सत्यमेव जयते

DISASTER MANAGEMENT IN INDIA

Ministry of Home Affairs
Government of India

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गृह मंत्री
भारत
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HOME MINISTER
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NEW DELHI-110001

May 3, 2011

MESSAGE

A disaster is not bound by political, social, economic or geographic boundaries. When it occurs, it impacts all. Globally, there has been an increase in the number of natural disasters over the past few years. The impact of such a calamity, however, does not remain confined to its physical component but transcends beyond it and impacts the socio-economic conditions of affected persons and places.

India has been actively pursuing a paradigm shift in disaster management from a relief centric approach in the past to the current holistic one, encompassing all facets of disaster management. The understanding and approach to management of disaster, however, remain myopic and need to be broadened. A holistic approach needs to include events which may not be catastrophic and sudden, impacting large number of the people at one go, but may take a slow epidemic form with huge tolls over a period of time, such as road accidents which result in maximum number of casualties: little or no attention is given to their prevention. Any approach to disaster management should consider that a single death in any disaster is more than a loss of human life; it impacts the entire family and puts the environment around them under stress.

India has made long strides in several areas towards strengthening the institutional mechanism, response capacities and the financial arrangement for different activities relating to disaster management. However, the recent earthquake and tsunami in Japan (March 2011) is a grim reminder that despite the best preparedness and highest response standards, disasters remain a challenge to humankind. We are yet to demystify nature and its fury which sometimes goes beyond the human imagination, as evident from an earthquake on the coast of Japan leading to the tsunami, resulting in major fires and cascading into the breakdown of nuclear facilities and eventually turning into a nuclear emergency.

The challenge before us is, therefore, to strive towards higher levels of understanding, preparedness, mitigation efforts and response mechanisms. This in turn needs to be backed by better coordination among different central ministries, state governments, Panchayati Raj Institutions, academic institutions, the corporate sector, civil societies and citizens at large. Towards strengthening the Disaster Risk Reduction (DRR) effort, the Government of India recently has set up a working group in the Planning Commission to make more efficient the mainstreaming efforts of DRR activities in our next Twelfth Five Year Plan (2012-2017).

I would urge all the stakeholders to come together and work concertedly for reducing the disaster risk in the country and make India as safe as humanly possible.

(P. Chidambaram)

MULLAPPALLY RAMACHANDRAN

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MINISTER OF STATE FOR
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MESSAGE

Recognising the hazard and vulnerability profile of the country, the requirement for protecting lives and assets from disasters as well as to prevent erosion of development gains attained over several years, the Government of India has been systematically addressing various challenges faced by the country. Traditionally, like many other countries, the focus was on response. The shift to a holistic approach started with the preparation of the Vulnerability Atlas and constitution of the High Powered Committee in the late nineties. The Ministry of Home Affairs was entrusted with the responsibility of coordinating disaster management activities at the national level. Soon after, in 2003, a framework for addressing disaster management in holistic manner was conceptualised and outlined in the national disaster management framework prepared by MHA. Subsequently, the National Disaster Management Act (2005) was enacted and the National Disaster Management Authority was established. Formation of similar structures by state governments at the state and district levels were made mandatory, and the National Disaster Management Policy (2009) was announced.

Recognising that flawed development has aggravated various types of vulnerabilities, the need to consider disaster risk as a development problem was emphasized for the first time in the Tenth Five Year Plan (2002-2007). Certification of measures taken to ensure risk reduction and "do no harm" approach under development projects is now required before securing approval of funds. The Government has also set up an expert group to identify measures required to reduce the existing risk as well as the measures required to avoid creating new risks.

Though states have amended development control regimes, the capacity to enforce the provisions in these instruments are not adequate. Therefore, greater importance on training large number of government and non-government functionaries as well as capacity development of the construction professionals is required. There are several good practices in the country, and a variety of measures to promote such information and knowledge-sharing will have to be encouraged. Additionally, issues of up-scaling will have to be addressed.

This document captures the measures undertaken and systems established for disaster management in the country. It also articulates the next steps required. I hope the disaster management practitioners would find the document useful and utilize it to promote collaborative efforts to reduce disaster risk in the country.

(Mullappally Ramachandran)

Gopal K. Pillai

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North Block
New Delhi.

9 May 2011

PREFACE

The geo-climatic zone in which India is located, the large land mass located in vulnerable areas along with the physical, social, and economic vulnerability of people living in high risk areas makes it one of the most disaster prone countries in the world. Floods, droughts, earthquakes, cyclones and landslides are common hazards that India faces. Natural hazards have affected nearly six per cent of the population and twenty four per cent of deaths in Asia caused by disasters have occurred in India. Around two per cent of national GDP is lost because of these disasters. A study conducted by the World Bank in 2003 suggested that natural disasters are a major impediment on the path of economic development in India.

The Ministry of Home Affairs is the nodal department responsible for coordination of disaster management in the Government of India. Since early 2000, the government has been focusing on developing the capacities in the country for preparedness, prevention and mitigation along with developing capacities for response. The need to eliminate the underlying vulnerabilities through systematic integration of disaster risk reduction in development programmes is being actively pursued at the national and state levels. Achieving India's development goals and sustainable development are not possible unless we ensure that all developments are disaster resilient. This would entail putting in place legal instruments, appropriate institutional arrangements, building capacities at all levels to carry out a variety of risk reduction measures and developing appropriate tools and guidelines.

Against this backdrop, the Government of India has taken up several measures to support sub-national level structures both in the government and in non-government sector. This document tries to capture the existing structures and mechanisms as well as outlines some of the priority areas that need focus in the near future. We would make efforts to enrich our interventions based on the inputs from all DM practitioners.

(Gopal K. Pillai)

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Dated: May 18, 2011.

FOREWORD

India is highly vulnerable to natural disasters, losing about 2 per cent of the GDP on an average due to these disasters. Almost every part of the country falls in at least one natural hazard zone or other and the socio-economic vulnerabilities in these areas makes it difficult for the people to cope with the impact of these incidents without external support.

Realising the loss of lives and revenue, as well as the erosion of development gains as a result of natural disasters of varying degrees that occur every year, the Government of India has been an active participant in the international movement for disaster risk reduction. The country has also been making efforts to develop capacities through a variety of enabling mechanisms for risk reduction, which includes community based initiatives. The speed of risk reduction measures needs to be accelerated as disasters could hit any time and unfortunately we do not have the luxury of preparing for it after the location of such events is known through various forecasting techniques.

Indian scientists have been working on potential impact scenarios of climate variability and changes in various agro-climatic zones. The uncertainties associated with the changes that are being experienced in various parts of the country remind us of the need to be prepared and to undertake robust risk reduction measures. The traditional approach of risk assessment factoring is not adequate. The Government of India has been facilitating the work of state governments through a variety of measures ranging from institutional structures, human resource development as well as structural mitigation measures. The preparedness and mitigation measures need further effort at all levels of governance, including at the Panchayati Raj Institutions level.

This document captures some of these initiatives and more importantly flags some areas that need attention. The government alone cannot undertake these initiatives and even if it does, that is not enough because disaster risk reduction is the responsibility of every development partner. There is thus a need to develop capacities of all stakeholders, particularly the citizens of India. We cannot wait, so I would expect all to join hands and work with government to make the country safe.

(A.E Ahmad)

ACKNOWLEDGEMENT

The perception about disaster and its management has undergone a change following the enactment of the Disaster Management Act, 2005. The definition of disaster is now all encompassing, which includes not only the events emanating from natural and man-made causes, but even those events which are caused by accident or negligence. There was a long felt need to capture information about all such events occurring across the sectors and efforts made to mitigate them in the country and to collate them at one place in a global perspective. This book has been an effort towards realising this thought. This book in the present format is the outcome of the in-house compilation and analysis of information relating to disasters and their management gathered from different sources (domestic as well as the UN and other such agencies).

All the three Directors in the Disaster Management Division, namely Shri J.P. Misra, Shri Dev Kumar and Shri Sanjay Agarwal have contributed inputs to this Book relating to their sectors. Support extended by Prof. Santosh Kumar, Shri R.K. Mall, former faculty and Shri Arun Sahdeo from NIDM have been very valuable in preparing an overview of the book. This book would have been impossible without the active support, suggestions and inputs of Dr. J. Radhakrishnan, Assistant Country Director (DM Unit), UNDP, New Delhi and the members of the UNDP Disaster Management Team including Shri Arvind Sinha, Consultant, UNDP. Support was extended by all the concerned ministries who provided the data that has been used in compiling this book. We sincerely acknowledge the organisations and the individuals whose photographs, figures and tables have been used in the presentation of this book for highlighting the issues concerned.

While compiling disaster issues across the sectors, for the first time, with substantial information pertaining to other nodal ministries dealing with the subject, the chances of errors creeping in, is not ruled out. There would always be scope of improvement in the accuracy of material and analysis of facts. It is, however, expected that in the days to come, on the base prepared, this will be further improved upon, following the suggestions received from the end users. In producing this document, the cooperation extended by colleagues from different ministries/ departments and Government agencies is acknowledged. Without the consistent guidance and support extended by Shri G.K. Pillai, Union Home Secretary and Shri A.E. Ahmad, Secretary (Border Management) it would not have been possible to prepare this document.

R. K. Srivastava
Joint Secretary
Ministry of Home Affairs
Government of India

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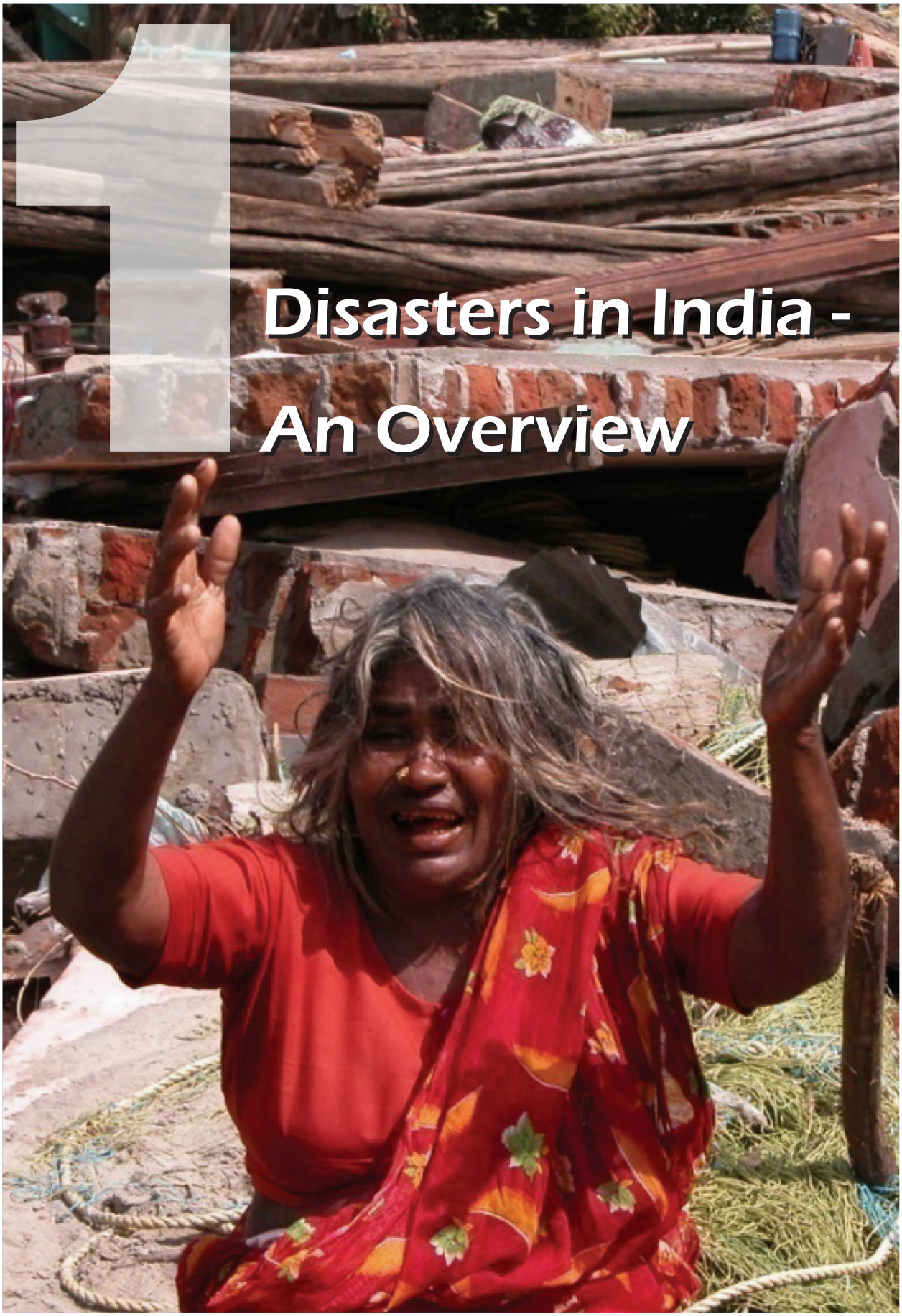


1 Disasters in India - An Overview

1.1 Introduction

1.1.1 India's geo-climatic conditions as well as its high degree of socio-economic vulnerability, makes it one of the most disaster prone country in the world. A disaster is an extreme disruption of the functioning of a society that causes widespread human, material, or environmental losses that exceed the ability of the affected society to cope with its own resources. Disasters are sometimes classified according to whether they are "natural" disasters, or "human-made" disasters. For example, disasters caused by floods, droughts, tidal waves and earth tremors are generally considered "natural disasters." Disasters caused by chemical or industrial accidents, environmental pollution, transport accidents and political unrest are classified as "human-made" or "human-induced" disasters since they are the direct result of human action.

1.1.2 A more modern and social understanding of disasters, however, views this distinction as artificial since most disasters result from the action or inaction of people and their social and economic structures. This happens by people living in ways that degrade their environment, developing and over populating urban centres, or creating and perpetuating social and economic systems. Communities and population settled in areas susceptible to the impact of a raging river or the violent tremors of the earth are placed in situations of high vulnerability because of their socio-economic conditions. This is compounded by every aspect of nature being subject to seasonal, annual and sudden fluctuations and also due to the unpredictability of the timing, frequency and magnitude of occurrence of the disasters.

1.2 Etymology

The word 'Disaster' derives from Middle French *désastre*[1] and that from Old Italian *disastro*, which in turn comes from the Greek pejorative prefix δυσ-, (*dus*-) "bad"+ αστήρ (*aster*), "star". The root of the word *disaster*[2] ("bad star" in Greek and Latin) comes from an astrological theme in which the ancients used to refer to the destruction or deconstruction of a star as a disaster.

1.3 Definition

1.3.1 Disaster is an event or series of events, which gives rise to casualties and damage or loss of properties, infrastructures, environment, essential services or means of livelihood on such a scale which is beyond the normal capacity of the affected community to cope with. Disaster is also sometimes described as a *"catastrophic situation in which the normal pattern of life or eco-system has been disrupted and extra-ordinary emergency interventions are required to save and preserve lives and or the environment".*

1.3.2 The Disaster Management Act, 2005 defines disaster as *"a catastrophe, mishap, calamity or grave occurrence in any area, arising from natural or man made causes, or by accident or negligence which results in substantial loss of life or human suffering or damage to, and destruction of, property, or damage to, or degradation of, environment, and is of such a nature or magnitude as to be beyond the coping capacity of the community of the affected area"*.

1.3.3 The United Nations defines disaster as *"the occurrence of sudden or major misfortune which disrupts the basic fabric and normal functioning of the society or community".*

1.4 Disasters not new to Mankind

1.4.1 Disasters are not new to mankind. They have been the constant, though inconvenient, companions of the human beings since time immemorial. Disasters can be natural or human-made. Earthquake, cyclone, hailstorm, cloud-burst, landslide, soil erosion, snow avalanche,

flood etc. are the examples of natural disasters while fire, epidemics, road, air, rail accidents and leakages of chemicals/ nuclear installations etc. fall under the category of human-made disasters. The High Power Committee on Disaster Management, constituted in 1999, has identified 31 various disasters categorized into five major sub-groups which are given in Box 1.1.

Box 1.1: List of various Disasters			
i.	Water and climate related disasters	a) b) c) d) e) f) g) h) i) j) k)	Floods and drainage management Cyclones Tornadoes and hurricanes Hailstorm Cloud burst Heat wave and cold wave Snow avalanches Droughts Sea erosion Thunder and lightening Tsunami
ii.	Geological related disasters	a) b) c) d)	Landslides and mudflows Earthquakes Dam failures/ Dam bursts Minor fires
iii.	Chemical, industrial and nuclear related disasters	a) b)	Chemical and industrial disasters Nuclear disasters
iv.	Accident related disasters	a) b) c) d) e) f) g) h) i) j) k)	Forest fires Urban fires Mine flooding Oil spills Major building collapse Serial bomb blasts Festival related disasters Electrical disasters and fires Air, road and rail accidents Boat capsizing Village fire
v.	Biological related disasters	a) b) c) d)	Biological disasters and epidemics Pest attacks Cattle epidemics Food poisoning

Source: High Powered Committee Report-1999

Note: After 2004, Tsunami has also been included in the list of disasters.

1.5 Database

The mechanism for preparing a database for different kinds of disasters happening across the country is yet to be developed. National Institute for Disaster Management (NIDM), under the Disaster Management Act, 2005 has been tasked with research work and it is expected that it would develop a mechanism to capture such data on the disasters including its impact on socio-economic life of the nation and GDP growth. At the global level, the three main sources which have been collecting the data are EM-DAT, Natcat and Sigma. EM-DAT is the acronym for data that the Centre for Research on the Epidemiology on Disasters (CRED) has been collecting from the

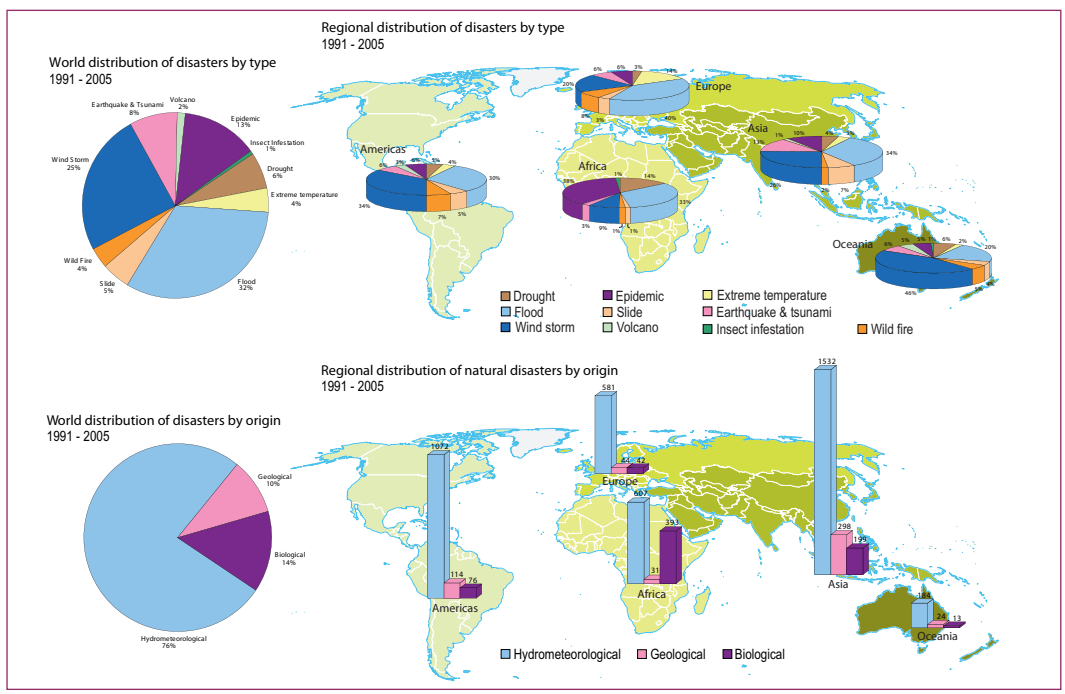
countries since 1987 (going back to 1900). Munich Reinsurance Company maintains Natcat and Swiss Reinsurance Company maintains Sigma. The authenticity of the data collected by these agencies varies and the figures given by them do not necessarily attest to any comprehensive data and may be exaggerated sometimes which was realized in the case of the report given in respect of 1999 landslides in Venezuela[3].

1.5.1 Lack of Central Statistical database as a record of past disasters is a major constraint for risk assessment and compilation of disaster history in the country. Different sources of data have different figures of casualties and impacts, thereby hindering an objective assessment. Scientific data on major hazards are available but information on vulnerabilities are scattered in multiple places and often such data are not available uniformly for the entire country.

1.5.2 Disaster information available from different sources are yet to be regularly assessed by common public as well as other stakeholders. Lack of awareness about available resources is a reason for lack of last mile reach of the available information.

1.5.3 In India, Ministry of Statistics and Programme Implementation have taken initiatives for collection of data in respect of different disasters. A Technical Committee was constituted by the Central Statistics Office with a view to prepare a framework for disaster statistics for developing a database on disaster and related aspects. Five formats have been developed for capturing the information about (i) Statistics on disaster at district level, (ii) Statistics on relief, rehabilitation and reconstruction at district level, (iii) District wise compilation of statistics on disaster, (iv) District-wise compilation of statistics on relief, rehabilitation and reconstruction and (v) Aggregation of damage and relief data at state level. The state Government and District level institutions would be required to furnish this information for preparing the data base at centralized level.

Figure 1.1: Regional Distributions of Disasters by Type



Source: Centre for Research on Epidemiology of Disaster

1.6. Disasters – Global Scenario[4]

1.6.1 Disasters - natural or human-made are common throughout the world. Disasters continue to occur without warning and are perceived to be on an increase in their magnitude, complexity, frequency and economic impact. Hazards pose threats to people and assume serious proportions in the under developed countries with dense population. During the second half of the 20th century, more than 200 worst natural disasters occurred in the different parts of the world and claimed lives of around 1.4 million people. Losses due to natural disasters are 20 times greater (as % of GDP) in the developing countries than in industrialized one. Asia tops the list of casualties due to natural disasters. Figure 1.1 shows the Regional distribution of disasters by type, as prepared by Centre for Research on Epidemiology of Disaster.

1.6.2 There have been several natural, as well as, man-made disasters. Records of natural disasters can be traced way back to 430 B.C. when the Typhus epidemic was reported in Athens. Ten deadliest natural disasters recorded in the world are dated back to 1556 when an earthquake in Shaanxi province of China occurred on 23rd January, 1556 and 8,30,000 casualties were recorded.

List of ten deadliest disasters which have occurred across the world and in India in the known history and in the last century may be seen from the Table 1.1 and Table 1.2 respectively.

Table 1.1: World's Deadliest Disasters

Sl. No.	Name of Event	Year	Country and Region	Fatalities
In the Known History				
1.	Earthquake	1556	China, Shaanxi▲	830000
2.	Earthquake	1731	China▲	100,000
3.	Cyclone	1737	India, Calcutta▲	300000
4.	Yellow River flood	1887	China▲	900,000–2,000,000
5.	Messina Earthquake	1908	Italy○	123000
6.	Earthquake	1920	China, Gansu▲	235000
7.	Great Kanto Earthquake	1923	Japan○	142,000
8.	Great Chinese Famine	1958-1961	China○	15,000,000–43,000,000
9.	Bhola Cyclone	1970	West Bengal, India & East Pakistan (now Bangladesh)○	500,000
10.	Tangshan Earthquake	1976	China○	242,419
In the Last Century				
1.	China Floods,	1931	China○	1,000,000–2,500,000
2.	Floods	1954	China○	40,000
3.	Cyclone	1970	Bangladesh, Chittagong, Khulna○	300,000
4.	Bangladesh Cyclone,	1991	Bangladesh○	139,000
5.	Earthquake	1999	Turkey○	17,000
6.	Tsunami	2004	Indonesia, Sri Lanka, India, Malaysia, Somalia, Bangladesh, Thailand▲	230,210

Sl. No.	Name of Event	Year	Country and Region	Fatalities
7.	Hurricane Katrina	2005	United States of America[▲]	1,836
8.	Sichuan Earthquake	2008	China[▲]	87476 deaths including missing
9.	Cyclone Nargis	2008	Myanmar[▲]	More than 138,000 deaths
10.	Haiti Earthquake	2010	Haiti[▲]	316,000

[▲] *Topics 2000, Natural Catastrophes-the current position, Special Millennium Issue, Munich Re Group, 1999*
[❍] *Centre for Research on Epidemiology of Disasters (CRED) EM-DAT, Belgium*

Table: 1.2: India's Deadliest Disasters

Sl. No.	Name of Event	Year	State & Area	Fatalities
In the Known History				
1.	Earthquake	1618	Mumbai, Maharashtra[❍]	2,000 deaths
2.	Bengal Earthquake	1737	Bengal[❍]	300, 000 deaths
3.	Cyclone	1864	Kolkata, West Bengal[❍]	60,000 deaths
4.	The Great Famine	1876-1878	Southern India[❍]	58.5 million people affected 5.5 million deaths due to starvation
5.	Cyclone	1882	Bombay, Maharashtra[❍]	100,000 deaths
6.	The Indian famine	1896-1897	Whole India[❍]	1.25 million to 10 million deaths
7	Earthquake	1934	Bihar[❍]	6,000 deaths
8	Bhola Cyclone	1970	West Bengal[❍]	500,000 deaths (including Hindu Kush Himalayas and surrounding areas)
9	Drought	1972	Large part of the country[❍]	200 million people affected
10	Drought	1987	Haryana[❍]	300 million people affected
In the Last Century				
1	Earthquake	1905	Kangra, Himachal Pradesh[❍]	20,000 deaths
2	Cyclone	1977	Andhra Pradesh[❍]	10,000 deaths hundreds of thousands homeless 40,000 cattle deaths. Destroyed 40% of India's food grains.
3	Latur Earthquake	1993	Latur, Marthawada, region of the Maharashtra[❍]	7,928 people died and another 30,000 were injured.
4	Orissa Super Cyclone	1999	Orissa[❍]	10,000 deaths
5	Gujarat Earthquake	2001	Bhuj, Bachau, Anjar, Ahmedabad, and Surat in Gujarat State[❍]	25,000 deaths 6.3 million people affected

Sl. No.	Name of Event	Year	State & Area	Fatalities
6	Tsunami	2004	coastline of Tamil Nadu, Kerala, Andhra Pradesh and Pondicherry, as well as the Andaman and Nicobar Islands of India❍	10,749 deaths 5,640 persons missing 2.79 million people affected 11,827 hectares of crops damaged 300,000 fisher folk lost their livelihoods
7	Maharashtra floods	July 2005	Maharashtra State▲	1094 deaths 167 Injured 54 Missing
8	Kashmir Earthquake	2005	Kashmir State❍	86000 deaths (includes Kashmir & surrounding Himalayan region)
9	Kosi Floods	2008	North Bihar▲	527 Deaths 19323 Livestock perished 222754 Houses damaged 3329423 persons affected
10	Cyclone Nisha	2008	Tamil Nadu❍	204 deaths $800 million worth damages

▲ *Topics 2000, Natural Catastrophes-the current position, Special Millennium Issue, Munich Re Group, 1999*
❍ *Centre for Research on Epidemiology of Disasters (CRED) EM-DAT, Belgium*

Figure 1.2 and 1.3 shows the vulnerability scenario across the globe in terms of events and India has faced more than 260 events of disasters and over 3.5 million people affected from 1975 - 2001. It further analyses that the vulnerability of people and severity of disasters.

Figure 1.2: Global Disaster Scenario: Distribution of Natural Disasters

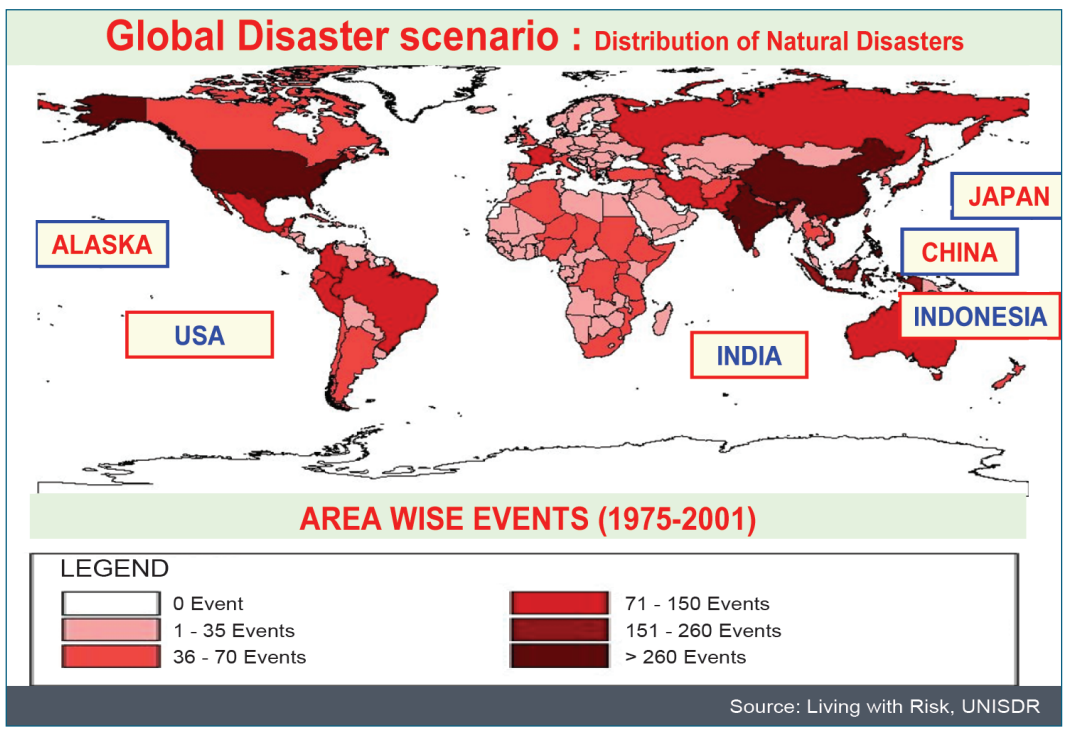
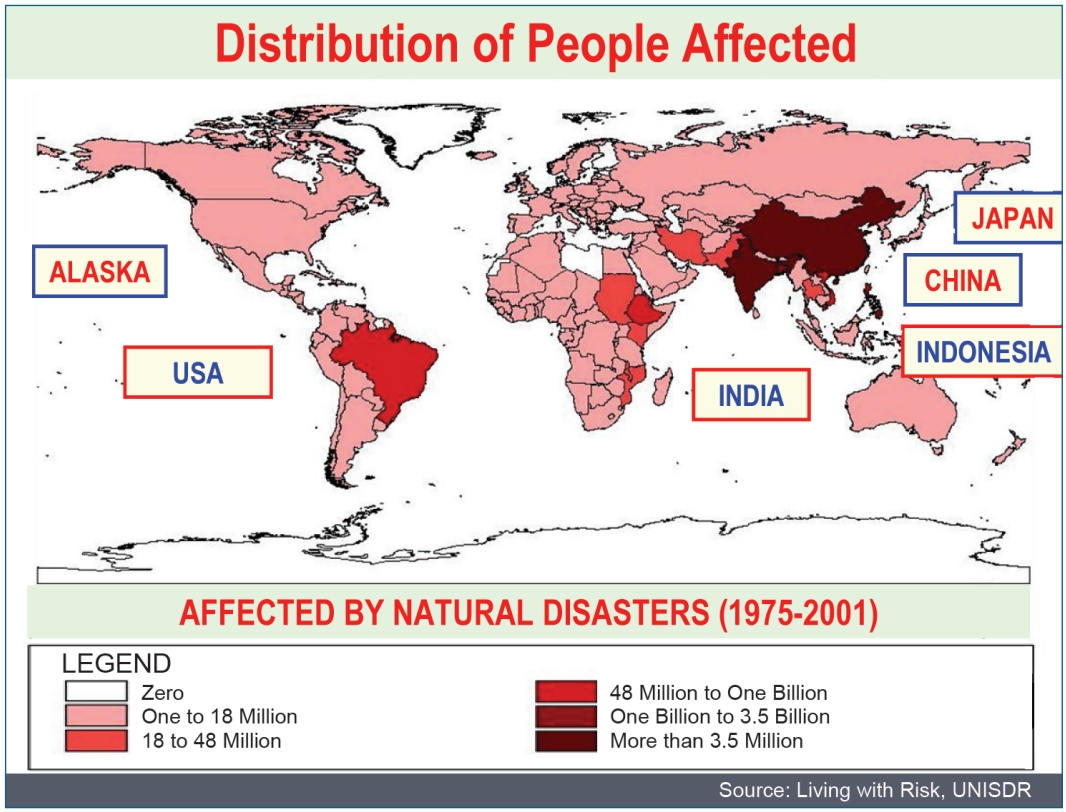


Figure 1.3: Distribution of People Affected



1.6.3 Disaster events which have occurred between 1900-2009 may be further categorized based on hydro meteorological, geological and biological reasons. This may be seen in Table 1.3.

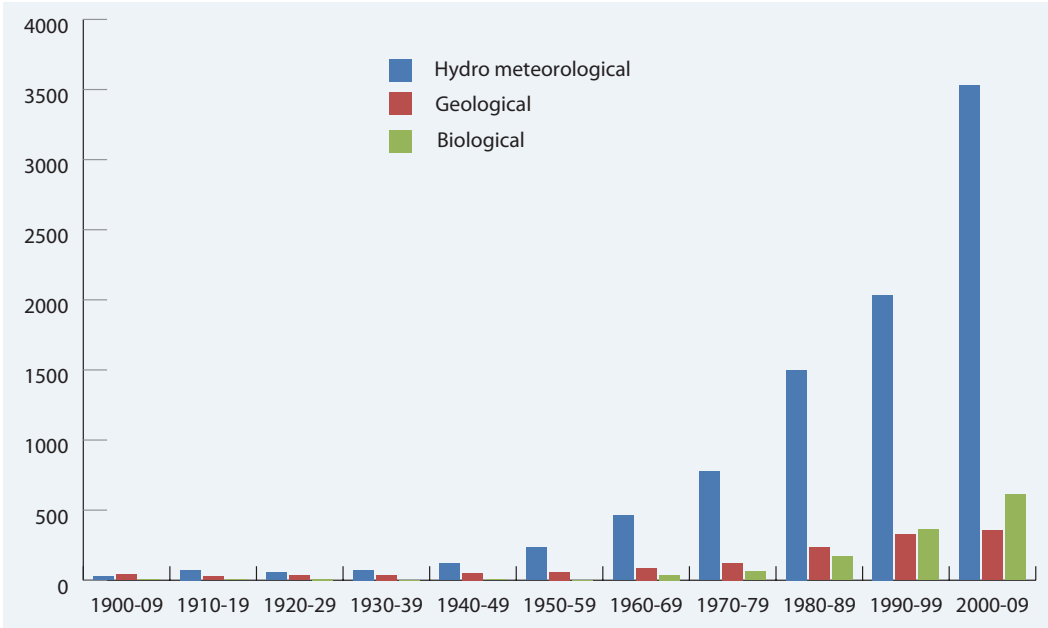
Table 1.3: Events of Disasters globally between 1900 - 2009

Disaster Types	Decades											
	1900 -09	1910 -19	1920 -29	1930 -39	1940 -49	1950 -59	1960 -69	1970 -79	1980 -89	1990 -99	2000 -09	Total
Hydro meteorological	28	72	56	72	120	232	463	776	1498	2034	3529	8880 78.4%
Geological	40	28	33	37	52	60	88	124	232	325	354	1373 12.1%
Biological	5	7	10	3	4	2	37	64	170	361	612	1275 11.3%
Total	73	107	99	112	176	294	388	964	1900	2720	4495	11328

Source: Centre for Research on Epidemiology of Disasters (CRED)

1.6.4 **The Disaster Events:** From Figure 1.4 it may be noticed that the disasters are on increase. The number of disasters events which was 73 in 1900-09 have increased 4494 during 2000-2009. The rise are between the decade of 1900-99 over the period of 2000-09 has been more than 67%.

Figure 1.4: Event of Disasters globally in between 1900 - 2009



Source: Centre for Research on Epidemiology of Disasters (CRED)

Figure 1.5 shows that 78.4% of the disaster events are accounted during this period for hydro meteorological events. Figure 1.5 and 1.6 shows that incidents of Hydro meteorological is on increase and life lost is also maximum in the hydro meteorological events.

Figure 1.5: Disaster Events (1900-2009)

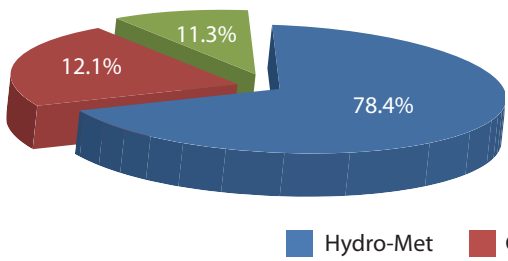
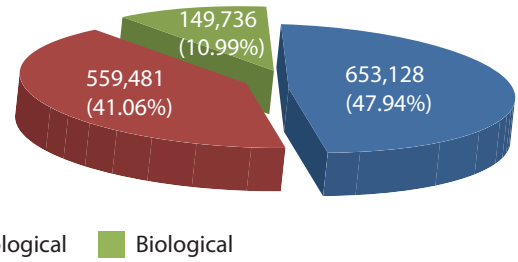


Figure 1.6: Disaster Deaths (1900 - 2009)



Source: Centre for Research on Epidemiology of Disasters (CRED)

1.6.5 **Indian Scenario:** India due to its geo-climatic and socio-economic condition is prone to various disasters. During the last thirty years time span the country has been hit by 431 major disasters resulting into enormous loss to life and property. According to the Prevention Web statistics, 143039 people were killed and about 150 crore were affected by various disasters in the country during these three decades. The disasters caused huge loss to property and other infrastructures costing more than US $ 4800 crore. The most severe disasters in the country and their impact in term of people affected, lives lost and economic damage is given in the Table 1.4.

Table 1.4: People affected, lives lost and economic damage due to Disasters in India between 1980 to 2010

Year	Type of Disasters	People affected	Life lost	Economic damage (USD x 1,000)
1980	Flood	30,000,023		
1982	Drought	100,000,000		
	Flood	33,500,000		
1984	Epidemic		3290	
1987	Drought	300,000,000		
1988	Epidemic		3000	
1990	Storm			2,200,000
1993	Flood	128,000,000		7,000,000
	Earthquake*		9,748	
1994	Flood		2001	
1995	Flood	32,704,000		
1996	Storm			1,500,300
1998	Storm		2871	
	Extreme Temp.		2541	
	Flood		1811	
1999	Storm		9,843	2,500,000
2000	Drought	50,000,000		
2001	Earthquake*		20,005	2,623,000
2002	Drought	300,000,000		
	Flood	42,000,000		
2004	Flood	33,000,000		2,500,000
	Earthquake*		16,389	
2005	Flood			3,330,000
	Flood			2,300,000
2006	Flood			3,390,000
2009	Flood			2,150,000

Source: "EM-DAT: The OFDA/CRED International Disaster Database

** (includes Tsunami)*

1.6.6 In India, the cyclone which occurred on 25th November, 1839 had a death toll of three lakh people. The Bhuj earthquake of 2001 in Gujarat and the Super Cyclone of Orissa on 29th October, 1999 are still fresh in the memory of most Indians. The most recent natural disaster of a cloud burst resulting in flash floods and mudflow in Leh and surrounding areas in the early hours of 6th August, 2010, caused severe damage in terms of human lives as well as property. There was a reported death toll of 196 persons, 65 missing persons, 3,661 damaged houses and 27,350 hectares of affected crop area.

1.6.7 Floods, earthquakes, cyclones, hailstorms, etc. are the most frequently occurring disasters in India. Table 1.5 gives an account of the loss due to above disasters during decade of 2001-2010.

