes are actually foreshocks and a larger earthquake might occur. Minimize your movements to a few steps that reach a nearby safe place and stay indoors until the shaking has stopped and you are sure exiting is safe.

If indoors

- DROP to the ground; take COVER by getting under a sturdy table or other piece of furniture; and HOLD ON until the shaking stops. If there is no a table or desk near you, cover your face and head with your arms and crouch in an inside corner of the building.
- Protect yourself by staying under the lintel of an inner door, in the corner of a room, under a table or even under a bed.
- Stay away from glass, windows, outside doors and walls, and anything that could fall, (such as lighting fixtures or furniture).
- Stay in bed if you are there when the earthquake strikes. Hold on and protect your head with a pillow, unless you are under a heavy light fixture that could fall. In that case, move to the nearest safe place.
- Use a doorway for shelter only if it is in close proximity to you and if you know it is a strongly supported, load bearing doorway.

- Stay inside until the shaking stops and it is safe to go outside. Research has shown that most injuries occur when people inside buildings attempt to move to a different location inside the building or try to leave
- Be aware that the electricity may go out or the sprinkler systems or fire alarms may turn on.

If outdoors

- Do not move from where you are. However, move away from buildings, trees, streetlights, and utility wires.
- If you are in open space, stay there until the shaking stops. The greatest danger exists directly outside buildings; at exits; and alongside exterior walls. Most earthquake-related casualties result from collapsing walls, flying glass, and falling objects.

If in a moving vehicle

- Stop as quickly as safety permits and stay in the vehicle. Avoid stopping near or under buildings, trees, overpasses, and utility wires.
- Proceed cautiously once the earthquake has stopped. Avoid roads, bridges, or ramps that might have been damaged by the earthquake.

If trapped under debris

- Do not light a match.
- Do not move about or kick up dust.
- Cover your mouth with a handkerchief or clothing.
- Tap on a pipe or wall so rescuers can locate you. Use a whistle if one is available. Shout only as a last resort. Shouting can cause you to inhale dangerous amounts of dust.

Annexure - II

Revised list of Items and Norms of Assistance from State Disaster Response Fund (SDRF) and National Disaster Response Fund (NDRF)

GRATUITOUS RELIEF (a) Ex-gratia payment to families of deceased persons	Rs.4.00 lakh per deceased person including those involved in relief operations or associated in preparedness activities, subject to certification regarding cause of death from appropriate authority.
(b) Ex-gratia payment for loss of a limb or eye(s)	(i) Rs. 59,100/- per person, when the disability is between 40% and 60% (ii) Rs.2.00 lakh per person when the disability is more than 60% Subject to certification by a doctor from a hospital or dispensary of Government, regarding extent and cause of disability.
(c) Grievous injury requiring hospitalisation	(i) Rs.12,700/- per person requiring hospitalization more than a week
	(ii) Rs.4,300/- per person requiring hospitalization for less than a week
(d) Clothing and utensils / household goods for families whose houses have been washed away / fully damaged / severely inundated for more than two days due to a Natural Calamity	Rs.1800/- per family for loss of clothing
	Rs.2000/- per family for loss of utensils / household goods.

(e) Gratuitous Relief for families whose livelihood is seriously affected.	Rs.60/- per adult and Rs.45/- per child, not housed in relief camps. The Tahsildar shall verify and prepare a list of those affected and identify the beneficiaries. Period of providing gratuitous relief will be as per assessment of State Executive Committee and the Central Team(in case of NDRF). The default period of assistance will be upto 30 days, which may be extended upto 60 days in the first instance, if required, and subsequently upto 90 days in case of drought / pest attack. Depending on the ground situation, the State Executive Committee can extend the time period beyond the prescribed limit subject to the stipulation that expenditure on this account should not exceed 25% of SDRF allocation for the year.
SEARCH AND RESCUE OPERATIONS	
a) Cost of search and rescue measures / evacuation of people affected / likely to be affected	As per actual cost incurred, assessed by State Executive Committee and recommended by the Central Team (in case of NDRF) By the time if the search and rescue operations are over before the visit of the Central Team, then the State Executive Committee will assess/recommend actual/ near actual cost.
b) Hiring of boats/ essential equipment for carrying immediate relief and saving lives.	As per actual cost incurred, assessed by State Executive Committee and recommended by the Central Team (in case of NDRF).