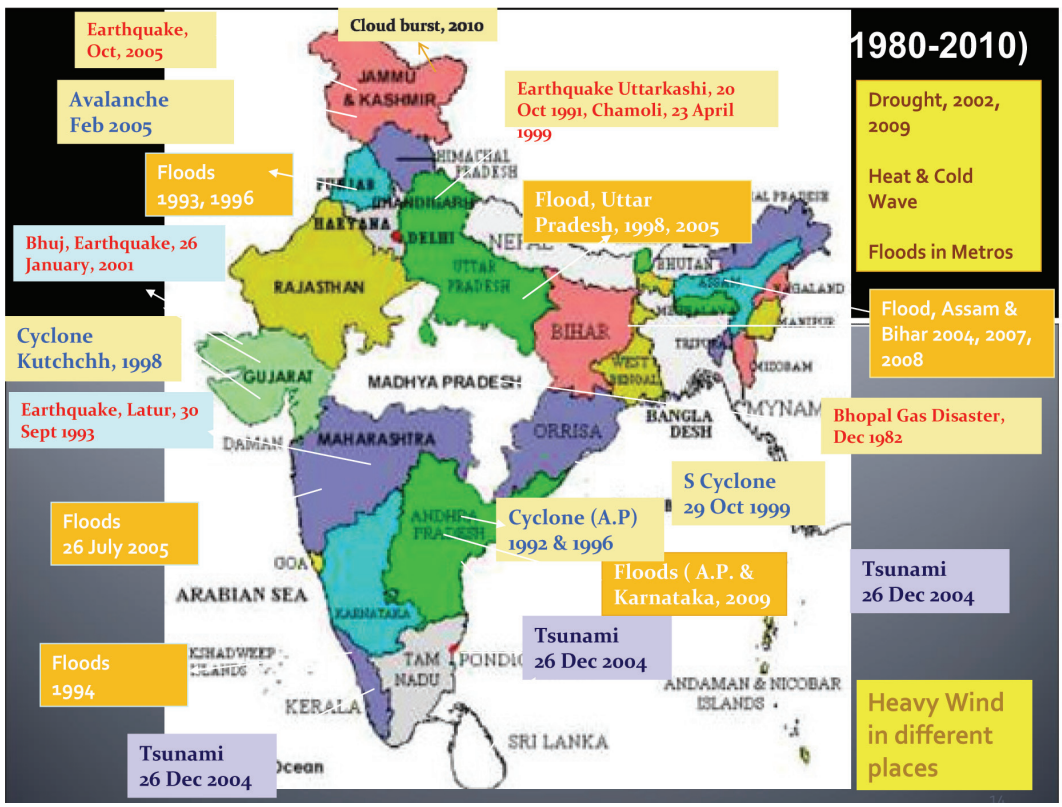
Table 1.5: Year-wise damage caused due to floods, cyclonic storms, landslides etc. during last ten years in India

Year	Live Lost human (in No.)	Cattle Lost (in No.)	Houses damaged (in No.)	Cropped areas affected (in Lakh hectares)
2001-02	834	21,269	3,46,878	18.72
2002-03	898	3,729	4,62,700	21.00
2003-04	1,992	25,393	6,82,209	31.98
2004-05	1,995	12,389	16,03,300	32.53
2005-06	2,698	1,10,997	21,20,012	35.52
2006-07	2,402	4,55,619	19,34,680	70.87
2007-08	3,764	1,19,218	35,27,041	85.13
2008-09	3,405	53,833	16,46,905	35.56
2009-10	1,677	1,28,452	13,59,726	47.13
2010-11	2,310	48,778	13,38,619	46.25

Source: Ministry of Home Affairs (MHA)

1.6.8 The hazard vulnerability of the country as shown in Figure 1.7 finds a face when we look at the major disasters of the country from 1980-2010. During this period of 30 years the country has been hit by approximately 25 major disasters apart from the heat wave, cold wave and heavy winds affecting some areas of the country.

Figure 1.7: Major Disasters in India from 1980-2010



Source: NIDM

1.7. Vulnerability Profile of India

1.7.1 India has been vulnerable, in varying degrees, to a large number of natural, as well as, human-made disasters on account of its unique geo-climatic and socio-economic conditions. It is highly vulnerable to floods, droughts, cyclones, earthquakes, landslides, avalanches and forest fires. Out of 35 states and union territories in the country, 27 of them are disaster prone. Almost 58.6 per cent of the landmass is prone to earthquakes of moderate to very high intensity; over 40 million hectares (12 per cent of land) are prone to floods and river erosion; of the 7,516 km long coastline, close to 5,700 km is prone to cyclones and tsunamis; 68 per cent of the cultivable area is vulnerable to drought and hilly areas are at risk from landslides and avalanches. A multi-hazard map of India may be seen in Figure 1.8.

Hazard Profile of India

(a) India is one of the ten worst disaster prone countries of the world. The country is prone to disasters due to number of factors; both natural and human induced, including adverse geo climatic conditions, topographic features, environmental degradation, population growth, urbanisation, industrialization, non scientific development practices etc. The factors either in original or by accelerating the intensity and frequency of disasters are responsible for heavy toll of human lives and disrupting the life supporting system in the country.

The basic reason for the high vulnerability of the country to natural disasters is its unique geographical and geological situations. As far as the vulnerability to disaster is concerned, the five distinctive regions of the country i.e. Himalayan region, the alluvial plains, the hilly part of the peninsula, and the coastal zone have their own specific problems. While on one hand the Himalayan region is prone to disasters like earthquakes and landslides, the plain is affected by floods almost every year. The desert part of the country is affected by droughts and famine while the coastal zone susceptible to cyclones and storms.

(b) The natural geological setting of the country is the primary basic reason for its increased vulnerability. The geo-tectonic features of the Himalayan region and adjacent alluvial plains make the region susceptible to earthquakes, landslides, water erosion etc. Though peninsular India is considered to be the most stable portions, but occasional earthquakes in the region shows that geo- tectonic movements are still going on within its depth.

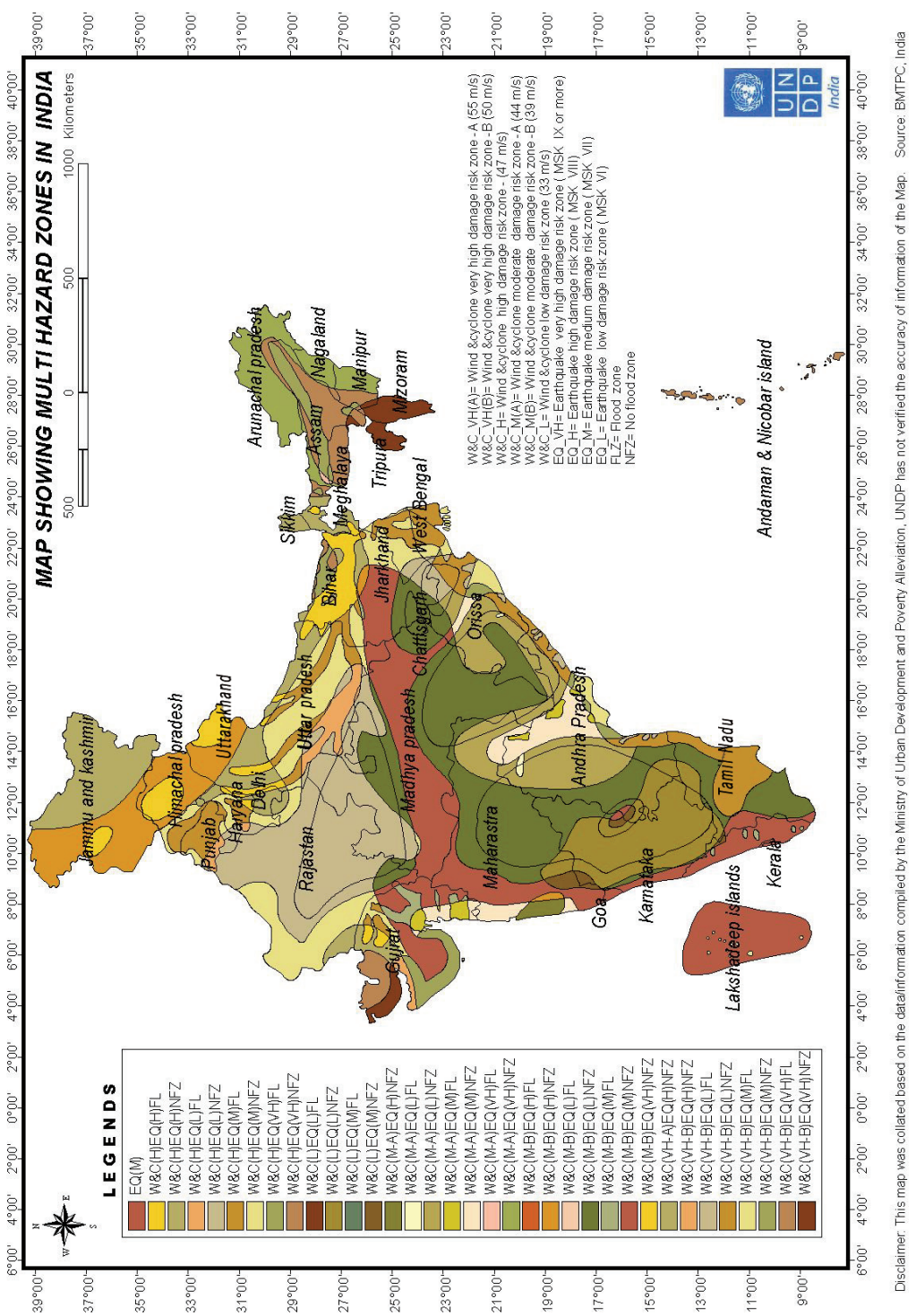
(c) The tectonic features, characteristics of the Hiamalya are prevalent in the alluvial plains of Indus, Ganga and Brahmputra too, as the rocks lying below the alluvial pains are just extension of the Himalayan ranges only. Thus this region is also quite prone to seismic activities. As a result of various major river systems flowing from Himalaya and huge quantity of sediment brought by them, the area is also suffering from river channel siltation, resulting into frequent floods, especially in the plains of Uttar Pardesh and Bihar.

(d) The western part of the country, including Rajasthan, Gujarat and some parts of Maharashtra are hit very frequently by drought situation. If Monsoon worsens the situation spreads in other parts of the country too. The disturbance in the pressure conditions over oceans, results into cyclones in coastal regions. The geo tectonic movements going on in the ocean floor make the coastal region prone to tsunami disaster too.

(e) The extreme weather conditions, huge quantity of ice and snow stored in the glaciers etc. are other natural factors which make the country prone to various forms of disasters.

(f) Along with the natural factors discussed in the preceding text, various human induced activities like increasing demographic pressure, deteriorating environmental conditions,

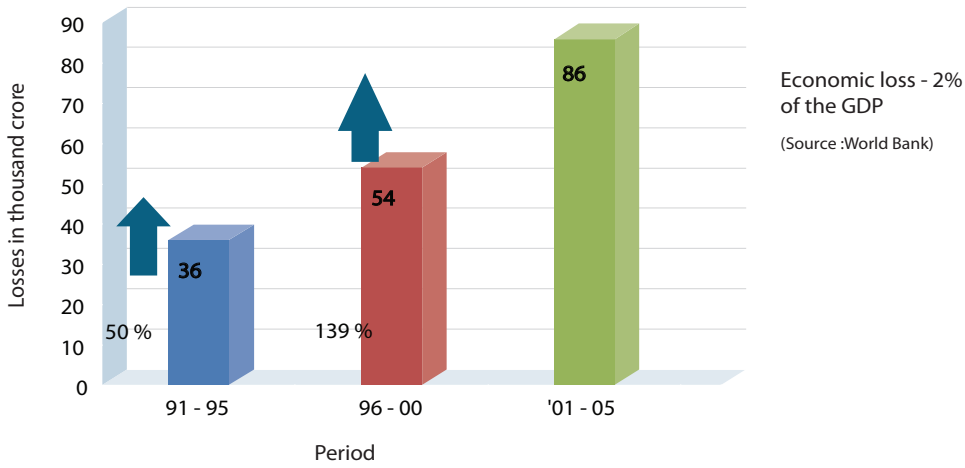
Figure 1.8 : Multi Hazard Map of India



Source: DM unit, UNDP, India

deforestation, unscientific development, faulty agricultural practices and grazing, unplanned urbanisation, construction of large dams on river channels etc. are also responsible for accelerated impact and increase in frequency of disasters in the country.

Figure 1.9: INDIA - Losses due to Disasters



Source: NDMA

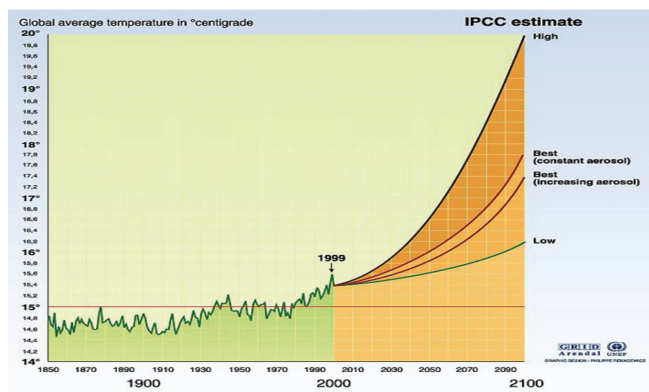
Losses due to disasters have been shown in Figure 1.9. It shows that economic loss is accounted for 2% of the GDP due to disasters as per the study of the World Bank.

1.7.2 Vulnerability to disasters or emergencies of Chemical, Biological Radiological and Nuclear (CBRN) origin has increased on account of socio-economic development. Heightened vulnerabilities to disaster risks can be related to expanding population, urbanization and industrialization, development within high-risk zones, environmental degradation and climate change.

During the last two decades of the 19th century (1982-2001), natural disasters in India had claimed a total death toll of around 1, 07,813 people (on an average more than 5,390 death toll every year). As mentioned above, India with its extended coast line is exposed to five to six tropical cyclones on an average, both from the Arabian Sea and Bay of Bengal annually.

1.7.3 **Climate Change:** This is evident from the increase in the global average air and ocean temperatures, precipitation and extreme rainfall, widespread melting of snow and ice, storms/ storm surges/coastal flooding and rising global mean sea level, as recorded in the fourth Assessment Report of Intergovernmental Panel on Climate Change (IPCC) Figure 1.10. Climate change is expected to increase the

Figure 1.10: IPCC estimates of climate change



Source: IPCC

frequency and intensity of current extreme weather events and give rise to new vulnerabilities with differential spatial and socio-economic impacts on communities. The unprecedented increase is expected to have severe impacts on the hydrological cycle, water resource, droughts, flood, drinking water, forest and ecosystems, sea level/coastal area losses of coastal wetlands and mangroves, food security, health and other related areas. The impact would be particularly disastrous for developing countries, including India and further degrade the resilience of poor, vulnerable communities, which make up between one quarter and one half of the population of the most Indian cities.

1.7.4 **Reason for concern:** There is clear evidence that the observed change in surface temperature, rainfall, evaporation and extreme events and climate change is a significant environmental challenge. The main impact of global climate change will be felt due to changes in climate variability and weather extremes. Observations during the last decade and projections indicate that extreme events i.e. heat waves, cold waves, more floods, more droughts, more intense cyclones and flash floods will increase. Extreme rainfall has substantially increased over large areas, particularly over the west coast and west central India. There is thus an urgent need for a paradigm shift in disaster management, especially under changing climate.

1.7.5 **Poverty and disaster vulnerability:** Poverty and risk to disasters are inextricably linked and mutually reinforcing. The poor section of the society is worst affected in case of disaster. The situation further aggravates due to the compulsion of the poor to exploit environmental resources for their survival, increasing the risk and exposure of the society to disasters, in particular those triggered by flood, drought and landslides. Poverty also compels the poor to migrate and live at physically more vulnerable locations, often on unsafe land and in unsafe shelters. These inhabitations of the poor at such locations are either due to the fact that there is no other land available at reasonable cost or it is close to the employment opportunities. The inhabitations of the poor people on marginal land are prone to all types of disasters. The type of construction of these houses further deteriorates the condition. These dwellings made up of low cost material without giving much consideration to technical aspect are easy targets of various hazards.

1.8. Climate Profile[5]

1.8.1 India is home to an extraordinary variety of climatic regions, ranging from tropical in the south to temperate and alpine in the Himalayan north. The nation's climate is strongly influenced by the Himalayas and the Thar deserts. For the purpose of identification of drought prone areas by Central Water Commission (CWC) the criteria adopted was that "drought is a situation occurring in an area when the annual rainfall is less than 75 percent of normal in 20 percent of the years examined. Any block or equivalent unit where 30 percent or more of the cultivated area is irrigated is considered to have reached a stage, which enables it to sustain a reasonable protection against drought". A study rainfall data from 1875 to 1998 indicated the percentage area of the country affected by moderate and severe drought. It may be noted that during the complete 124 year period there were three occasions i.e. 1877, 1899 and 1918 when percentage of the country affected by drought was more than 60 percent).

1.8.2 In the span of 124 years, the probability of occurrence of drought was found maximum in Rajasthan (25 %), Saurastra & Kutch (23%), followed by Jammu & Kashmir (21%) and Gujarat (21%) region. The drought of 1987 in various parts of the country was of "unprecedented intensity" resulting in serious crop damages and an alarming scarcity of drinking water.

1.8.3 **Rainfall in India:** The country is influenced by two seasons of rains, accompanied by seasonal reversal of winds from January to July. Consequent to the intense heat of the summer months, the northern Indian landmass becomes hot and draws moist winds over the oceans causing a reversal of the winds over the region called the summer or the south-west (SW) monsoon. This is most important feature controlling the Indian climate because about 75 percent of the annual rainfall is received during a short span of four months ie June to September. There is a large variation in the amounts of rainfall received at different locations. The average annual rainfall is less than 13 cm over the western Rajasthan, while Mausiram in the Meghalaya has as much as 1141 cm. During the period from 1871 to 2009, there were 27 major drought years in India. One of the major reasons for these droughts has been a strong link with the El Nino-Southern Oscillation (ENSO) patterns and its linkages with Indian food grain production.

1.8.4 **South West Monsoon:** The rainfall over India has large spatial as well as temporal variability. A homogeneous data series has been constructed for the period 1901-2003. Mean monthly rainfall during July (286.5 mm) is the highest and contributes about 24.2 percent of the annual rainfall (1182.8 mm). The mean rainfall during August is slightly lower and contributes 21.2 percent of the annual rainfall. June and September rainfalls are almost similar and contribute 13.8 percent and 14.2 percent of the annual rainfall, respectively. The mean south-west monsoon (June, July, August and September) rainfall (877.2 mm) contributes 74.2 percent of the annual rainfall (1182.8 mm).

1.8.5 The onset of the SW monsoon normally starts over the Kerala coast, the southern tip of the country by 1st June, advances along the Konkan coast in early June and covers the whole country by middle of July. Onset occurs about a week earlier over islands in the Bay of Bengal. The monsoon is influenced by global and local phenomenon like El Nino, northern hemisphere temperature, sea surface temperatures, snow cover etc. The monsoon rainfall oscillates between active spells associated with widespread rains over most parts of the country. Heavy rainfall in the mountainous catchment under 'break' conditions result in flooding of the plains.

1.8.6 Cyclonic systems of low pressure called 'monsoon depressions' are formed in the Bay of Bengal during this season. These systems generally form in the northern part of the Bay with average frequency of about two to three per month and move in a northward or north-westward direction, bringing well distributed rainfall over the central and northern parts of the country. The SW monsoon generally starts withdrawing from Rajasthan by 1st September and from north-western part of India by 15th September. It withdraws from almost all parts of the country by 15th October. It is replaced by a northerly continental airflow called North-East Monsoon. The retreating monsoon winds cause occasional showers along the east coast of Tamil Nadu.

1.8.7 **North East Monsoon:** Post- monsoon or Northeast monsoon or Retreating SW Monsoon Season (October, November and December): North- East monsoon or post monsoon season is a transition season associated with the establishment of the north-easterly wind regime over the Indian sub continent. Meteorological subdivisions of coastal Andhra Pradesh, Tamil Nadu, Kerala and South Interior Karnataka receive good amounts of rainfall accounting for about 35 percent of their annual total rainfall in these months. Many parts of this region are affected due to the storms forming in the Bay of Bengal. Large scale losses to life and property occur due to heavy rainfall, strong winds and storm surges in the coastal region.

1.9 Cause and Effect of Disasters[6]

1.9.1 India is vulnerable to extreme weather events (Box 1.2). Over the decade of the 1990s, both the number and severity of such events have increased. Weather events can be classified as extreme on the basis of various factors such as the impact, the socio-economic losses, environmental degradation and long term damages etc.

1.9.2 With more than 70 percent of India's population relying on agriculture directly or indirectly, the impact of extreme weather on human life and other living beings. is critical. In the state of Orissa, 49 years have experienced floods, 30 have had droughts, and 11 faced cyclones. These analyses have yielded a 30-year cyclicity of the Indian monsoons. Droughts were more common in the 1960s. Of the 14 major drought years in the 85-year record, eight occurred in the first 30 year period (1891-1920) whereas there was only one in the second 30 year period (1921-1950). In the 25-year period from 1951 –1981, five major drought years were recorded. In 1972 and 1979 deficient rainfall (about 25% below normal) was recorded in one half to two thirds of India's plains. In 1994, monsoon rainfall was deficient (between 20% and 43%) in 10 of the 31 meteorological subdivisions of India.

1.9.3 According to the World Meteorological Organization (WMO), data of major natural disasters/ extremes that occurred around the world during the period 1963-2002, indicates that floods and droughts cause the maximum damage as shown in Table 1.6.

Table 1.6: Worldwide view of damage caused by Natural disasters

Type of natural disaster around the world	Damage caused by natural calamities (%)
Floods	32
Tropical Cyclones	30
Droughts	22
Earthquakes	10
Other disasters	6

Source: World Meteorological Organisation

1.9.4 Floods and droughts occurring in India are closely associated with the nature and extent of the summer monsoon. The inter-annual fluctuations in the summer monsoon rainfall over India are sufficiently large to cause devastating floods or serious droughts. Floods and droughts affect vast areas of the country, transcending state boundaries. One-sixth area of the country is drought-prone. Out of 40 million hectares of the flood prone area in the country, on an average, floods affect an area of around 7.5 million hectares per year.

Box 1.2: Examples of extreme weather events

Primary Climatic Events

- Cold wave, fog, snow storms and avalanches
- Hailstorm, thunderstorm and dust storms
- Extreme temperature
- Tropical cyclone and tidal wave
- Floods, heavy rain
- Droughts (hydrological, meteorological and agricultural etc.)

Secondary Events (May be climate-driven)

- Incidence of epidemics or diseases
- Urban and rural water shortage
- Crop plantation failure or harvest failure
- Malnutrition or under nutrition and hunger
- Landslides, saline water intrusion and mudflows

Source: NIDM

1.10 Droughts[7]

The primary cause of any drought is deficiency of rainfall and in particular, the timing, distribution and intensity of this deficiency in relation to existing reserves. A prolonged period of relatively dry weather leading to drought is a widely recognized climate anomaly. Drought can be devastating as water supplies dry up, crops fail to grow, animals die, and malnutrition and ill health become widespread The environmental effects of drought, including stalinization of soil and groundwater decline, increased pollution of freshwater ecosystems and regional extinction of animal species. The details of the drought years may be seen from the Table 1.7.

Table 1.7: Drought years with percentage area of the country affected by drought

S. No.	Year	Moderate drought (%)	Severe drought (%)	Total (%)
1	1877	30.6	28.9	59.5
2	1891	22.4	0.3	22.7
3	1899	44.1	24.3	68.4
4	1901	19.3	10.7	30.0
5	1904	17.5	16.9	34.4
6	1905	25.2	12.0	37.2
7	1907	27.9	1.2	29.1
8	1911	13.0	15.4	28.4
9	1913	24.5	0.0	24.5
10	1915	18.8	3.4	22.2
11	1918	44.3	25.7	70.0
12	1920	35.7	2.3	38.0
13	1925	21.1	0.0	21.1
14	1939	17.8	10.7	28.5
15	1941	35.5	0.0	35.5
16	1951	35.1	0.0	35.1
17	1965	38.3	0.0	38.3
18	1966	35.4	0.0	35.4
19	1968	21.9	0.0	21.9
20	1972	36.6	3.8	40.4
21	1974	27.1	6.9	34.0
22	1979	33.0	1.8	34.8
23	1982	29.1	0.0	29.1
24	1985	25.6	16.7	42.3
25	1987	29.8	17.9	47.7
26	2002	19.0	10.0	29.0
27	2009	32.5	13.5	46.0

Source: IMD

Source: NDMA

In India around 68 percent of the country is prone to drought in varying degrees. Of the entire area 35 percent receives rain falls between 750 mm and 1125 mm which is considers drought prone while 33 percent which receives rainfalls between less than 750 mm is considered to be chronically drought prone.

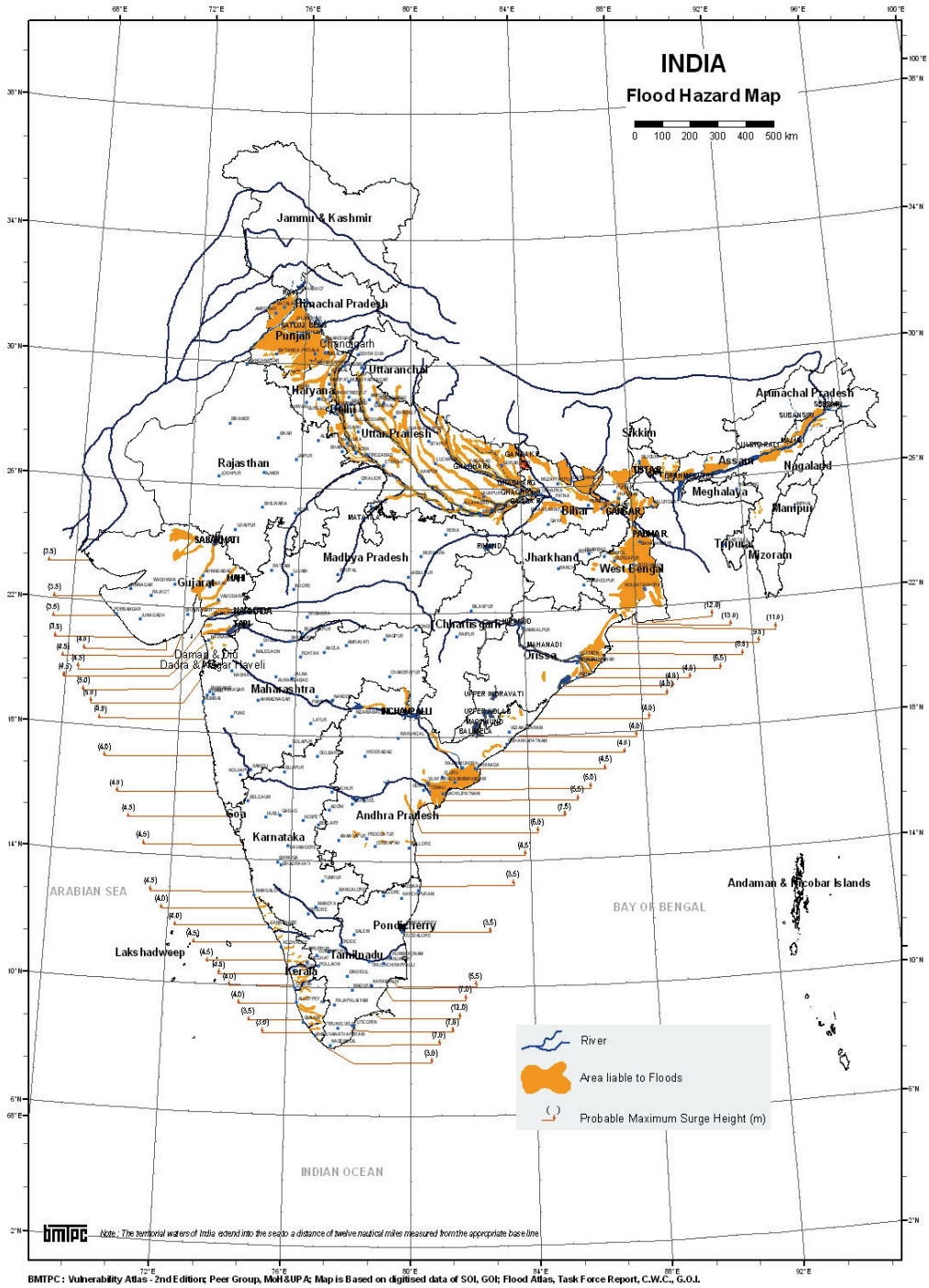
1.11. Floods[8]

1.11.1 Flood destructions have always brought miseries to numerous people, especially in rural areas. Flood results in the outbreak of serious epidemics, specially malaria and cholera. Simultaneously, scarcity of water also arises. It has a drastic effect on agricultural produce. Sometimes, water remains standing over large areas for long span of time hampering the Rabi crops. The flood hazard map of India may be seen in the Figure 1.11.

1.11.2 India is one of the most flood prone countries in the world. The principal reasons for flood lie in the very nature of natural ecological systems in this country, namely, the monsoon, the highly silted river systems and the steep and highly erodible mountains, particularly those of the Himalayan ranges. The average rainfall in India is 1150 mm with significant variation across the country. The annual rainfall along the western coast and Western Ghats, Khasi hills and over most of the Brahmaputra valley amounts to more than 2500 mm. Most of the floods occur during the monsoon period and are usually associated with tropical storms or depressions, active monsoon conditions and break monsoon situations.

1.11.3 Twenty-three of the 35 states and union territories in the country are subject to floods and 40 million hectares of land, roughly one-eighth of the country's geographical area, is prone to floods. The National Flood Control Program was launched in the country in 1954. Since then sizeable progress has been made in the flood protection measures. By 1976, nearly one third of the flood prone area had been afforded reasonable protection; considerable experience has been gained in planning, implementation and performance of flood warning, protection and control measures (CWC, 2007). Table 1.8 presents the flood affected area and damages for the period 1953 to 2004 in India as per Water Data Complete Book 2005 and Central Water Commission, 2007).

Figure 1. 11: Flood hazard map of India



Source: BMTPC

Mumbai Flood in 2006- Urban Flooding

Table 1.8: Flood affected areas and damages in India (1953 to 2004)

Sl No.	Item	Unit	Average During (1953- 2004)	Years	Maximum Damage (Year)
1	Area Affected	Million Hectare	7.63	1978	17.50
2	Population affected	Million	32.92	1978	70.45
3	Human Lives Lost	No.	1597	1977	11316
4	Cattle Lost	In thousands	94	1979	618
5	Cropped Area Affected	Million Hectare	3.56	1988	10.15
6	Value of Damage Crops	₹ Crore	708.57	2000	4246.6
7	Houses Damaged	Th. No.	1235.61	1978	3508
8	Value of Damage Houses	₹ Crore	251.05	1995	1307.9
9	Value of Damage Public Utilities	₹ Crore	813.69	2001	5604
10	Value of total Damage to Houses, Crops and Public Utilities	₹ Crore	1817.07	2000	8864

Source: Central Water Commission (FMP Directorate)

1.11.4 Floods occur in almost all rivers basins in India. The main causes of floods are heavy rainfall, inadequate capacity of rivers to carry the high flood discharge, inadequate drainage to carry away the rainwater quickly to streams/ rivers. Ice jams or landslides blocking streams; typhoons and cyclones also cause floods. Flash floods occur due to high rate of water flow as also due to poor permeability of the soil. Areas with hardpan just below the surface of the soil are more prone to, floods as water fails to seep down to the deeper layers.

Floods in Uttarakhand in September 2010

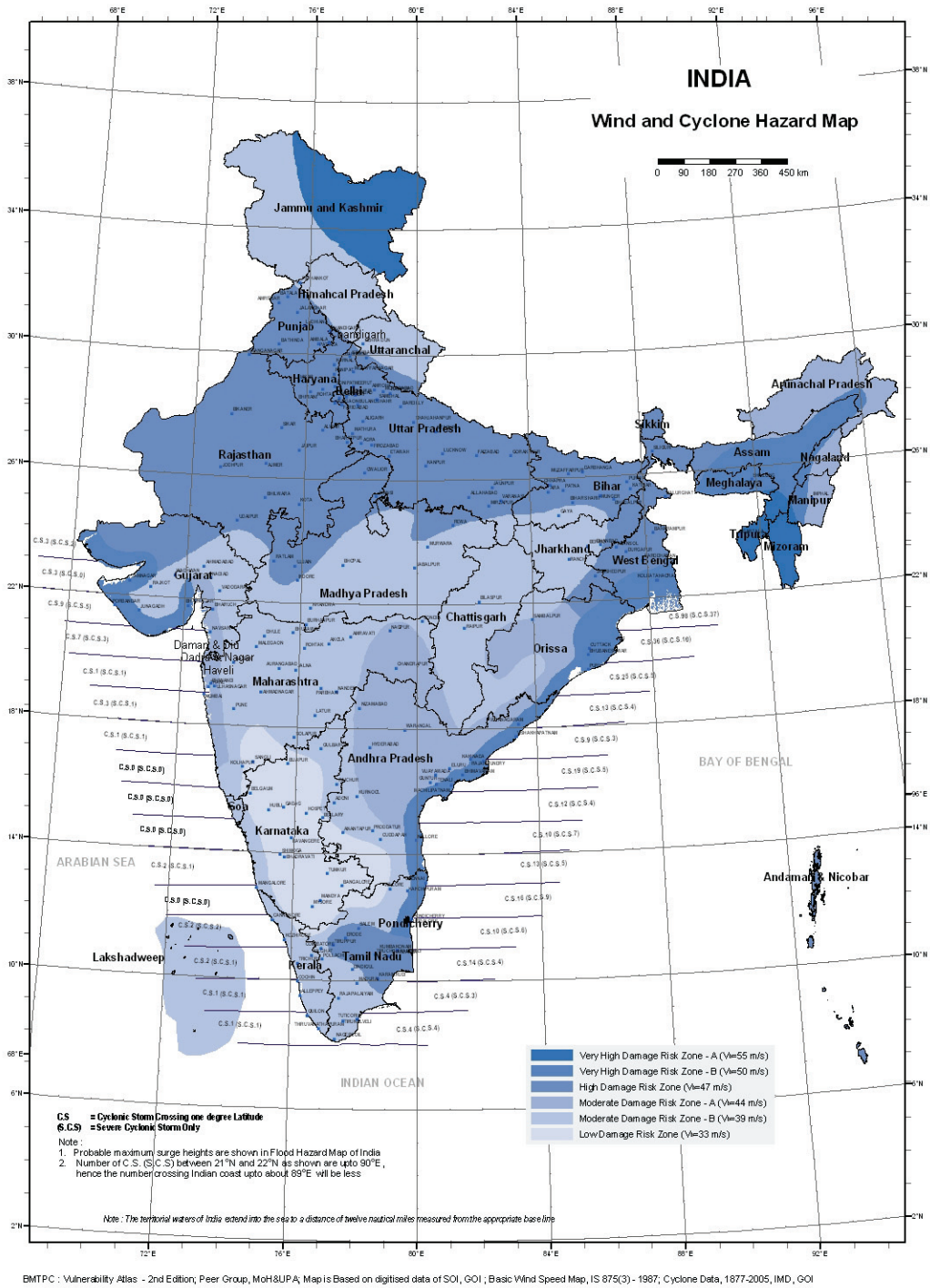
1.11.5 Vulnerability to floods and other natural disasters is caused by the high population density, widespread poverty, unemployment, illiteracy, enormous pressure on rural land, and an economy traditionally dominated by agriculture. Children and women are particularly vulnerable. Eighty-five percent of the deaths during disasters are of women and children (Centre for Research on the Epidemiology of Disasters, CRED 2000). Presently there is an inadequate level of protection in the country against floods. Though non-structural measures improve the preparedness to floods and reduce losses, the necessity of structural measures would always remain to reduce the extent of physical damage caused by floods. In future, programme, flood control and management planning along with climate change need to be integrated into development planning for the country.

1.12 Tropical Cyclones[9]

1.12.1 The major natural disaster that affects the coastal regions of India is cyclone and as India has a coastline of about 7516 kms, it is exposed to nearly 10 percent of the world's tropical cyclones. About 71 percent of this area is in ten states (Gujarat, Maharashtra, Goa, Karnataka, Kerala, Tamil Nadu, Puducherry, Andhra Pradesh, Orissa and West Bengal). The islands of Andaman, Nicobar and Lakshadweep are also prone to cyclones. On an average, about five or six tropical cyclones form in the Bay of Bengal and Arabian sea and hit the coast every year. Out of these, two or three are severe.

1.12.2 When a cyclone approaches to coast, a risk of serious loss or damage arises from severe winds, heavy rainfall, storm surges and river floods. The effect of a storm surge is most pronounced in wide and shallow bays exposed to cyclones such as in the northern part of Bay of Bengal. On an average, five or six tropical cyclones occur every year, of which two or three could be severe. Most cyclones occur in the Bay of Bengal followed by those in the Arabian Sea and the ratio is approximately 4:1. The incidence of cyclonic storms, with wind speeds between 65 Km/h and 117 Km/h and severe cyclonic storm with wind speeds between 119 Km/h and 164

Figure 1.12: Cyclone Hazard Map



Source: BMTPC

Km/h, reaching Tamil Nadu and Andhra Pradesh is high during the north east monsoon season ie. October – December, where as the highest annual number of storms, severe storms occur in the Orissa - West Bengal coast.

1.12.3 The yearly distribution of tropical cyclones in the north Indian Ocean indicates large year-to-year variations in the frequency of cyclonic disturbances and tropical cyclones, but no distinct periodicity. However, the trend indicates a slight decrease with time. The annual average of cyclonic disturbances in the North Indian Ocean is about 15.7 with a standard deviation of 3.1. The annual number of cyclonic disturbances range from seven in 1984 to twenty three in 1927. The annual average of tropical cyclones has varied from one in 1949 to ten in 1893, 1926, 1930 and 1976. The Cyclone hazard map of India may be seen in the Figure 1.12. gives the vulnerability map of hazard due to cyclone.

1.12.4 A severe super cyclonic storm with winds of upto 250 km/hour crossed the coast in Orissa on October 29, 1999. This may have been the worst cyclone of the country in the Orissa region and was responsible for as many as 10,000 deaths, rendering millions homeless and extensive damage to property and environment. Some of the disastrous tropical storms of India and Bangladesh are given in Table 1.9.

Table 1.9: Major Cyclones of India and Bangladesh

Year	Name of the Country	No. of Deaths	Storm surge (Height in ft.)
1737	Hoogli, West Bengal (India)	3,00,000	40′
1876	Bakerganj (Bangladesh)	2,50,000	10′-40′
1885	False point (Orissa)	5,000	22′
1960	Bangladesh	5,490	19″
1961	Bangladesh	11,468	16′
1970	Bangladesh	2,00,000	13-17′
1971	Paradeep, Orissa (India)	10,000	7′-20′
1977	Chirala, Andhra Pradesh	10,000	16′-18′
1990	Andhra Pradesh	990	13′-17′
1991	Bangladesh	1,38,000	7′-20′
1998	Porbander cyclone	1,173	--
1999	Paradeep, Orissa	9,885	30′

Source: IMD Disastrous weather Events annual reports

1.13 Heat Wave[10]

1.13.1 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 often continues till June, in rare cases till July, over the northwestern parts of the country. Table 1.10 gives the number of heat waves observed in India during 1911-1999.

Table 1.10: Number of Heat Waves in India

State	Epochs				
	1911-67	1968-77	1978-99	2000-2009**	1911-2009
West Bengal	31	2	28	6	67
Bihar	76	9	28	4	117
Uttar Pradesh	105	6	23	-	134
Rajasthan	27	3	42	14	56
Gujarat, Saurashtra & Kutch	43	1	7	2	53
Punjab	-	2	-	6	8
Himachal Pradesh	-	1	-	1	2
Jammu & Kashmir	-	-	-	-	-
Maharashtra	26	5	35	12	78
Madhya Pradesh	32	4	15	5	56
Orissa	25	8	18	22	73
Andhra Pradesh	21	-	3	2	26
Assam	-	4	19	-	23
Haryana, Delhi & Chandigarh	-	1	2	2	5
Tamil Nadu	5	-	2	1	8
Karnataka	-	-	-	1	-

Source: IMD Disastrous weather Events annual reports; EMDAT

Note: Epoch is defined as number of events.

1.13.2 In recent years, heat wave induced casualties have some what increased. Abnormally high temperatures were observed during April 2002 across the country. On 10th May 2002, the maximum temperature at Gannavaram (Vijayawada) 49°C (WMO 2003) was recorded. Decrease in the Diurnal Temperature Range (DTR) due to urbanisation is a new factor leading to human

Table 1.11: Deaths due to Heat Waves in India

Year	No of Deaths	Year	No of Deaths	Year	No of Deaths
1979	361	1989	44	1999	126
1980	156	1990	2	2000	57
1981	72	1991	252	2001	70
1982	16	1992	114	2002	806
1983	185	1993	42	2003	1539
1984	58	1994	434	2004	117
1985	142	1995	412	2005	587
1986	156	1996	20	2006	135
1987	91	1997	20	2007	476
1988	637	1998	1662	2008	294

Source- IMD Report

mortality and discomfort. Increased minimum temperatures in summer do not allow the necessary nocturnal cooling to neutralize the high maximum temperature during a heat wave epoch. Table 1.11 gives the details of the death due to the heat waves in India.

1.14 Cold Wave and Fog[11]

1.14.1 Occurrences of extreme low temperature in association with incursion of dry cold winds from north into the sub continent are known as cold waves. The northern parts of India, specially the hilly regions and the adjoining plains, are influenced by transient disturbances in the mid latitude westerlies which often have weak frontal characteristics. These are known as western disturbances. The cold waves mainly affect the areas to the north of 20°N but in association with large amplitude troughs, cold wave conditions are sometimes reported from states like Maharashtra and Karnataka as well. Table 1.12 gives the frequencies of the occurrence of cold waves in different parts of the country for different periods. In recent years due to deterioration of the air quality in urban locations of India the deaths and discomfort from cold waves have been substantial. UP and Bihar rank the highest in terms of casualties from cold wave and this could be due to poor level of development and lack of shelters to the outdoor workers and farmers.

Table 1.12: Number of Cold Waves in India

	Epochs					
	1901-10	1911-67	1968-77	1978-99	2000-2009**	1901-2009
West Bengal	2	14	3	28	7	54
Bihar	7	27	8	67	12	121
Uttar Pradesh	21	51	8	47	13	140
Rajasthan	11	124	7	53	12	207
Gujarat, Saurashtra & Kutch	2	85	6	6		99
Punjab	3	34	4	19	10	70
Himachal Pradesh	-	-	4	18	4	26
Jammu & Kashmir	1	189	6	15	2	213
Maharashtra	-	60	4	18	1	83
Madhya Pradesh	9	88	7	12	1	117
Orissa	4	5	-	-	3	15
Andhra Pradesh	2	-	-	-	-	2
Assam	1	1	-	-	2	4
Haryana, Delhi & Chandigarh	-	-	4	15	15	34
Tamil Nadu	-	-	-	-	-	-
Karnataka	-	10	-	-	-	10
Jharkhand	-	-	-	-	1	1

Source: IMD Disastrous weather Events annual reports; EMDAT

Note: Epoch is defined as number of events.

1.15 Thunderstorm, Hailstorm and Dust Storm[12]

1.15.1 As winter season transforms into spring, the temperature rises initially in the southern parts of India, giving rise to thunderstorms and squally weather which are hazardous in nature. While the southernmost part of the country is free from dust storms and hailstorms, such hazardous weather affects the central, northeastern, north and northwestern parts of the country. The hailstorm frequencies are highest in the Assam valley, followed by hills of Uttarakhand, Jharkhand and Vidarbha Maharashtra (Philip & Daniel 1976). However, thunderstorms also occur in Kolkatta, Delhi, Jaipur and Ahmedabad. Tornadoes are rare in India but some of them are quite devastating. Some of other tornadoes which caused extensive damage and destruction in the country is given in the Table 1.13.

Table 1.13: Past Incidences of Tornadoes

Sl.No	Event	Date and years	Place	Loss of life	Injured	Homeless
1	Tornado	19th April 1963	Cooch Bihar, West Bengal, India	139	-	3760
2.	Tornado	1st April 1977	Dhaka, Bangladesh	500	6000	-
3.	Tornado	12 April 1983	Gaighata, West Bengal, India	28	500	-
4.	Tornado	19th October 1987	Chapra, India	20	517	-
5.	Tornado	9th April 1993	Kanthi in WB, India	50	180	-

Source: IMD Disastrous weather Events annual reports

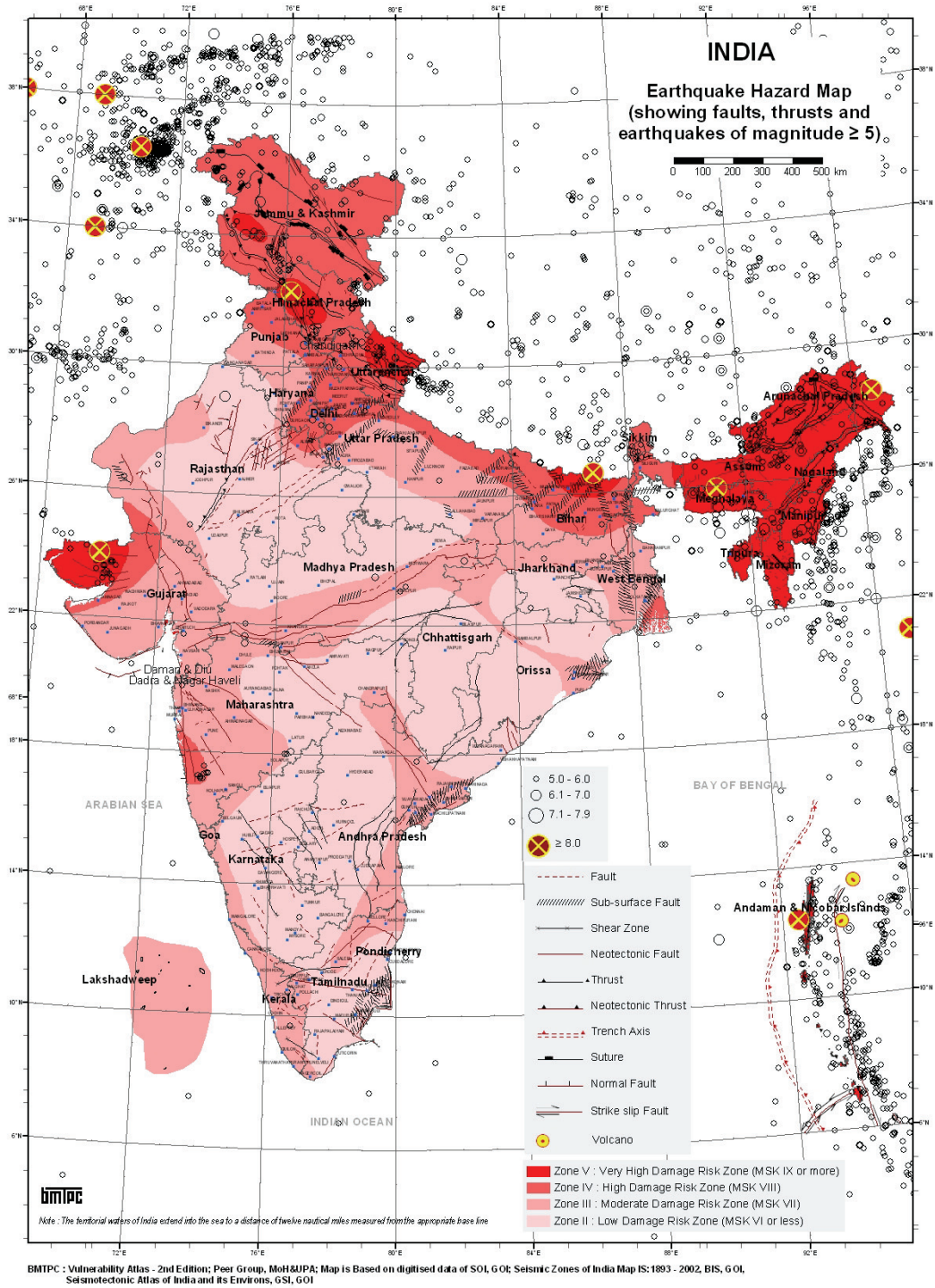
1.16 Earthquakes[13]

1.16.1 Globally, earthquakes result in a loss of about 50,000 lives every year. Earthquakes over 5.5 magnitude on the Richter scale are progressively damaging to property and human life. However, there are many other factors that influences the damage pattern. Massive earthquakes generally occur near the junction of two tectonic plates, e.g., along the Himalayan range, where the Indian plate goes below Eurasian plate. The Indian sub- continent situated on the boundaries of two continental plates is very prone to earthquakes. Some of the most intense earthquakes of the world have occurred in India. Fortunately, none of these have occurred in any of the major cities. According to latest seismic zoning map brought out by the Bureau of Indian Standard (BIS), over 65 percent of the country is prone to earthquake of intensity Modified Mercalli Intensity Scale (MSK) VII or more.

1.16.2 India has been divided into four seismic zones according to the maximum intensity of earthquake expected (Figure 1.13). Of these, zone V is the most active which comprises of whole of Northeast India, the northern portion of Bihar, Uttarakhand, Himachal Pradesh, J&K, Gujarat and Andaman & Nicobar Islands. India has highly populous cities and the constructions in these cities are not earthquake resistant. Regulatory mechanisms are weak, thus any earthquake striking in one of these cities would turn into a major disaster. Six major earthquakes have struck different parts of India over a span of the last 15 years.

1.16.3 The entire Himalayan Region is considered to be vulnerable to high intensity earthquakes of a magnitude exceeding 8.0 on the Richter Scale, and in a relatively short span of about 50 years, four such major earthquakes have occurred in the region: Shillong, 1897 (M8.7); Kangra, 1905

Figure 1.13: Earthquake hazard map of India



Source: BMTPC

Damaged structure due to earthquake- Gujarat 2001

(M.8.0); Bihar–Nepal, 1934 (M 8.3); and Assam–Tibet, 1950 (M 8.6). Scientific publications have warned that very severe earthquakes are likely to occur anytime in the Himalayan Region, which could adversely affect the lives of several million people in India. Some significant earthquakes in India are listed in the Table 1.14.

Table 1.14: Some Significant Earthquakes in India

Date	Epicenter		Location	Magnitude
	Lat (Deg. N)	Lat (Deg. E)		
16 June 1819	23.6	68.6	Kutch, Gujarat	8.0
10 June 1869	25	93	Near Cachar, Assam	7.5
30 May 1885	34.1	74.6	Sopor, J&K	7.0
12 June 1897	26	91	Shilong Plateau	8.7
04 April 1905	32.3	76.3	Kangra, HP	8.0
08 July 1918	24.5	91.0	Srimangal, Assam	7.6
02 July 1930	25.8	90.2	Dhubri, Assam	7.1
15 Jan 1934	26.6	86.8	Bihar- Nepal Border	8.3
26 June 1941	12.4	92.5	Andaman Island	8.1
23 Oct 1943	26.8	94.0	Assam	7.2
15 Aug 1950	28.5	96.7	Arunachal Pradesh- China Border	8.5
21 July 1956	23.3	70.0	Anjar, Gujarat	7.0
10 Dec 1967	17.37	73.75	Koyna, Maharastra	6.5
19 June 1975	32.38	78.49	Kinnuar, HP	6.2
06 Aug 1988	25.13	95.15	Manipur-Myanmar Border	6.6
21 Aug 1988	26.72	86.63	Bihar- Nepal Border	6.4
20 Oct 1991	30.75	78.86	Uttarkhashi, Uttarakhand	6.6
30 Sept 1993	18.07	76.62	Latur- Osmanabad, Maharshtra	6.3
22 May 1997	23.08	80.06	Jabalpur, MP	6.0
29 Mar 1999	30.41	79.42	Chamoli Dist, UK	6.8
26 Jan 2001	23.40	70.28	Bhuj, Gujarat	7.7
08 Oct 2005	34.49	73.15	Kashmir	7.6

Source: IMD

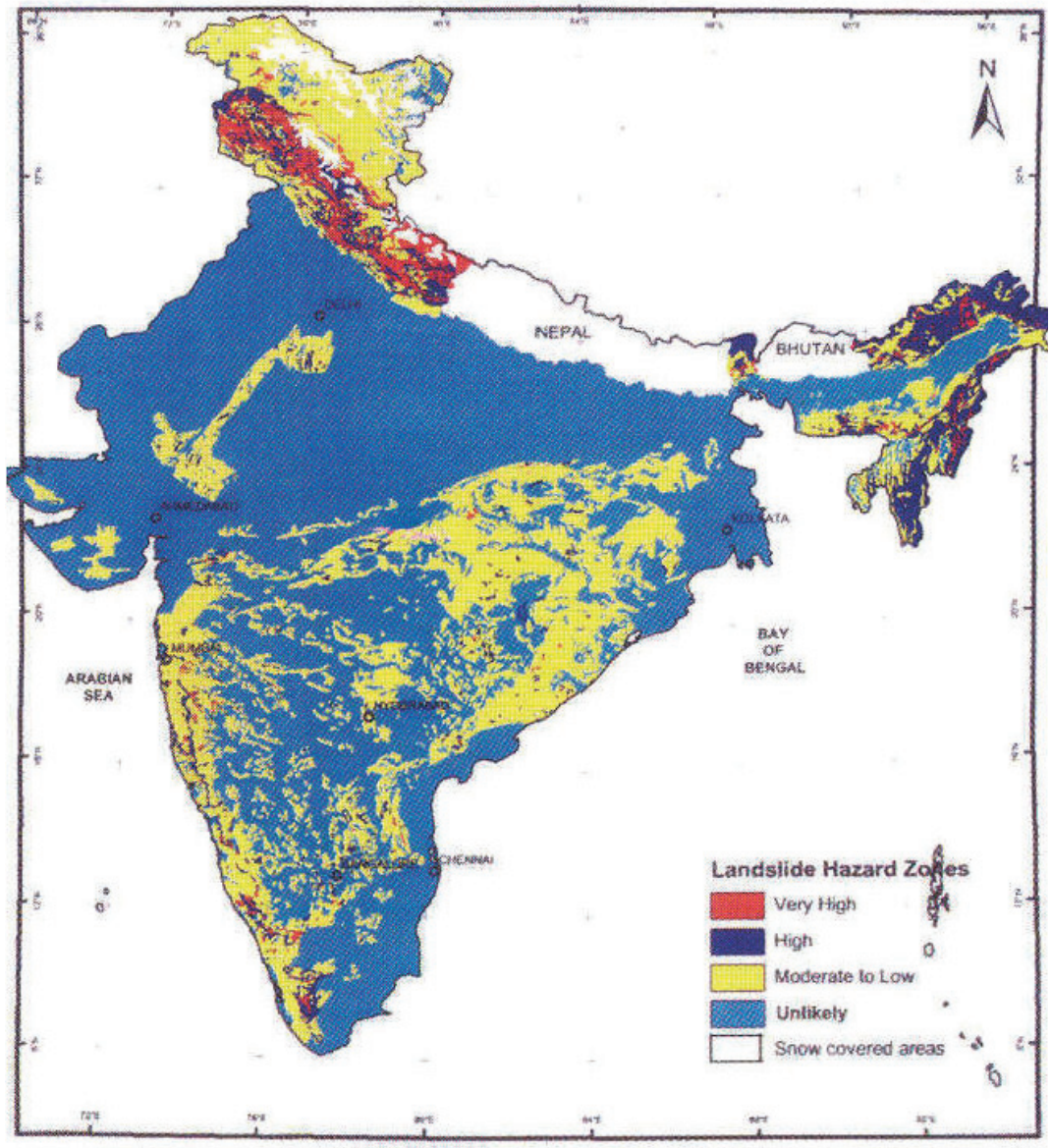
1.17 Landslides[14]

1.17.1 Landslides mainly affect the Himalayan region and the western ghats of India. Landslides are also common in the Nilgiri range. It is estimated that 30 percent of the world's landslides occur in the Himalayas. The Himalayan mountains, which constitute the youngest and most dominating mountain system in the world, are not a single long landmass but comprises a series of seven curvilinear parallel folds running along a grand arc for a total of 3400 kilometers. Due to its unique nature, the Himalayas have a history of landslides that has no comparison with any other mountain range in the world. Landslides are also common in western ghat. In the Nilgiris, in 1978 alone, unprecedented rains in the region triggered about one hundred landslides which caused severe damage to communication lines, tea gardens and other cultivated crops. A valley in Nilgiris is called "Avalanches Valley". Scientific observation in north Sikkim and Garhwal regions in the Himalayas clearly reveal that there is an average of two landslides per sq. km. The mean rate of land loss is to the tune of 120 meter per km per year and annual soil loss is about 2500 tones per sq km. Fig 1.14 shows the landslide hazard zones in India

1.17.2 Landslides constitute a major natural hazard in our country, which accounts for considerable loss of life and damage to communication routes, human settlements, agricultural fields and forest lands. Based on the general experience with landslides, a rough estimate of monetary loss is of the order of ₹ 100 crore to ₹ 150 crore per annum at the current prices for the country as a whole.

Landslide at Darjeeling, 2010 *Source: Save the Hills Organisation*

Figure 1.14: Landslide hazard zones in India



Source: BMTPC

1.18 Industrial and Chemical Disasters[15]

1.18.1 Industrial disasters include events that occur due to mishaps or failures in industry or related activities and also the disasters that affect the industrial functions, property and productivity. 'Chemical Disasters' and 'Industrial Disasters' are terms often used interchangeably but are actually a sub-category of the other. A chemical disaster may occur due to both, natural or human-made sources, however, in view of growing chemical usage and industrial development worldwide, the pre-disaster prevention and mitigation of chemical (industrial) disasters is a

serious concern. It is estimated that there are currently over 1949 Major Accident Hazards units in India besides other small and medium–sized industries, in huge numbers, all across the nation. New industries are also coming up at a rapid rate. A year wise list of chemical disasters for past decade may be seen in Table 1.15.

1.18.2 **Industrial disaster:** Industrial disasters are disasters caused by chemical, mechanical, civil, electrical or other process failures due to accident, negligence or incompetence, in an industrial plant which may spill over to the areas outside the plant or with in causing damage to life, property and environment.

1.18.3 **Chemical disaster:** Chemical disasters are occurrence of emission, fire or explosion involving one or more hazardous chemicals in the course of industrial activity (handling), storage or transportation or due to natural events leading to serious effects inside or outside the installation likely to cause loss of life and property including adverse effects on the environment. "Chemical accident or emergency can result in extensive damage to the environment with considerable human and economic costs. Chemical and industrial emergencies may arise in a number of ways, such as -

- Explosion in a plant
- Accidents in storage facilities of chemicals
- Accidents during the transportation of chemicals, misuse of chemicals
- Improper waste management
- Accidents in treatment plants
- Technological system failures
- Failures of plant safety design
- Arson and sabotage
- Human error

Table 1.15: Year wise Chemical disasters in past decade

SL No.	Year	No. of incidents	No. of Deaths	No. of injured	States where the incidents were recorded
1.	2002	06	05	31	Gujarat, Kerala, Maharashtra
2.	2003	06	11	112	Andhra Pradesh, Assam, Kerala, Madhya Pradesh, Punjab
3.	2004	18	47	91	Andhra Pradesh, Gujarat, Haryana, Kerala, Madhya Pradesh, Maharashtra, Punjab, Tamil Nadu, Uttarakhand, West Bengal, Delhi
4.	2005	11	15	14	Andhra Pradesh, Assam, Gujarat, Kerala, Tamilnadu, Uttar Pradesh
5.	2006	16	32	24	Andhra Pradesh, Gujarat, Kerala, Maharashtra, Rajasthan, Uttarakhand, Uttar Pradesh, West Bengal
6.	2007	18	37	14	Assam, Gujarat, Kerala, Madhya Pradesh, Maharashtra, Punjab, Uttarakhand, West Bengal
7.	2008	23	50	148	Andhra Pradesh, Gujarat, Jharkhand, Kerala, Maharashtra, Uttar Pradesh
8.	2009	24	50	128	Andhra Pradesh, Assam, Haryana, Kerala, Madhya Pradesh, Punjab, Rajasthan, Uttar Pradesh, Uttarakhand, West Bengal
9.	2010	08	12	01	Andhra Pradesh, Assam, Maharashtra, Punjab, Uttar Pradesh
10.	**Total**	**130**	**259**	**563**	

Source: Ministry of Environment and Forests

1.19 Tsunami

1.19.1 Tsunamis and earthquakes happen after centuries of energy build up within the earth. A tsunami (in Japanese 'tsu' means harbor and 'nami' means wave) is a series of water waves caused by the displacement of a large volume of a body of water, usually an ocean. In the Tamil language it is known as "Aazhi Peralai". Seismicity generated tsunamis are result of abrupt deformation of sea floor resulting vertical displacement of the overlying water. Earthquakes occurring beneath the sea level, the water above the reformed area is displaced from its equilibrium position. The release of energy produces tsunami waves which have small amplitude but a very long wavelength (often hundreds of kilometer long). It may be caused by non-seismic event also such as a landslide or impact of a meteor.

1.19.2 **Characteristics:** Tsunami in the deep ocean may have very long waves length of hundred of kilometer and travels at about 800 km per hour, but an amplitude of only about 1 km. It remains undetected by ships in the deep sea. However when it approaches the coast its wavelength diminishes but amplitude grows enormously, and it takes very little time to reach its full height. Computer model can provide tsunami arrival, usually within minutes of the arrival time. Tsunamis have great erosion potential, stripping beaches of sand, coastal vegetation and dissipating its energy through the destruction of houses and coastal structure.

1.19.3 Tsunami Vulnerability[16]: Potential Tsunamigenic zones may be seen from Figure 1.15. For Tsunami to hit the Indian coast according to INCOIS, it is necessary that the earthquake of magnitude more than 7.0 on Richter scale should normally occur. The possible zones for such an event to occur are Andaman - Sumatra or Makran (Pakistan). Not all the major eqrthquakes are Tsunamigenic. Few historical events to Tsunami in India may be seen in Box No. 1.3.

Box 1. 3: Historical Tsunamis in India

Tsunami Sources for India

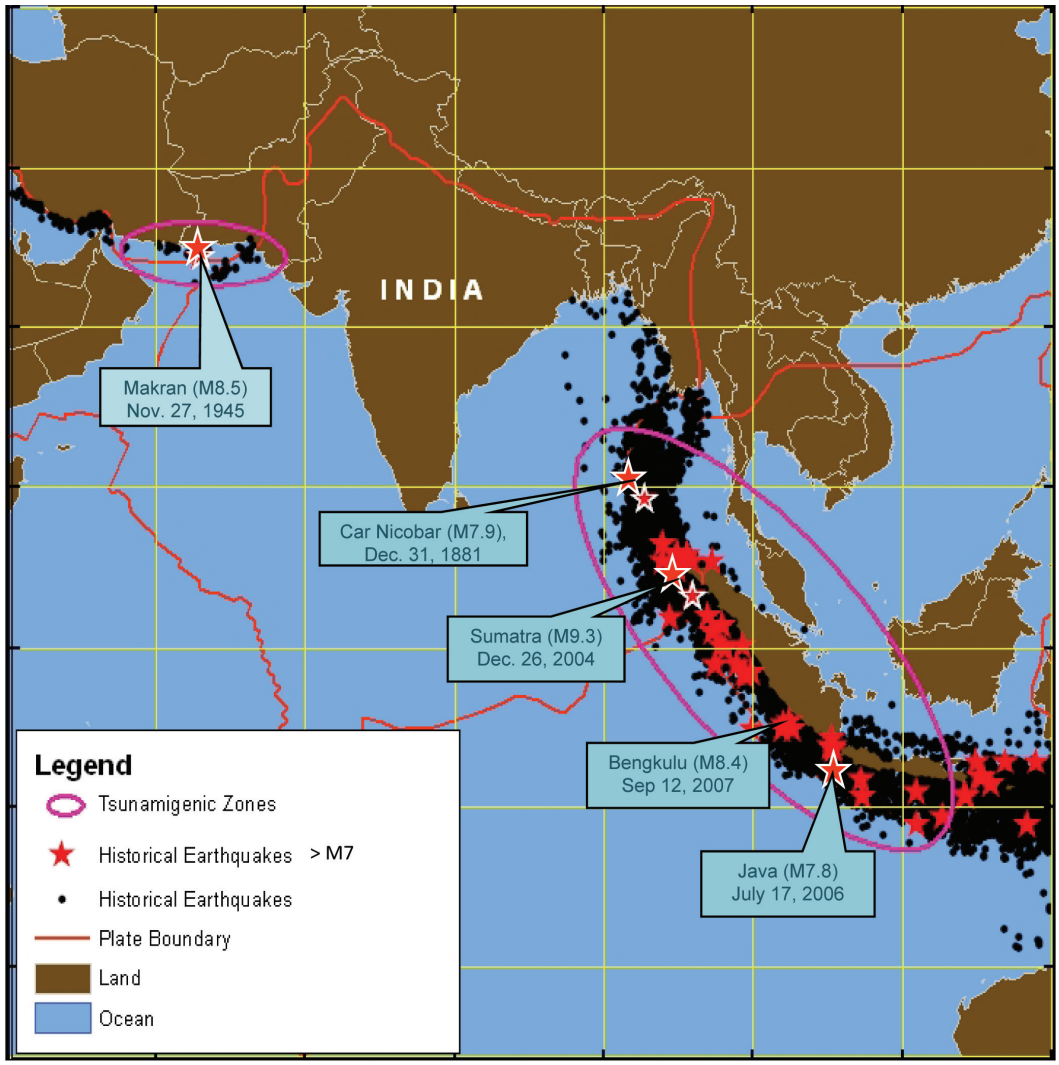
- For a tsunami to hit Indian coast, it is necessary that earthquake of magnitude > 7 should occur. Two such possible zones are
- **Andaman-Sumatra**
- **Makran**
- Not all major earthquakes are tsunamigenic
- To generate tsunami
- **Earthquakes must occur under or near ocean**
- **Depth < 100km**
- **Vertical movement of the sea-floor**
- Slow Rupture Velocities are most efficient Tsunami Generators
- **Historical Tsunamis in India**
- 12 Apr, 1762 (BoB EQ) – 1.8 M
- 31 Dec, 1881 (Car Nicobar EQ)
- 27 Aug, 1883 (Krakatoa) – 2 M
- 26 Jun, 1941 (Andaman EQ)
- 27 Nov, 1945 (Makran EQ) – 12 M
- 26 Dec, 2004 (Sumatra EQ) – 10 M

Source: INCOIS

Box 1. 4: Tsunami in Indian Ocean

The Tsunami of 26th December 2004 caused extensive damage to life and property in the states of Tamil Nadu, Kerala, Andhra Pradesh, UTs of Puducherry and Andman & Nicobar Islands (A & NI). The Tsunami disaster had badly affected the fishermen community who not only lost their near and dear ones but also lost their means of livelihood. A population of 26.63 lakhs in 1396 villages in five states and UTs was affected by this disaster. Almost 9395 people lost their lives and 3964 people were reported missing and feared dead. Most of the missing persons were from Andaman & Nicobar Islands.

Figure 1.15: Potential Tsunamigenic zones

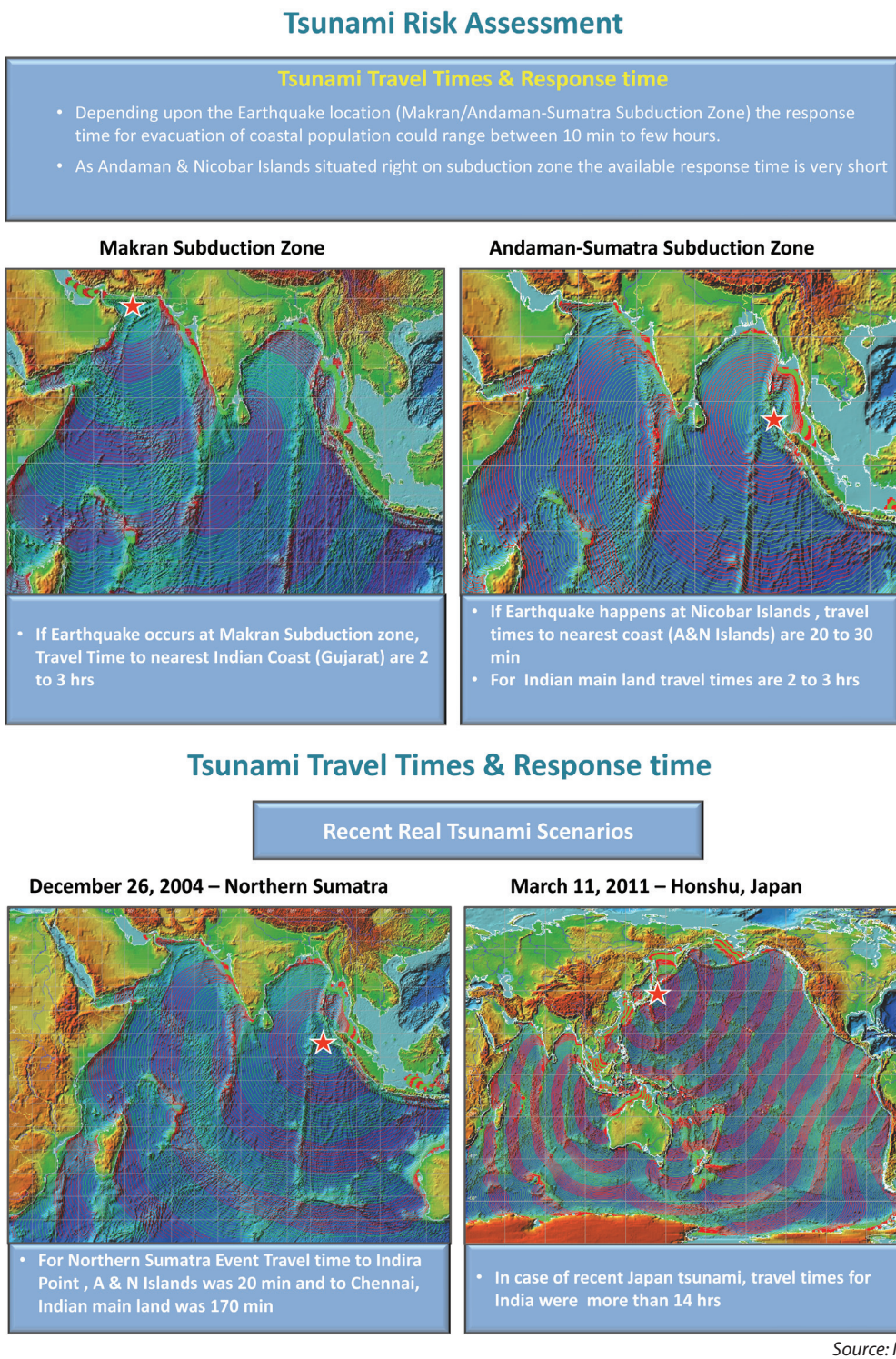


Source: INCOIS

1.19.4 **Tsunami Risk Assessment**[17]: A preliminary risk assessment has been done for the Indian Coast w.r.t. tsunamis taking into account the seismo-tectonic setting, historical seismicity and past tsunami events. The east and west coasts of India and the island regions are likely to be affected by Tsunamis generated mainly by subduction zone related earthquakes from the two potential source regions, viz., the Andaman-Nicobar-Sumatra Island Arc and the Makran subduction zone north of Arabian Sea.

Depending upon the location of the Earthquake, the response time for evacuation of coastal population could range between 10 minutes to a few hours (Figure 1.16). Tsunami modeling studies indicate that the least response time available is for the Andaman & Nicobar Islands which are situated right on the subduction zones capable of triggering tsunamigenic earthquakes. Considering that a credible worst case earthquake of 7.5 or higher occurs near Nicobar, the

Figure 1.16: Tsunami travel times & response time



Source: INCOIS

travel time to the nearest coast in Nicobar would be approximately 20 – 30 minutes and for the Indian mainland about 2 – 3 hours. For earthquakes occurring near Indonesia, the travel time to Andaman & Nicobar would be in the range of 1 – 2 hours and to the Indian mainland about 3 – 5 hours. For earthquakes occurring off Makran, the travel time to the nearest Indian coast (Gujarat) would be about 2 – 3 hours. A table showing typical travel times of tsunami waves to a few Indian Coastal locations for 4 historic events is illustrated in Table 1.16.

Table 1.16: Tsunami travel time

	EQ Location Northern Sumatra 93.9 E 4.33 N Dec 2004 9.3 M	EQ Location Java 102.8 E 4.4 S Aug 1977 8.3 M	EQ Location Andaman 92.1 E 9.1 N June 1941 7.7 M	EQ Location Makran 63.4 E 25.1 N Nov 1945 8.1 M
Coastal Location	**Tsunami Travel Times**			
Indira Point	20 Min	160 Min	30 Min	NA
Port Blair	90 Min	230 Min	30 Min	NA
Chennai	170 Min	300 Min	140 Min	NA
Visakhapatnam	180 Min	320 Min	150 Min	NA
Kochi	250 Min	NA	NA	240 Min
Gujarat	430 Min	NA	NA	105 Min
Mumbai	440 Min	NA	NA	230 Min

Source: INCOIS

Box 1.5: Cascading effect of Disaster – Earthquake, Tsunami, fire and nuclear disaster: Japan Experience[16]

Event of one kind of Disaster sometimes lead to a cascading effect and untold other disasters. The preparedness to respond to such unforeseen chain of events is difficult to visualize and plan and is going to be one of the challenges to managers engaged in DRR. Recent experiences of earthquake in Japan leading to Tsunami, fire and then nuclear emergency are an eye opener to those underestimating the might and fury of nature.

i. **Earthquake**

On 11th March 2011, at 14:46 the northeastern part of Japan was triggered by a major earthquake of magnitude 9 with an epicenter at 130 km off the pacific coast of Tohoku region and depth of

Source: National Geographic News

24 km. As per the Japan Meteorological Agency (JMA), the seismic intensity of 7[in the Japanese scale of 1 to 7] was recorded in Kurihara city of Miyagi prefecture. Moreover, the intensity of 6+ was recorded in 28 cities and towns in Miyagi, Fukushima, Ibaraki, and Tochigi prefacture. It also included Wakuya town, Tome city and Osaki city. Intensity of 6 or weaker was observed in different parts of the country.

ii. **Tsunami**

It was followed by a major Tsunami, with maximum height of 11.87 meter recorded near the coast of Akamae at 15:31 JST, Major tsunami of more than 3 m or more arrived in northern part of Japan: eastern, central, western part of pacific coast of Hokkaido, Pacific coast of Aomori, Iwate, Miyagi, Fukushima, Ibaraki, Chiba prefecture, Kujukuri, & Sotoboare and Izu islands. The earthquake in Japan also triggered warning in other countries such as Taiwan, Indonesia, Russia, Philippines, the pacific Islands, and as far away as Hawaii, Mexico and Colombia. The earthquake happened in 14:46, and the tsunami warning was issued at 14:49, and it was on the JMA website on 14:49.

The hypo-central region of this earthquake extends from offshore Iwate prefecture to offshore Ibaraki prefecture so that the most effected area were Iwate prefecture, Myagi prefecture, Fukushima prefecture and Ibaraki prefecture The Japanese Meteorological Agency said that the earthquake may have ruptured the fault zone from Iwate to Ibaraki with a length of 500 km and a width of 200 km.

Following the 9.0 magnitude earthquake, massive waves of debris-filled water swept away buildings, cars, and ships. Fires occurred in several cities and nuclear power plants, refineries, airports, and parts of the transport networks were shut down.

As of 23rd March, the resulted death was nearly 9,079, and 12,782 missing. The disaster also damaged 126,000 buildings, besides damaging other infrastructure, such as bridges, transportation system,

Tsunami at Natori, Japan *Source: National Geographic News*

electricity, gas supplies, and communication services. Citigroup expects 5-10 trillion yen in damage to housing and infrastructure, while Barclays Capital estimates economic losses of 15 trillion yen ($183.7 billion) or 3 percent of Japan's GDP.

iii. **Fire Events**

On 11th March, several fires' resulted due to powerful earthquake triggered near the east coast of Honshu, the largest and main island of Japan. Fire broke out at Cosmo Oil Company refinery in Ichihara city. The fire continued till 14th March. The number of events increased after the first day of earthquake, when only 44 cases were recorded. It increased to 325 cases on 19th March.

iv. **Nuclear Emergency**

Same day at 20:30 CET (04:30 JST), a nuclear emergency situation at the Fukushima Daiichi (number one) nuclear power plant was declared. Because of the intense earthquake all the three operating (out of six) reactors automatically began the process to be shut down. The back-up diesel generators for supplying the water to cool down the fuel rods inside the reactors due to the tsunami were damaged. The water available began to evaporate and at 15:30 JST on March 12 a first hydrogen explosion took place at the number one reactor and led the Japanese government to evacuate people within a 20 km radius around the Fukushima Daiichi power plant. On March 14 at 11:01 JST, another explosion took place in reactor number 3 at the Fukushima Daiichi nuclear power plant. At 06:14 JST on March 15, another explosion took place in the number 2 reactor at the Fukushima Daiichi nuclear power plant. And a fire broke out in the number 4 reactor where spent fuel rods were stored to undergo their cooling process, soon after the fire was extinguished. These incidents led to further increase of emission of radiation with levels up to 400 millisievert per hour near the site. (A person is normally not to be exposed to more than

Source: Fire at Yuriage in Natori, Japan *Source: National Geographic News*

Nuclear Emergency at Fukushima, Daiichi *Source: National Geographic News*

2.4 millisivert per year!) Subsequently, the Japanese Government established a 30km radius "No Fly Zone" around the Fukhushima Daiichi nuclear power plant. On March 17, the helicopters' water spraying supported by further units of the Self Defense Force (SDF) shot water from the ground, using heavy water cannon trucks, into the most troubled number 3 reactor which continued the following days. Meanwhile new power cables were installed to provide the reactors number 1 and 2 with energy to start-up again the cooling mechanisms. Increased radiation levels were reported in spinach, milk and tap water outside the demarcated 30km evacuation zone. Farmers were advised to voluntarily avoid distributing contaminated food into the markets.

V. Lessons

This recent event is a pointer to the need to have a multi-hazard approach and plan to handle unexpected disasters. Japan as a country is one of the best prepared countries, yet had to face the cascading impact of disasters starting from the large undersea earthquake, resultant Tsunami, fire and nuclear and energy related emergencies in addition to the disaster linked loss of life, livelihood assets etc.

Soldiers of Japan Self-Defense Force and firefighters search for the victims in the rubbles in Matsushima, Miyagi Prefecture, Japan. Source: www.foxnews.com

Extracts from the report- MEGA DISASTER IN A RESILIENT SOCIETY - The Great East Japan (Tohoku Kanto) Earthquake and Tsunami of 11th March 2011 - SYNTHESIS AND INITIAL OBSERVATIONS, International Environment and Disaster Management Graduate School of Global Environmental Studies Kyoto University, 25th March, 2011.

1.20 Stampede[18]

The term stampede is applied to a sudden rush of a crowd of people, usually resulting in many injuries and death from suffocation and trampling. In stampede, the term mob or crowd is used to refer to a congregated, active, polarized aggregate of people, which is basically heterogeneous and complex. Its most salient features include homogeneity of thought and action among its participants and their impulsive and irrational actions.

1.20.1 **Causes:** Incidents of stampedes can occur in numerous socio-cultural situations. These stampede incidents can be categorized into the following types, where the causes and the impact are described in the incident. Though the list is not exhaustive, it provides a fair idea about various types of situations where stampedes can occur.

- Entertainment events
- Escalator and moving walkways
- Food distribution
- Processions
- Natural disasters
- Power failure
- Religious events
- Fire incidents during religious/other events
- Riots
- Sports events
- Weather related

The details of some of the major stampedes in India may be seen form the Table 1.17.

Table 1.17: Major Stampedes in India - 2005-2010

Month & Year	Event	No. of Deaths	Injured
January 2005:	Hindu pilgrims stampede near a remote temple in Maharashtra, India.	265	
December 2005:	Flood relief supplies were handed out to homeless refugees in southern India	42	
October 3, 2007	Train station in northern India	14	
March 27, 2008	Indian temple crush during a pilgrimage	8	10
August 3, 2008	At the Naina Devi temple in Himachal Pradesh	138	47
September 30, 2008	At the Chamunda Devi temple in Jodhpur, India.	147	
March 4, 2010	At Ram Janki Temple, in Kunda, India	71	200
January 14, 2011	At Sabarimala, Kerala	104	50

Source: NIDM

1.21. Nuclear Emergencies[19]

1.21.1 Nuclear emergency /Disaster is caused due to an extraordinary release of radioactive material or radiation either in the operation of nuclear reactors or other nuclear events like explosion of a Radiological Dispersal Device (RDD) or Improvised Nuclear Device (IND) or explosion of a nuclear weapon. It is accompanied with sudden release of harmful radiations or radioactive materials or both together in to the environment.

(i) Nuclear emergency may be encountered in the following situations: Intentional use of nuclear weapons in the event of war: Nuclear attacks may make use of nuclear weapons, which are extremely destructive and powerful enough to destroy an entire city. With the advancement of scientific research in the world, several countries have acquired the technology to produce nuclear weapons, which are more destructive and harmful than the atom bomb used more than half a century ago against Japan during the Second World War.

(ii) Accidents in nuclear power project: The nuclear Power Plants take care of safety by Engineered safety features by design and redundancy in safety systems to prevent any mal-operations and to bring the system to a safe shut down in case of any abnormalities. However, in case of a major malfunction, there is a remote possibility of release of radioactivity/ radiation to the environment. The area affected would depend on the amount of the release, and wind direction, speed and weather conditions.

(iii) Accidents in handling radiation sources :Other accidental exposure of radiation could be due to accident with the radioactive material during transportation, wrong/faulty practices, failure of machinery of a radiation facility etc. A brief summary of the accidents between 1987 to 2010 are given in Table 1.18.

Table 1.18: Incidents in Nuclear Facilities in India

Date & Month	Place	Event
4 May 1987	Kalpakkam, India	In an incident during refueling of FBTR, structural deformation happened in some of the fuel assemblies. There was no release of radioactivity. The reactor remained shut down for about two years for restoration which involved development of special tools, inspection and removal of affected fuel assemblies.
13 May 1992	Tarapur, Maharashtra, India	There was a minor tube leak in one heat exchanger which was subsequently replaced. Radioactivity released was within the regulated limits
31 Mar 1993	Bulandshahr, Uttar Pradesh, India	A fire occurred in Turbine building which is not a part of reactor system. This resulted in damage of the steam turbine blades. The reactor was brought to safe shutdown state. The unit was restarted after Regulatory approval
22 Oct 2002	Kalpakkam, India	About 75 kg of sodium from primary sodium purification line at Fast Breeder Test Reactor leaked inside the purification cabin. There was no fire or any release of radioactivity.
April 2010	Mayapuri, Delhi India	In a radiological accident, an irradiator was sold to metal scrap dealer. The dealer dismantled the irradiator which caused release of radioactive source resulting the exposure to a worker in the shop leads to one fatality

Source: Babha Automic Research Centre, Mumbai

1.21.3 Radiation releases due to any reason can be devastating - Chernobyl is a good example. With modern reactor design, a catastrophic release of radiation is highly unlikely, but nevertheless, possible. This can happen due to factors beyond the control of the operating agencies e.g., human error, system failure, sabotage, earthquake, cyclone, flood and tsunami etc.

1.22 Road Accidents[18]

1.22.1 The rapid expansion of road transport has brought with it the challenge of addressing adverse factors such as the increase in road accidents. Road accidents are a human tragedy. It involves high human suffering and monetary costs in terms of premature deaths, injuries, loss of productivity etc. Most deaths and injuries due to road accidents are invisible to society. They are a hidden epidemic. In India, motor vehicles including two wheelers are growing at a faster rate then the economic and population growth.

1.22.2 Global Status Report on Road Safety (WHO, 2009) has estimated that 1.2 million people die on the world's road every year, and as many as 50 million others are injured. Over 90% of deaths occurred in low income and middle income countries, which have only 48% of the world's registered vehicles. The problem of road safety is acute in India. In the year 2008 alone, number of road accidents were 4.8 lakh resulting in close to 1.2 lakh deaths and 5.2 lakh injured, many of whom are disabled for rest of their lives. Sadly, many of these victims are economically active young people.

1.22.3 **Trends in accidents, injuries, fatalities, motor vehicles & road network:** Between 1970 and 2008, the number of accidents quadrupled with more than 7 fold increase in injuries and more than 8 fold increase in fatalities in the backdrop of about 64 fold increase in the number of registered motor vehicles and threefold increase in road network.