RELIEF MEASURES	
a) Provision for temporary accommodation, food, clothing, medical care, etc., for people affected/evacuated and sheltered in relief camps.	A package of 10 KG rice, one saree and one dhoti, one liter of kerosene and Rs.1000/- the families evacuated from their houses and moved to shelters. As per assessment of need by State Executive Committee and recommendation of the Central Team (in case of NDRF) for a period up to 30 days. The State Executive Committee would need to specify the number of camps. their, duration and the number of persons in camps. In case of continuation of a calamity like drought or widespread devastation caused by earthquake or flood etc., this period may be extended to 60 days, and upto 90 days in cases of severe drought. Depending on the ground situation, the State Executive Committee can extend the time period beyond the prescribed limit subject to the stipulation that expenditure on this account should not exceed 25% of SDRF allocation for the year.Medical care may be provided from National Rural Health Mission (NRHM).
b) Air dropping of essential supplies.	As per actual, based on assessment of need by State Executive Committee and recommendation of the Central Team (in case of NDRF). The quantum of assistance will be limited to actual amount raised in the bills by the Ministry of Defence for airdropping of essential supplies and rescue operations only.

c) Provision of emergency supply of drinking water in rural areas and urban areas	As per actual cost, based on assessment of need by State Executive Committee and recommended by the Central Team (in case of NDRF) up to 30 days and may be extended upto 90 days in case of drought. Depending on the ground situation, the State Executive Committee can extend the time period beyond the prescribed limit subject to the stipulation that expenditure on this account should not exceed 25% of SDRF allocation for the year.
CLEARANCE OF AFFECTED AREAS	
a) Clearance of debris in public areas.	As per cost within 30 days from the date of start of the work based on assessment of need by State Executive Committee for the assistance to be provided under SDRF and as per assessment of the Central team for assistance to be provided under NDRF.
b) Draining off flood water in affected areas	As per actual cost within 30 days from the date of start of the work based on assessment of need by State Executive Committee for the assistance to be provided under SDRF and as per assessment of the Central team (in case of NDRF)
c) Disposal of dead bodies / Carcases	As per actuals based on assessment of need by SEC and recommendation of the Central Team (in case of NDRF)
AGRICULTURE	
Assistance to farmers.	
A) Assistance for land and other loss	
a) Desilting of agricultural land (where thickness of sand / silt deposit is more than 3'' to be certified by the competent authority of the State Government)	Rs.12,200/- per hectare. (Subject to the condition that no other assistance / subsidy has been availed of by / is eligible to the beneficiary under any other Government Scheme)

b) Removal of debris on agricultural land in hilly areas.	
c) De-silting / Restoration / Repair of fish farms	
d) Loss of substantial portion of land caused by landslide, avalanche change of course of rivers	Rs.37,500/- per hectare whose ownership of the land is legitimate as per the revenue records
Input subsidy (where crop loss is 33% and above)	
a) For agriculture crops, horticulture crops and annual plantation crops	Rs.7410/- per hectare for crops other than paddy. In rain fed areas and restricted to sown areas.
	Rs.13,500/- per hectare for crops in assured irrigated areas, subject to minimum assistance not less than Rs.1000 and restricted to sown areas.
b) Perennial crops	Rs.18,000/- per hectare for all types of perennial crops subject to minimum assistance not less than Rs.2000/- and restricted to sown areas.
c) Sericulture	Rs.7410/- per hectare for Eri, Maulberry, Tussar Rs.6,000/- per hectare for Muga.
d) Paddy	Rs.13,500/- per hectare subject to minimum assistance not less than Rs.1000 and restricted to sown areas.