1.22.4 **Profile of road accidents:** The proportion of fatal accidents in the total road accidents has consistently increased since 2001 as reflected in Table 1.19 and 1.20. The severity of road accidents measured in terms of persons killed per 100 accidents is observed to have increased from less than 20 in 2001 to 24.7 in 2008.

Table 1.19: Number of Accidents and Number of Persons Involved : 2001 to 2008

Year	Number of Accidents		Number of Persons		Accident Severity*
	Total	Fatal	Killed	Injured	
2001	405637	71219 (17.6)	80888	405216	19.9
2002	407497	73650 (18.1)	84674	408711	20.8
2003	406726	73589 (18.1)	85998	435122	21.1
2004	429910	79357 (18.5)	92618	464521	21.5
2005	439255	83491 (19.0)	94968	465282	21.6
2006	460920	93917 (20.4)	105749	496481	22.9
2007	479216	101161 (21.1)	114444	513340	23.8
2008 (P)	484704	106591 (22.0)	119860	523193	24.7

*(P): Provisional; Source: Information supplied by States/UTs. Figures within parenthesis indicate share of fatal accidents (i.e. involving death) to total accidents. * Accident Severity : No. of Persons Killed per 100 Accidents*

Source: Transport Research Wing, Ministry of Road Transport & Highways, GOI

Figure 1.17 shows that there is increasing trend in road accidents and death from year 2001 - 2008.

1.22.5 **Road Accidents: Inter State Comparisons:** Maharashtra, Tamil Nadu and Karnataka which had a share of around 30.4 % in total number of vehicles registered in India in 2006, accounted for about 38% of the total road accidents , 28 % of the total number of persons killed and 35% of the total persons injured in road accidents in year 2008 (Table 1.17).

Figure 1.17: Graphic presentation showing number of accidents and person killed (2001-2008)

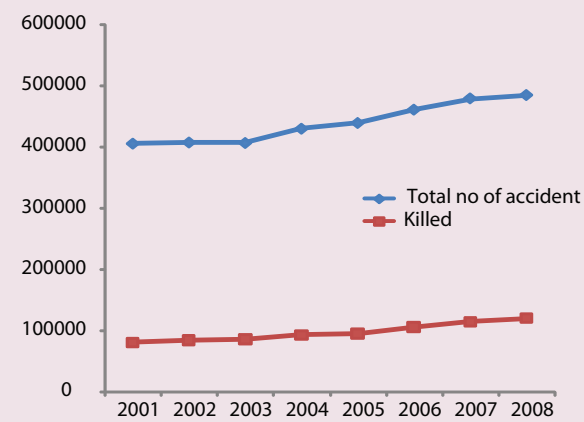


Table 1.20: All India Share of Select States (in %): Road Accidents and Registered Motor Vehicles

State/UT	2005	2006	2007	2008(P)
Top 5 States: Share in Total Number of Road Accidents (in %)				
Share of 5 States	54.4	55.4	55.4	55.4
1 Maharashtra	16.5	16.4	15.4	15.6
2 Tamilnadu	12.3	12	12.3	12.5
3 Karnataka	9.2	9.4	9.7	9.5
4 Madhya Pradesh	8	8.3	8.8	9
5 Andhra Pradesh	8.5	9.5	9.2	8.8
Share of the above 5 States in total Registered Vehicle	43.3	43.6	-	-

Source: Transport Research Wing, Ministry of Road Transport & Highways, GOI

1.22.6 **Classification of Accidents:** National Highways accounted for 29% in total road accidents and 36% in total number of persons killed in 2008. Similarly, State Highways accounted for 26%of total accidents and a share of close to 28 % in the total number of persons killed in road accidents in 2008 (Table 1.21). Highways permit greater speed resulting in relatively greater number of road accidents and fatalities.

Table 1.21: Number of Accidents, persons killed & injured as per road classification (2008)

Road Classification	National Highways	State Highways	Other Roads
No. of Accidents	137995 (28.47)	123972 (25.58)	222737 (45.95)
No. of Persons Killed	42670 (35.60)	34081 (28.43)	43109 (35.97)
No. of Persons Injured	149693 (28.61)	143708 (27.47)	229792 (43.92)

Note: Figures within parenthesis indicate share in total accidents, killed and injured in the respective road categories.

Figure 1.18 shows that, there is increased percentage of accidents in other roads than the national state highways and Figure 1.19 shows that there is loss of life similar to other road and national highways but less life loss in state highways.

Figure 1.18: No. of Accidents as per raod classification in 2008

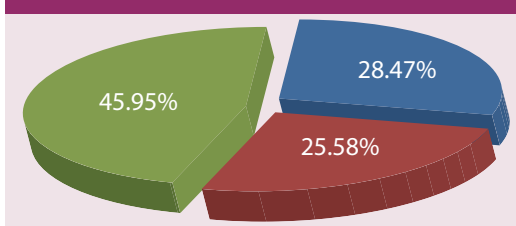
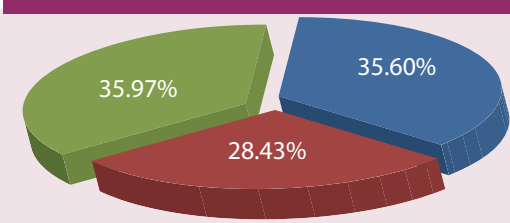


Figure 1.19: No. of Persons Killed as per road classification in 2008



1.22.7 **International Comparisons of Road Traffic Injury, Accidents and Deaths:** Cross country comparisons of incidence of road accident related deaths and injury accidents per lakh persons as per World Road Statistics 2009 (published by International Road Federation, Geneva) shows lower incidence of both the parameters for India in comparison to many developed and developing countries. The number of road accident deaths per lakh of population at 10.5 in India was much lower compared with 12.72 in Korea and 13.68 in USA. Similarly, injury accidents per lakh of population for both in India and China were substantially lower at around 36.69 and 24.82 respectively when compared to U.K. (298.54), USA (579.68), France (131.75), Germany (408.23).

1.23 Rail Accidents[21]

1.23.1 Based on the definition of the Disaster Management Act 2005, Ministry of Railways has adopted the following definition on Railway Disaster: *"Railway Disaster is a serious train accident or an untoward event of grave nature, either on railway premises or arising out of railway activity, due to natural or human-made causes, that may lead to loss of many lives and /or grievous injuries to a large number of people, and/or severe disruption of traffic etc, necessitating large scale help from other government/non-government and private organizations."*

1.23.2 **Nodal Department for policy Formulation on DM on Indian Railways:** The preparation of Disaster Management Plan on Indian railways and on the Zonal Railways in coordination with the different Departments of the Railway, other Central/State Govt. agencies, NGOs, private agencies, etc. has to be done by the Safety Department in the railway Board, on the Zonal Railway and Divisions. Railway Board has approved the nomination of GMs, AGMs or CSOs (when GM/AGM is not available) for declaring an untoward incident as a Railway Disaster.

1.23.4 **Train accident analysis:** The statistics of the death and injured in the consequential train accidents during the last ten years are given in Table 1.22:

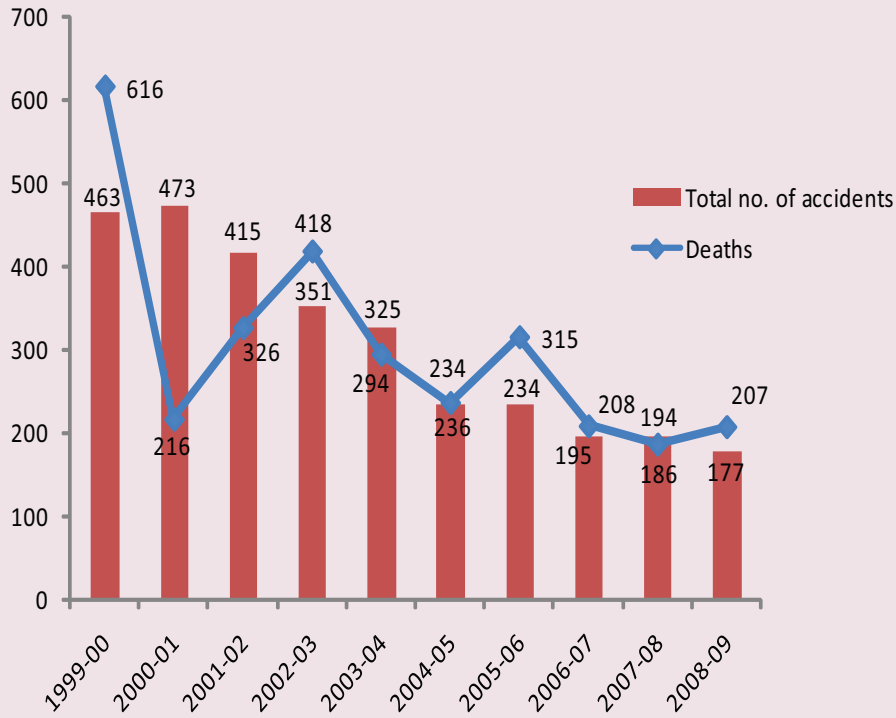
Table 1.22: Train Accidents in India between 1999-2009

Year	Collisions	Derail-ments	LC Accidents	Fire	Misc	Death	Injured	Total	Acct./ MTKm
1999-00	20	329	93	21	-	616	1121	463	0.65
2000-01	20	350	84	17	2	216	488	473	0.65
2001-02	30	280	88	9	8	326	808	415	0.55
2002-03	16	218	96	14	7	418	982	351	0.44
2003-04	9	202	95	14	5	294	492	325	0.41
2004-05	13	138	70	10	3	236	412	234	0.29
2005-06	9	131	75	15	4	315	627	234	0.28
2006-07	8	96	79	4	8	208	402	195	0.23
2007-08	8	100	77	5	4	186	412	194	0.22
2008-09	13	85	69	3	7	207	416	177	0.20

Source: Safety Railway Board, Ministry of Railways

There is a visible decreasing trend in rail accidents and deaths from the year 1999-2009 as shown in Figure 1.20. It shows that there is a better preparedness and latest technologies has helped in reducing the train accidents and subsequent deaths.

Figure 1.20: Graphical presentation of Train accident: number of accidents and deaths (1999-2009)



1.24 Air Accidents[22]

1.24.1 Air accidents are by and large of four types; mid-air collisions, forced landings, crash due to technical snags and air-crash in mountainous terrain due to poor visibility. While air accidents can occur at any time and at any place, areas within about 30 – 40 kms. radius of airports are most vulnerable. Experience shows that a majority of air accidents occur either during take-off or landing near major airports where flight paths get congested. In addition, air accidents also take place at remote inaccessible places like forests, hilly and mountainous regions, high seas, etc. Accidents to Indian Civil Registered Aircraft from 1990 to 2000 may be seen in Table 1.23.

1.24.2 **Causes:** Causes of air accidents are either human failure of pilots, air traffic controllers or technical failures of on board, landing instruments. In rare cases, it may also be the result of terrorist activities.

Table 1.23: Accidents to Indian Civil Registered Aircraft from 1990 to 2000

S/N	Date/ Place	A/c Type/Regn.	Operator	Fatalities	Damage Details
1.	14/02/1990 Banglore	Airbus A-320 VT-EPN	Indian Airlines	92	Destroyed
2.	16/08/1991, Imphal	Boeing 737 VT	Indian Airlines	69	Destroyed
3.	05/09/1991, Patiala	Pushpak MK -1	Delhi Flying Club	2	

S/N	Date/ Place	A/c Type/Regn.	Operator	Fatalities	Damage Details
3.	26/04/1993, Aurangabad	Boeing 737 VT- ECQ	Indian Airlines	55	Destroyed
4.	11/07/1996, Near Kullu	L-410, VT-ETC	Archna Airways	9	Destroyed
5.	12/11/1996, New Delhi	B-747 & IL-76 SV-763 & KZ- 1907	Saudi Arabian Kazakhstan	349	Destroyed
6.	17/7/2000, Patna	B-737-200 VT-EGD	Alliance Air	60	Destroyed
7.	29/7/2000, Near Mandi, HP	Super King Air B 200 VT-EIE	Aerial Svc. Pvt. Ltd	5	Destroyed
8.	4 September 2009, Chhatrapati Shivaji International Airport, Mumbai	Air India flight 829, a Boeing 747-400	Air India	21 Injured	Partially damaged
9	22, May 2010, Manglore, International Airport	Flight No. 812, Boeing 737-800	Air India	158 died	Destroyed

Source: Director General Civil Aviation (DGCA)

1.25 Mine Disasters[23]

1.25.1 Mines Act, 1965 defines Disaster as an act Accident (unexpect event) causing loss of more than 10 lives. A mining accident is an accident that occurs in the process of mining minerals. The Act categories an accident involving loss of lives less than 10 major accident. Thousands of miners die from mining accidents each year, especially in the process of coal mining and hard rock mining. One of the greatest mining disasters in Indian mines occurred on 27 December 1975 due to water in rush from old abandoned incline working to a deep shaft mine working of Chasnallah Colliery leading to death of 375 miners.

1.25.2 Following types of mining disasters, losses and impacts are classified by the DGMS.

- Side fall (slope failure) disaster in opencast mines,
- Roof and side falls in underground mines,
- Collapse of mine pillars,
- Air Blast,
- Failure of rope haulage,
- Accident due to electricity,
- Mine fires,
- Accidents due to explosive,
- Inundations,
- Explosions in mines.
- Rock burst and bumps,

1.25.4 The details of disasters involving 10 or more fatalities in both coal & Non coal mines in India are given in the Table 1.24 and 1.25.

Table 1.24: Detail of Disasters (more than 10 fatalities) in Coal Mines during 1901- 2010 in India

Sl. No.	Date of Accident	Name of Mine	Killed	S/Injured	Brief Cause
1	16-Jun-1908	Nadir Khas	20	0	Explosions of fire-damp
2	7-Feb-1910	Dishergarh	11	0	Explosion of fire-damp
3	15-Oct-1910	Sitalpur	12	0	Fall of roof
4	26-Nov-1910	Namdang	14	4	Explosion of fire-damp
5	9-Nov-1911	Kendwadih	14	0	Explosion of fire-damp
6	11-Jul-1912	phularitand	21	0	Irruption of water
7	28-Jun-1913	Jotejanake	13	0	Irruption of water
8	22-Oct-1913	Chowrasi	27	0	Explosion of fire-damp
9	31-Aug-1915	Chanda	10	0	Miscellaneous on Surface
10	4-Feb-1916	Bhowra	24	0	Miscellaneous on Surface
11	20-Jul-1916	Dishergarh	14	4	Explosion of Fire-damp
12	18-Nov-1918	Dishergarh	10	4	Explosion of Fire-damp
13	24-Nov-1919	Kustore South	14	0	In Shaft (Rope/Chain Breaking)
14	28-Feb-1921	Amlabad	11	0	Explosion or Fire-damp
15	9-Mar-1922	Khost	13	3	Explosions
16	4-Jan-1923	Parbelia	74	0	Explosion/Ignition of Firedamp
17	14-Apr-1923	Rawanwara	16	1	Fall of Roof
18	17-Feb-1931	Nongah	13	3	Explosives
19	16-Jan-1935	Loyabad	11	0	Irruption of Water
20	29-Jun-1935	Bagdigi	19	7	Explosion/Ignition of Firedamp
21	24-Jul-1935	Kurhurbaree	62	14	Explosion/Ignition of Firedamp
22	30-Jan-1936	Loyabad	35	0	Fire/Suffocation by Gases
23	18-Dec-1936	Poidih	209	0	Explosion/Ignition of Firedamp
24	6-Jul-1942	Makerwal	14	0	Irruption of Water
25	22-Feb-1943	Sodepur 9, 10 & 11 Pits	13	3	Fall of Roof
26	8-Oct-1943	Jhamuria 7 & 8 Pits	12	1	Sundries Underground
27	19-Mar-1946	Begunia	13	0	Explosion/Ignition of Firedamp
28	12-Jul-1952	Dhemo Main	12	0	Fall of Roof
29	5-Aug-1953	Majri	11	0	Irruption of Water
30	14-Mar-1954	Damra	10	0	Explosion/Ignition of Firedamp
31	10-Dec-1954	Newton Chikli	63	0	Irruption of Water
32	5-Feb-1955	Amlabad	52	1	Explosion of Inflamable Gas
33	26-Sep-1956	Burradhemo	28	0	Irruption of Water
34	19-Feb-1958	Chinakuri 1 & 2 Pits	176	7	Explosions
35	20-Feb-1958	Central Bhowrah	23	0	Irruption of Water
36	5-Jan-1960	Damua	16	0	Irruption of Water
37	28-May-1965	Dhori	268	9	Explosion of Coal Dust
38	11-Apr-1968	West Chirimiri	14	16	Fall of Sides

Sl. No.	Date of Accident	Name of Mine	Killed	S/Injured	Brief Cause
39	18-Mar-1973	Noonodih Jitpur	48	13	Explosion/Ignition of Gas/Dust
40	8-Aug-1975	Kessurgarh	11	1	Fall of Roof
41	18-Nov-1975	Silewara	10	1	Irruption of Water
42	27-Dec-1975	Chasnalla	375	0	Irruption of Water
43	16-Sep-1976	Central Saunda	10	0	Irruption of Water
44	4-Oct-1976	Sudamdih Shaft	43	3	Explosion/Ignition of Gas/Dust
45	22-Jan-1979	Baragolai	16	0	Explosion/Ignition of Gas/Dust
46	24-Jun-1981	Jagannath	10	4	Fire
47	16-Jul-1982	Topa	16	4	Fall of Roof
48	14-Sep-1983	Hurriladih	19	0	Inundation
49	25-Jan-1994	New Kenda	55	0	Fire
50	27-Sep-1995	Gaslitand	64	0	Irruption of Water
51	3-Mar-1997	New Moghla	10	12	Explosion/Ignition of Gas/Dust
52	24-Jun-2000	Kawadi Opencast Mine	10	0	Fall of Sides
53	2-Feb-2001	Bagdigi	29	0	Irruption of Water
54	16-Jun-2003	Godavari Khani No.7 LEP	17	0	Irruption of Water
55	17-Oct-2003	Godavari Khani No. 8A	10	2	Fall of Roof
56	15-Jun-2005	Central Sounda	14	0	Irruption of Water
57	6-Sep-2006	Bhatdee	50	0	Explosion/Ignition of Gas/Dust
58	6-May-2010	Anjan Hill	14	5	Other explosive accident

Source: Directorate of Mines Safety

Table 1. 25: Detail of Disasters (more than 10 fatalities) in Non-Coal Mines during 1901- 2010

Sl. No.	Date of Accident	Name of Mine	Killed	S/Injured	Brief Cuase
1	6-Dec-1910	Shivrajpur Manganese	12	0	Fall of Sides
2	18-Sep-1920	Badwin Lead-Silver	11	0	In Shaft Ascending/ Descending
3	16-May-1929	Bawdwin Silver-Lead-Zinc	10	0	Fall of Roof
4	12-Apr-1932	Lady Rangi Mica	19	0	Suffocation by Gases
5	19-Apr-1952	Champion Reef Gold	20	4	Rock Burst
6	30-Jun-1952	Champion Reef Gold	10	5	Rock Burst
7	27-May-1955	Champion Reef Gold	10	8	Rock Burst
8	29-Sep-1957	Rajupalem Barytes	11	2	Fall of Sides
9	28-Aug-1994	Rajpura Dariba Galena & Sphal.	13	0	Irruption of Water
10	25-Feb-2010	Hamsa Mineral Granite Mine	14	1	Fall of sides(other than overhang)

Source: Directorate of Mines Safety

Mining accidents can have a variety of causes, including leaks of poisonous gases such as methane or explosive natural gas called firedamp, asphyxiant gases, dust explosions, collapsing of mine stops, flooding or general mechanical errors from improperly used or malfunctioning of mining equipment.

1.25.5 A statistical analysis of major mining accidents (more than four fatalities) in 1901-2010 (Table 1.26.) revealed that about 334 numbers of incidences caused 3672 fatalities.

Table 1.26: Major accidents (more than four fatalities) in mines – cause wise (1901-2010)

Cause	Number of incidences	Percentage of total incidence	Fatalities	Percentage of total fatalities
Explosion	38	11.37	1267	34.50
Inrush of water	35	10.47	836	22.76
Roof/side fall	218	65.26	1224	33.33
Mine fire	6	1.79	109	2.96
Suffocation of gas	6	1.79	40	1.08
Winding in shafts	17	5.08	100	2.72
Explosives	14	4.19	96	2.61
Total	334		3672	

Source: Directorate of Mines Safety

1.26 Epidemics in India[24]

1.26.1 Infectious diseases are a major public health problem in India. While many infectious diseases like tuberculosis and malaria are endemic, some of them occasionally attain epidemic proportion. An epidemic refers to an increase, often sudden, in number of cases of a disease in a community clearly in excess of what is normally expected in that population. Epidemics are public health emergencies which disrupt routine health services and are major drain on resources. Epidemics include viral infections disease (mengitis, measles, dengue, polio, typhoid fever etc.) and Bacterial infectious diseases (cholera, diarrheoa etc.) The main causes for epidemic are non availability of clean and hygienic drinking water contamination of drinking water sources, lack of awareness about sanitation, unhygienic food, overcrowding, biological conditions in addition to ecological factors. Besides direct costs in epidemic control measures and treatment of patients, the indirect costs due to negative impact on domestic and international tourism and trade can be significant. For example, plague which was not reported from any part of India for almost a quarter of century, caused a major outbreak in Beed district in Maharashtra and Surat in Gujarat in 1994 and resulted in an estimated loss of almost US$ 1.7 billion.

1.26.2 Several factors related to microbes, environment and host susceptibility contribute to the occurrence of epidemics. Because of prevalence of these factors, developing countries including India are frequently affected by epidemics/ outbreaks which result in high morbidity and mortality and affect the public health and economy adversely. Outbreaks reported by States under the Integrated Disease Surveillance Project (IDSP) during the period 2008-2010 are shown in Table 1.27.

Table 1.27: Disease-wise outbreaks/epidemics reported by states under IDSP, 2008-10

Sl. No.	Disease/Illness	No. of outbreaks			Total
		2008	2009	2010	
1	Acute Diarrhoeal Disease	228	332	411	971
2	Food Poisoning	50	121	188	359
3	Measles	40	44	94	178
4	Malaria	43	34	37	114
5	Chikungunya	25	61	25	111
6	Viral Fever	31	37	40	108
7	Chicken Pox	12	45	47	104
8	Dengue	42	20	40	102
9	Cholera	20	34	34	88
10	Viral Hepatitis	28	30	24	82
11	Enteric Fever	6	10	10	26
12	Acute Encephalitis Syndrome	6	5	11	22
13	Leptospirosis	6	3	6	15
14	Anthrax	2	6	3	11
15	Acute Respiratory Illness	4	3	3	10
16	Meningitis	2	3	1	6
17	Mumps	0	2	3	5
18	Scrub Typhus	3	1	1	5
19	Dysentery	0	1	3	4
20	Kalazar	1	0	3	4
21	PUO	2	2	1	5
22	Diphtheria	1	1	1	3
23	Rubella	0	1	2	3
24	Others	1	3	2	6
Total		553	799	990	2342

Source: National Centre for Disease Control (NCDC)

1.26.3 As shown in the Table 1.27, most of the outbreaks/epidemics reported in India are due to water-borne diseases, vector-borne diseases and vaccine preventable diseases. While National Vector Borne Diseases Control Programme (NVBDCP) is the key programme for prevention/ control of outbreak of epidemics of malaria, dengue, chikungunya etc, vaccines administered under UIP/EPI reduce the morbidity and mortality due to diseases like measles, diphtheria, pertussis, poliomyelitis etc. Availability of safe water and adoption of personal and domestic hygienic practices are important measures to prevent/control epidemics of water-borne diseases like cholera, viral hepatitis etc.

1.27 Deaths due to Unnatural Cause[25]

1.27.1 A comparative list prepared by National Crime Record Bureau, MHA for year 2008 and 2009 in respect of death due to unnatural cause have been given in Table 1.28, which would show the enormity of problems leading to such deaths which attracts little attention due to their sporadic nature and such calamity happening in a diffused manner and not in one event generally.

Table 1.28: Incidence, Share & Rate of Accidental Deaths by Causes Attributable to Nature and Un-Natural Causes during 2008 & 2009

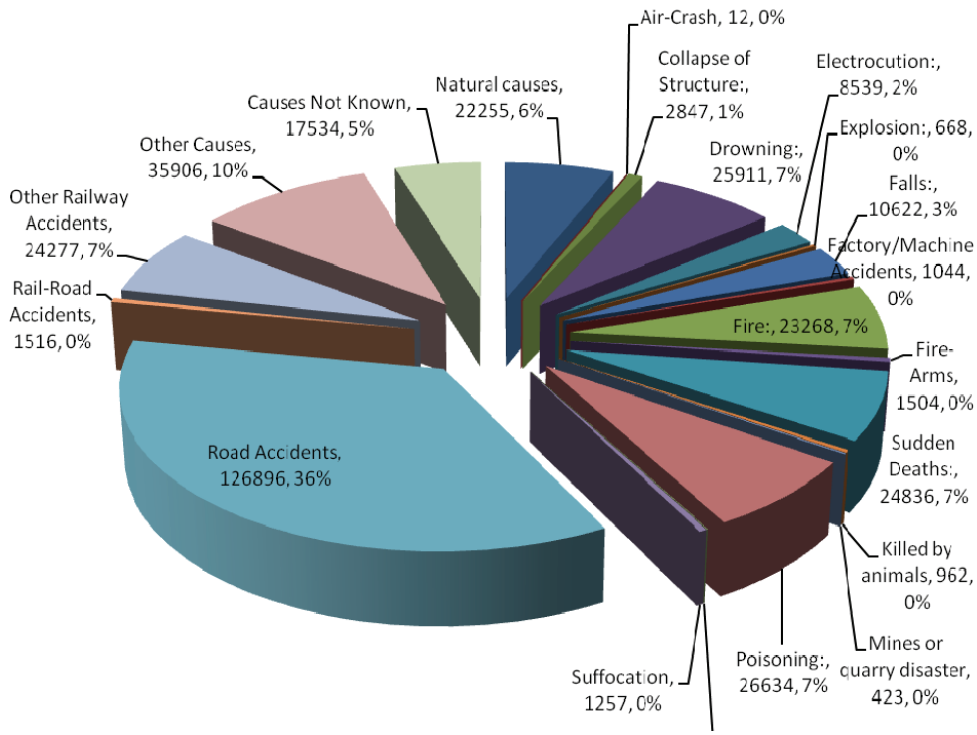
Sl. No.	Cause	2008			2009			% variation of incidences in 2009 over 2009
		No.	% share (w.r.t. All India)	Rate	No.	% share (w.r.t. All India)	Rate	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
A. Causes Attributable To Nature:								
1	Avalanche	47	0	0	22	0	0	-53.2
2	Cold and Exposure	836	0.2	0.1	742	0.2	0.1	-11.2
3	Cyclone/Tornado	99	0	0	128	0	0	29.3
4	Starvation/Thirst	227	0.1	0	175	0	0	-22.9
5	Earthquake	6	0	0	2	0	0	-66.7
6	Epidemic	73	0	0	75	0	0	2.7
7	Flood	861	0.3	0.1	726	0.2	0.1	-15.7
8	Heat Stroke	616	0.2	0.1	1071	0.3	0.1	73.9
9	Landslide	340	0.1	0	394	0.1	0	15.9
10	Lightning	2553	0.7	0.2	2113	0.6	0.2	-17.2
11	Torrential Rains	148	0	0	132	0	0	-10.8
12	Other causes attributable to nature	18187	5.3	1.6	16675	4.7	1.4	-8.3
	Total (A)	23993	7	2.1	22255	6.2	1.9	-7.2
B. Un-Natural Causes								
1	Air-Crash	19	0	0	12	0	0	-36.8
2	Collapse of Structure:	2833	0.8	0.2	2847	0.8	0.2	0.5
	(i) House	1173	0.3	0.1	1091	0.3	0.1	-7
	(ii) Building	249	0.1	0	265	0.1	0	6.4
	(iii)Dam	66	0	0	30	0	0	-54.5
	(iv) Bridge	93	0	0	44	0	0	-52.7
	(v) Others	1252	0.4	0.1	1417	0.4	0.1	13.2
3	Drowning:	27206	7.9	2.4	25911	7.3	2.2	-4.8
	(i) Boat Capsize	979	0.3	0.1	984	0.3	0.1	0.5
	(ii) Other Cases	26227	7.7	2.3	24927	7	2.1	-5
4	Electrocution:	8067	2.4	0.7	8539	2.4	0.7	5.9
5	Explosion:	792	0.2	0.1	668	0.2	0.1	-15.7
	(i) Bomb explosion	490	0.1	0	261	0.1	0	-46.7
	(ii) Other explosion (Boilers etc.)	302	0.1	0	407	0.1	0	34.8
6	Falls:	10637	3.1	0.9	10622	3	0.9	-0.1
	(i) Fall from Height	8757	2.6	0.8	8796	2.5	0.8	0.4
	(ii) Fall into Pit/Manhole etc.	1880	0.5	0.2	1826	0.5	0.2	-2.9
7	Factory/Machine Accidents	858	0.3	0.1	1044	0.3	0.1	21.7
8	Fire:	22454	6.6	1.9	23268	6.5	2	3.6
	(i) Fireworks/Crackers	342	0.1	0	547	0.2	0	59.9
	(ii) Short-Circuit	1098	0.3	0.1	1328	0.4	0.1	20.9
	(iii) Gas Cylinder/Stove Burst	3628	1.1	0.3	4127	1.2	0.4	13.8

Sl. No.	Cause	2008			2009			% variation of incidences in 2009 over 2009
		No.	% share (w.r.t. All India)	Rate	No.	% share (w.r.t. All India)	Rate	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	(iv) Other Fire Accidents	17386	5.1	1.5	17266	4.8	1.5	-0.7
9	Fire-Arms	1639	0.5	0.1	1504	0.4	0.1	-8.2
10	Sudden Deaths:	22738	6.6	2	24836	7	2.1	9.2
	(i) Heart Attacks	14397	4.2	1.2	16007	4.5	1.4	11.2
	(ii) Epileptic Fits/ Giddiness	3182	0.9	0.3	3535	1	0.3	11.1
	(iii) Abortions/Child Birth	851	0.2	0.1	811	0.2	0.1	-4.7
	(iv) Influence of Alcohol	4308	1.3	0.4	4483	1.3	0.4	4.1
11	Killed by animals	827	0.2	0.1	962	0.3	0.1	16.3
12	Mines or quarry disaster	371	0.1	0	423	0.1	0	14
13	Poisoning:	24261	7.1	2.1	26634	7.5	2.3	9.8
	(i) Food Poisoning/ Accidental Intake of	7829	2.3	0.7	8154	2.3	0.7	4.2
	Insecticide							
	(ii) Spurious/poisonous liquor	1358	0.4	0.1	1450	0.4	0.1	6.8
	(iii) Leakage of poisonous gases Etc.	247	0.1	0	247	0.1	0	0
	(iv) Snake Bite/Animal Bite	7825	2.3	0.7	8035	2.3	0.7	2.7
	(v) Other	7002	2	0.6	8748	2.5	0.7	24.9
14	Stampede	434	0.1	0	110	0	0	-74.7
15	Suffocation	1496	0.4	0.1	1257	0.4	0.1	-16
16	Traffic Accidents:	144587	42.2	12.5	152689	42.8	13.1	5.6
	(i) Road Accidents	118239	34.5	10.3	126896	35.5	10.9	7.3
	(ii) Rail-Road Accidents	2222	0.6	0.2	1516	0.4	0.1	-31.8
	(iii) Other Railway Accidents	24126	7	2.1	24277	6.8	2.1	0.6
17	Other Causes	35135	10.3	3	35906	10.1	3.1	2.2
18	Causes Not Known	13962	4.1	1.2	17534	4.9	1.5	25.6
	Total (B)	318316	93	27.6	334766	93.8	28.6	5.2
	Grand Total (A+B)	342309	100	29.7	357021	100	30.5	4.3

Source: NCRB

1.27.2 **Analysis of deaths due to Accidents:** Accidents - human-made and natural - are among the two most important reasons of pre-mature end to human lives. Injuries resulting from the accidents handicap many people. These unfortunate victims are important members of their families as well as of the society. This way, the loss due to accidents and suicides is felt by family members and society at large. The deep and wide impact of accidents and suicides make it incumbent upon society to make efforts at reducing the incidence of these phenomena. Appropriate intervention measures can be devised only after studying various facets of these phenomena. Detailed data is a sine qua non for any study. While individual disaster and event data maintained by the states and reported to the GOI may not accurately tally with the

Figure 1.21: Unnatural deaths in 2009- Causes, Number and as a percentage of the Total deaths (357,021)



Source: National Crime Record Bureau (NCRB)

NCRB report as some are maintained calendar year wise and some financial year wise yet the NCRB collected data is a useful data for analysis. This data on accidental deaths due to causes attributable to nature - such as cyclone / tornado, earthquake, flood, landslide and torrential rains, to name a few - as well as those not attributable to nature - for example, explosion, fire, sudden deaths, stampede, traffic accidents and others are revealing. These may be seen from the Figure 1.21. Accidental deaths due to natural causes were 6.2 % and those due to unnatural causes were 93.8% and traffic accidents account for the maximum deaths. These trends are a cause of concern for every class of the society, especially to policy makers principally for two reasons. Firstly, the Government is committed for improving the living conditions of its citizens and Secondly, the loss of these lives results in irreparable damage to the society.

1.28 Conclusion

A series of catastrophes across the world in recent times have served as a reminder and backdrop of the chapters following the overview which is an attempt to capture valuable and available information across sectors and departments with focus on disaster management. It is hoped that the information will serve as a tool to improve the roles and capacities of all the stakeholders while facing the hazards, risks and the resultant disasters.

2 Institutional Framework

2.1 Evolution of Disaster Management in India

Disaster management in India has evolved from an activity-based reactive setup to a proactive institutionalized structure; from single faculty domain to a multi-stakeholder setup; and from a relief-based approach to a 'multi-dimensional pro-active holistic approach for reducing risk'. The beginnings of an institutional structure for disaster management can be traced to the British period following the series of disasters such as famines of 1900, 1905, 1907 & 1943, and the Bihar-Nepal earthquake of 1937. Over the past century, the disaster management in India has undergone substantive changes in its composition, nature and policy.

2.2 Disaster Management during British Administration and Post Independence

During the British administration, relief departments were set up for emergencies during disasters. Such an activity-based setup with a reactive approach was functional only in the post-disaster scenarios. The policy was relief-oriented and activities included designing the relief codes and initialising food for work programmes. Post-Independence, the task for managing disasters continued to rest with the Relief Commissioners in each state, who functioned under the Central Relief Commissioner, with their role limited to delegation of relief material and money in the affected areas. Every five-year plan addressed flood disasters under "Irrigation, Command Area Development and Flood Control". Until this stage, the disaster management structure was activity-based, functioning under the Relief Departments.

2.3 Emergence of Institutional Arrangement in India

A permanent and institutionalised setup began in the decade of 1990s with set up of a disaster management cell under the Ministry of Agriculture, following the declaration of the decade of 1990 as the 'International Decade for Natural Disaster Reduction' (IDNDR) by the UN General Assembly. Following series of disasters such as Latur Earthquake (1993), Malpa Landslide (1994), Orissa Super Cyclone (1999) and Bhuj Earthquake (2001), a high powered Committee under the Chairmanship of Mr. J.C. Pant, Secretary, Ministry of Agriculture was constituted for drawing up a systematic, comprehensive and holistic approach towards disasters. There was a shift in policy from an approach of relief through financial aid to a holistic one for addressing disaster management. Consequently, the disaster management division was shifted under the Ministry of Home Affairs in 2002 vide Cabinet Secretariat's Notification No. DOC.CD-108/2002 dated 27/02/2002 and a hierarchical structure for disaster management evolved in India.

2.4 Organisation and Structure of Disaster Management

The Disaster Management Division is headed by Joint Secretary (DM) in MHA, who is assisted by three Directors, Under Secretaries, Section Officers, Technical Officer, Senior Economic Investigator consultants and other supporting staff. The upper echelon of the structure consists of Secretary (Border Management), Home Secretary, Minister of State in charge and the Home Minister.

2.5 Disaster Management Framework

Shifting from relief and response mode, disaster management in India started to address the issues of early warning systems, forecasting and monitoring setup for various weather related hazards. A structure for flow of information, in the form of warnings, alerts and updates about the oncoming hazard, also emerged within this framework. A multi-stakeholder High powered group was setup by involving representatives from different ministries and departments. Some of these ministries were also designated as the nodal authorities for specific disasters.

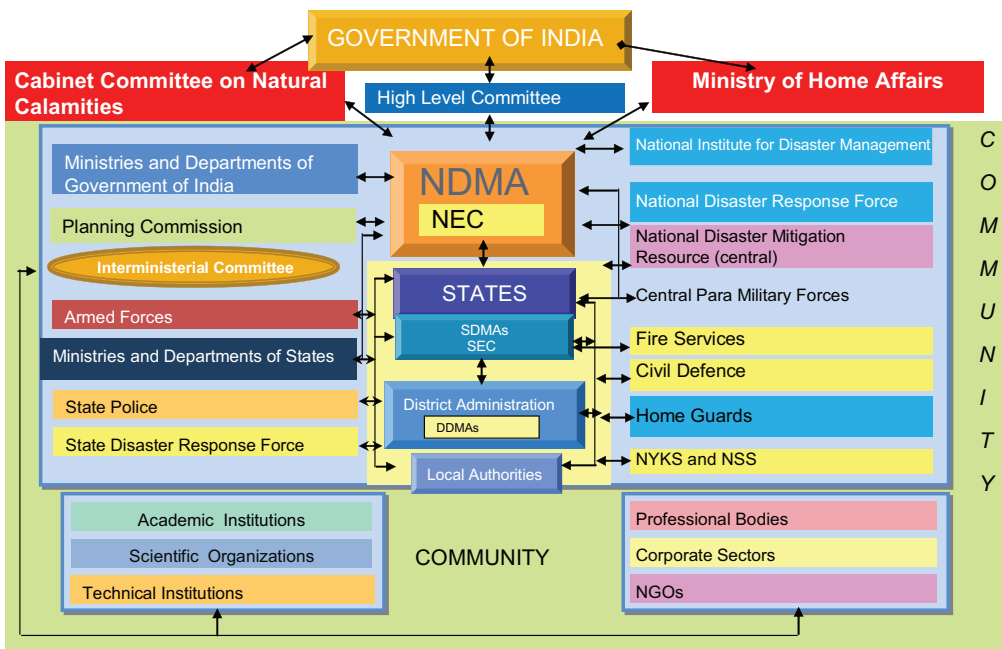
Following a High Powered Committee Report on Disaster Management for establishment of a separate institutional structure for addressing disasters and enactment of a suitable law for institutionalizing disaster management in the country, a multi-level links between these ministries and the disaster management framework have emerged. Disaster Management framework may be seen in Figure 2.8.

2.6 Present Structure for Disaster Management in India

2.6.1 The institutional structure for disaster management in India is in a state of transition. The new setup, following the implementation of the Act, is evolving; while the previous structure also continues (Figure 2.1). Thus, the two structures co-exist at present. The National Disaster Management Authority has been established at the centre, and the SDMA at state and district authorities at district level are gradually being formalized. In addition to this, the National Crisis Management Committee, part of the earlier setup, also functions at the Centre. The nodal ministries, as identified for different disaster types of function under the overall guidance of the Ministry of Home Affairs (nodal ministry for disaster management). This makes the stakeholders interact at different levels within the disaster management framework.

2.6.2 Within this transitional and evolving setup, two distinct features of the institutional structure for disaster management may be noticed. Firstly, the structure is hierarchical and functions at four levels – centre, state, district and local. In both the setups – one that existed prior to the implementation of the Act, and other that is being formalized post-implementation of the Act, there have existed institutionalized structures at the centre, state, district and local levels. Each preceding level guides the activities and decision making at the next level in hierarchy. Secondly, it is a multi-stakeholder setup, i.e., the structure draws involvement of various relevant ministries, government departments and administrative bodies.

Figure 2.1: National Disaster Management Structure



2.7 Disaster Management Act, 2005

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

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

2.7.3 Further the enactment of 73rd and 74th Amendments to the constitution and emergence of local self- government, both rural and urban, as important tiers of governance, the role of local authorities becomes very important. The DM Act, 2005 also envisages specific roles to be played by the local bodies in disaster management.

2.7.4 **Legal - Institutional Framework:** A legal institutional framework developed based on the provision of the Act across the country, in vertical and horizontal hierarchical and in the federal setup of country may be seen in the Figure 2.2 for appreciation of response mechanism which has been put in place.

National Level Institutions

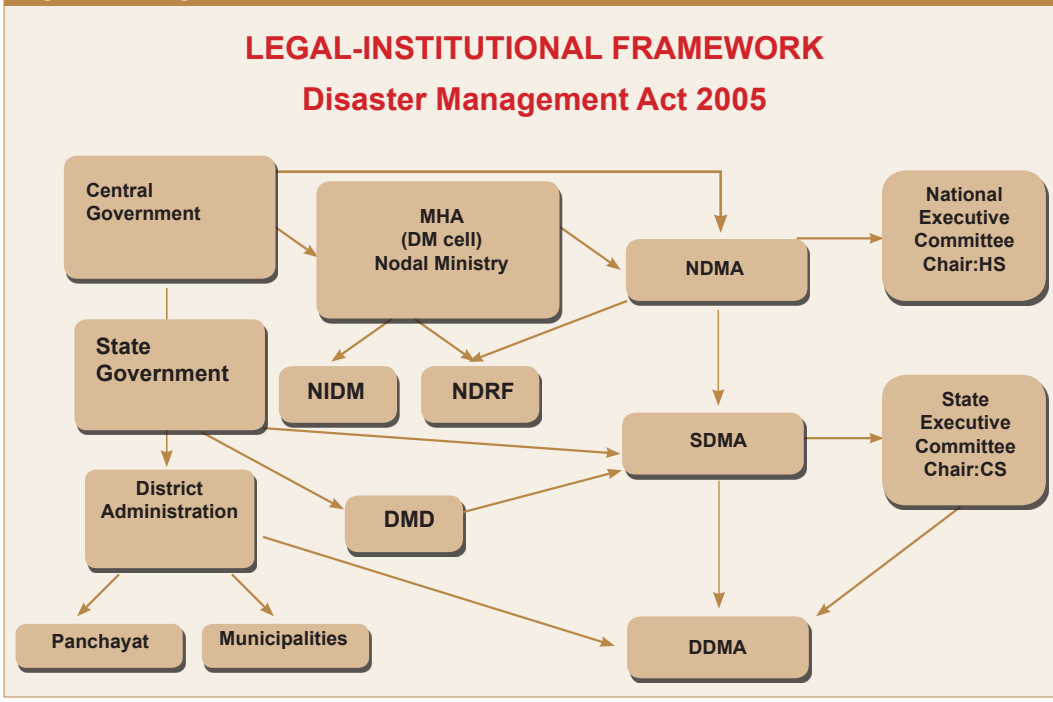
2.8. National Disaster Management Authority (NDMA)

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

2.8.1 **Mandate of NDMA:** The NDMA has been mandated with laying down policies on disaster management and guidelines which would be followed by different Ministries, Departments of the Government of India and State Government in taking measures for disaster risk reduction. It has also to laid down guidelines to be followed by the State Authorities in drawing up the State Plans and to take such measures for the management of disasters, Details of these responsibilities are given as under :-

(a) Lay down policies on disaster management;

Figure 2.2: Legal Institutional Framework



(b) Approve the National Plan;

(c) Approve plans prepared by the Ministries or Departments of the Government of India in accordance with the National Plan;

(d) Lay down guidelines to be followed by the State Authorities in drawing up the State Plan;

(e) Lay down guidelines to be followed by the different Ministries or Departments of the Government of India for the purpose of integrating the measures for prevention of disaster or the mitigation of its effects in their development plans and projects;

(f) Coordinate the enforcement and implementation of the policy and plan for disaster management;

(g) Recommend provision of funds for the purpose of mitigation;

(h) Provide such support to other countries affected by major disasters as may be determined by the Central Government;

(i) Take such other measures for the prevention of disaster, or the mitigation, or preparedness and capacity building for dealing with the threatening disaster situation or disaster as it may consider necessary;

(j) Lay down broad policies and guidelines for the functioning of the National Institute of Disaster Management.

2.8.2 **Composition of NDMA:** Besides the nine members nominated by the Prime Minister, Chairperson of the Authority**,** the Organisational structure consists of a Secretary and five Joint Secretaries including one Financial Advisor. There are 10 posts of Joint Advisors and Directors,

14 Assistant Advisors, Under Secretaries and Assistant Financial Advisor and Duty Officer along with supporting staff.

Further, Recruitment Rules have been notified as

(a) National Disaster Management Authority, Group-'C' posts Recruitment Rules, 2009.

(b) National Disaster Management Authority (Group 'A') Recruitment Rules, 2009.

Under Section 7 (1) of DM Act an Advisory Committee with 12 Members has been constituted during 2007.

2.9 National Executive Committee (NEC)

2.9.1 A National Executive Committee is constituted under Section 8 of DM Act, 2005 to assist the National Authority in the performance of its functions. NEC consists of Home Secretary as its Chairperson, *ex-officio*, with other Secretaries to the Government of India in the Ministries or Departments having administrative control of the agriculture, atomic energy, defence, drinking water supply, environment and forest, finance (expenditure), health, power, rural development science and technology, space, telecommunication, urban development, water resources. The Chief of Integrated Defence Staff of the Chiefs of Staff Committee, *ex-officio,* is also its Members.

2.9.2 NEC may as and when it considers necessary constitute one or more sub-committees for the efficient discharge of its functions. For the conduct of NEC, Disaster Management National Executive Committee (Procedure and Allowances) Rules, 2006 has been issued which may be visited at www.mha.nic.in. NEC has been given the responsibility to act as the coordinating and monitoring body for disaster management, to prepare a National Plan, monitor the implementation of National Policy etc. vide section 10 of the DM Act.

State level Institutions

2.10 State Disaster Management Authority (SDMA)

The DM Act, 2005 provides for constitution of SDMAs and DDMAs in all the states and UTs. As per the information received from the states and UTs, except Gujarat and Daman & Diu, all the rest have constituted SDMAs under the DM Act, 2005. Gujarat has constituted its SDMA under its Gujarat State Disaster Management Act, 2003. Daman & Diu have also established SDMAs prior to enactment of DM Act 2005.

2.11 State Executive Committee (SEC)

The Act envisages establishment of State Executive Committee under Section 20 of the Act, to be headed by Chief Secretary of the state Government with four other Secretaries of such departments as the state Government may think fit. It has the responsibility for coordinating and monitoring the implementation of the National Policy, the National Plan and the State Plan as provided under section 22 of the Act.

District level Institutions

2.12 District Disaster Management Authority (DDMA)

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

designated as Co-Chairperson. Further in district, where Zila Parishad exist, its Chairperson shall be the Co-Chairperson of DDMA. Other members of this authority include the CEO of the District Authority, Superintendant of Police, Chief Medical Officer of the District and other two district level officers are designated by the state Government.

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

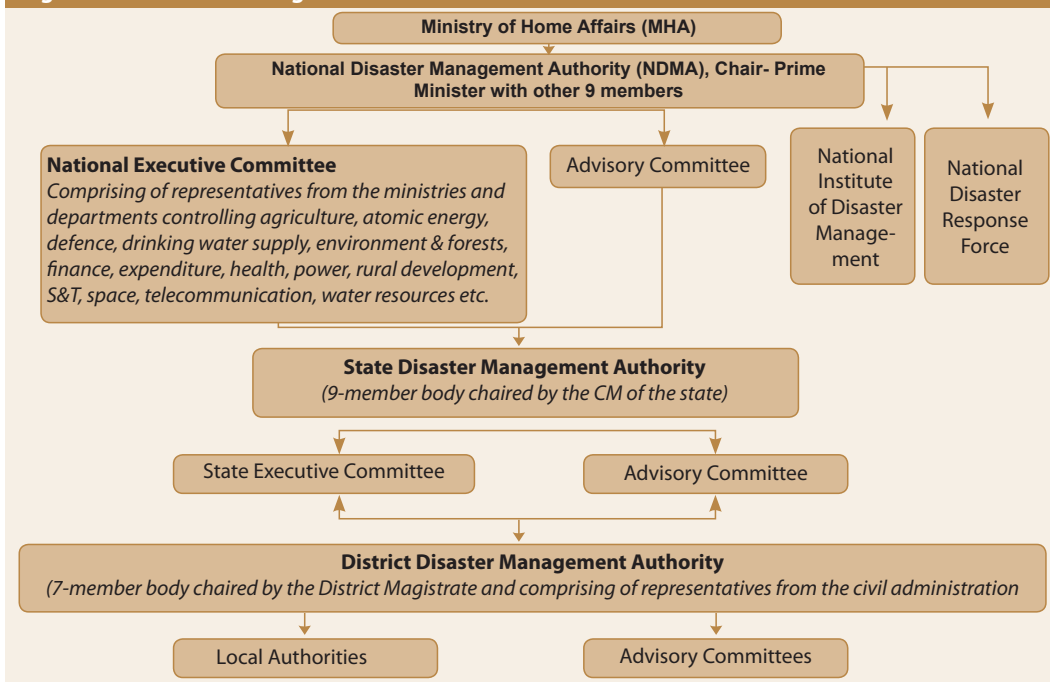
2.13. Institutional Framework for Metropolitan Cities

In the larger cities (say, with population exceeding 2.5 million), the recommendation of the second Administrative Reforms Commission has suggested that the Mayor, assisted by the Commissioner of the Municipal Corporation and the Police Commissioner to be directly responsible for Crisis Management. It has now been accepted by the Government.

2.14 Hierarchical Structure of Authority and Committee

In this structure, National Disaster Management Authority is the authority for formulation of policy and guidelines for all disaster management work in the country. The state authorities further lay down the guidelines for departments of the state and the districts falling in their respective jurisdictions. Similarly, district authorities direct the civil administration, departments and local authorities such as the municipalities, police department and civil administration. The State Executive Committees are responsible for execution of the tasks envisaged by the authorities. The structure thus discussed is summarised in the Figure 2.3.

Figure 2.3: Disaster Management Structure in India



2.15 National Institute of Disaster Management (NIDM)

2.15.1 **Background**: In the backdrop of the International decade for Natural Disaster Reduction (IDNDR), a National Centre for Disaster Management was established at the Indian Institute for Public Administration (IIPA) in 1995. The Centre was upgraded and designated as the National Institute of Disaster management (NIDM) on 16th October 2003. It has now achieved the status of a statutory organisation under the Disaster Management Act, 2005. Section 42 of Chapter VII of the Disaster Management Act, 2005 entrusts the institute with numerous responsibilities, namely to develop training modules, undertake research and documentation in disaster management, organise training programmes, undertake and organise study courses, conferences, lectures and seminars to promote and institutionalize disaster management, undertake and provide for publication of journals, research papers and books.

2.15.2 **Management Structure:** The Union Home Minister is the President of the Institute, It was constituted on 23rd February, 2007 and has a general body of forty two members comprising of secretaries of various ministries,departments of the Union Government and heads of national level scientific, research and technical organizations.

In terms of Section 42(4) of the Disaster Management Act, 2005 vide order dated 3rd May, 2007, the Government also constituted a 14 member Governing Body which may be seen in Figure 2.4 of the Institute.

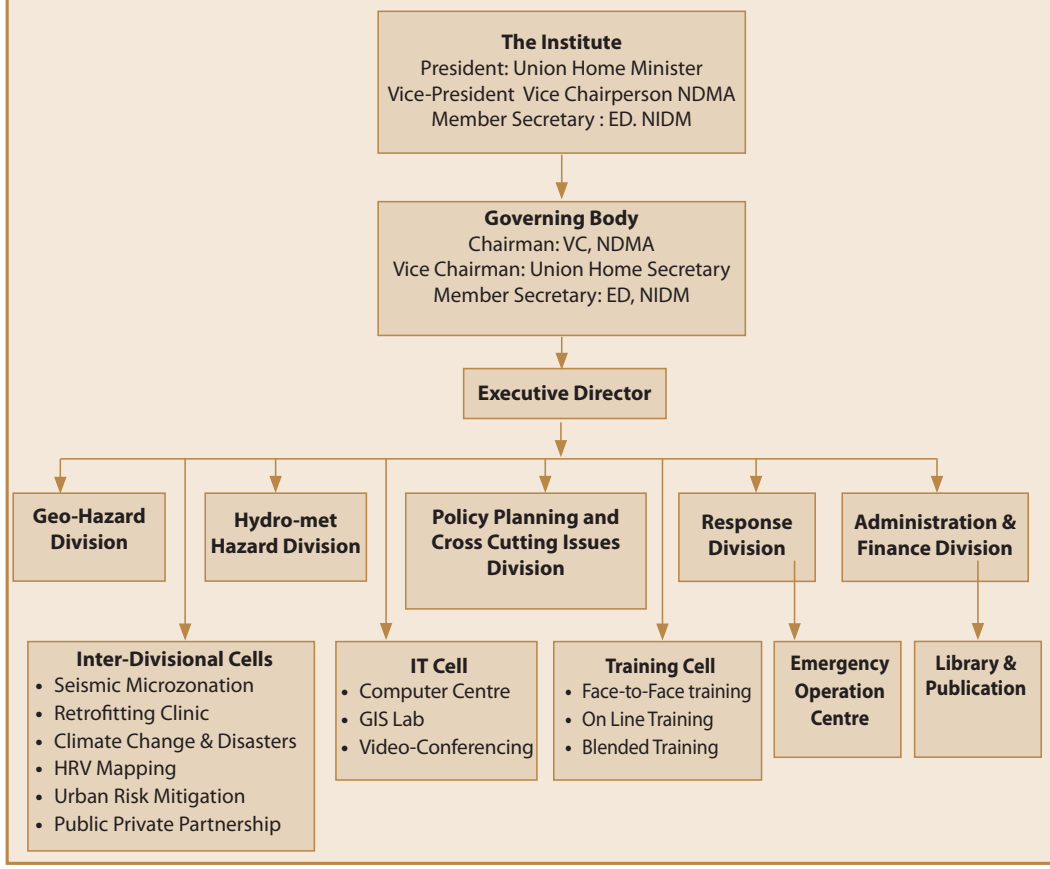
Figure 2.4: Governing Body of National Institute of Disaster Management

In terms of Section 42(4) of the Disaster Management Act, 2005 read with Rule 6 of the Disaster Management (National Institute of Disaster Management) Rules, 2006, Governing Body of the NIDM has been constituted vide Order No. 45/1/2007-NDM-IV dated 3rd May, 2007 with following members:-

i.	The Vice-Chairperson, National Disaster Management Authority (NDMA)	Chairperson
ii	Union Home Secretary	Vice-Chairperson
iii	Secretary (BM)	Member
iv	Secretary, Ministry of Finance, Department. of Expenditure	Member
v	Secretary/ Additional Secretary, NDMA	Member
vi	Additional Secretary and Financial Advisor, Ministry of Home Affairs	Member
vii	Secretary(Disaster Management), Government of Gujarat	Member
viii	Vice-Chancellor, Guru Gobind Singh Indraprastha University, Delhi	Member
ix	Director, Indian Institute of Technology, Roorkee	Member
x	Director, Indian Institute of Management, Kolkatta	Member
xi	Director, National Eco-physical Research Institute, Hyderabad	Member
xii	Secretary, Department of Space	Member
xiii	Secretary, Department of Science and Technology	Member
xiv	Executive Director, NIDM	Member Secretary

2.15.3 **Organizational Structure – NIDM** is headed by an Executive Director along with the faculty and staff. The organizational structure may be seen from the Figure 2.5.

Figure 2.5: Organisational Structure of NIDM



2.15. 4 The Institute has four academic divisions

- Geo-Hazard Division
- Hydro-met Hazard Division
- Policy Planning and Cross Cutting Issues Division
- Response Division

2.15.5 **Location and Facilities:** Located centrally at the Indraprastha Estate on the Mahatma Gandhi Road, within the campus of the IIPA, the institute is equipped with state-of-the-art facilities of training and research on disaster management. It has fully air conditioned training and conference halls, a well stocked library, GIS laboratory, computer centre, and a video conference hall. The institute also provides Boarding and lodging facilities for participants of its programmes.

2.16. National Disaster Response Force (NDRF)

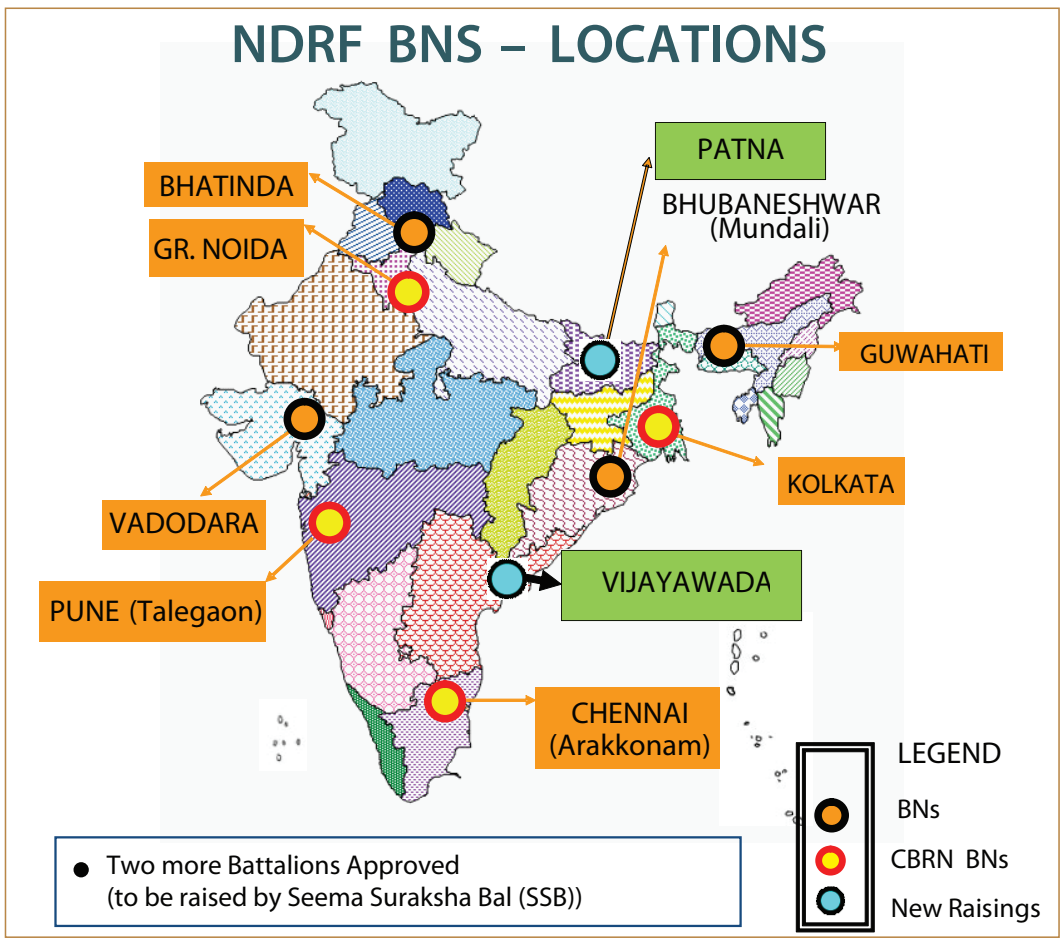
2.16.1 **Constitution and role of NDRF:** The National Disaster Response Force (NDRF) has been constituted under Section 44 of the DM Act, 2005 by up-gradation/conversion of eight

standard battalions of Central Para Military Forces i.e. two battalions each from Border Security Force (BSF), Indo-Tibetan Border Police (ITBP), Central Industrial Security Force (CISF) and Central Reserve Police Force (CRPF) to build them up as a specialist force to respond to disaster or disaster like situations.

2.16.2 The eight battalions (1 battalion comprised of nearly 1000 person) of NDRF consist of 144 specialised teams trained in various types of natural, man made and non-natural disasters. 72 of such teams are designed to cater to the Chemical, Biological, Radiological and Nuclear (CBRN) calamities besides natural calamities. Each NDRF battalion consists of 1149 personnel organised in 18 teams comprising of 45 personnel, who are being equipped and trained for rendering effective response to any threatening disaster situation or disaster, both natural and man made. All these eight battalions are being trained in natural disasters while four of them are being additionally trained for handling CBRN disasters. The composition of such battalions may be visited at *www.ndmindia.nic.in*

2.16.3 Based on vulnerability profile of different regions of the country, these specialist battalions have been presently stationed at the following eight places as may be seen from the map in Figure 2.6.

Figure 2.6: Location of NDRF Battalions



The disaster specialization, location and the details of the parent force may be seen from the Figure 2.7.

Figure 2.7: Details of the NDRF Battalions

Sl. No.	Battalion	Parent Force	Location	State
For Natural Disaster and CBRN emergencies (Chemical, Biological, Radiological and Nuclear)				
(i)	4th	CISF	Arakkonam	Chennai
(ii)	8th	ITBP	Greater Noida	Uttar Pradesh
(iii)	2nd	BSF	Barasat	Kolkatta
(iv)	5th	CRPF	Pune	Maharastra
Natural Disasters				
(i)	3rd	CISF	Mundali	Orissa
(ii)	7th	ITBP	Bhatinda	Punjab
(iii)	1st	BSF	Guwahati	Assam
(iv)	6th	CRPF	Gandhinagar	Gujarat

2.16.4 The Government of India has approved the raising of two additional battalions of National Disaster Response Force by upgradation and conversion of one battalion each of Border Security Force and Central Reserve Police Force to be located in the states of Bihar (Bihata, Patna) and Andhra Pradesh (Vijaywada) respectively. The administrative approval for raising the two battalions was issued on 13-10- 2010.

2.16.5 There are different training institutes where such forces are given the basic and specialised training. The details of such training programmes are given in Chapter 7 of Capacity Development.

2.17 State Disaster Response Force (SDRF)

The states/UTs have also been advised to set up their own Specialist Response Force for responding to disasters on the lines of National Disaster Response Force vide Ministry of Home Affairs letter dated 26th July 2007 and 8th March, 2011. The Central Government is providing assistance for training of trainers. The state governments have been also advised to utilise 10 percent of their State Disaster Response Fund and Capacity Building Grant for the procurement of search and rescue equipment and for training purposes of the Response Force.

2.18 Civil Defence

2.18.1 **Aims and Objectives of Civil Defence Act:** The Civil Defence Policy of the GoI until 1962 was confined to making the states and UTs conscious of the need of civil protection measures and to keep in readiness civil protection plans for major cities and towns under the Emergency Relief Organisation (ERO) scheme. The legislation on Civil Defence (CD) known as Civil Defence Act was enacted in 1968 which is in force throughout the country.

2.18.2 The Act defines CD and provides for the powers of Central Government to make rules for CD, spelling out various actions to be taken for CD measures. It further stipulates for constitution of CD corps, appointment of members and officers, functions of members etc. The Act has since been amended in 2010 to cater to the needs of disaster management

so as to utilise the services of Civil Defence volunteers effectively for enhancement of public participation in disaster management related activities in the country.

2.18.3 The CD Organisation is raised only in such areas and zones which are considered vulnerable to enemy attacks. The revision and renewal of categorised CD towns is done at regular intervals, with the level of perceived threat or external aggression or hostile attacks by anti- national elements or terrorists to vital installations.

2.18.4 **Compendium of instructions** – CD deals very briefly with all different aspects of CD in India and includes references to important policy letters including legal aspects. It was first published in February 1969. Subsequently, its scope was enlarged by including the Master Plan of Civil Defence, Civil Defence Act 1968, training courses conducted at NCDC, Nagpur, training syllabus of states.

2.18.5 **Role of Civil Defence:** During times of war and emergencies, the CD organisation has the vital role of guarding the hinterland, supporting the armed forces, mobilising the citizens and helping civil administration for saving life and property, minimising damage, maintaining continuity in production centers and raising public morale. The concept of CD over the years has shifted from management of damage against conventional weapons to also include threat perceptions against nuclear weapons, biological and chemical warfare and environmental disasters.

2.18.6 Three tier structure as given below has been created to formulate CD policy and for coordinating and supervising measures to implement it.

- Civil Defence Advisory Committee under the Chairmanship of Union Home Minister,
- Civil Defence Committee under the Chairmanship of Home Secretary and
- Civil Defence Joint Planning Staff Committee under the Chairmanship of Director General Civil Defence.

2.18.7 **Eligibility to become volunteers:**

(a) A person who intends to apply for appointment to a Civil Defence Corps must fulfill the following conditions:-

- to be a citizen of India or Bhutan or of Nepal;
- to have completed the age of 18 years provided that this age limit may be relaxed at the discretion of the competent authority up to a maximum of three years for any branch or category of the Corps,
- to have passed at least the primary standard, that is to say, the fourth class; and this condition may be relaxed by the Controller at his discretion.

(b) A person shall not be entitled to be appointed to the Corps unless he is found to be physically fit and mentally alert.

(c) Any service in the National Volunteer Force and in the armed forces of the Union shall be a special qualification

(d) Such persons shall ordinarily serve in a voluntary and honorary capacity and they are required to perform the duties assigned to them by order under the Civil Defence Regulations, 1968 or under any other law for the time being in force, for the protection of persons and property against hostile attack

(e) A candidate who has been accepted for appointment to the Corps shall be formally enrolled in such manner as the Controller may, by order, determine and at the time of enrollment shall make an oath or affirmation before such officer as the Controller may, by order, appoint.

2.18.8 **Directorate General of Civil Defence (DGCD):** DGCD was established in 1962 with its headquarters at New Delhi in the Ministry of Home Affairs to handle all policy and planning matters related to Civil Defence, Home Guards and Fire Services including the functioning of National Civil Defence College, and National Fire Service College, Nagpur. An IPS officer in the rank of Director General of Police heads the organisation. He has dual charge of D.G. National Disaster Response Force and Civil Defence (DG, NDRF & CD).

2.18.9 **Civil Defence Setup in the States:** The state government for the purpose of coordinating the activities of the Controllers of Civil Defence within the state appoints a Director of Civil Defence and also may constitute, for any area within the state a body of a person to be called the Civil Defence Corps. Out of 225 towns from 35 states notified as CD towns, currently the CD organisations at only 130 towns have been activated. Each town has nucleus of four Permanent Staff along with 400 CD Volunteers for a two lakh population. It is expected that each state will have one CD Training Institute with permanent strength of 36 personnel, five vehicles and other equipments. The District Magistrate is designated as a Controller for CD Towns. The present strength of CD volunteers is 5.72 lakhs, out of which 5.11 lakhs are already trained. The target strength of CD volunteers has been fixed at 13 lakhs based on the population of CD towns as per 2001 census.

In accordance with the directions issued by Hon'ble Home Minister, one member high powered committee was constituted on 7th February, 2006 under the chairmanship of one of the member of NDMA to analyse the existing functions of Civil Defence Organisations and suggest changes required to enlarge its role to include Disaster Management.

2.18.10 **Civil Defence at district level:** The state government may appoint a person, not being in its opinion, below the rank of a District Magistrate to be known as the "Controller". Under certain conditions, the state government may also appoint a Deputy Controller of Civil Defence in appropriate rank up to that of Deputy Collector, but not inferior to that of a Sub-Divisional Magistrate.

2.19 Fire Services

2.19.1 Fire services are mandate of the Municipal Bodies as estimated in item 7 of Schedule 12 under Article 243W of the constitution. The structure across is not uniform. Presently Fire prevention and Fire Fighting Services are organized by the concerned States and UTs. Ministry of Home Affairs, Govt. of India, renders technical advice to the States and UTs and Central Ministries on Fire Protection, Fire Prevention and Fire Legislation.

2.19.2 The Government of India in 1956, formed a "Standing Fire Advisory Committee" under the Ministry of Home Affairs. The mandate of the committee was to examine the technical problems

relating to Fire Services and to advise the Government of India for speedy development and upgradation of Fire Services all over the country. This committee had representation from each State Fire Services, as well as the representation from Ministry of Home, Defence, Transport, Communication and Bureau of Indian Standards. This Committee was renamed as "Standing Fire Advisory Council" (SFAC) during the year 1980.

2.19.3 Fire Services in Gujarat, Chhatisgarh, Punjab, Maharashtra, Himachal Pradesh, Haryana and Madhya Pradesh excluding Indore are under the respective concerned Municipal Corporations. In other remaining States it is under the Home Department. While some States have enacted their own Fire Act, some others have not. As on today, there is no standardization with regard to the scaling of equipment, the type of equipment, or the training of their manpower. In each state it has grown according to the initiatives taken by the States and the funds provided for the Fire Services.

2.19.4 Presently the only Basic Life Line of Fire & Emergency Services which is fully committed to the common public, is the Municipal in some states and State Fire Services. The Airport Authority, Big Industrial Establishments, CISF and Armed Forces, however also have their own Fire Services and many a times in case of need rush in aid to the local Fire Services. Apart from the lack of being a proper government department with a complete developmental plan, State Fire Services have their own organizational structure, administrative setup, funding mechanism, training facilities and equipments.

2.20 National Civil Defence College (NCDC), Nagpur

The first Disaster Management Training Institution of the country was founded on 29th April 1957 at Nagpur as the Central Emergency Relief Training Institute (CERTI) to support the Emergency Relief Organisation of the Government of India. This Institute organised advanced and specialist training for revenue officials responsible for Disaster Relief Operations against any natural or manmade disaster. CERTI was renamed as National Civil Defence College on 1st April 1968. NCDC is mandated for conducting training courses for various groups of stakeholders. Details of training on capacity development are given in Chapter on Capacity Development

2.21 National Fire Service College (NFSC), Nagpur

2.21.1 The National Fire Service College was established in 1956 as a sub- ordinate establishment of Ministry of Home Affairs with the aim of providing training to the Fire Officers of the country in advanced techniques of fire fighting and rescue, and creating uniformity in the Fire Service organisations and their management across the country. NFSC began its activities with only one course; later, considering the needs of the country, industrialisation and growth of Indian industry, had added many more courses to its curriculum to give the fire training a professional outlook.

2.21.2 The college has so far trained 15197 fire officers in the country. Being a residential college, National Fire Service College (NFSC), has its own hostel facilities with well furnished accommodation for about 200 trainees at a time.

2.21.3 The college awards certificates, diplomas, and advanced diplomas on successful completion of courses. These are recognized by the state, central government, the public and

private sectors and the business community as well. In addition, the diploma and advanced diploma of NFSC are also recognised by the Union Public Service Commission for appointment in the middle management cadre.

2.22 Home Guard

2.22.1 **Role:** The role of Home Guards is to serve as an auxiliary to the police in the maintenance of law and order, internal security and help the community in any kind of emergency such as air-raid, fire, cyclone, earthquake, epidemic etc. They are also expected to help the police in maintenance of communal harmony, assist the administration in protecting weaker sections, participate in socio-economic and welfare activities and perform Civil Defence duties.

2.22.2 **Types:** Home Guards are of two types – rural and urban besides in Border States, Border Wing Home Guards Battalions at national level. Border Wing, Home Guard serve as an auxiliary to the Border Security Force. The total strength of Home Guards is 5, 73,793 against which the raised strength is 5,00,410. The organisation is spread over all states and UTs except in Kerala.

Eighteen Border Wing Home Guards (BWHG) Battalions have been raised in the border states viz. Punjab (6 Bns.), Rajasthan (4 Bns.), Gujarat (4Bns.) and one of Bn each. for Assam, Meghalaya, Tripura and West Bengal to serve as an auxiliary to Border Security Force for preventing infiltration on the international border and coastal areas, guarding of vital Installations and lines of communication in vulnerable areas at the time of external aggression.

2.22.3 **Statutory Mechanisms and Service Condition:** Home Guards are raised under the Home Guards Act and Rules of the states and UTs. They are recruited from a cross section of the population such as doctors, engineers, lawyers, private sector organisations, college and university students, agricultural and industrial workers, etc. who give their spare time to the organisation for betterment of the community. Home Guards are provided free uniform, duty allowances and awards for gallantry, distinguished and meritorious services. Members of Home Guards with three year service in the organisation are trained to assist police in maintenance of law and order, prevention of crime, anti-decoity measures, border patrolling, prohibition, flood relief, fire-fighting, election duties and social welfare activities.

The Ministry of Home Affairs formulates the policy regarding role, target, raising, training, equipping, establishment and other important matters of Home Guards Organisation.

2.23 Interface between the Ministries for disaster Management

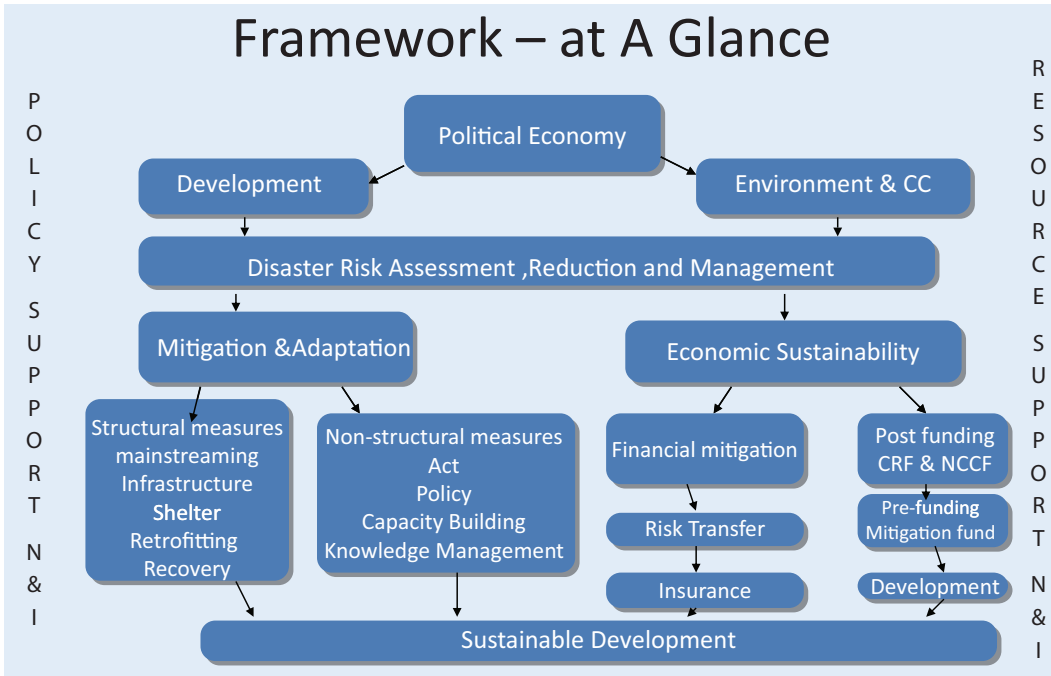
2.23.1 The interface between stakeholders and the disaster management framework is permanent, backed by legislative measures, decisions, such as those taken for establishment of the bodies and committees for managing disasters and the government orders to execute these decisions. These decisions or measures direct the composition of the structure by identifying the stakeholders to be involved in the disaster management framework. The role to be performed by each stakeholder is in the evolving stage and needs to be defined within different SOPs. Thus, while the involvement of stakeholders in the interface is mandated and permanent, the nature of interface is guided by the expertise or relevance of the stakeholder to the disaster management framework.

2.23.2 The expertise based interfaces emerge when the stakeholders serve as 'service providers' to the disaster management framework. For instance, the institutions under Ministry of Earth

Sciences and Ministry of Water Resources, that is, Indian Meteorological Department (IMD) and Central Water Commission (CWC) respectively, provide information on the weather and climatic parameters and the potential hazards and threats to the nodal management authority. Further, these organizations are involved with disaster planning activities – flood zonation and flood plain management in case of CWC, and hazard mapping and database generation in case of IMD. The organizations and institutions under the Department of Space provide research and technical support by monitoring the weather elements and facilitating satellite based communication, and also undertaking activities such as land use mapping and hazard zoning.

2.23.3 The framework which emerges from above discussion may be summarised in a flow chart form as given in Figure 2.8.

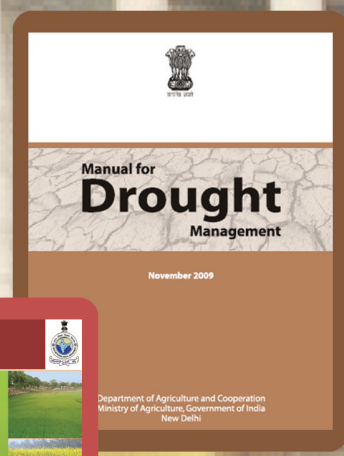
Figure 2.8: Interface among the stakeholders, leading to the development of society

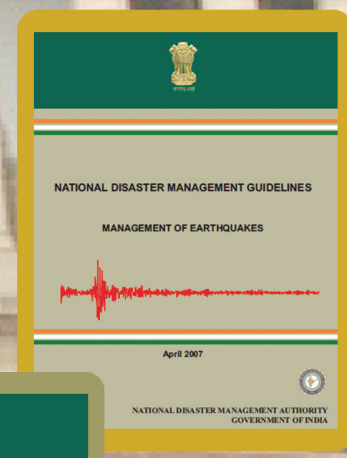


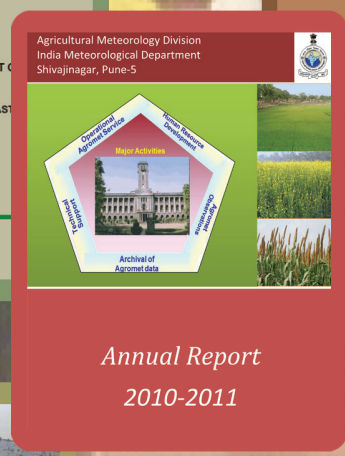
Source: NIDM

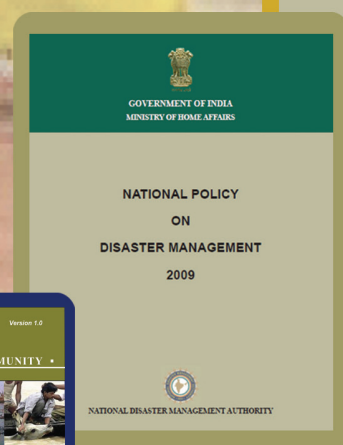
2.23.3 The Disaster Risk Reduction (DRR) should be seen as on integral part of environment (climate change also) and development. The impending risk analysis should be done in the light of disasters and possible threat of high intensity disasters due to climate change. Accordingly, mitigation and adaptation programmes should be developed. The mitigation plan should address the issues of structural and non-structural interventions along with the fiscal and monetary tools (for DRR & adaptation) for pre and post disaster planning. If this is main streamed, sustainable development can be attained and miseries of the people could be minimised. The top down and bottom up institutional linkages for policy formulation and programme execution would be interdependent with each other.

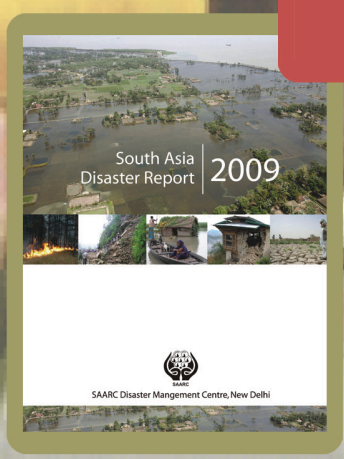
3 Policy and Guidelines

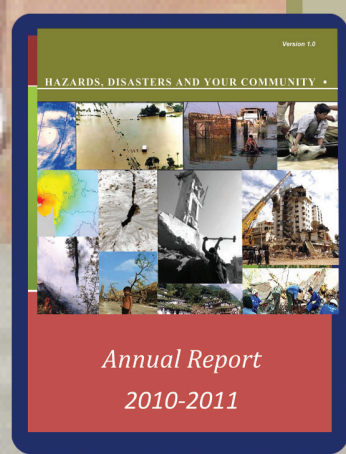


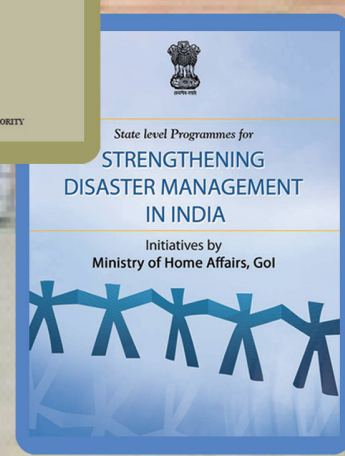












3.1 Introduction

3.1.1 The National Authority, under the Disaster Management Act, has been mandated with the responsibility for laying down the policies, plans and guidelines for disaster management to ensure timely and effective response to disasters. It is further required to approve the plans prepared by the ministries or departments of the Government of India in accordance with the national plans. The guidelines laid down by the National Authority have to be followed by State Authorities in drawing up their State Plans and the same is applicable to different ministries and departments of the Government of India for the purpose of integrating the measures for prevention of disaster or the mitigation of its effects in their development plans and projects. The National Institute of Disaster Management (NIDM) has to follow the broad policies and guidelines set by the NDMA.

3.1.2 The National Executive Committee, under the Act has to prepare the National Plan, coordinate and monitor the implementation of the National Policy.

3.1.3 Similarly, the State Authority of each state has been given the responsibility for laying down policies and plans for disaster management for their state, under the Act.

3.2 National Policy on Disaster Management (NPDM)

3.2.1 The National Policy on Disaster Management (NPDM) has been approved by the central government on October 22, 2009 and circulated to all concerned. The policy envisages a safe and disaster resilient India by developing a holistic, proactive, multi-disaster oriented and technology driven strategy through a culture of prevention, mitigation, preparedness and response. The policy covers all aspects of disaster management including institutional and legal arrangements, financial arrangements, disaster prevention, mitigation and preparedness, techno-legal regime, response, relief and rehabilitation, reconstruction and recovery, capacity development, knowledge management, research and development. It focuses on the areas where action is needed and the institutional mechanism through which such action can be channelised.

3.2.2 The NPDM addresses the concerns of all the sections of the society including differently abled persons, women, children and other disadvantaged groups in terms of granting relief and formulating measures for rehabilitation of the persons affected by disasters. The issue of equity and inclusiveness has been accorded due consideration. It aims to bring in transparency and accountability in all aspects of disaster management through involvement of community, community based organisations, Panchayati Raj Institutions (PRIs), local bodies and civil society.

3.3 National Plan on Disaster Management

3.3.1 An institutional mechanism for preparation of the National Plan has been put in place, which is under preparation in three parts namely:-

(i) National Response Plan,

(ii) National Mitigation Plan and

(iii) National Capacity Building Plan.

3.3.2 A Facilitation Committee under the Chairmanship of Secretary (Border Management) in the Ministry of Home Affairs and three sub-committees namely: (i) National Response Plan Committee (ii) National Mitigation Plan Committee and (iii) National Capacity Building

Plan Committee have been constituted for preparation of the National Plan on Disaster Management.

3.3.3 The National Mitigation Plans are under preparation by the concerned nodal ministries for disasters in respect of which the Nodal Ministries have been identified and designated (Table 3.1). The Nodal Officers of the ministries concerned with the disasters are the conveners of the National Mitigation Plan Committees and are required to complete the Mitigation Plan in consultation with the members concerned with the respective disasters in NDMA.