ANIMAL HUSBANDRY - Assistance to Small and Marginal Farmers	
i) Replacement of milch animals, draught animals or animals used for haulage	Milch Animals :- Rs.30,000/- Buffalo / Cow / Camel / Yak / Mithun etc., Rs.3000/- Sheep / Goat / Pig **Draught Animals:-** Rs.25,000/- Camel / Horse / Bullock etc. Rs.16,000/- Calf / Donkey/ Pony/ Mule.
	Poultry:- Poultry @ Rs.100/- per bird. Note: Relief under these norms is not eligible if the assistance is available from any other Government Scheme, e.g., loss of birds due to Avian Influenza or any other diseases for which the Department of Animal Husbandry has a separate scheme for compensating the poultry owners.
ii) Provision of fodder / feed concentrate including water supply and medicines in cattle camps	Large animals - Rs.70/- per day Small animals Rs.35/- per day Period for providing relief will be as per assessment of the State Executive Committee (SEC) and the Central Team (in case of NDRF). The default period for assistance will be upto 30 days which may be extended upto 60 days in the first instance and in case of severe drought upto 90 days. Depending on the ground situation the State Executive Committee can extend the time period beyond the prescribed limit, subject to the stipulation that expenditure on this account should not exceed 25% of SDRF allocation for the year. Based on assessment of need by SEC and recommendation of the Central Team, (in case of NDRF) consistent with estimates of cattle as per Livestock Census and subject to the certificate by the competent authority about the requirement of medicine and vaccine being calamity related.

III) Transport of fodder to cattle outside cattle camps	As per actual cost of transport, based on assessment of need by State Executive Committee and recommendation of the Central Team (in case of NDRF) consistent with estimates of cattle as per Livestock Census.
FISHERY	
(i) Assistance to Fishermen for repair/ replacement of boats, nets- damaged or lost- Boat- Dugout-Canoe-Catamaran- Net. (This assistance will not be provided if the beneficiary is eligible or has availed of any subsidy/assistance, for the instant calamity, under any other Government Scheme	i) Replacement of fully damaged/lost wooden catamaran with a wooden catamaran, a fully subsidy will be of Rs.32,000/- (inclusive of net) ii) For repair/ rebuilding of partially damaged catamaran Rs.10,000/- unit. iii) For replacement of fully damaged/lost wooden/FRP Vallam, the percentage of subsidy assistance will be enhanced from 35% to 50% of the total cost subject to maximum subsidy of Rs.75,000/- calculated at a unit cost of Rs.1.5 lakhs (inclusive of engine and net) iv) For partially damaged FRP Vallam at the rate of Rs. 20,000/- per unit v) For replacement of fully damaged/lost mechanised boats the subsidy to be paid will be 35% of total cost, restricted to a maximum subsidy of Rs.5 lakhs per boat. vi) For repairs of partially damaged mechanized fishing boats, the subsidy will be provided at 60% of the assessed value of the damages restricted to a maximum subsidy of Rs.3 lakhs per boat. vii) For replacement of Gill nets for catamaran Rs.10,000/- per unit. Repair of OBM/IBE Engines-Rs.5000/- per engine.

ii) Input subsidy for fish seed farm	Rs.8,200/- per hectare (This assistance will not be provided if the beneficiary is eligible or has availed of any subsidy / assistance, for the instant calamity, under any other Government Scheme, except the one time subsidy provided under the Scheme of Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture)
HANDICRAFTS / HANDLOOM ASSISTANCE TO ARTISANS	
i) For replacement of damaged tools / equipments	Rs. 4,100/- per artisan for equipments - Subject to certification by the competent authority designated by the Government about damage and its replacement.
ii) For loss of raw material / goods in process / finished goods	Rs. 4,100/- per artisan for raw material (Subject to certification by the competent authority designated by the State Government about loss and its replacement).
HOUSING	
(a) Fully damaged / destroyed houses/severely damaged	i) Rs 95,100/- per house, in plain areas.
Pucca house	ii) Rs.1,01,900/- per house in hilly areas including Integrated Action Plan (IAP) Districts
(b) Partially damaged Houses Pucca (Other than huts) where the damage is at least 15%	Rs.5,200/- per house
(c) Damaged/destroyed huts	Fully damaged Hut-Rs.5000/- per hut Partially Damaged Hut-Rs.4,100/- per hut and 10 k.g rice for each case of damaged huts.
d) Cattle shed attached with house	Rs.2,100/- per shed