Table 3.1: Convenor - Nodal Ministry/Department for Management/Mitigation of Different Disasters

S. No.	Disaster	Disaster Management by	Mitigation efforts	
			Nodal Ministry	Member Ministries on Mitigation Plan Committee (MPC)
1.	Earthquake	MHA	Ministry of Earth Sciences	Ministries of Science and Technology, Urban Development; Rural Development; HRD; Health & Family Welfare; Panchayati Raj; Youth Affairs & Sports; Women & Child Development; IT & Telecommunication; I & B; and Space
2.	Flood	MHA	Ministry of Water Resources	Space; Telecommunication
3.	Drought, Hailstorm and Pest Attack	A&C	Deptt. of Agriculture and Cooperation, Ministry of Agriculture	---
4.	Landslide	MHA	Ministry of Mines	Road Transport and Highways and Shipping
5.	Avalanche	MHA	Ministry of Defence	Road Transport and Highways and Shipping
6.	Forest Fire	E&F	Ministry of Environment and Forests	
7.	Nuclear Disaster	MHA/ AE	Deptt. of Atomic Energy	Defence; Health and Family Welfare
8.	Industrial and Chemical Disasters	E&F	Ministry of Environment and Forests	
9.	Biological Disaster	H&FW	Ministry of Health and Family Welfare	Defence, Environment and Forests, Agriculture and Co-operation, Animal Husbandry, Dairying & Fisheries; and Chemicals & Fertilizers
10.	Rail Accidents	Rly	Ministry of Railways	---

S. No.	Disaster	Disaster Management by	Mitigation efforts	
			Nodal Ministry	Member Ministries on Mitigation Plan Committee (MPC)
11.	Road Accidents	RTH&S	Ministry of Road Transport and Highways and Shipping	---
12.	Aviation Accidents	CA	Ministry of Civil Aviation	---
13.	Cyclone/ Tornado/ Hurricane	MHA	India Metrological Deptt. under Ministry of Earth Sciences	---
14.	Tsunami	MHA	Ministry of Earth Sciences	---

3.4 Focus and Objectives of Guidelines

NDMA is engaged in the formulation of guidelines through a consultative process involving multiple stakeholders, including the government, non-government organisations, academic and scientific institutions, the corporate sector and community. Since its inception, NDMA has so far released various disaster specific and thematic guidelines. These may be visited at the site www.ndma.gov.in. Salient features of the guidelines issued are as follows:-

3.4.1 **Management of Landslide and Snow Avalanches:** The objectives of these guidelines are to institutionalise the landslide hazard mitigation efforts, to make the society aware of the various aspects of landslide hazard in the country and to prepare the society to take suitable action to reduce both risks and costs associated with this hazard. The guidelines include regulatory and non-regulatory frameworks with defined time schedules for all activities.

3.4.2 **Management of Cyclones:** The guidelines aim to deal with the tropical cyclones by way of appropriate coping strategies and risk reduction plans along with greater public awareness. The guidelines call for proactive, participatory, fail safe, multi-disciplinary and multi-sector approach at various levels. An approach encompassing Early Warning System on cyclones, structural measures for preparedness and mitigation, covering cyclone shelters, buildings, road links, drains, embankments, communication/power transmission networks, and non-structural mitigation options, such as coastal zone management, coastal flood plain management, natural resources management, awareness generation related to CDM, hazard zoning and mapping, including the use of GIS tools, capacity development, etc; and its implementation strategies are suggested.

3.4.3 **Management of Earthquake:** The guidelines emphasise that all new structures are built in compliance with earthquake resistant building codes. Town planning, bye-laws, structural safety audits of existing lifeline structures and other critical structures in earthquake prone areas, carrying out selective seismic strengthening and retrofitting ought to be addressed.

3.4.4 **Management of Floods:** The guidelines aim at measures for preparedness, prevention, mitigation in the pre-flood stage and on prompt and effective response, relief and recovery during

– and post flood stages. Importance on non-structural measures besides structural measures is emphasized in the guidelines. Setting of basin-wise organisations for flood management and also for setting up a National Flood Management Institute for training, education and research are suggested in the guideline.

3.4.5 **Chemical Disasters (Industrial):** These guidelines call for a protective, participatory, well-structured, fail-safe, multi-disciplinary and multi-structural approach at various levels. On the basis of vulnerabilities and consequences of chemical accidents, the guidelines review the existing regulatory framework and practices and thus propose for a regulatory framework, code of practices, capacity development, institutional framework, etc. They further set out an approach for implementation of the guidelines.

3.4.6 **Management of Chemical (Terrorism) Disasters:** The guidelines focus on outlining the preparedness and efforts made for mitigating the chemical terrorism, the act of violence perpetrated to achieve professed aims, using chemical agents. While reviewing the existing legislations and regulatory framework, the guidelines identify the gaps and propose the measures required to fill the gaps in the legislative and regulatory frameworks. They also deal with the aspects of surveillance measures for strengthening the intelligence in order to prevent intentional use of chemical agents.

3.4.7 **Preparation of State Disaster Management Plans:** The aim of the state DM plan is to ensure that the components of DM are addressed to facilitate planning, preparedness, operational, coordination and community participation. The guideline suggests outlays for preparation of the plan to include the state profile, vulnerability assessment and risk analysis, prevention measures, mainstreaming DM concerns into developmental plan and programme projects, preparedness measures, response and partnership with the other stakeholders besides providing for financial arrangement.

3.4.8 **Psycho-Social Support and Mental Health Services in Disasters:** Disasters leave a trail of agony and affect the survivors' mental health. The guidelines on this subject outlay the entire gamut of psycho-social support and mental health services with a view to build the nation resilient to respond effectively in all types of disasters. The intent of these guidelines is to develop and integrate a holistic, coordinated and pro-active strategy for management of psycho-social support and mental health services after a disaster through a culture of prevention, mitigation and preparedness to generate a prompt and effective response.

3.4.9 **Medical Preparedness and Mass Casualty Management:** A Mass Casualty Event (MCE) is an incident resulting in a number of victims large enough to disrupt the normal course of emergency and health care services. The guidelines for MCE focus on all aspects of medical preparedness and mass casualty management with emphasis on prevention, mitigation preparedness, relief and medical response etc. They aim to develop a rigorous medical management framework to reduce the number of deaths during MCE.

3.4.10 **Management of Nuclear and Radiological Emergencies:** The overall objective of the guidelines is to implement the concept of prevention of nuclear and radiological emergencies. . In rare cases of their occurrence due to factors beyond human control, the guidelines suggest the emergency should be managed through certain pre-planned and established structural and non-structural measures to minimise risks to health, life and the environment.

3.4.11 **Incident Response System:** These guidelines provide directions and guidelines to central ministries and the states for an effective and well coordinated response. They suggest a multi-disciplinary, and systematic approach to guide administrative mechanisms at all levels of the government with scope for participation of private sector, NGOs, PRIs and communities to work together seamlessly in the response activities. The guidelines are applicable to the management of all incidents - natural or human-made. The proposed methodology is expected to be equally useful for handling all kinds of incidents such as terrorism (Counter Insurgency), law and order situations, serial bomb blast, hijacking, air accidents, chemical, biological, radiological and nuclear (CBRN) disasters, mine disaster, port and harbour emergencies, forest fires, oil field fires and oil spills.

3.4.12 **Strengthening of Safety and Security for Transportation of POL tankers:** The guidelines envisage measures for prevention and for adoption of preparedness practices to a level that there is no chance of error. This calls for firming up the regulations, setting up of mechanisms of strict conformation, as well as fail proof functioning by each role player.

3.4.13 **Management of Biological Disaster:** The guidelines for management of biological disasters focus on all aspects of Biological Disaster Management (BDM) including Bio-terrorism (BT). It emphasises a preventive approach such as immunisation of first responders and stockpiles of medical countermeasures based upon risk reduction measures by developing a rigorous medical management framework to reduce the number of deaths during biological disasters, both intentional and accidental. These include the development of specialised measures pertaining to the management of biological disasters.

3.4.14 **Management of Tsunami** :The guidelines present an introductory overview on the tsunami risk and vulnerability in the country and the preparedness as a nation. It provides for structural mitigation measures and lay down strategies for protecting lifeline with the sea front besides laying down the guidance for developing the techno legal regime and giving an account of various tool kits for tsunami risk management.

3.4.15 **Role of NGOs in Disaster Management:** The guidelines discuss the role of NGOs in disaster preparedness, mitigation and response and spell out the institutional mechanism for improving the effectiveness of disaster management through effective coordination between NGOs and the government at different levels.

3.4.16 **Urban Flooding:** The guidelines aim to develop plans for the management of urban flooding with a view to guide the ministry and other government bodies for preparation of their disaster management plans on this aspect of disaster, recurrent in urban areas during monsoon. While reviewing the existing international and national practices for the design and maintenance of the urban drainage system, it addresses the issue of urban flood risk, vulnerability analysis and hazard mapping and provides for response action.

3.4.17 **Management of Dead in the Aftermath of Disaster:** These guidelines are aimed at institutionalising the standard procedure for proper management of dead bodies and animal carcasses in the aftermath of disasters.

3.4.18 **Plan to counter threats to Municipal Water Supply and Water Reservoirs :** The plan aims to counter any threat to municipal water supply and water reservoir in view of such a

perception and taking into account the present water supply system and legislative framework. The plan suggests to framing a preparedness plan and also outlining the guidelines for a standard operating plan.

3.4.19 NDMA from time to time has also been organizing workshops on different issues related to disasters and publishing its reports for action by concerned Ministry or agency. Such reports are given as under

(i) **Training regime for disaster response:** The key to efficiency in disaster response does not lie in good equipment but in effective ongoing training of NDRF personnel. . The report on the training regime is the outcome of detailed needs analysis, followed by extensive research on good practices in disaster response training in vogue within the country and elsewhere in the world. The training regime so devised aims to help the process of capacity building of NDRF for efficient and effective discharge of its onerous responsibility.

(ii) **Pandemic Preparedness:** The outcome of the workshop held on the subject on 21-22nd April, 2008 deals with the existing status of preparedness at different levels of the government and attached offices and inter-dependency of the sectors. The report presents the recommendations following two days of deliberations, on the subject.

(iii) **Revamping of Civil Defence set up in the country:** The changing scenario, reducing changes and occurrence of traditional wars, an steadily and increasing threat from natural and man- made disasters, with large scale devastation of life and property, warrants a greater role on the part of Civil Defence from merely hostile act-centric responsibility to a holistic role in all the facets of disaster management in the country. It recommends revamping the existing structure of civil defence for enhancing its functional responsibilities in realistic and cost effective manner.

3.5 Management of Droughts[26]

3.5.1 The new manual for drought management is jointly prepared by MOA & NIDM and issued in November 2009. It suggests a system for drought management policy and programmes to be followed by the Government of India and state governments. It focuses on the general and common elements of drought management at the national level, while allowing the states to include their specific schemes and interventions. The manual incorporates drought forecasting, monitoring, response and mitigation as a continuum of activities.

3.5.2 The manual is divided into following sections, namely - understanding drought, its monitoring, declaration of drought, providing relief and measures taken for mitigation of drought. While classifying the droughts of different types and associated vulnerability, the guidelines suggests the measures for management of drought. The guidelines lay emphasis on risk management rather than following the traditional approach of crisis management as a reactive response measure. The vital components of drought management namely, drought intensity assessment, it's declaration, prioritisation of areas of drought management and implementation of drought management strategy are outlined in the guidelines. The manual may also be visited on NDMA's website at the link : http://ndma.gov.in/ndma/guidelines/NDMA_Droughtguidelines.pdf

3.6 National Action Plan on Climate Change

3.6.1 On June 30, 2008, Prime Minister Dr. Manmohan Singh released India's first National Action Plan on Climate Change (NAPCC), outlining existing and future policies and programs addressing climate mitigation and adaptation. The plan identifies eight core "national missions" running through 2017 and directs ministries to submit detailed implementation plans to the Prime Minister's Council on Climate Change by December 2008.

3.6.2 Emphasizing the overriding priority of maintaining high economic growth rates to raise living standards, the plan "identifies measures that promote our development objectives while also yielding co-benefits for addressing climate change effectively." It stipulates that these national measures would be more successful with assistance from developed countries, and pledges that India's per capita greenhouse gas emissions "will at no point exceed that of developed countries even as we pursue our development objectives." The plan can be visited on the website of Ministry of Environment and Forest (MOEF)

3.6.3 National Action Plan on Climate Change identified Eight missions.

- National Solar Mission
- National Mission on Sustainable Habitat
- National Mission for Enhanced Energy Efficiency
- National Mission for Sustaining The Himalayan Ecosystem
- National Water Mission
- National Mission for Green India
- National Mission for Sustainable Agriculture
- National Mission for Strategic Knowledge on Climate Change

3.7 Rules notified under the Disaster Management Act, 2005

Several rules for administration of the different provisions of the Disaster Management Act have been notified by MHA and the briefs are given in Table 3.2.

Table 3.2: Rules notified under DM Act, 2005

S. No.	Rules and regulations	Notification Date	Scope
1.	Disaster Management (Term of Office and Conditions of Service of Members of the National Authority and payment of allowances to Members of Advisory Committee) Rules, 2006	27.9.2006	Provide for pay and service conditions of Vice Chairperson / Member of NDMA, disqualifications, resignation and filling up vacancies in the National Authority.
2.	Disaster Management (National Institute of Disaster Management) Rules, 2006	30.10.2006	Provide for composition of the institute and governing body, filling up of vacancies, meetings of the institute and powers and functions of the Executive Director.

S. No.	Rules and regulations	Notification Date	Scope
3.	National Institute of Disaster Management Regulations, 2006	30.10.2006	Provide for composition of the institute and the governing body – meetings, transaction / recording of business of the institute; delegation of functions to governing body or Executive Director; term of office, powers and functions, transaction, powers and functions of Executive Director.
4.	Disaster Management National Executive Committee (Procedures & Allowances) Rules, 2006	27.9.2006	Provide for procedures to be followed by the National Executive Committee (exercise of powers by the Chairperson of NEC during emergency, meeting of NEC atleast once in three months, forwarding minutes of every meeting to National Authority, etc), allowances to be paid to a person associated as an expert with a sub-committee of NEC.
5.	Disaster Management (Removal of Difficulties) Order, 2006	27.9.2006	Provide tenure to the Vice Chairperson and members of NDMA.
6.	Disaster Management (Annual Report of National Authority) Rules, 2006	30.10.2006	Provide for the contents to be included in the annual report and its laying before both the Houses of Parliament within nine months of the end of the Financial Year.
7.	Disaster Management (Notice of Alleged Offence) Rules, 2007	10.8.2007	Provides for notice of alleged offence and intention to make a complaint and particulars to be furnished alongwith notice.
8.	National Disaster Management Authority (Financial Advisor) Recruitment Rules, 2008	11.1.2008	Recruitment Rules for selecting a Financial Advisor (JS equivalent) on deputation in NDMA.
9.	Disaster Management (National Disaster Management Response Force) Rules, 2008	13.2.2008	Provide for constitution of force; direction and control of Force; responsibility, training, skill, duties, etc. and conditions of service of NDRF.
10.	Disaster Management (National Disaster Response Force) Amendment Rules, 2008	11.12.2008	Provides for insertion of Sashastra Seema Bal Act, 2007 and omission / insertion in entries (iii) and (iv).
11.	National Disaster Management Authority, Group 'C' posts Recruitment Rules, 2009	13.4.2009	Provides for Recruitment Rules for selection of group C such as dispatch rider, Hindi typist, cashier, etc. in NDMA.
12.	National Disaster Management Authority (Group 'A') Recruitment Rules, 2009	16.9.2009	Provides for Recruitment Rules for selection of Advisor, Joint Advisor and Senior Research Officer etc. in NDMA.

These rules may be visited at the website http://www.mha.nic.in

3.8 Conclusion

The policy and guidelines are only illustrative. The concerned Ministries related to DM activities, either have come out with their own policy, plans and regulatory mechanisms for management of disasters pertaining to their domain or are at different stages of its formulations. It is hoped that by going through the details of the available policy and the guidelines and other information at one place, the other ministries, states and the stakeholders may get necessary inputs and guidance to use them and come up with effective and implementable plans at their level.

4 Prevention and Mitigation

4.1 Introduction

The Yokohama message emanating from the International Decade for Natural Disaster Reduction in May 1994 underlined the need for an emphatic shift in the strategy for disaster mitigation. It inter-alia stressed that disaster prevention, mitigation, preparedness and relief were four elements, which contribute to and gain from the implementation of the sustainable development policies. These elements along with environmental protection and sustainable development, are closely inter related. Nations, therefore should incorporate them in their development plans and ensure efficient follow up measures at the community, sub-regional, regional, national and international levels. Disaster prevention, mitigation and preparedness are better than disaster response in achieving the goals and objectives of vulnerability reduction.

It would be evident from the table given in 4.1 that if we compare the disasters of similar magnitude in USA and Japan with that of India it is found that the loss of lives in USA and Japan are much less as compared to that of India. The factors influencing reduced loss is attributed to the better preparedness in USA and Japan.

Table 4.1: Comparison among India, Japan & USA on death in Earthquake of similar magnitude

Country/ Place	Date	Intensity of Quake	Human Lives Lost
USA			
Southern California	28.6.1991	6.2 M	2
Landers California	28.6.1992	7.3 M	3
Oregon	21.9.1993	6.4 M	2
Northridge, California	17-1-1994	6.9 M	60
Wyoming	3-2-1995	6.7 M	1
Central California	22-12-2003	6.8 M	2
JAPAN			
Hokkaido	25-9-2003	8.3 M	0
Kobe	16.1.1995	6.9 M	5530
Kamchatka	12-5-2005	7.3 M	0
Fukuoka	20-3-2005	6.5 M	0
Honshu	16-8-2005	7.2 M	0
INDIA			
Uttarkashii	20.10.1991	6.6 M	2000
Latur	30.9.1993	6.3 M	9475
Jabalpur	22.5.1997	6.0 M	39
Chamoli	29.3.1999	6.8 M	100
Bhuj	26.1.2001	6.9 M	13805

Source: UNDP (BCPR)

4.2 Mainstreaming of Disaster Risk Reduction in Developmental Strategy

4.2.1 Prevention and mitigation contribute to lasting improvement in safety and should be integrated in the disaster management. The Government of India has adopted mitigation and prevention as essential components of their development strategy. Accordingly, the Tenth Five Year Plan document has a detailed chapter on disaster management. The plan emphasises the fact that development cannot be sustainable without mitigation being built into the developmental process.

4.2.2 Mainstreaming DRR involves incorporating disaster risk reduction into development policy and practice. It means radically expanding and enhancing disaster risk reduction so that it becomes normal practice, fully institutionalised within an agency's relief and development agenda. Mainstreaming has three purposes:

(a) To make certain that all the development programmes and projects that originate from or are funded by an agency, are designed with evident consideration for potential disaster risks and to resist hazard impact,

(b) To make certain that all the development programmes and projects that originate from or are funded by an agency, do not inadvertently increase vulnerability to disaster in all sectors: social, physical, economic and environment,

(c) To make certain that all the disaster relief and rehabilitation programmes and projects that originate from or are funded by an agency are designed to contribute to developmental aims and to reduce future disaster risk.

4.2.3 Mainstreaming DRR into the developmental plans is an important mandate of the Disaster Management Act 2005. Integration of disaster risk reduction measures into ongoing flagship programmes of Government of India is being used as an entry point for mainstreaming DRR in development plans. Steps for ensuring the incorporation of DRR into various ongoing programmes\plans are as follows:

(a) Identification of key programme/projects of Government of India,

(b) Identification of entry points within the programme for integration of DRR (structural, non-structural and other mitigation measures) at various levels viz. national, state and district levels,

(c) Close coordination with concerned departments such as State Planning Commission and Finance Department for promoting DRR measures into development plans and policies,

(d) Advocacy for allocation of dedicated budget for DRR within the departmental plans,

(e) Preparation of guidelines for integration of disaster risk reduction measures into development plans of various departments at the district and sub-district levels.

4.2.4 **Mainstreaming of National Plan and its Sub-Plan:** Three committees constituted by Government of India are working for preparing the National Response Plan, National Human Resource and Capacity Development Plan and Mitigation Plans by respective ministries who have been designated as nodal agencies for the disaster relating to their activities. The draft National Response Plan and National Human Resource and Capacity Development Plan are ready. Certain rectifications and modifications are underway before it is presented to the National Executive Committee for its approval.

4.2.5 It is expected that National Response Plan will be put in place once it is adopted by Government of India. It will pave the way for institutionalising the response plan at three tiers as envisaged in the Disaster Management Act.

4.2.6 Similarly, the Capacity Development Plan, once approved and adopted will provide a roadmap for undertaking the capacity building for people engaged in different facets of disaster management and enhance the capacity at the individual, organizational as well as at the environmental levels.

4.2.7 Mitigation Plans have been submitted by the ministries of Defence, Mines (Geological survey of India), Department of Atomic Energy, Department of Agriculture & Cooperation, Railways and Water Resources, which are under examination and finalization. It is expected that once these mitigation plans are approved, the concerned ministry will undertake activities for taking the prevention and mitigation measures to address the hazard and risk involved in the activities of their sector. It would be the endeavor of the government to persuade the other ministries who have yet to bring their Mitigation Plans at the draft stage to take it further for approval and adoption.

4.3 National Disaster Mitigation Fund:

4.3.1 Section 47 of the Disaster Management Act 2005 provides for constitution of National Disaster Mitigation Fund. The provisions of the Act are as under:

(a) The Central Government may, by notification in the Official Gazette, constitute a fund to be called the National Disaster Mitigation Fund (NDMF) for projects exclusively for the purpose of mitigation and there shall be credited thereto such amount which the Central Government may, after due appropriation made by parliament by law in this behalf.

(b) The National Disaster Mitigation Fund shall be applied by the National Disaster Management Authority.

4.3.2 The modalities of constitution of NDMF have been discussed by MHA with the MoF, Planning Commission and NDMA from time to time. A reference was made to 13th Finance Commission. The 13th Finance Commission has given its report and as per its recommendations: "Mitigation and reconstruction activities should be kept out of the schemes funded through Finance Commission grants and met out of overall development plan funds of the centre and the states."The issue is under consideration of Ministry of Home Affairs with other concerned Ministries.

4.4. Measures taken for Prevention and Mitigation of Hazards

Risk of destruction and casualties associated with different disasters can substantially be reduced by introduction of prevention and mitigation measures. Mitigation is generally categorised into two main types of activities i.e. structural and non-structural. Structural mitigation refers to any physical construction to reduce or avoid possible impacts of hazards, which include engineering measures and construction of hazard-resistant protective structures and infrastructure. Non-structural mitigation refers to policies, awareness, knowledge development, public commitment, and methods and operating practices, including participatory mechanisms and the provision of information, which can reduce risk with related impacts. The Government of India has adopted several mitigation measures for reducing the risk of being affected by disasters. These measures are being implemented by the concerned ministries. Some of these initiatives are described below.

4.5 Earthquakes

4.5.1 India has been divided into five seismic zones according to the maximum intensity of earthquakes expected. Of these, zone V is most active and comprises whole of Northeast India, the northern portion of Bihar, western Uttar Pradesh hills, Himachal Pradesh and Andaman & Nicobar Islands.

4.5.2 Pace of Urbanisation in India has been increasing. Many of the cities and townships including the national capital of New Delhi, are located in zones of high seismic risk. Typically, the majority of the constructions in these cities are not earthquake resistant. Regulatory mechanisms are

weak, thus any earthquake striking in one of these cities would turn into a major disaster. Six major earthquakes have struck different parts of India over a span of last 15 years. The following measures have been initiated for prevention and mitigation of such disasters:

4.5.3 **National Earthquake Risk Mitigation Project (NERMP):** Understanding the importance of the management of such hazardous situations caused by the earthquake, the Government of India has taken a national initiative for launching a project of 'National Earthquake Risk Mitigation Project (NERMP). The proposed project aims at strengthening the structural and non-structural earthquake mitigation efforts and reducing the vulnerability in the high risk districts prone to earthquakes. Necessary risk mitigation measures are proposed to be put in place in the highly seismic zones. NDMA, tasked with this project has prepared a Detailed Project Report (DPR) which is under consultation with all the stakeholders. The proposed components of the project include techno-legal regime, institutional strengthening, capacity building and public awareness etc.

4.5.4 **National Building Code (NBC):** The National Building Code of India (NBC), a comprehensive building code, is a national instrument providing guidelines for regulating the building construction activities across the country. The NBC was first published in 1970 at the instance of Planning Commission and was revised in 1983. Thereafter three major amendments, two in 1987 and the third in 1997 were issued. Considering a series of further developments in the field of building construction, including the lessons learnt in the aftermath of number of natural calamities like devastating earthquakes and super cyclones, a project for comprehensive revision of NBC was taken up under the aegis of National Building Code Committee. The revised NBC has now been brought out as National Building Code of India 2005 (NBC 2005). The salient features of the revised NBC include meeting the challenges posed by natural calamities and reflecting the state-of-the-art and contemporary applicable international practices. The code may be accessed at http://www.bis.org.in/sf/nbc.htm.

Box 4.1: Building collapse in Lalita Park, Laxmi Nagar, Delhi

There was an incidence of building collapse in Lalita Park, Laxmi Nagar, East Delhi on 15th November 2010. Several people lost their life and many injured in this incidence. Lt. Governor of National Capital Delhi appointed an inquiry commission by exercising of the power conferred by section 3 of the Commission of Inquiry Act, 1952 (60 of 1952) and read with the Notification No. F.2/4/66-UT dated 20th August, 1966, issued by Govt. of India, Ministry of Home Affairs.

Single member, namely, Sh. Lokeshwar Prasad, retired Justice of Delhi High Court has been appointed.

The terms of reference of the Commission is as under:-

1. to determine the immediate and proximate causes for the collapse of the building,
2. to determine the circumstances and sequences of events leading to the collapse of the building,
3. to fix responsibility, both individual and institutional, for the collapse of this building and for the building already built that are unsafe structurally in East Delhi,
4. to determine the administrative, procedural and statutory lapses of various departments and agencies to evaluate structural safety aspects of buildings already built or proposed to be built in East Delhi and to recommend remedial measures,
5. to recommend measures that will combat corruption and make concerted public servant accountable for construction of unsafe building.

It is expected the commission will come out with recommendations, which may be useful for framing policy and action to contain such mishaps in future.

Jammu & Kashmir Earthquake 2005- Retrofitting on walls and windows

4.5.5 Effective implementation of these codes has been a challenge. The Bureau of Indian Standards & National Design and Research Forum with the Institute of Engineers have organised series of brainstorming sessions and workshops to pave the way to inculcate the same into practice. As part of their continuous efforts, a workshop has been scheduled in the month of in May 2011 titled "Implementation of Standards in Infrastructural Development".

4.5.6 **Efforts by Building Materials & Technology Promotion Council (BMTPC):** The BMTPC undertook projects for retrofitting of life-line structures for generating awareness among the people as well as various government agencies about the need and techniques of retrofitting. The Council has initiated retrofitting of MCD school buildings in Delhi. It has further initiated a study of 250 bedded hall of Bara Hindu Rao Hospital, New Delhi. It has earlier carried out seismic strengthening and retrofitting of the sub-district hospital in Kupwara in Jammu & Kashmir, 442 structures in Gujarat and primary school buildings at Thano, Block Raipur and Dehradun. The experience on these retrofitted buildings is aimed to help people at large and the policy makers in particular in working towards reducing the vulnerability of lakhs of existing public and private buildings, thereby protecting most number of people in case of future earthquakes.

4.5.7 Earthquake and Seismic Zones: The entire Indian landmass, susceptible to different levels of earthquake hazards, referred to as Zone II to V as per the Seismic Zoning Map of India contained in IS 1893:2002 Fifth Revision.

Multi-purpose Cyclone Shelter, Kendrapada, Orissa

The general basis of the zones is as follows:

Zone V: Covers the areas liable to seismic intensity 1X and above on MSK (1964) Intensity scale. This is the most severe seismic zone and is referred here as Very High Damage Risk Zone.

Zone IV: Gives the area liable to MSK VIII. This zone is second in severity to zone V. This referred here as High Damage Risk Zone.

Zone III: The associated intensity is MSK VII. This is termed here as moderate Damage Risk Zone.

Zone II: The probable intensity is MKS VII. This zone is referred to as Low Damage Risk Zone.

Note: *In the revision of the Seismic Zone Map given earlier in the Vulnerability Atlas of India 1997, the seismic zone I has now been merged into Seismic Zone II and renamed as Zone II, Zone III has been extended to cover more areas in Maharashtra, Andhra Pradesh and Tamil Nadu. Zones IV and V have remained unchanged.*

It may be mentioned here that the new intensity scale, called as MSK Intensity Scale 1964, is much more detailed and quantitative in nature as compared to the Modified Mercalli (MM) though almost similar in intensity. Hence MSK has been used in place of MM in the classification of the seismic zones given above

4.5.8 **Initiative by Ministry of Panchayati Raj:** It releases funds under Backward Regions Grant Fund (BRGF) for meeting critical infrastructural gaps and other developmental requirements. The ministry has financed several district plans under the BRGF for construction of panchayat buildings, anganwadi centres, school buildings, class rooms, roads, bridges, culverts etc. and restructuring of State Institutes for Rural Development (SIRD) buildings, block resource centres, panchayat training centers etc. The ministry, vide its letter No. N-11012/35/2007- P&J, dated 2nd February 2010 has advised all the states that it is imperative for all such structures to be made disaster resilient in the line with the national vision of disaster management.

4.6 Cyclones

4.6.1 National Cyclone Risk Mitigation Project (NCRMP) Initiative: Recurrent cyclones account for a large number of deaths, loss of livelihood opportunities, loss of public and private property, and severe damage to infrastructure, thus reversing the developmental gains whenever disasters occur. In order to reduce the loss of life and properties in the events of future calamities, the NCRMP has been launched by MHA in three phases in the cyclone prone coastal states and Union Territories, keeping in view the vulnerability of the states and their readiness with investment proposals.

Box 4.2: National Cyclone Risk Mitigation Project

Aim: The scheme aims to upgrade cyclone forecasting, tracking and warning systems, build capacity in multi-hazard risk management and to construct major infrastructures including multi-purpose cyclone shelters and embankments.

Outcome: The project is expected to benefit 5.60 lac people in Orissa and over 5.50 lacs in Andhra Pradesh.

Execution Authority: The National Disaster Management Authority (NDMA) has been designated as the implementing agency. The scheme is regularly monitored by NDMA and MHA.

Principal Components: The major components under the scheme are as follows;

- Community mobilisation and training,
- Cyclone Risk Mitigation Infrastructure (construction of cyclone shelters, roads/missing links and construction/repair of Saline Embankments etc.),
- Technical assistance for capacity building on Disaster Risk Management (risk assessment, damage and need assessment),
- Capacity Building and knowledge creation along with project management and implementation support.

States covered: In the first phase of the project, states of Orissa and Andhra Pradesh are being covered.

Project cost: The total outlay of the project is ₹1496.71 crore. The World Bank is providing financial assistance equivalent to ₹1198.44 crore and contribution from the state governments is ₹298.27 crore (i.e. Orissa- ₹ 132.98 crore and Andhra Pradesh – ₹165.29 crore).

4.6.2 **Integrated Coastal Zone Management Project (ICZMP):** The Government of India under the aegis of Ministry of Environment and Forest (MoEF) has launched the ICZMP. The objective of the project is to assist GoI in building the national capacity for implementation of a comprehensive coastal management approach in the country and piloting the integrated coastal zone management approach in states of Gujarat, Orissa and West Bengal.

Box 4.3: Integrated Coastal Zone Management Project

There are four components of this project:

(i) **Capacity Building:** It includes mapping, delineation and demarcation of the hazard lines, and delineation of coastal sediment cells all along the mainland coast of India.

(ii) **Piloting ICZM approaches in Gujarat:** This component will support capacity building of the state level agencies and institutions, including preparation of an ICZM plan for the coastal sediment cell that includes the Gulf of Kachchh and pilot investments.

(iii) **Piloting ICZM approaches in Orissa:** It provides for capacity building of the state level agencies and institutions, including preparation of an ICZM plan for the coastal sediment cells that include the stretches of Paradip-Dhamra and Gopalpur-Chilika, including a regional coastal process study, and pilot investments.

(iv) **Piloting ICZM approaches in West Bengal:** The project cost is ₹ 1425 crores ($285.67 million) and it is slated to be completed by 31 Dec. 2015.

4.7 Floods

4.7.1 **National Flood Risk Mitigation Project (NFRMP):** NFRMP has been envisaged for mitigation or reduction in risk, severity or consequences of floods. It aims at ensuring that arrangements are in place to mobilise the resources and capability for relief, rehabilitation, reconstruction and recovery from disasters besides creating awareness among vulnerable communities. NDMA has been entrusted to prepare a Detailed Project Report (DPR) on Flood Risk Mitigation Project.

4.7.2 **Flood Management Programme:** The state governments are engaged in flood management work since the independence of the country. Upto the Tenth Five Year Plan, 45.6 million hectares (m-ha.) of flood prone areas in the country had been provided a reasonable degree of protection. The Eleventh Five Year Plan envisages protecting an additional area of 2.18 million hectares. Management of water resources is primarily the responsibility of the state governments. The schemes for Flood Control and Protection are therefore, to be planned, funded and executed by the state governments. The Government of India, under the aegis of Ministry of Water Resources has launched the "Flood Management Programme (FMP)" at a total cost of ₹ 8000 crores for the 11th Plan period (2007-12).

Darbhanga Town Protection Wall *Source: Annual Report 2009-10, Ministry of Water Resources*

Raising & strengthening of Embankment on River, Burhi Gandak *Source: Annual Report 2009-10, Ministry of Water Resources*

Box 4.4: Flood Management Programme

Background: The FMP scheme was launched by Ministry of Water Resources under the central plan at a total cost of ₹ 8000 crores. The sanction of the scheme was been conveyed vide MoWR Order No. 5/7/2006-Ganga (Vol.II) / 4749-77 dated 28.11.2007.

Aim: The scheme provides financial assistance to the state governments for undertaking flood management works in critical areas during the 11th Plan period (2007-12).

Components:

(i) Critical flood control and river management works in the entire country (includes river management, flood control, anti-erosion, drainage development, anti-sea erosion, and flood proofing works besides flood prone area development programme in critical regions and restoration of damaged flood control/ management works).

(ii) The spillover works of on-going central plan schemes of Xth Plan would also be supported under this scheme during XI Plan.

Executing Authority: The FMP scheme has been implemented by Flood Control, Water Resources / Irrigation Departments of the state governments.

Under the programme, a total of 311 flood management work schemes of critical nature are included from 19 States for central assistance up to 31st March, 2010, out of which 117 works for 10 States are reported to be physically complete. It is expected that 1.33 billion hectares of flood prone areas have thus been restored and protected which will provide safety to about 12.89 million people during high floods.

4.7.3 For the year 2010-11, another 42 new flood management schemes have been included under the FMP from Assam, Bihar, Goa, Gujarat, J&K, Kerala, Manipur, Orissa, Pondicherry, Tamil Nadu, Uttarakhand, U.P. and West Bengal.

4.8 Study of Land Contour by GSI

4.8.1 Geological Survey of India (GSI) studied the shape and material of the land getting inundated and generates data on area, shape, slope, infiltration and permeability of soil of the basin, drainage pattern, landform and longitudinal and cross profiles of the channels. On the basis of these studies, GSI produces flood hazard maps indicating prohibitive, Restricted, Cautionary and Flood Free Zones.

4.8.2 Significant flood related studies and recommendations made by GSI are as follows

- Brahmaputra Valley - A comprehensive geo-environmental database for environmental management and flood control generated,
- Lower Banas sub-basin- selective irrigation to prevent rise of ground water table recommended,
- Kandi basin West Bengal- GSI recommended construction of small weirs to reduce impact of flood,
- Mokameh Tal area in the Ganga Flood Plain- rejuvenation of existing drainage channels to reduce flood problem recommended,
- Lower Damodar Basin- diversion along artificial canals and re-excavation of old river channel recommended,
- Landslide zonation map for Himalayan region,
- The contribution of snow melting to annual flood.

GSI's flood related studies are used by Central Water Commission, Water Resource Development Project Authorities, Urban and Rural Planning Authorities, Ministry of Environment and Forest and Ministry of Agriculture etc.

4.9 Landslides

In view of challenges caused by landslides, the 'National Landslide Risk Mitigation Project' (NLRMP) has been proposed to be launched. It aims at strengthening the structural and non-structural landslide mitigation efforts, reducing the landslide risk and vulnerability in the hilly districts prone to landslides and mud flows and minimise the risks arising out of disasters in landslides. NDMA has been entrusted to prepare

Doria Bridge, Assam, India *Photo: Shantanoo Bhattacharyya*

Detailed Project Report (DPR) on Landslide Mitigation Project and is in the process of appointing consultants to conduct a study and prepare DPR after defining the scope of work in consultation with all the stakeholders.

4.10 Tsunami

4.10.1 The Tsunami of 26th December 2004 caused extensive damage to life and property in the States of Tamil Nadu, Kerala, Andhra Pradesh and UTs of Puducherry and Andaman & Nicobar Islands (A&NI). It hit the fishermen community badly besides their means of livelihood. There had also been extensive damage to the infrastructure including houses, harbors, jetties, roads, bridges, power, telecom, hospitals, schools and other social sector buildings after Tsunami in Samanthanpettai village Nagapattanam.

Box 4.5: Measures by Japan

Japan, where tsunami science and response measures first began following disaster in 1896. The country has built many tsunami walls of up to 4.5 meters (15ft) to protect the populated coastal areas. Other localities have built floodgates and channels to redirect the water from incoming tsunami. However, their effectiveness has been questioned, as tsunami often overtops the barriers. For instance, the Okushiri Hokkaido tsunami which struck Okushiri Island of Hokkaido within two to five minutes of the earthquake on July 12, 1993 created waves as high as 30 meters (100ft) tall - as high as a 10-storey building. The port town on Aonae was completely protected by tsunami wall, but the waves washed right over the wall and destroyed all the wood-framed structures in the area. The wall may have succeeded in slowing down and moderating the height of tsunami, but it did not prevent major destruction and loss of lives.

Source: http://www.asianetindia.com/commentary/tsunami_249905.html

4.10.2 One of the natural measures which could be adopted for mitigating the impact of tsunami is using shoreline tree cover. Tree plantation is a cost-effective long- lasting means of tsunami mitigation in comparison to the artificial barriers. Some locations of Indian Ocean

Damaged Houses, (December 2004) and Reconstruction of houses, Nagapattinam, Tamil Nadu (September 2005)

Natural Mitigation- Sand dune- Pogainallur village Nagapattanam, Tamil Nadu

Natural Mitigation-Mangroves - Tamil Nadu

where Tsunami struck in 2004 remained almost intact because the existing coconut palms and mangroves trees absorbed the tsunami's energy. Similarly, the village of Naluvedapathy in Tamil Nadu region faced minimal damage and few deaths because of the forest of 80, 244 trees planted along the shoreline in 2002

4.11 Droughts

4.11.1 The Department of Agriculture & Cooperation, under the Ministry of Agriculture, Government of India released a manual for drought management in November, 2009. The manual suggests for looking beyond the traditional drought management through famine codes for dealing with situations of mass hunger and collective penury. It focuses on plans which take into account all capabilities of the state to address the impact of drought i.e., focus on mitigation measures, tapping newer technologies, enabling the systems adapt to the new legal framework and including improvement and area development programmes in drought mitigation.

4.11.2 The National Institute of Agriculture and Extension (MANAGE), Hyderabad has been identified to launch a National Project for Integrated Drought Monitoring & Management, with MANAGE as the lead partner. A proposal submitted by MANAGES to implement this national project through available budgetary provisions of Department of Agriculture & Cooperation is under consideration. Another proposal to set up a National Institute of Drought Management is also under consideration of Ministry of Agriculture & Cooperation.

4.11.3 The Drought Prone Areas Programme (DPAP) and Desert Development Programme (DDP) are being implemented by the Government of India since 1973-74 and 1977-78 respectively. These programmes aim at drought proofing and minimising desertification of fragile areas in

the arid, semi-arid and dry-sub humid regions often affected by severe drought conditions and desertification.

4.11.4 National Rainfed Area Authority in the Ministry of Agriculture has been set up to address the issue of drought mitigation on a long term basis. It comprises experts who provide knowledge inputs regarding systematic upgradation and management of the country's dryland and rainfed agriculture.

4.11.5 The Ministry of Agriculture & Cooperation has also undertaken some other measures to address the drought management including:

- Implementation of water harvesting conservation, artificial recharge of ground water, traditional water harvesting and conservation, water saving technologies like drip and sprinkler irrigation systems, improved water saving farm practices, long term irrigation management etc,
- Working towards convergence of lessons learnt from studies carried out by multiple institutions working in related fields such as Central Research Institute for Dry land Agriculture (CRIDA), International Crop Research for Semi-arid Tropics (ICRISAT), India Meteorological Department (IMD), National Remote Sensing Centre *(*NRSC) and Indian Council for Agricultural Research (ICAR), etc,
- Exploring practices such as harvesting cereal crops for fodder, supplemental irrigation if feasible, and ensuring availability of seeds when alternative crops are beneficial with logistic support from state and district machineries,
- Maximising efficient use of available surface and groundwater in drought prone areas i.e. to resort to drip and sprinkler practices wherever possible, particularly for commercial crops including fruit orchards,
- Undertaking construction of water shed structures at the right place to enhance water recharge for life saving irrigation at critical stages of crop growth and during drought situations, and
- Using optimally the services of Village Resources Centre established by Indian Space Research Organisation, ICAR, State Agriculture University and other organisations towards management of drought.