INFRASTRUCTURE	
Repair / restoration (of immediate nature) of the damaged infrastructure 1.Roads & bridges 2. Drinking water supply works 3.Irrigation 4. Power (only limited to immediate restoration of electricity supply in the affected areas) 5.Schools 6. Primary Health Centres 7. Community assets owned by Panchayat Sectors such as Telecommunication and Power (except immediate restoration of power supply), which generate their own revenue and also undertake immediate repair/restoration works from their own funds / resources are excluded	**Activities of immediate nature:** Illustrative lists of activities which may be considered as works of an immediate nature are given in the Annexure II. Assessment of requirements: Based on assessment of need, as per State's costs / rates /schedules for repair, by State Executive Committee and recommendation of the Central Team (in case of NDRF). As regards repair of roads, due consideration shall be given to Norms for Maintenance of Roads in India, 2001, as amended from time to time, for repairs of roads affected by heavy rains/ floods, Cyclone, landslides, sand dunes, etc., to restore traffic. For reference these norms are - Normal and Urban areas: Upto 15% of total of Ordinary Repair (OR) and Periodical Repair (PR) - Hills: Upto 20% of total of OR and PR
	In case of repair of roads , assistance will be given based on the notified Ordinary Repair (OR) and Periodical Renewal (PR) of the State. In case OR and PR rate is not available, then assistance will be provided @Rs.1 lakh/Km for State Highway and Major District Road and @Rs. 0.60 lakh/km for rural roads. The condition of "State shall first use its provision under the budget for regular maintenance and repair" will no longer be required, in view of the difficulties in monitoring such stipulation, though it is a desirable goal for all the States.

	In case of repair of Bridges and Irrigation works, assistance will be given as per the schedule of rates notified by the concerned States. Assistance for micro irrigation scheme will be provided @Rs.1.5 lakh per damaged scheme. Assistance for restoration of damaged medium and large irrigation projects will also be given for the embankment portions, on par with the case of similar rural roads, subject to the stipulation that no duplication would be done with any ongoing schemes. Regarding repairs of damaged drinking water schemes, the eligible damaged drinking water structures will be eligible for assistance @Rs.1.5 lakh/damaged structure. Regarding repair of damaged primary and secondary schools, primary health centres, Anganwadi and community assets owned by the Panchayats, assistance will be given @ Rs.2 lakh / damaged structure. Regarding repair of damaged power sector, assistance will be given to damaged conductors, poles and transformers upto the level of 11 kv. The rate of assistance will be @ Rs. 4000 / Poles, Rs.0.50 lakhs per km of damaged conductor and Rs.1.00 lakh per damaged transformer
Procurement of essential search, rescue and evacuation equipments including communication equipments etc.,for response to disaster.	Expenditure is to be incurred from SDRF only (and not from NDRF) as assessed by State Executive Committee(SEC) - The total expenditure on this item should not exceed 10% of the annual allocation of the SDRF

Capacity Building	-Expenditure is to be incurred from SDRF only (and not from NDRF) as assessed by State Executive Committee(SEC) - The total expenditure on this item should not exceed 5% of the annual allocation of the SDRF.
State specific disasters within the local context in the State, which are not included in the notified list of disasters eligible for assistance from SDRF/NDRF, can be met from SDRF within the limit of 10% of the annual funds allocation of the SDRF.	-Expenditure is to be incurred from SDRF only (and not from NDRF) as assessed by State Executive Committee(SEC) - The norm for various items will be the same as applicable to other notified natural disasters, as listed above or - In these cases, the scale of relief assistance against each item for "local disaster" should not exceed the norms of SDRF. - The flexibility is to be applicable only after the State has formally listed the disasters for inclusion and notified transparent norms and guidelines with a clear procedure for identification of the beneficiaries for disaster relief for such 'local disasters' with the approval of SEC. (Provision of relief assistance to local disasters to be sanctioned as per norms and guidelines notified by GOTN).