4.12 Fire

4.12.1 A Centrally Sponsored Scheme for Strengthening of Fire and Emergency Service in the country was launched in November 2009 at an outlay of ₹ 200 crores. The overall objective of the scheme is to strengthen fire and emergency services in the country and progressively transform it into Multi-Hazard Response Force capable of acting as first responder in all types of emergency situations. As the scheme is to be implemented with the centre and state contributions for procurement of equipment (in the ratio of 75:25 and for north-eastern states in the ratio of 90:10) within the XIth Five Year Plan period, the state governments are to contribute ₹ 40.23 crore as their share.

4.12.2 The main components and activity wise progress under the scheme are given in Table 4.2 and Table 4.3.

Table 4.2: Components of the Scheme for Strengthening of Fire and Emergency Service

S. No.	Components	Funds (₹ in crore)
(i)	Procurement of capital items such as advanced fire tender, high pressure pump with mist technology, quick response team vehicle and search and rescue combi-tools.	178.12
(ii)	Awareness generation/ School safety programme	4.38
(iii)	Training of trainers in advanced courses of collapsed structure search and rescue and fire fighting at the NFSC, Nagpur	5.00
(iv)	Fire hazard and risk analysis	10.00
(v)	Project management and monitoring	2.50

Table 4.3: The activity-wise progress of Fire Service Scheme (March 2011)

Activities	Details	Present Status
Purchase of Capital Items	Purchase of advanced fire tender, high pressure pump with mist technology, quick response team vehicle and search and rescue combi-tools by the state governments.	More than 89% of total funds have been earmarked for purchase of capital items. The state governments are required to undertake the procurement as per prescribed specifications.
Fire Hazard and Risk Assessment	The study will attempt to identify the gaps in existing fire services in the country and evolve a futuristic strategy for bridging the gaps and taking steps for mitigating the impacts of a fire hazard.	Consultant is being appointed.
Training of Trainers	Capacity building of thirty fire officers in advance methods of search and rescue, medical first responders. These trained officers will further impart trainings to 750 other fire officials.	Thirty fire service officials have been trained at Fire Service College, UK in advance methods of fire fighting and urban search and rescue. These officials were initially trained in basic DM aspects at NIDM, New Delhi.
Awareness Generation/ School Safety Programme	Conducting awareness generation programmes with communities and schools on fire safety measures.	IEC materials were developed and circulated to all the State Fire Services. DGCD is to conduct awareness programmes in the states.

4.12.3 **Fire Hazard and Risk Analysis of fire services in the Country:** The MHA has proposed to undertake a study on fire hazard and risk analysis of fire services in the country. The aim of the study is to identify gaps in existing fire services and evolve strategies for mitigating impacts of fire hazards in the country. The outcome of the study will be used to formulate an action plan (state/UT wise) for augmentation and future development of the fire services along with the plan to source the funding for its implementation. As a part of study, the consultant would be required to organise visits to each of the fire stations and fire service organisations in the country and generate database through primary and secondary surveys. Govt. of India has prepared the list of Multi-Hazard districts. List of Multi-Hazard districts is shown in Table 4.4.

Table 4.4: List of Multi-Hazard Districts For Creation of Civil Defence Set-up

State	District
Assam	Bongaigon
Assam	Dibrugarh
Assam	Jorhat
Assam	Tinsukia
Delhi	North East Delhi
Delhi	South Delhi
Goa	North Goa
Goa	South Goa
Gujarat	Ahmedabad
Gujarat	Bharuch
Gujarat	Dangs
Gujarat	Gandhinagar
Gujarat	Jamnagar
Gujarat	Kachch
Gujarat	Mehasana
Gujarat	Narmada
Gujarat	Navsari
Gujarat	Surat
Gujarat	Vadodra
Jammu & Kashmir	Anantnag
Jammu & Kashmir	Badgam
Jammu & Kashmir	Jammu
Jammu & Kashmir	Poonch
Jammu & Kashmir	Rajouri
Jammu & Kashmir	Srinagar
Maharashtra	Mumbai
Maharashtra	Ratnagiri
Maharashtra	Thane
Punjab	Amritsar
Punjab	Bhatinda
Punjab	Faridkot
Punjab	Ferozpur
Punjab	Gurdaspur
Punjab	Hoshiarpur
Punjab	Jalandhar
Punjab	Ludhiana
Punjab	Patiala
Punjab	Ropar
Punjab	Sangrur
Rajasthan	Alwar
Rajasthan	Barmer
Uttar Pradesh	Agra
Uttar Pradesh	Allahabad
Uttar Pradesh	Baghpat
Uttar Pradesh	Bareilly
Uttar Pradesh	Bulandshahar
Uttar Pradesh	Ghaziabad
Uttar Pradesh	Gorakhpur
Uttar Pradesh	Jhansi
Uttar Pradesh	Kanpur (Nagar)

State	District
Uttar Pradesh	Lucknow
Uttar Pradesh	Mathura
Uttar Pradesh	Meerut
Uttar Pradesh	Moradabad
Uttar Pradesh	Muzaffarnagar
Uttar Pradesh	Saharanpur
Uttar Pradesh	Varanasi
Andhra Pradesh	Hyderabad
Andhra Pradesh	Vishakapattanam
Assam	Darrang
Assam	Golaghat
Assam	Kabri Anglong
Assam	Kakrajhar
Bihar	Begusarai
Bihar	Kathihar
Bihar	Patna
Bihar	Purnia
Haryana	Ambala
Haryana	Faridabad
Haryana	Gurgaon
Haryana	Hissar
Haryana	Jhajjar
Himachal Pradesh	Shimla
Jammu & Kashmir	Baramullah
Jammu & Kashmir	Doda
Jammu & Kashmir	Kargil
Jammu & Kashmir	Kupwara
Jammu & Kashmir	Leh
Jammu & Kashmir	Pulwama
Jammu & Kashmir	Udhampur
Jharkhand	Godda
Jharkhand	Sahibganj
Maharashtra	Raigarh
Maharashtra	Sindhudurg
Orissa	Baleshwar (Balasore)
Orissa	Bhadrak
Orissa	Dhenkanal
Orissa	Jagatsinghpur
Orissa	Kendrapara
Rajasthan	Jalore
West Bengal	Bardhaman
West Bengal	Birbhium
West Bengal	Darjeeling
West Bengal	East Mednipur
West Bengal	Howrah
West Bengal	Hugli
West Bengal	Jalpaiguri
West Bengal	Kolkatta
West Bengal	Murshidabad
West Bengal	West Mednipur

4.13 Forest Fire Management:

4.13.1 Fire prevention, detection and suppression activities are state subjects. The Central Government has been formulating policy, planning and financing the states from time to time. Forest Protection Division of Ministry of Forests headed by DIG of Forests is responsible for the forest fire management at the central level. The Joint Forest Management Committees, 36,165 in number across the country, have been given the responsibility to protect the forests from fires. The Central Government has issued the National Forest Fire, Prevention and Control guidelines and has also worked on a National Master Plan on Forest Fire Control.

4.13.2 A centrally sponsored scheme 'Intensification of Forest Management' initiated since the Tenth Five Year Plan has allocated 15 percent of the funds for forest fire management.

4.14 Oil Industry

In the oil industry, the disaster management plan is maintained at the area level and covers a wide aspect (since their activities are likely to affect local people also). Oil companies have established their Crisis Management Plan at the company level and at the HQ level also with specialist to deal with fires and other identified hazards. In oil companies, it has been observed that international players for rescue and recovery operations are also hired at very short notice at cater to the specific requirements.

4.15 Chemical Disasters

The MOEF has taken the following measures towards developing a Regulatory Framework for Chemical Safety:

(i) The Environment (Protection) Act was enacted in 1986. Under the Act, two rules have been notified for ensuring chemical safety, namely,

  (a) The Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 (MSIHC) amended in 1994 and 2000;

  (b) The Chemical Accidents (Emergency, Planning, Preparedness, and Response) Rules, 1996 (EPPR) under the Environment (Protection) Act, 1986.

(ii) The Public Liability Insurance Act 1991, amended in 1992 and the Public Liability Insurance Rules 1991, amended in 1993 require maximum hazard units to procure an insurance policy and deposit an equal amount in the Environment Relief Fund to provide immediate relief to victims of chemical accidents.

4.16 Prevention of Disasters in Mines

The various safeguards and preventive measures against coal mine fires are outlined in the Coal Mines Regulations, 1957 and related circulars, notifications and technical instructions. The Directorate General of Mines Safety (DGMS) examines from each and every application for underground and surface mining from all considerations. Wherever necessary the DGMS imposes additional precautionary and preventive measures. The officers of the DGMS from time to time inspect the mines to assess the implementation of the measures and suggest modifications, etc.

For the new projects and reorganisational projects, after the issuance of the EIA Notification, 1994 under the Environment (protection) Act, 1986, it has become compulsory to get

environmental clearance from the Ministry of Environment and Forests (MOEF) and for this the mines are required to develop their Environmental Management Plans (EMPs) in which the problems of the mine fires are adequately addressed as the mine fires have considerable environmental impacts.

4.17 Epidemics

4.17.1 The Ministry of Health & Family Welfare is instrumental and responsible for implementation of various programmes on a national scale in the areas of prevention and control of major communicable diseases and promotion of traditional and indigenous systems of medicines. This ministry also assists states in preventing and controlling the spread of seasonal disease outbreaks and epidemics through technical assistance. It is actively involved in disease diagnosis during epidemics and outbreaks, operational research, manpower development, advisory role and other multifarious activities towards prevention and control of a cascade of epidemic prone disease of larger public health importance in collaboration with National Institute of Communicable Disease (NICD) and external organisations and institutes. (Photo : A health camp at Akkarapettai Villager in Nagapattinam District-December 2004)

4.17.2 Post-disaster management of health, sanitation and hygiene services is crucial to prevent an outbreak of epidemics. The draft Public Health (Prevention, Control and Management of Epidemics, Bio-terrorism and Disasters) Bill prepared by the Ministry of Health & Family Welfare is under consideration for enactment.

4.17.3 National Vector Borne Diseases Control Programme (NVBDCP) is the key programme for prevention/control of outbreaks/epidemics of malaria, dengue, chikungunya etc., vaccines administered to reduce the morbidity and mortality due to diseases like measles, diphtheria, pertussis, poliomyelitis etc. Two key measures to prevent/control epidemics of water-borne diseases like cholera, viral hepatitis etc. include making available safe water and ensuring personal and domestic hygienic practices are adopted.

4.17.4 It is impossible to always prevent epidemics, but its impact can always be mitigated by anticipating them and by being prepared. Epidemic preparedness and response is a multi-sectoral and multi-agency activity. Health sector plays a lead role in preparing and executing the epidemic preparedness plan but need the expertise and support of other disciplines/sectors also. Planning process will *inter alia* require extensive review of health infrastructure, disease surveillance and response system, availability of laboratories, trained professionals, drugs, vaccines and equipment in the country, communication system, coordinating mechanism between different sectors and between the national and international agencies and legal issues.

4.17.5 Accordingly, Govt. of India launched Integrated Disease Surveillance Project (IDSP) in November 2004 to strengthen capacity at state/district levels to detect and respond to the epidemics in early rising phase. Under the project, the district and states have been strengthened by providing additional technical manpower (epidemiologists, microbiologists, entomologists), training of rapid response teams for outbreak investigation and control, strengthening of laboratories for detection of organisms causing epidemic prone diseases, and establishment of IT network for data compilation, dissemination and analysis. The states are at varying stages of implementation.

4.17.6 The key achievement of IDSP has been creation of capacity at sub-district/district/state levels to detect early warning signals and outbreaks of epidemic prone diseases so that they can

Medical camp during Tsunami, 2004 in Nagapattinam, Tamil Nadu

be responded early. They collect weekly surveillance data, monitor disease trends and investigate rising in cases. About 85% of districts are reporting these data to Central Surveillance Unit through e-mail and more than 60% report through portal. The result is that states have detected and responded to more number of outbreaks after implementation of IDSP. For example, a total of 553 outbreaks were reported and responded to by states in 2008, 799 outbreaks in 2009 and 990 outbreaks in 2010. Earlier not many outbreaks were reported in the country by the States/ UTs.

4.17.7 Finally, a mention must be made about the International Health Regulations (IHR), 2005 which were adopted by the 58th World Health Assembly in May 2005 and came into force on 15 June 2007 (in India on 8 August 2007). IHR (2005) also provide us an opportunity to strengthen core capacities to detect, assess and notify and control all public health emergencies of international concern (PHEIC). These capacities will also help us to control endemic infectious diseases which may not spread to other countries.

4.18 Measures taken for Rail Safety

Several measures have been taken to improve safety of Rail Transportation which is summarised as below:

4.18.1 **Special Railway Safety Fund (SRSF):** Arising out of an important recommendation of Railway Safety Review Committee (RSRC) (Khanna Committee), to pull up the backlog of arrears for track renewals, bridges, rolling stock and signaling gear within a fixed time frame, a non-lapsable 'Special Railway Safety Fund' of ₹ 17000 crores was set up with effect from 01.10.2001 with a contribution from the Ministry of Finance and Railways. Works related to replacement / renewal of over-aged bridges, signaling gears and replacement of narrow gauge locomotives is ongoing.

4.18.2 **Corporate Safety Plan (2003-2013*):*** Railway Safety Review Committee (1998), in its report recommended that railways formulate a safety plan with the following broad objectives:

- To achieve reduction in rate of accidents per million train kilometers from 0.44 (in 2002-03) to 0.17 by the year 2013,
- Implement measures to reduce chances of passenger fatality substantially in consequential train accidents by 2013,
- Focus on development of manpower through major improvements in working environment and training to reduce the accidents attributable to human failure by 40 percent by 2013,
- Achieve safety culture on all fronts including maintenance depots, worksites, stations, controls etc.,
- Progressively achieve an environment of "fail-proof" from the present "fail-safe" system of asset failures by upgrading the systems by 2013, and
- Prioritisation of safety related projects.

It is estimated that index of accidents per million train kilometers would be reduced from 0.44 (in 2002-03) to 0.17 in 2012-13. Similarly, the performance indices targets have been laid down for track defects, coach defects/ failures, wagon detachments/ failure, poor brake power (goods), incidence of train parting (goods), motive power defects, signal defects/ failures, communication failures and OHE (Overhead Equipment) defects.

4.18.3 **Measures taken to reduce Derailments:** Several measures have been taken to reduce the derailment such as

- Replacement of over-aged tracks, bridges, gears and rolling stock,
- Gradual phasing out of derailment prone four wheeler tank wagons,
- Reduction in Thermit welded joints on rails, use of SPURT Cars for rail flaw detection,
- Track circulation for enhanced safety in train operations,
- Introduction of Self Propelled Accident Relief Medical Van (SPARMV) and Wheel Impact Load Detector (WILD).

4.18.4 **Measures taken to reduce Collisions;** Similarly several measures are under implementation for reducing the incidents of collision which may be summarised such as;

- Extensive training to train operations staff
- Improved maintenance and safety checks
- Improvement in design of rolling stocks
- Installation of Anti Collision Device (ACD). ACD has been installed on 1900 Route kms. of Northeast Frontier Railway Railway and 800 route kms. on Konkan Railway Corporation Limited and put under trial. Decision has been taken to extend ACD to Southern Railway, South Central Railway and South Western Railway on a trial basis.

4.18.5 **Measures taken to reduce level crossing accidents**: Railway track have been jig jagging across the country side have rendered vulnerability profile of the people living near tracks very high. Following measures are underway to reduce accidents arising out of crossing them.

- Social awareness programmes have been launched in rural areas through divisions,
- Construction of Road Over Bridges (ROBs)/Road Under Bridges (RUBs) at level crossing with Train Vehicle Units (TVUs) > 1 lakh, limited use subways to replace level crossings,
- Manning of unmanned level crossings,
- Interlocking and provision of phones at level crossing gates,
- Trial of Train Actuated Warning Device (TAWD).

4.18.6 **Measures taken to reduce fire accidents:** Following measures have been taken to reduce the fire accidents,

- Provision of fire retardant material in new coaches and retro-fitment in existing coaches,
- Emergency exits have been introduced in coaches to reduce fatalities,
- Provision of electrical fire sensing and extinguishing system in rolling stock and stationary installations,
- Provision of electrical fire sensing and extra quashing system in rolling stock and stationary installations.

4.19. Road

4.19.1 The main thrust of accident prevention and control across the world has been on the four "E"s , namely,

(i) Education
(ii) Enforcement
(iii) Engineering
(iv Environment and Emergency care of road accident victims.

4.19.2 The measures taken by Government of India to reduce the risk of road accidents are summarised as follows:

i. **Road Engineering:** These are design/specification related aspects of roads and highways to enhance road safety. The National Highway Authority of India (NHAI) is ensuring usage of road safety furniture and has taken a number of steps to enhance safety of road users. The safety measures are inbuilt in the projects during design, construction, operations and maintenance.

ii. **Enforcement:** The state governments and UTs are to take measures for enforcing the statutory provisions provided under the Motor Vehicles Act, 1988 and the Central Motor Vehicle Rules, 1989. The enforcement measures under the said statute provides for inspection, licensing and verification of fitness of vehicles.

iii. **Education and Training:** These primarily involve spreading road safety awareness and imparting training to drivers. The initiatives undertaken in the field of training are refresher training for heavy vehicle drivers and providing financial assistance to states/UTs for setting up model driving schools to turn out well trained drivers.

iv. **Faster relief and evacuation of road accident victims:** In order to reduce the trauma and probability of death and disability associated with the road accidents, National Highway Accident Relief Service Scheme has been initiated which provides for supply of cranes and ambulances to states/UTs and NGOs for relief, rescue and

evacuation of accident victims to the closest medical centre and for clearing the accident site.

v. Another measure is medical care in which financial assistance upto ₹1.50 crores was provided to the state government hospitals located on national highways for upgradation and strengthening of emergency facilities

vi. **Road Safety Audit:** The specific aim of the road safety audit is to minimise the risk and safety of accidents on the national highways and expressways.

4.20 Civil Aviation

4.20.1 The Directorate General Civil Aviation (DGCA) has the regulatory responsibility for aviation safety. Its mandate is to ensure the highest level of safety in the Indian Aviation System by employing International Civil Aviation Organization (ICAO) standards and recommended practices. Mindful of India's State Safety Programme (SSP), DGCA is to maintain an integrated set of regulations and activities aimed at enhancing aviation safety.

4.20.2 DGCA implements proactive and as far as possible predictive strategies, for encouraging all stakeholders and service providers to understand the benefits of a safety culture, which are based on an inclusive reporting culture. DGCA fosters and assists stakeholders in developing comprehensive Safety Management Systems (SMS) and develops preventive safety strategies for the aviation system in an environment of a "just culture". DGCA works with service providers in a cooperative and collaborative manner to help them develop and establish their safety management systems.

4.20.3 The responsibility for coordination and search and rescue (SAR) with other agencies is, however vested with the Airports Authority of India (AAI) under the Airports Authority of India Act, 1944, as amended by AAI (Amendment) Rules, 2003.

4.20.4 The SSP is based on comprehensive analysis of the States Aviation System, safety policies, risk management, safety assurances and permission.

4.20.5 An appropriate legislative framework in safety management has been implemented in India in accordance with ICAO Standard and Recommended Practices (SARPs). For carrying out ICAO functions, India has three layers of legislation - the Aircraft Act 1934 which is the primary legislation, the secondary Aircraft Rules, 1937 and the tertiary Aircraft (Carriage of Dangerous Goods) Rules, 2003.

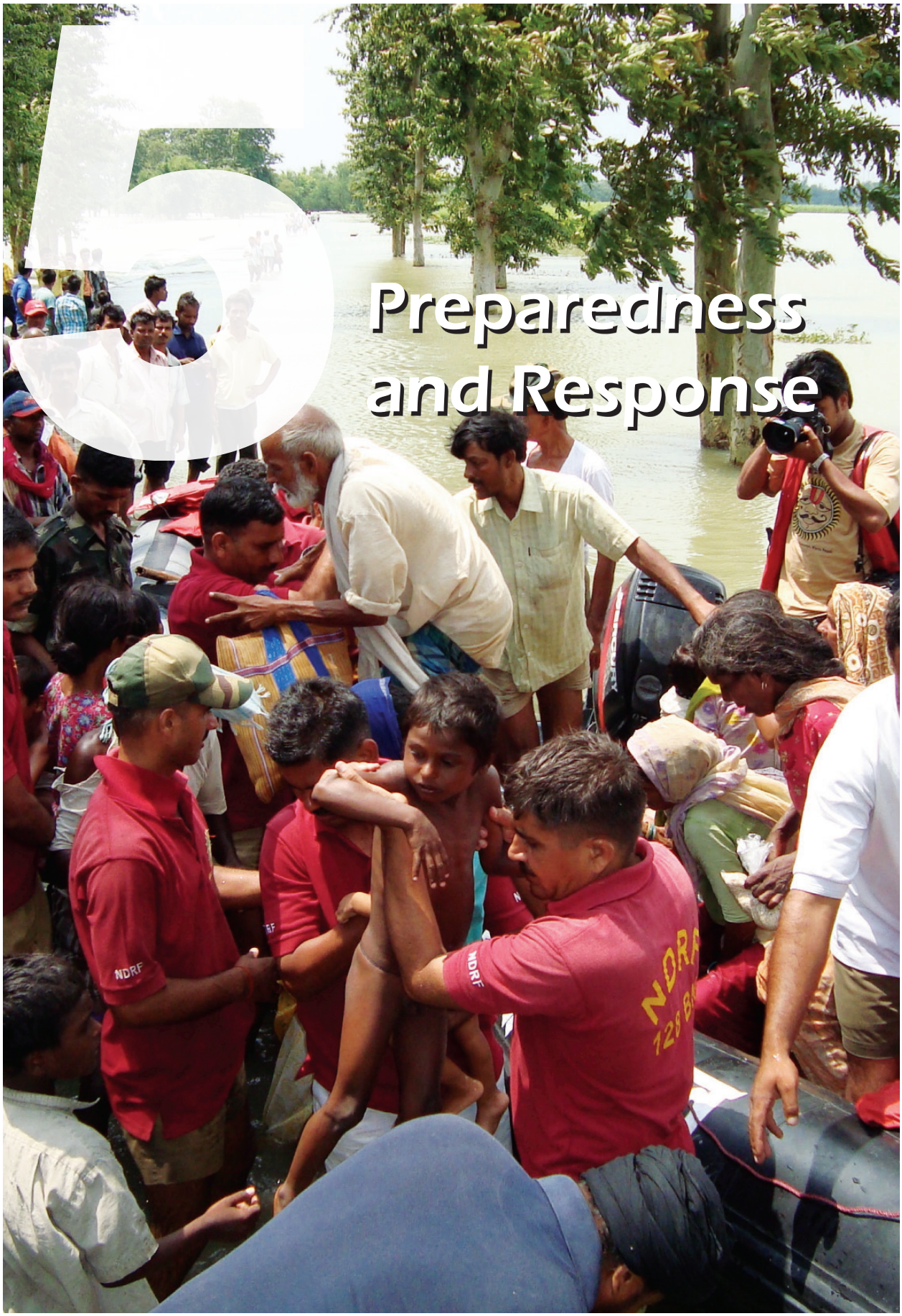
4.20.6 The DGCA has released a series of Safety Management System-Civil Aviation Regulation (SMS-CARs) about operational regulations and implementation policies for the applicable service providers.

4.21 Conclusion

Effective planning and focus on prevention and mitigation would greatly help in ensuring that the hazards do not transform itself into disasters and the coping capacities of the vulnerable population is greatly increased. This would again need systematic planning and coordination to ensure that the Disaster Risk Reduction is constantly promoted and mainstreamed in the regular programmes of each department. Recently planning commission has constituted a committee for inclusion of DRR measures in the 12th five year plan.

5

Preparedness and Response



5.1 Introduction

5.1.1 Facing disaster by way of mitigation, prevention, preparedness, response, evacuation, relief and rehabilitation has been part of the administrative ethos. India has a long history of rendering relief in an organized fashion in times of drought and famine. The states have antiquated relief code which deals with the general principles of administration of relief. It starts with the responsibility of the Government for combating distress, defining scope of object of such measures etc. India, with a vast agrarian economy in the past had focused on distress relief mainly related to agricultural activities. Preparedness included collection of statistical data on the rainfall, weather conditions, crop pattern activities relating to management of cattle etc. The relief work focused on departmental work and village work for generation of employment during drought. With the changing pattern of disaster and with the introduction of technology, material and new financial terms into disaster management, several modifications have been incorporated in the administrative measures for relief work

5.1.2 The scope of disaster has since changed and so the response thereto. With the constitution of successive Finance Commission under the provision of the Constitution, the measures for relief and the scope of disaster have enlarged. An attempt has been made in the succeeding paragraphs to capture the information relating to timely prediction/forecasting of different kind of disasters and development of Standard Operating Procedures (SOPs) for responding such disasters.

5.2 Institutional Arrangements

5.2.1 Forecasting about climate change is pre requisite for taking preparedness measure to respond to the disaster is the most important element of disaster management. The Ministry of Environment & Forest (MoEF), Ministry of Earth Sciences (MoES), Ministry of Science & Technology (MST), Ministry of Agriculture (MoA), Ministry of Water Resources (MWR), Ministry of Human Resource Development (MHRD), Ministry of Non-conventional Energy (MNES), Defence Research & Development Organization (DRDO), Ministry of Defence (MoD), Ministry of Health and Family Welfare (MoHFW), Indian Space Research Organization (ISRO) and Indian Meteorological Department (IMD) promote and undertake climate and climate change related research in the country.

Government of India has designated the offices as given in the Box 5.1 as the nodal agencies for early warning of different natural hazards:

Box 5.1: Disaster wise nodal agencies for Forecast

Disasters	Agencies
Cyclone	Indian Meteorological Department
Tsunami	Indian National Centre for Oceanic Information Services
Floods	Central Water Commission
Landslides	Geological Survey of India
Avalanches	Snow and Avalanche Study Establishment
Heat & Cold Waves	Indian Meteorological Department

5.3 India Meteorological Department (IMD)

5.3.1 Modernized meteorological observations and research in India was initiated more than 200 year ago, since 1793, when the first Indian Meteorological observatory was set up at Madras (now Chennai). IMD was formally established in 1875 with a network of about 90 weather observatories for systematic observation and research.

5.3.2 India Meteorological Department's tradition of monitoring weather and climate spans more than 135 years giving it a sound and useful dataset to fall back upon for environmental assessment. Ozone monitoring network was started as a globally pioneering effort as early as in 1954 realizing that this trace gas plays a very important role in atmospheric chemical mechanisms. It also started radiation measurements about 50 year back and currently maintaining 45 stations in the country for providing exclusive countrywide dataset for assessment of solar energy resources.

5.3.3 A network of 10 Global Atmosphere Watch Stations (GAW, formerly Background Air Pollution Monitoring Network or BAPMoN) consisting of Allahabad, Jodhpur, Kodaikanal, Minicoy, Mohanbari, Port Blair, Pune, Nagpur, Srinagar and Vishakhapatnam, is maintained by IMD as per WMO protocols and standards since 1974 to generate data and information on the exchange of trace materials between the atmosphere and the earth's surface, making atmospheric turbidity and air quality measurements to quantify trends and acid rain threats.

5.3.4 **Atmospheric monitoring:** There are 25 types of atmospheric monitoring networks that are operated and coordinated by the IMD. This includes meteorological, climatologically, environment, air pollution and other specialized observation of atmospheric trace constituents. It maintains 559 surface meteorological observatories, about 35 radio-stations and 64 pilot balloon stations for monitoring the upper atmosphere. Specialized observations are made for agro meteorological purposes at 219 stations and radiation parameters are monitored at 45 stations. There are about 70 observatories that monitor current weather conditions for aviation. The IMD collects meteorological data over oceans by an establishment of cooperation fleet of Voluntary Observing Ships (VOF) comprising merchant ships of Indian registry, some foreign merchant vessels and a few ships of the Indian Navy. These ships, while sailing on the high seas, function as floating observatories. Records of observations are passed on to the IMD for analysis and archival.

5.4. Forecast of Rainfall

5.4.1 India receives 80 per cent of its annual rainfall during the southwest monsoon season of June to September. Rainfall over the country during this season shows a wide range of spatial variation due to orographic influences and preferential occurrence of rain-bearing systems in certain regions. India has a very extensive rain gauge network and rainfall monitoring over the country.

5.4.2 The real-time monitoring and statistical analysis of district wise daily rainfall is one of the important functions of the IMD at New Delhi. Based on the real time daily rainfall data, weekly district wise, sub-division wise and state wise rainfall distribution summaries are prepared regularly by the Rainfall Monitoring Unit. Maps showing weekly and cumulative rainfall figures in 36 meteorological subdivisions of the country are prepared. This information is very important to many user agencies, particularly for agricultural planning.

5.5. Forecasting System - Background

5.5.1 India Meteorological Department (IMD) follows a two-stage forecasting strategy for long range forecasting of the south-west monsoon season rainfall over the country as a whole. The Long Period Average (LPA) of the south-west monsoon season rainfall over the country as a whole for the period 1951-2000 is 89cm. The first long range forecast for the south-west monsoon season (June-September) rainfall is issued in April and the forecast update is issued in June.

From 2007 onwards, IMD has been using the following statistical models for preparing quantitative and probabilistic forecasts of the south-west monsoon rainfall (June – September) for the country as a whole:

a. A 5- parameter statistical ensemble forecasting system requiring data up to March, for the first forecast in April.

b. A 6- parameter statistical ensemble forecasting system requiring data up to May for the forecast update in June. Three of these 6-parameters are same as that used for April forecast.

For preparing the first stage forecast for the 2011 South-west monsoon rainfall for the country as a whole presented here, the 5-parameter statistical ensemble forecasting system has been used.

5.5.2 **Operational Statistical Forecast System**: In the IMD's Ensemble Statistical Forecasting system for April forecast, the following 5 predictors are used. The model error of the April forecasting systems is ±5%.

Table 5.1: Model error of the April forecasting systems

S.No	Predictor	Period
1	North Atlantic Sea Surface Temperature	December + January
2	Equatorial South Indian Ocean Sea Surface Temperature	February + March
3	East Asia Mean Sea Level Pressure	February + March
4	NW Europe Land Surface Air Temperature	January
5	Equatorial Pacific Warm Water Volume	February + March

The 5-parameter ensemble statistical forecasting system was also used to prepare probability forecasts for five pre-defined rainfall categories. These are deficient (less than 90% of LPA), below normal (90-96% of LPA), normal (96-104% of LPA), above normal (104-110% of LPA) and excess (above 110% of LPA). The forecasted probabilities in percentage based on this system for the above 5 categories are 6%, 30%, 53%, 10% and 1% respectively.

5.5.3 **Experimental Forecasts:** IMD has an experimental dynamical forecast system. The experimental ensemble dynamical forecast for the 2011 south-west monsoon rainfall was computed as the ensemble average of 10 member forecasts with forecasted sea surface temperatures (SST) as boundary SST forcing.

In addition, IMD takes into account the experimental forecasts prepared by the national institutes like Indian Institute of Tropical Meteorology, Pune, Indian Institute of Science, Bangalore, Space Applications Centre, Ahmedabad, National Aerospace Laboratories, Bangalore, Centre for Mathematical Modelling and Computer Simulation, Bangalore, National Centre for Medium Range Weather Forecasting, Noida and Center for Development of Advanced Computing, Pune.

Operational/experimental forecasts prepared by international institutes like the National Centers for Environmental Prediction, USA, International Research Institute for Climate and Society, USA, Meteorological Office, UK, the European Center for Medium Range Weather Forecasts, UK , the Experimental Climate Prediction Center, USA, and World Meteorological Organization's Lead Centre for Long Range Forecasting - Multi-Model Ensemble were also taken into account.

The experimental forecasts from majority of the statistical and dynamical models suggest below normal to normal monsoon season rainfall over the country as a whole.

5.5.4 **Sea Surface Temperature Conditions over the equatorial Pacific & Indian Oceans:** The El Niño conditions that were originated since June, 2009 peaked in December 2009 and then started to weaken to reach ENSO-neutral conditions in May, 2010. This continued till mid June when weak La Nina conditions emerged. The La Niña conditions strengthened subsequently and become moderate to strong during mid-August 2010 to early February 2011. The La Nina conditions since have weakened to weak to moderate strength as of mid-March 2011. The latest forecasts from a majority of the dynamical and statistical models indicate strong probability for the present La Niña conditions to continue till June. Subsequently the La Nina conditions are expected to weaken further to reach ENSO- neutral conditions. However, it may be mentioned that the climate forecasts prepared at this time of the year has large uncertainty.

It is important to note that in addition to ENSO events, other factors such as the Indian Ocean Sea surface temperatures (SSTs) have also significant influence on Indian monsoon. Recent forecasts from some coupled models suggest possibility of the development of a weak negative Indian Ocean Dipole event during the second half of the year, which may not have much impact on the Indian monsoon.

As the extreme sea surface temperature conditions over Pacific and Indian Oceans particularly ENSO conditions over Pacific (El Nino or La Nina) are known to have strong influence on the Indian summer monsoon, IMD is carefully monitoring the sea surface conditions over Pacific and Indian oceans.

5.5.5 **Forecast for the 2011 South-west monsoon rainfall**: IMD's long range forecast for the 2011 south-west monsoon season (June to September) is that the rainfall for the country as a whole is most likely to be Normal (96-104% of Long Period Average (LPA)). There is very low probability for season rainfall to be deficient (below 90% of LPA) or excess (above 110% of LPA).

Quantitatively, monsoon season rainfall is likely to be 98% of the LPA with a model error of ± 5%. The LPA of the season rainfall over the country as a whole for the period 1951-2000 is 89 cm.

IMD will update the above forecast in June 2011 as a part of the second stage forecast. Along with the update forecast, separate forecasts for the monthly (July and August) rainfall over the country as a whole and seasonal (June-September) rainfall over the four geographical regions of India will also be issued. Forecast for the rainfall over the country as a whole during the second of the season (August + September) will be issued in July and that for September will be issued in August.

5.6 Forecasting and Warning of Cyclones

5.6.1 IMD is the nodal agency in the country to monitor and predict the cyclonic disturbances and issue the warning and advisory bulletins. IMD, New Delhi also acts as a Regional Specialized Meteorological Centre (RSMC) for providing tropical cyclone advisories to the World

Meteorological Organization (WMO)/ Economic and Social Cooperation for Asia and the Pacific (ESCAP) Panel members countries viz Bangladesh, Myanmar, Thailand, Sri Lanka, Maldives, Pakistan and Oman. IMD, New Delhi also works as a Tropical Cyclone Advisory Centre (TCAC) for international civil aviation as per the requirement of International Civil Aviation Organization (ICAO)

5.6.2 The cyclone warning are issued to State Government officials in four stages: i.e.

(i) pre-cyclone watch issued 72 hours in advance,

(ii) cyclone alert issued at least 48 hours in advance ,

(iii) cyclone warning issued at least 24 hours in advance, and

(iv) as post landfall outlook issued at least 12 hours in advance of expected time of landfall.

IMD has prepared roadmap for cyclonegenesis and further intensification, monitoring and prediction.

5.7. Flood Forecasting – Central Water Commission[27]

5.7.1 The flood forecasting and warning system is used for alerting the likely damage centre well in advance of the actual arrival of floods, to enable the people to move and also to remove the moveable property to safer places or to raised platforms specially constructed for the purpose.

5.7.2 A beginning in scientific flood forecasting was made in November, 1958 by CWC (then known as Central Water & Power Commission) when a Flood Forecasting Centre was set up at its Headquarters, at Delhi for giving timely Forecasts and Warnings of the incoming floods to the villages located in the river areas around the National Capital, Delhi. The network has been expanding and by now the Flood Forecasting Network of the CWC covers the entire major flood prone inter State basins in the country.

5.7.3 The flood forecasting involves the following four main activities:

(i) observation and collection of hydrological and hydro meteorological data,

(ii) transmission of Data to forecasting centres,

(iii) analysis of data and formulation of forecast, and

(iv) Dissemination of forecast.

5.7.4 On an average 6000 forecasts at various places in the country are issued during the monsoon seasons every year. The analysis of the forecasts issued during the last 25 years (1978 to 2002) indicates that accuracy of forecasts has consistently increased from around 81% to 98%. Forecast is considered accurate if forecast water level is within $\pm$ 15 cm of actual water level of the inflow forecast (i.e. discharge) and is within $\pm$ 20% of actual discharge.

5.7.5 In monitoring the floods, severity of floods are placed in the following four categories by the CWC

(i) Low Flood stage – It is that flood situation when the water level of the river is flowing between warning level and danger level of the forecasting stations.

(ii) Medium flood stage – The river is called in medium floods when its water level is at or above the danger level of the forecasting station but below 0.50 of its highest flood level (HFL)

(iii) High flood state – When the water level of the river is below the HFL but within 0.50 m of the HFL of the forecasting stations.

(iv) Unprecedented flood stage – The river is called in unprecedented floods when it attains water level equal to or above its previous HFL at any forecasting stations.

5.7.6 A computerized monitoring system has been developed under which daily water levels as observed at 0800 hours and forecasts issued by field units are transmitted to CWC headquarters in New Delhi. Based on the compilation of all such data received from field divisions, daily water level and flood forecast bulletins in two parts for stage and for inflow forecasting stations respectively.

5.8 Tsunami warning – Indian National Centre for Oceanic Information System (INCOIS)[28]

5.8.1 Post tsunami dated 26th December, 2004, Ministry of Earth Sciences has established the Indian National Tsunami Warning System at Indian National Centre for Ocean Information Services (INCOIS), Hyderabad. The Tsunami Early Warning System (TEWS) was made operational on 15th Oct 2007. This agency has developed a protocol for issue for Tsunami Watch, Alert and Warnings. The Centre gives information to all responders about the origin, time, location of the epicenter, magnitude and depth of an earthquake inside the ocean and accordingly issues bulletins.

5.8.2 The system is capable of detecting all earthquake events of more than 6 Magnitude occurring in the Indian Ocean in less than 20 minutes of occurrence and first report on the occurrence of an earthquake in India and the Indian Ocean region to sent to MHA within 25-30 minutes indicating the location and magnitude of the earthquake. Further, if any rise in water level is reported by NIOT, TEWC would issue a Tsunami warning within 60 minutes of the occurrence of the earthquake. The information so generated would be disseminated through various communication channels to the concerned user agencies in a fully automated mode.

5.9 Warning about Landslide hazard – Geological Survey of India (GSI)

5.9.1 Geological Survey of India (GSI), established in 1851 is a government organization under the Union Ministry of Mines with the Headquarter at New Delhi for conducting geological surveys and studies. It is one of the oldest of such organizations in the world.

5.9.2 The GSI was designated as nodal agency for coordinating geological studies, landslides hazard zonation, monitoring landslides, avalanches, studying the factors responsible and suggesting precautionary and preventive measure on 29th January, 2004. The input from GSI as nodal agency help the Ministries and Departments concerned in the Central Government as well as the State Government for taking appropriate preventive and mitigation measures for reducing landslide hazard and responding in the mountainous areas and hill in the Himalayan and sub Himalayan regions. GSI is the nodal agency responsible for early warning relating to the landslides in the country.

5.9.3 **Study of Land Contour by GSI:** Geological Survey of India (GSI) studies the shape and material of the land getting inundated and generates data on area, shape, slope, infiltration and permeability of soil of the basin, drainage pattern, landform and longitudinal and cross profiles of the channels. On the basis of these studies, GSI produces flood hazard maps indicating

Prohibitive, Restricted, Cautionary and Flood Free Zones. Significant flood related studies and recommendations made by GSI are as follows:

- Brahmaputra Valley - a comprehensive geo-environmental data base for environmental management and flood control generated,
- Lower Banas sub-basin - selective irrigation to prevent rise of groundwater table recommended,
- Kandi basin in West Bengal- GSI recommended construction of small weirs to reduce impact of flood,
- Mokameh Tal area in the Ganga Flood plain - rejuvenation of existing drainage channels to reduce flood problem recommended,
- Lower Damodar Basin- diversion along artificial canals and re-excavation of old river channel recommended,
- Landslide zonation map for Himalayan region,
- The contribution of snow melting to annual flood.

GSI's flood related studies are used by Central Water Commission, Water Resource Development Project Authorities, Urban and Rural Planning Authorities, Ministry of Environment and Forest, Ministry of Agriculture, etc.

5.10 Avalanche warning – Defence Research & Development Organization (DRDO) [29]

5.10.1 DRDO was formed in 1958 with the amalgamation of the then already functioning technical development establishments of the Indian Army and the Directorate of Technical Development and projection with the Defence Science Organization. DRDO was then a small organization with 10 establishment or laboratories. Over the years it has grown as multi directionally in terms of the Variety of disciplines, number of laboratories, achievements and stature.

5.10.2 Today network of more than fifty laboratories are deeply engaged in developing Defence technologies. Center for Snow and Avalanche Study Establishment (SASE) is one of the laboratories of the DRDO located at Chandigarh with its primary function to do research in the field of snow and avalanches and to provide avalanche control measures and forecasting support to Armed forces. The SASE is the nodal agency for issuing advisories and warnings about the avalanche in the country.

5.11 Disaster Management Support (DMS) – Indian Space Research Organization (ISRO) [30]

5.11.1 The Space activities in the country started during early 1960s with the scientific investigation of upper atmosphere and ionosphere over the magnetic equator that passes over Thumba near Thiruvananthapuram using small sounding rockets Realising the immense potential of space technology for national development, Dr. Vikram Sarabhai, the visionary leader envisioned that this powerful technology could play a meaningful role in national development and solving the problems of common man.