Illustrative list of activities identified as of an immediate nature

1	Drinking water Supply	i. Repair of damaged platforms of Hand pumps/Ring wells/ Spring tapped chambers / Public stand posts, cisterns . ii. Restoration of damaged stand posts including replacement of damaged pipe lengths with new pipe lengths, cleaning of dear water reservoir (to make it leak proof) iii. Repair of damaged pumping machines, leaking overhead reservoirs and water pumps including damaged intake structures approach gantries/jetties
2	Roads	i. Filling up of breaches and potholes, use of pipe for creating waterways, repair and stone pitching of embankments. ii. Repair of breached culverts. iii. Providing diversions to the damaged/washed out portions of bridges to restore immediate connectivity. iv. Temporary repair of approaches to bridges/embankments of bridges, repair of damaged railing bridges, repair of causeways to restore immediate connectivity, granular sub base, over damaged stretch of roads to restore traffic.
3	Irrigation	i. Immediate repair of damaged canal structures and earthen/ masonry works of tanks and small reservoirs with the use of cement, sand bags and stones. ii. Repair of weak areas such as piping or rat holes in dam walls/embankments. iii. Removal of vegetative material / building material debris from canal and drainage system. iv. Repair of embankments of minor, medium and major irrigation projects.
4	Health	Repair of damaged approach roads, buildings and electrical lines of PHCs/Community Health Centers.
5	Community assets of Panchayat	a. Repair of village internal roads. b. Removal of debris from drainage/ sewerage line. c. Repair of internal water supply lines d. Repair of street lights. e. Temporary repair of primary schools Panchayat ghars, Community halls, anganwadi etc.,
7	Power	Poles/ conductors and transformers upto 11 kv

The assistance will be considered as per the merit towards the following activities:-

	Items / Particulars	Norms of assistance will be adopted for immediate repair
i.	Damaged primary school building Higher secondary/middle college and other educational institutions buildings	Up to Rs.1.50 lakh/ unit Not covered
ii.	Primary health Centre	Upto Rs.1.50 lakh/unit
iii.	Electric poles and wires etc.	Normative cost (Upto Rs.4000 per pole and Rs.0.50 lakh per km)
iv.	Panchayat ghars/ Anganwadi/Mahila Mondal/Yuva kendra/community hall	Upto 2.00 Lakh/unit
v.	State Highways/Major District road	Rs.1.00 lakh/Km.
vi.	Rural road/bridge	Rs.0.60 lakh/km
vii.	Drinking water scheme	Upto 1.50 lakh/unit
viii.	Irrigation sector: Minor irrigation schemes/canal Major irrigation scheme Flood control and anti Erosion Protection work	Upto Rs.1.50 lakh/scheme Not covered Not covered
ix.	Hydro Power Project/HT Distribution systems Transformers and sub stations	Not covered
x.	High Tension Lines(above II Kv)	Not covered
xi.	State Government Buildings viz departmental/ Office building, departmental/residential quarters, religious structures, patwarkhana, Court premises, play ground, forest bungalow property and animal/ bird sanctuary etc.,	Not covered
xii.	Long terms/permanent Restoration work incentive	Not covered
xiii	Any new work of long term nature	Not covered
xiv	Distribution of commodities	Not covered (However, there is a provision for assistance as GR to families in dire need of assistance after a disasters).
xv.	Procurement if equipment/machineries under NDRF	Not covered
xvi	National Highways	Not covered (Since GOI born entire expenditure towards restoration works activities
xvii	Fodder seed to augment fodder production	Not covered

Annexure-III

Minimum Standards for Relief Camp

According to Section 19 of the DM act 2005, the State Authorities shall lay down detailed guidelines for providing standards of relief to persons affected by disaster in the State. Some of the points to be considered for a relief camp are as follows.

- Relief Shelters and Rehabilitation camps shall be set up in order to accommodate people affected by a disaster. The camp shall be temporary in nature, with basic necessities. People in the camp shall be encouraged to return to their respective accommodation once the normalcy is returned.
- The factors like terrain, climatic conditions at the site of disaster etc., will also impact the requirement and ability of the administration and other stakeholders to deliver relief. These constraints should also be kept in view while prescribing minimum standards of relief.
- The State/District Administration shall take necessary steps to pre-identify locations/ buildings like local schools, anganwadi centers/ cyclone shelters/community centers/ marriage halls etc which can be used as Relief Shelters where people can be accommodated in case of disaster in that area. In such centers, necessary facilities like sufficient number of toilets, water supply, generators with fuel for power back up during disasters shall be ensured.
- In the relief centers, basic lighting facilities shall be catered to accommodate the victims. In mountainous areas, minimum covered area shall be relaxed due to lack of available flat land/built up area. Special care shall be taken for safety and privacy of inmates, especially for women, widows and children. Special arrangements should be made for differently-abled persons, old and medically serious patients.
- Relief centers shall be temporary in nature and be closed as soon as normalcy returns in the area.
- Sufficient number of sites based on population density shall be identified as relief centers and earmarked well in advance at the time of planning and development of a Metro/city/town.
- Milk and other dairy products shall be provided for the children and lactating mothers.
- Sufficient steps shall be taken to ensure hygiene at community and camp kitchens.

- Sufficient quantity of water shall be provided in the relief camps for personal cleanliness and hand wash.
- Separate toilet and bath area be catered for women and children. Hand wash facility in toilets should be ensured. Steps may be taken for control of spread of diseases. Dignity kits for women shall be provided with sanitary napkins and disposable paper bags with proper labeling.
- Drainage or spillage from defecation system shall not run towards any surface water source or shallow ground water source.
- Mobile medical teams shall visit relief camps to attend the affected people. Steps shall be taken to avoid spread of communicable diseases.
- If the relief camps are extended over a long time, then necessary arrangement may be made for psychosocial treatment.
- In each camp, a separate register shall be maintained for entering the details of women who are widowed and for children who are orphaned due to the disaster.
- Special care shall be given to widows and orphans who are separated from their

Annexure-IV

IMPORTANT CONTACT DETAILS

TAMILNADU STATE DISASTER MANAGEMENT AGENCY

Designation	Office	Mobile	Fax	E.Mail ID
Chairman and Project Co-ordinator	28411552 Ext101	9445000444	28546624	tnsdma.chairman@gmail.com
Director (Disaster Management	28528745/ 28411552 Ext.103	9444446881	28592921/ 28411654	relief@tn.nic.in cdrrp.osd@gmail.com
Joint Director (Disaster Management)	28411552 Ext.105	9444446559		tnsdma.jd@gmail.com
Deputy Director (Public Relations)	28411552 Ext.106	9444446558		tnsdma.ddpr@gmail.com
Assistant Director (P&M)	28411552 Ext.105	9445461709		tnsdma.adpm@gmail.com
Assistant Director (SP)	28411552 Ext.108	9444446885		tnsdma.adsp@gmail.com
Assistant Director (RR)	28411552 Extension No.109	9444446882		tnsdma.adrr@gmail.com

INDIAN METEOROLOGICAL DEPARTMENT

Designation	Office	Mobile	Fax	E.Mail ID
Deputy Director General	28276752	9445246157	28276752	sbthambi@gmail.com
Director	28229860	9444765065	28271581	metmds@bsnl.in, srramanan56@gmail.com
Scientist (Seismic Section)	28252002	9840460410		amudha2003@gmail.com
Control Room	28271951 28230091 28230092 28230094 Ext. 240			

CONTROL ROOMS

Office	Phone /Mob	Fax
Chief Secretary's Control Room	25671388/25670372	25677128
Secretariat EPABX	25665566	
Revenue Department	25671821	25671821
State Relief Commissioner/Addl Chief Secretary and Commr of Rev Admn	28593990/28593988/1070 (Toll Free)	28410577
Director General of Police	28447777	28447703
Commissioner of Police (Control Room)	23452359-362	23453364/28555034
Inspector General of Police and Dy. Commandant General, Home Guards	9443312255/25385740 (R)/28441617(O)	28443498
Public Works Department	28410402-10/Ext 194	
Highways Department	28544370	28529798
Fire and Rescue Services Department	28294132,30,35,65	28294188
Indian Coast Guard	25395016/23460404	23460404
Fisheries	24341757	

LINE DEPARTMENTS

Designation	Office	Mobile	Fax	E.Mail ID
Corporation of Chennai Principal Secretary/ Commissioner of Corporation	25619200/ 25381330	9840111106/ 9445419966	25383962	commissioner@ chennaicorporation.gov.in
Home Guards IGP and Director of Civil Defence & Dy.Cmt. Gen. Home Guards	28441617	9443312255	28443498	bkravi@hotmail.com
Fire and Rescue Service Additional Director General of Police Fire and Rescue Service	28294129	944000755		fireserv@tn.nic.in rckudawla@reddifmail.com
Control Room	28554176/ 309 /11/13/16		28550931	Fire_camp@gmail.com
Public Works Department EIC (WRO)	28525351	9444031951	28594148	eicwrotn@yahoo.co.in
CE (Chennai Region)	28523007	9443476626	28523007	cecwropwd@yahoo.com
Health Department Director of Public Health and Preventive Medicine	24320802	9489048909	24323942	dphpm@rediffmail.com
Director of Medical and Rural Health Services	24343271/ 24364755		24343271	dmrhs.tn@nic.in

Fisheries Department Director of Fisheries	24320791	9444212223	24335585	tnfisheries@tn.nic.in
Rural Development and Pt. Raj Department Commr. of Rural Devlp and Pt.Raj	24323794/ 24338690	9788395555	24343205	drdchamber@gmail.com
Agriculture Department Director of Agriculture	28524894	9751534567	28551763	diragriculture@tn.nic.in
Animal Husbandry Dept. Director of Animal Husbandry & Veterinary Services	24338714	9445001100	24323784 24321412	anh.tn@nic.in
Director Municipal Administration Dept. Director of Municipal Administration	28513259	9445029555	28411364	tncma@nic.in
Director of Town Panchayat	25340352	9003090099	25358742	dtp@tn.nic.in
Registrar Department Registrar of Cooperative Societies	28364848	9445434556	28364867	rcs@tn.nic.in

Director of Handlooms and Textiles	25341204	9578605888	25341084	dirhandlooms@yahoo.co.in
CMWSSBMD, CMWSSB	28459000	9444072746	28458181	cmwssb@md2.vsnl.net.in
Education Department Director of School Education	28278796	9443110845	28232580	dirsedu@tn.nic.in
Director of Collegiate Education	28212090	9751237730	28275094	tndceoffice@gmail.co.in
Commissioner of Technical Education	22352299	9444343536	22201514	tndote@gmail.com
Metropolitan Transport Corporation Secretary to Government and Chairman, Managing Director	25671475 23455833	24482010	25670083 23455830	tmsec@tn.gov.in emtcedp@dataone.in
Industries and Commerce Department	044-22341646			
Tamil Nadu Agricultural University	0422-661125			
Institute of Remote Sensing (IRS) Anna University	044-22301197		22358191	dirirs@annauniv.edu
ELCOT	65512300		24330612	

ARMED FORCES

Office	Designation	Office	Fax	Mobile
Army	Col.	044-25316105(Di) 044-25316205 (off)	25316256	9444076956
Navy	Commodore Naval Officer (i/c) (TN) & Pondicheery	25396488/ 22392196	25391389	
Air force	SQN Leader	22392196/ 22560156	22398070	9840338648
Coast Guard	Commandant	23460/424 25672425	23460456	
NDRF	Commandant	04177-246269	04177-246594	
SDRF Control Room	ADGP (Operations) Manager	25362665		9444954422 9498107100