5.11.2 The objective of ISRO is to develop space technology and its application to various national tasks. ISRO has established two major space systems, INSAT for communication, television broadcasting and meteorological services, and Indian Remote Sensing Satellites (IRS) system for resources monitoring and management. ISRO has developed two satellite launch vehicles, PSLV and GSLV, to place INSAT and IRS satellites in the required orbits. Accordingly, ISRO

has successfully operationalised two major satellite systems namely Indian National Satellites (INSAT) for communication services and Indian Remote Sensing (IRS) satellites for management of natural resources; also, Polar Satellite Launch Vehicle (PSLV) for launching IRS type of satellites and Geostationary Satellite Launch Vehicle (GSLV) for launching INSAT type of satellites.

5.11.3 The Disaster Management Support (DMS) Programme of ISRO, provides timely support and services from aero-space systems, both imaging and communications, towards efficient management of disasters in the country.. The DMS programme addresses disasters such as flood, cyclone, drought, forest fire, landslide and Earthquake. These include creation of digital data base for facilitating hazard zonation, damage assessment, etc., monitoring of major natural disasters using satellite and aerial data; development of appropriate techniques and tools for decision support, establishing satellite based reliable communication network, deployment of emergency communication equipments and R&D towards early warning of disasters.

5.11.4 To support the total cycle of disaster (emergency) management for the country in near real time, the database creation is addressed through National Database for Emergency Management (NDEM), a GIS based repository of data. NDEM is envisaged to have core data, hazard-specific data and dynamic data in spatial as well as spatial form.

5.11.5 Airborne ALTM-DC data acquisition is being carried out for the flood prone basins in the country. The development of flight model of C band DMSAR is nearing completion. SAR data was acquired over selected basins using Development model of DMSAR. Towards providing emergency communication for disaster management activities and at the behest of Ministry of Home Affairs, ISRO has set up a satellite based Virtual Private Network (VPN) linking the National Control Room at MHA with DMS-DSC at NRSC, important national agencies, key Government Offices in Delhi and the Control Rooms of 22 multi-hazard-prone States. Further ISRO has developed and deployed INSAT Type-D terminals (portable satellite phones), INSAT based Distress Alert Transmitter (DAT) for fishermen, Cyclone Warning Dissemination System (CWCS) and DTH based Digital Disaster Warning System (DDWS) in disaster prone areas.

5.11.6 As part of R&D support to DMS for remote sensing applications, work on Tropical Cyclone Track intensity and landfall prediction, Earthquake Precursor studies, Coastal Vulnerability mapping and Early Warning of Landslides are being carried out.

5.11.8 The DMS programme is also supporting the many international initiatives by sharing data and information. Through International Charter "Space and Major Disasters" and Sentinel Asia (SA) initiative for supporting disaster management activities in the Asia-Pacific region, ISRO is providing IRS datasets and other information for use during major calamities.

5.12 Radiological and Nuclear Emergencies

5.12.1 Department of Atomic Energy (DAE) is the nodal agency for providing the necessary technical inputs to the National or local authorities for responding to any nuclear or radiological emergency. The Ministry of Home Affairs (MHA) is the nodal ministry to coordinate with the various response agencies in the event of any nuclear or radiological disaster in the public domain. A Crisis Management Group (CMG) has been functioning since 1987 at DAE for this purpose. This Group is chaired by the Additional Secretary, DAE, and has on board expert members from different units of DAE and Atomic Energy Regulatory Board (AERB). Each member has an alternate member and CMG is backed by resource agencies of various units of DAE.

5.12.2 Based on the radiological conditions and their consequences, emergencies at nuclear facilities are categorized as emergency standby, personnel emergency, plant emergency, on-site emergency and off-site emergency. As a basic regulatory requirement, emergency preparedness exists at all nuclear and radiation facilities to respond to any on-site or off-site emergency in their areas. But to handle radiological emergencies arising from a transport accident or from the movement or handling of 'orphan source' (radioactive sources that have lost regulatory control is called 'orphan sources') or due to malevolent acts like explosion of an RDD, Radiation Exposure Device (RED) or IND any time or anywhere in the country, a network of 18 units of Emergency Response Centers (ERCs) has been established by Bhabha Atomic Research Center, DAE. These ERCs are equipped with radiation monitoring instruments, protective gear and other supporting infrastructure.

5.13 Installation of Radiological Detection Equipment

5.13.1 As a part of preparedness measure Radioactive Detection Equipments (RDE's) are being installed at entry and exit points in the country. On the initiatives of MHA and in consultation with the various Stakeholders, the Bhabha Atomic Research Centre (BARC) and Electric Corporation of India Limited (ECIL) a technical survey of the entry and exit points in a phased manner was undertake for installation of the RDE's. The survey for installation of RDEs at 29 entry/exit points has been identified by BARC (12 seaports, 14 airports and 3 international borders).

5.13.2 The responsibility of installation of these RDE's rest with the concerned Ministries and Departments as the responsibility for allocating funds for prevention, mitigation etc. for Disaster rests with the concerned Central Ministries and Departments. As such Ministry of Shipping, Ministry of Civil aviation and Ministry of Home Affairs are taking necessary action to carryout installation of RDE's in the time bound manner in consultation with BARC and ECIL**.** The ports / land crossing identified for the purpose are given as follows in Box 5.2.

Box 5.2: The port/land crossing identified for the purpose of installation of RDE

Areas of installation	Location	Ministry responsible
International Airports	IGIA New Delhi, NSCBA, Kolkata, Mumbai, Chennai, Goa, Ahmedabad, Hyderabad, Amritsar, Kalicut, Trivandrum, Guwahati, Cochin, Bangalore and Lucknow.	Ministry of Civil Aviation
International Sea port	Kandla, Chennai, Mumbai, Haldia, Kolkata, Vizag, Goa, Ennore, Cochin, Tuticorin, Paradeep, JNPT Mumbai.	Ministry of Shipping
Land border crossing	Wagah-Attari, Jogbani and Raxaul.	Ministry of Home Affairs

5.14 Director General of Mines Safety

5.14.1 Mining activity accounts for about 1% of the world employment but contributes to about 7% fatalities at the work place. In 1901 the then British Government in India established Bureau of Mines (now Directorate General of Mines Safety) with its headquarter at Calcutta with the object to enforce provisions of Mines Act. Till 1985, the Director General of Mines Safety was also entrusted with the job of covering the rescue and recovery operations at mines. The Rescue Station was headed by an Ex-officio Director of DGMS and the rescue was funded by a cess collected

from the coal companies. Rescue Rules under Mines Act, 1952 were framed in 1985 according to which standards/quantity/type of equipment/place of rescue station etc. were also governed.

5.14.2 Coal companies have provided and maintained rescue station in the heart of coal mining areas namely at Sitarampur (WB), Dhanbad (Jharkhand), Manindragarh (Chhatisgarh), Indora (Nagpur), Ramgarh (Jharkhand), Karimnagar (AP) etc. In case of Metalliferous sector, rescue room at the mine level/rescue station at the company level have been provided and maintained in the centrally located of mining areas by various companies engaged in metal mining, namely HZL at Udaipur (Rajasthan); UCIL at Jadugoda (Jharkahnd); MOIL at Balaghat (Nagpur); HGML at Hutti (Karnataka); HCL at Khetri,(Rajasthan) etc.

5.15 Epidemic

5.15.1 Three core capacities are essentially required to deal with epidemics. These are

(i) Establishment/strengthening of a laboratory based disease surveillance system to collect baseline data on infectious diseases, monitor disease trends and to detect epidemics in early rising phase,

(ii) Development of epidemiological, clinical, entomological and laboratory capacities to investigate the epidemics to characterize the cases in terms of time, person and place and to understand the transmission dynamics, and

(iii) Development of response capacities to prevent/control the epidemics to reduce the morbidity and mortality to the minimum.

5.15.2 The outbreaks/epidemics are usually investigated by the district or state Rapid Response Teams. Several central/regional institutes like National Centre for Disease Control (formerly National Institute of Communicable Diseases), Delhi; National Institute of Virology, Pune; National Institute of Cholera and Enteric Diseases, Kolkata; Vector Control Research Centre, Puducherry and other ICMR institutes provide epidemiological, laboratory and entomological support to the states for investigation and control when the outbreaks/epidemics are widespread and states request for assistance. Also there is increasing collaboration with Department of Animal Husbandry in managing emerging zoonotic diseases such as avian influenza and Crimean Congo Hemorrhagic fever.

5.16 Preparedness

5.16.1 **Annual Conference of Relief Commissioners and Secretaries of States and UTs**: An annual Conference of Relief Commissioners, Secretaries, to the Department of Disaster Management of States and UTs is organized before the onset of south west monsoon to review the status of preparedness for ensuing Monsoon and to discuss other disaster management related issues. The representatives of various Central Ministries, Organizations rendering Emergency Support Functions besides representatives of Central Para-Military Forces also participate.

5.16.2 **Issue of guidelines:** Necessary guidelines in the form of checklist as given in Box 5.3, for taking necessary preparatory measures are issued to the State for their guidance and appropriate action. Instructions are also issued for creating reserves of essential items required during rescue and relief phase.

Box 5.3: Guidelines on Preparedness/Response- (Checklist for preparedness by state/district agency)

- Vulnerability assessment
- Dissemination of warning
- Emergency Response activities
- Coordination
- Rapid Damage Assessment
- Maintenance of essential services
- Stocking of essential commodities
- Medicines
- Drinking water
- Shelter/Camps
- Pre- Contract
- Evacuation Plan
- Activating Control Rooms
- Search & Rescue Team
- Communication
- Identification of Nodal Officer
- Status of SDRF
- Preparedness Drill

5.17 Trigger Mechanism

This mechanism has been developed to activate the disaster response system automatically after receiving warning signals of a disaster happening or likely to happen or on receipt of information about the incident. The responders are required to undertake activities as per the SOPs issued in respect of such disasters. There may be scenario where early warning signals could be available and there may happen a disaster without any early warning.

5.18 Crisis Management Plan (CMP) and Standard Operating Procedures (SOPs)

5.18.1 In accordance with National Crisis Management Plan 2003 of the Cabinet Secretariat, MHA has formulated its CMP 2004 and circulated it to all States and UTs. The CMP of MHA comprises of two parts; Part-I deals with aspects, which are common to all contingencies situations and Part-II about the individual Standard Operating Procedures (SOPs) for dealing with specific crisis situation. SOPs are preparedness plan which emerges and activates the procedure for response on receipt of calamity or receipt of figure of impending disaster. It identifies the financial and administration powers to the people made responsible for the procedure.

5.18.2 The CMP of MHA is reviewed periodically. It was last reviewed in 2009 and was circulated to all Ministries and Departments of Central Government as well as States and UTs. An SOP for management of Natural Disasters formulated by this Ministry has also been circulated vide this Ministry's letter No.32-35/2003-NDM-I dated 21-04-2009.

5.18.3 The State Governments have been advised to formulate the similar kind of the CMP and SOPs. MHA has conducted number of training workshops for the States and UTs for assisting them in formulation of the SOPs.

5.19 Role and Responsibility of Central and State Governments

5.19.1 Ministry of Home Affairs is the nodal Ministry for management of natural disasters (other than drought, hailstorm and pest attack, which are handled by Ministry of Agriculture) on behalf of the Government of India. Disaster Management Division (DM Division) performs the function in the Ministry of Home Affairs.

5.19.2 The Central and State Governments are jointly responsible for undertaking relief, rehabilitation, preparedness, mitigation and response measures. The basic responsibility for undertaking these measures in the event of a disaster rests with the concerned State Government. The Central Government supplements the efforts of the State Governments by providing logistic and financial support in case of natural calamities of severe nature. The logistic support includes

deployment of aircrafts and boats, specialist teams of Armed Forces, Central Paramilitary Forces and personnel of National Disaster Response Force (NDRF), arrangements for relief materials & essential commodities including medical stores, restoration of critical infrastructure facilities including communication network and such other assistance as may be required by the affected States to meet the situation effectively.

5.19.3 DM Division of MHA closely monitors the disaster and disaster like situation to facilitate strategic interventions in the form of logistic and financial support by the Government of India to augment the resources of the affected States and UTs to deal effectively with each disaster situation. For this purpose close liaison is made with the affected States on the one side and the concerned Central line Ministries such as Ministry of Health, Ministry of Defence Ministry of Civil Aviation, Food and Civil Supplies etc on the other.

5.20 Inter Agency Co-ordination Mechanism

Co-ordination at the Central and the State level is achieved by way of various committees involving all departments that are working in Disaster management. A response set-up across the country may be viewed in Figure 5.1.

5.21 Cabinet Committee on Management of Natural Calamities

It is constituted to

- Oversee all aspects relating to management of natural calamities including assessment of the situation and identification of measures considered necessary to reduce its impact,
- Examine and implement programmes for reducing the adverse impact of natural calamities,
- Monitor and suggest long term measures for prevention of such calamities in the future; and,
- Formulate and recommend programmes for public awareness for building up society's resilience to natural calamities.

The Committee is to be serviced by Ministry of Home Affairs in all cases except in cases relating to Drought Management and Epidemics when it is serviced, as the case may be, by the Department of Agriculture and Cooperation and Department of Health and Family Welfare.

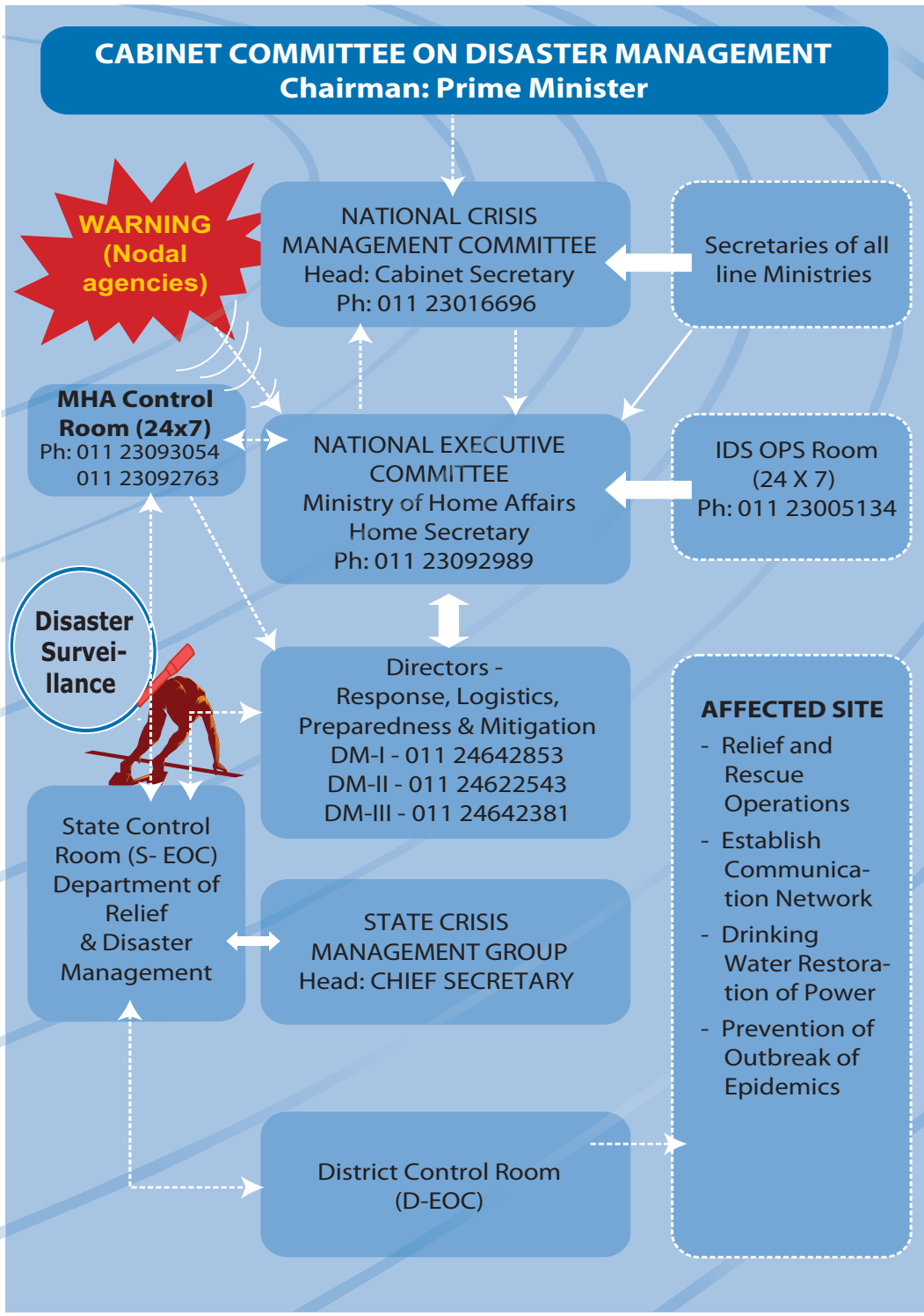
5.22 National Crisis Management Committee (NCMC)

At the Centre, under the Chairmanship of the Cabinet Secretary the NCMC has been constituted in the Cabinet Secretariat. The other members of this Committee include the Secretary to the Prime Minister, Secretaries of the Ministries of Home Affairs, Defence, Information & Broadcasting, RAW, NDMA, Deputy NSA and Director of Intelligence Bureau. Secretary (Security) Cabinet Secretariat is the convener of the NCMC. The NCMC gives direction to the Crisis Management Group as deemed necessary.

5.23 Crisis Management Group (CMG)/National Executive Committee

This is a group under the Chairmanship of the Home Secretary comprising the senior officers from the various ministries and other concerned departments. CMG's function is to review contingency plans every year formulated by the Central Ministries/ Departments and the measures required for dealing with a natural disaster; co-ordinate the activities of the Central Ministries and the State Governments in relation to disaster preparedness and relief and to obtain

Figure 5.1: Response set up across the country



information from the nodal officers on measures relating to the above. The Joint Secretary (DM) is the Convener of CMG for natural disasters.

5.24 Role of the State Government

5.24.1 In the context of federal set-up of India, the responsibility to formulate the Governments response to a natural calamity is essentially that of the concerned State Government. However, the Central Government, with its resources, physical and financial does provide the needed help and assistance to buttress relief efforts in the wake of major natural disasters. The dimensions of the response at the level of National Government are determined in accordance with the existing policy of financing the relief expenditure and keeping in view the factors like.

(i) gravity of a natural calamity,

(ii) scale of the relief operation necessary, and

(iii) Requirements of Central assistance for augmenting the financial resources at the disposal of the State Government.

5.24.2 Most of the States have Relief Commissioners under the Department of Disaster Management, who are in charge of the relief measures in the wake of natural disasters. In the absence of the Relief Commissioner, the Chief Secretary or an Officer nominated by him is in overall charge of the Relief operations in the concerned State.

5.24.3 At the state level, the State Relief Commissioner supervises and controls relief operations through Collectors or Deputy Commissioners, who are the main functionaries to coordinate the relief operation at district level. The State Governments are autonomous in organizing relief operations in the event of natural disasters and in developing the long-term rehabilitation measures. The State Government's efforts are supplemented by central Government based on the recommendations of the Finance Commission.

5.25 State Crisis Management Group (SCMG)

5.25.1 There is a State Crisis Management Group (SCMG) under the Chairmanship of Chief Secretary and Relief Commissioner. This Group comprises senior officers from the Departments of Revenue/relief, Home, Civil Supplies, Power, Irrigation, Water Supply, Panchayat (local self-government), Agriculture, Forests, rural Development, and health, Planning, Public Works and Finance.

5.25.2 The SCMG is required to take into consideration the guidance received, from time to time, from Government of India and formulate action plans for dealing with different natural disasters. It is also the duty of the Relief Commissioner of the State to establish a Emergency Operation Center (Control Room) at State headquarters as soon as a disaster situation develops. Besides having all updated information on forecasting and warning of disaster, the EOC would also be the contact point for the various concerned agencies.

5.26 Role of District Administration

5.26.1 The district Administration is the focal point for field level organizations. It is responsible for implementation of all government contingency plans. Considerable powers have therefore been wrested upon the District Collector to carry out operations in the shortest possible time.

5.26.2 The District Administration in the country is required to prepare an advance Contingency Plan depending on the type of disaster likely to affect the district. Contingency Plans are to follow a framework as laid down nationally which comprises type of preparedness, the relief material required to be mobilized and the concerned departments that need to work together and provide an efficient feedback and monitoring system.

5.26.3 The District Magistrate exercises coordinating and supervisory powers over functionaries of all the Departments at the district level in the event of emergencies. During actual operations for disaster mitigation or relief, the powers of the Collector are considerably enhanced, generally, by standing instructions or orders on the subject, or by specific Governments orders, if so required. Sometimes, the administrative culture of the State concerned permits, although informally, the collector to exercise higher powers in emergency situations and the decisions are later ratified by the competent authority.

5.26.4 District Relief Committee: The district level Relief Committee consisting of official and non-official members including the local Legislators and the Members of Parliament reviews the relief measures.

5.27 Role of Sub-district Administration

A District is sub-divided into sub-divisions and Tehsils or Talukas. The head of a sub-division is called the Sub-Divisional Officer (SDO) while the head of a Tehsil is generally known as the Tehsildar (Talukdar or Mamlatdar in some States). Contact with the individual villages is through the village Officer or Patwari who has one or more villages in his charge. When a disaster is apprehended, the entire machinery of the District, including officers of technical and other Departments, swings into action and maintains almost continuous contact with each village in the disaster threatened area. In the case of extensive disasters like drought, contact is maintained over a short cycle of a few days. The entire hierarchy right from the Central Government (the Department of Agriculture and Cooperation in the Ministry of Agriculture and irrigation) to the District level is connected by means of a telecommunication system.

Control Rooms

5.28 National Emergency Operation Centre (NEOC)

5.28.1 The National Emergency Operation Centre (NEOC) in the Ministry of Home Affairs functions 24X7 to monitor the disaster or disaster like situation. Based on the feedback received from National Forecasting Agencies viz Indian Meteorological Department, Central Water Commission, Snow & Avalanche Study Establishment etc. advisories to the concerned States/UTs are issued from time to time for keeping watch on the developing situation and take necessary measures such as evacuation of the vulnerable persons, operation of relief camps, pre positioning of essential commodities etc.

5.28.2 During the south west monsoon, daily situation reports (sitreps) are prepared based on the feedback received from the affected States and concerned Central Ministries and organizations, and are sent to all concerned. During the calamities of severe nature, special situation reports are also prepared and issued to all concerned. NEOC also issue SMS alerts to the concerned

Mock drill by NDRF, Mangalore

officers in MHA, PMO and Cabinet Secretariat. These reports are also uploaded on the website *www.ndmindia.nic.in*..

5.29 State Control Room

There is a State Level Control Room set up whenever a disaster situation develops. The Control Room is responsible for:

(i) Transmitting information about the development of a crisis as a result of natural disaster on continued basis to the Central Relief Commissioner.

(ii) Receiving instructions and communicating them to appropriate agencies for immediate action.

(iii) Collection and submission of information relating to implementation of relief measures to the Central Relief Commissioner; and

(iv) Keeping the State level authorities apprised of the developments on a continuing basis.

5.30 District Control Room

Likewise in the wake of natural disasters, a Control Room is set up in the district for day-to-day monitoring of the rescue and relief operations on a continuing basis, operationalising the contingency plan and keep close liaison with the State Headquarters, NGOs and other agencies dealing with disaster management and relief.

5.31 National Disaster Response Force (NDRF)

5.31.1 **Task and role of NDRF:** The main task of NDRF is to provide specialist response in case of disasters which broadly covers:

- NBC disasters (Decontamination of the area and personnel)
- Removal of debris
- Extrication of victims- live or dead

- First medical response to victims
- Extend moral support to victims
- Assistance to civil authorities in distribution of relief material
- Co-ordination with sister agencies
- Capacity building
- Providing assistance to foreign countries, if asked

5.31.2 **Specialized equipment for NDRF Battalions:** In NDRF has been equipped with latest and state of the art equipments required for the rescue and relief works. 310 different types of equipments have been authorized to NDRF which broadly consist of Medical First Responder (MFR) Equipments, Collapsed Structure Search & Rescue (CSSR), water rescue, CBRN equipments, specialist vehicle etc. The details of such equipment may be visited at *www.ndmindia.nic.in*

Box 5.4: Rescue and relief measures leading to further disasters - Tamil Nadu experience

Inadequate planning and preparation in rescue and relief may lead to further disasters. – "42 persons die in a stampede at Chennai flood relief camp - They came in droves seeking relief from their tragedy, instead they fell victim to another tragedy as a stampede on Sunday (18th December 2005) at a relief camp for flood victims in Chennai which left 42 people dead and 40 injured. Hundreds of people ran for cover following a sudden downpour and fell on each other, crushing women and children in their wake. The tragedy occurred at 4.30 a.m. as a crowd of around 4,500 - largely poor people - gathered in front of the locked gate of Arignar Anna Corporation Higher Secondary School at K.K. Nagar in west Chennai to receive food and other relief goods. The K.K. Nagar relief camp in the school was one of 141 such camps in and around Chennai distributing relief to victims of floods caused by unprecedented rains in different parts of the state since October".

(Source: Extract from a box from the 2nd ARC Report on Crisis Management)

5.31.3 **Other activities of NDRF:** NDRF is engaged in following other activities beside search and rescue operation undertaken during emergency situation.

- Conducting familiarisation exercise in order to acquaint personnel with vulnerability of their area of responsibility to different disasters

NDRF in action for rescue operation - Bihar floods

- To conduct mock exercises in coordination with other stake holders for well coordinated response during disasters.
- To conduct community awareness program for capacity building.
- To organise demonstrations and exhibitions as part of community awareness.
- To undergo different kinds of training in order to increase the skill and expertise of NDRF personnel.
- To train State Disaster Response Force (SDRF), community and NGO'S in disaster management.

5.31.4 **Major Operational Achievements of NDRF:** In the previous years, NDRF has proved its efficacy with its commendable performance during various disasters including the drowning cases, building collapses, landslides, devastating floods and Cyclones. NDRF has saved 1, 41,257 human lives and retrieved 362 dead bodies of disaster victims in various response operations in the country.

Table 5.2: NDRF : Response Activities

Year	No. of Activities
2007	20
2008	25
2009	23
2010	17
Total	**85**
Victims Rescued	1.41 Lakhs
Dead bodies retrieved	330

Source: NDMA

5. 32 State Disaster Response Force (SDRF)

The States/UTs have also been advised to set up their own Specialist Response force for responding to disasters on the lines of National Disaster Response Force vide Ministry of Home Affairs letter dt 26th July 2007 and vide this Ministry's letter dated 08 March 2011. The Central Government is providing assistance for training of trainers. The State Governments have been also advised to utilize 10% of their State Disaster Response Fund and Capacity Building Grant for the procurement of search and rescue equipment and for training purposes of the Response Force.

5.33 Policy for Acceptance of External Assistance

The present policy of Government of India is to not issue a formal appeal on behalf of the Government, either directly or through any other agency, to attract relief. However, relief donated on a voluntary basis are accepted and acknowledged as a sign of international solidarity. There is no objection to NGO's issuing appeals for donations provided it is clear that the appeals are not at the instance of the Government of India. In the case of UN organisations and agencies (like OCHA) such appeals would imply endorsement by member countries and they are advised against appeals for international assistance.

5.34 Drought Relief Measures

5.34.1 Management of drought has now been outlined in much elaborated manner in the drought manual issued by ministry of Agriculture and cooperation.

5.34.2 Following drought declaration, planning and implementation of drought relief and response measures is initiated. It is necessary that these measures are undertaken promptly so that it would mitigate the hardship faced by the people. Though these measures are sector specific, they require immense inter department coordination. Implementing these measures would require a continuous flow of information from the village level to the highest level of decision making in the State and a responsive administrative structure. It would also require careful financial planning so that the implementation of these measures could be undertaken on a sustained basis.

5.34.3 **Contingency crop planning:** Ministry of Agriculture, Government of India, Indian Council of Agricultural Research (ICAR), State Government agriculture departments and agricultural universities need to prepare the contingency crop plan and disseminate it among farmers with the help to support agencies, mentioned below. The alternative crop planning involves choosing suitable crops and / or crop varieties, alternative crop strategies, mid season's corrections and crop life saving measures.

5.34.4 **Relief employment:** The most important relief component is the generation of employment provision during the drought period. As soon as drought is declared, it is therefore, necessary for the State Governments to immediately start relief employment programmes and provide work to those who need employment within a radius of five kilometers.

5.34.5 Most State Governments have their own food for work programme. The Government of India has started the National Rural Employment Guarantee Scheme (NREGS), providing 100 days of employment to one person per family on demand. The scheme has been extended to the entire country. A large number of public works and watershed programmes could be supported through the NREGS. These programmes together can create substantial employment to tide over the hardship and deprivation caused by drought.

5.34.6 **Water resource management:** Water resource management in the drought affected areas is one of the most critical tasks of relief operations. It requires diverse measures such as augmentation of water supply, rationing of water use, and efficient utilization and management of water resources, in both urban and rural areas. Shortage of water is one of the earliest indicators of drought, affecting the entire society, rural and urban. Assessing the demand for water and its total availability in a specific region, therefore, is extremely important for meeting the needs of different user groups.

5.34.7 **Food security** Food security is one of the most important objectives of drought management. It is provided through food for work programmes, which are started by the State Governments to provide relief employment. Wages on these relief employment works are paid in the form of foodgrains, on a full or partial basis.

5.34.8 The National Rural Employment Guarantee Scheme (NREGS), extended to all the districts across the country, guarantees employment opportunities in the rural areas by providing work that taps labour intensive community assets. It assures manual work to one person per family for a maximum of 100 days in a year.

School preparedness; Photo: seedsindia.org

5.34.9 **Relief through tax waivers and concessions :** The primary objective of the tax waivers and concessions would be to help people meet their basic entitlements. The State Government can take a conscious decision to provide a number of tax waivers and concessions when a drought is declared. These tax waivers and concessions should be decided on the basis of the entitlement needs of certain segments of the population and the fiscal implications of such a relief to the State Government. Each State Government may decide on tax waivers and concessions to the people affected by drought, depending on fiscal situation of the State and severity of the drought.

5.34.10 **Cattle camps and fodder supply:** State Governments need to support their farmers in protecting their cattle population during a drought situation by providing necessary assistance for fodder, feed, and cattle health. During a drought situation, every measure needs to be taken to save useful cattle. When cattle wealth is seriously depleted the recovery is very slow. While sheep and goats have a potential for rapid growth, perhaps 25% a year or more, the growth of cow, buffaloes and camels is much slower, rarely more than 1-2% a year in a sustained manner. It is necessary to provide support to farmers for fodder so that they do not engage in distress selling of their cattle.

5.34.11 **Health and hygiene:** In a drought situation, health issues are largely related to contamination of water and spread of infection among the workers participating in public works programmes. People have less immunity in drought situations due to poor levels of nutrition. Necessary precautions need to be taken to prevent the spread of any water borne epidemic and other infectious diseases.

5.34.12 **Institutional response:** Drought management requires a strong institutional structure to monitor and provide a timely response to drought. While it is primarily the responsibility of the State Government to manage drought, the Central Government also plays an important role in monitoring drought and providing financial assistance to the States. The district administration headed by the Collector plays the most critical role in responding to drought on the ground. At the Central level, the Ministry of Agriculture is the department responsible for drought monitoring and management.

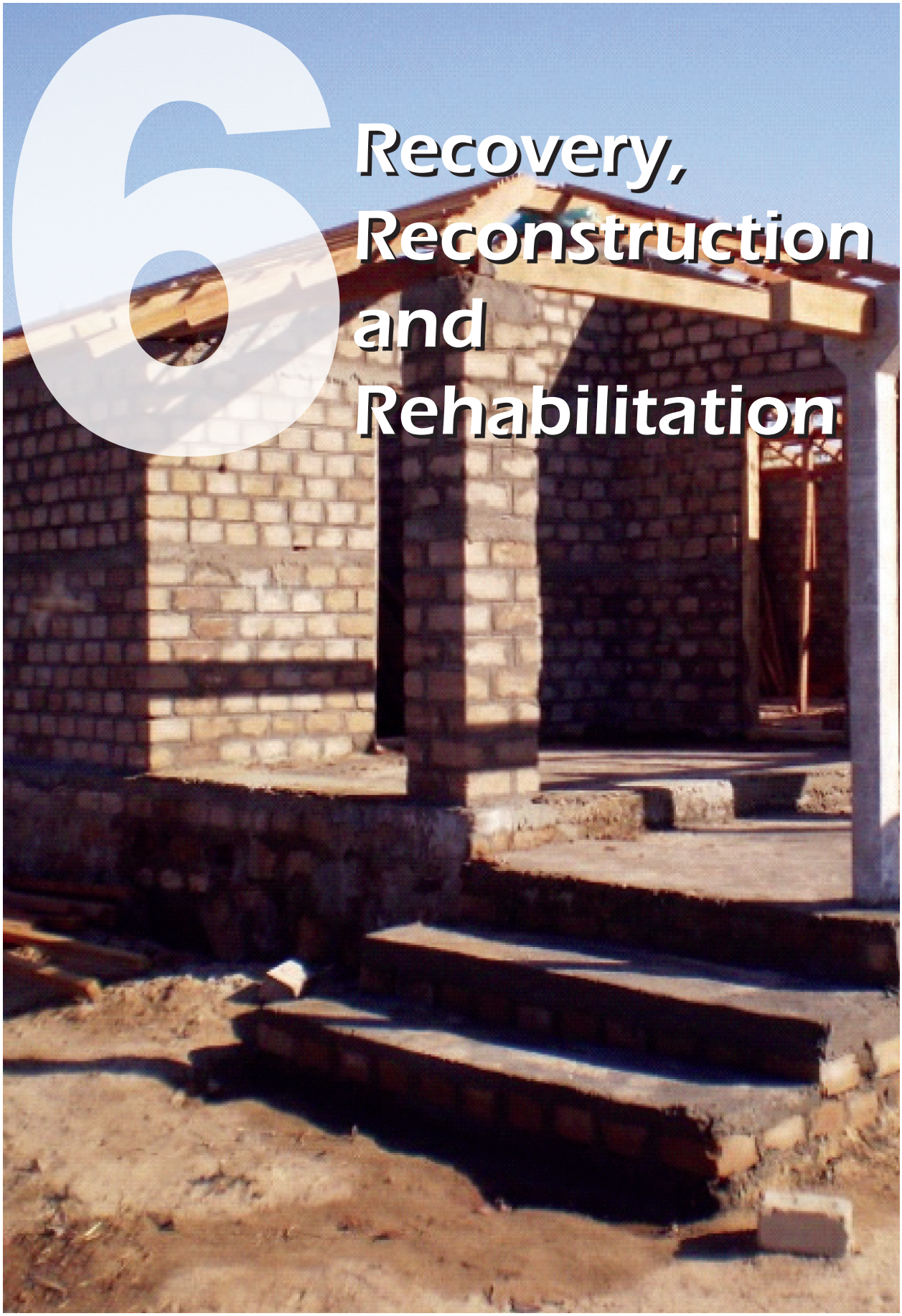
5.34.13 **Role of Panchayati Raj institutions:** It is necessary to involve the Panchayati Raj Institutions (PRIs) – Zila Parishads, Panchayat Samitis and village Panchayats in the implementation of drought management programmes.

5.34.14 **Financing relief expenditure:** In post independent India, financing relief expenditure has largely been arranged through the Finance Commission appointed under Article 280 of the Constitution. In the earlier phases the role of the Commission was restricted to suggesting the pattern of financial assistance by the centre. Subsequently the recommendations were enlarged to cover the "scheme of financing relief expenditure".

5.34.15 **Information management and media coordination :**The Central and State Governments should provide information on all aspects of drought to the people and media. It is necessary to inform the people about the severity and impact of drought and the measures being taken to alleviate the drought situation.

5.35 Conclusion

The preparedness and response phase in the Disaster management cycle are critical in reducing the impact of disasters. The involvement of multi-various stakeholders, therefore, need to ensure efficient inter-departmental coordination and need to constantly review and improve the systems in place. It has to be kept in mind to ensure that the focus on these two areas help in bringing a tangible improvement in handling the disasters.



6 Recovery, Reconstruction and Rehabilitation

6.1 Background

6.1.1 The International Strategy for Disaster Reduction (ISDR) defines recovery as the "decisions and actions taken after a disaster with a view to restore or improve the pre-disaster living conditions of the stricken community, while encouraging and facilitating necessary adjustments to reduce disaster risk".

6.1.2 While emergency response is vital as it is aimed at saving human lives and providing relief, the ultimate objective of any crisis management is restoration of devastated livelihoods. Recovery efforts following rescue and relief in any disaster can be classified into short term and long term. The short term activities for recovery are debris clearance, providing semi-permanent shelter and ensuring sanitation and restoring lifelines, while the long term activities involve building a safer and more sustainable livelihood.

6.2 Nature of Recovery

6.2.1 The damage caused by floods, earthquakes and cyclones is on a much larger scale than other disasters and recovery after these disasters poses a challenge. In disasters like drought, the relief phase is prolonged and since there is no damage to the infrastructure and property, the rehabilitation is confined to restoration of livelihoods which can get subsumed in normal development programmes.

6.2.2 Recovery in case of epidemics is more in the form of sanitising the locality against any future recurrence and may also involve counseling of the victims. Industrial disasters being quite varied in nature, the rehabilitation in major ones like the 'Bhopal Gas Tragedy' could involve rehabilitation efforts spanning over a generation of victims apart from restoring livelihoods and providing social and psychological assistance.

6.2.3 Rehabilitation following disasters such as landslides and avalanches is localised and is of a similar nature as in earthquakes but on a smaller scale. Finding safer sites near such locations often poses challenges and resistance.

6.3 Guiding Principles for Post-Recovery

Box 6.1 illustrates the principles applied generally based on international practices.

Box 6.1: Guiding Principles for Post- Recovery

- Mainstreaming disaster risk reduction in recovery and development process,
- Improving coordination,
- Promoting participatory approaches and decentralising planning and programming for recovery,
- Enhancing safety standards and integrating risk reduction in reconstruction and development,
- Improving the living conditions of the affected communities and sectors,
- Building local and national capacities for increased resilience, risk management and sustainable development,
- Taking advantage of ongoing initiatives,
- Gender sensibility,
- Demonstrative effects,
- Monitoring, evaluation and learning.

Source: GFDRR

6.4 Assessment

The first step after stabilizing the situation by providing sufficient relief is to assess the damage. A meticulously executed assessment exercise would provide an ideal base for the rehabilitation efforts. This exercise is best carried out through multi-disciplinary teams which go into all aspects of damage (social, economical, psychological) in participation with the local community. Based on the assessment of the damage and the needs, a recovery strategy has to be formulated. The strategy should include all interventions - economic, social, political and psychological. The resources should be identified and the roles and responsibilities of all concerned should be defined.

6.5 Co-ordination

6.5.1 Following any major disaster, a number of players arrive on the scene and as already stated, ensuring proper coordination amongst them thus becomes very important. Recovery activities are taken up by government agencies, local bodies, international agencies, voluntary organisations and others, through separate, overlapping and uncoordinated interventions. This leads to imbalances in the scale of operations, duplication of efforts in some areas, gaps in others and leakage and misuse of resources. Therefore establishing a framework for coordination is necessary for effective recovery. The role of voluntary organisations including international ones like the Red Cross is extremely useful for mitigating the impact of disaster.

6.5.2 The administration is also required to set up a voluntary organisations' coordination centre to coordinate the relief and rehabilitation activities of the multiple organisations so that they are not concentrated in a few pockets. It is often observed that post-disaster recovery efforts tend to focus on rapid and visible solutions to restore normalcy at the cost of sustainable development. The post-disaster recovery phase provides a 'window of opportunity' for disaster risk reduction. Risk reduction aspects should therefore be built into the redevelopment process.

6.6 Shelter

Shelter is one of the most visible and immediate needs in post-crisis settings. Relief efforts are often focused on providing shelter quickly, without taking into account the impact of short-term shelter strategies. Long-term shelter strategies help not only to focus on determination and implementation of realistic and permanent reconstruction plans for the affected communities, but are also concerned with rebuilding community confidence and support structure for civic responsibility and urban governance, through participatory planning of reconstruction. The development of disaster resistant housing is a major factor in reducing vulnerability to disasters. However, shelter issues in mitigation go beyond the structural aspects. Rights to ownership and security of tenure make an enormous difference to the maintenance, management and development of shelter, particularly in urban areas.

6.7 Sustainability in Recovery Process

Normally, it is seen that the recovery efforts have a tendency of tapering off with the passage of time. The Bureau for Crisis Prevention and Recovery of the UNDP has also observed "the general experience is that once the initial flurry of activities of providing rescue and relief is over, the attention received by the recovery efforts goes on declining steadily over a period of time and 'business as usual' sets in". The sustainability component in recovery process therefore is important. This could be achieved by capability building of the community and awareness generation and preparing local crisis management plans.

6.8 Accountability

A system of accountability needs to be evolved during the relief and rehabilitation phase. This system should ensure that the relief material reaches the target groups and that the funds are being utilised efficiently and optimally. A grievance redressal mechanism should also be put in place.

6.9 Evaluation

After the recovery phase, it is necessary to conduct a detailed evaluation of all aspects of crisis management. This should bring out the strengths and weaknesses of the disaster management machinery and also provide the basis for future improvements. Such an evaluation should be carried out by an independent professional agency like the NIDM, in all major disasters. This assessment should also include a quick audit of the expenditure incurred.

6.10 Guidance Notes on Recovery

The International Recovery Platform (IRP) and United Nations Development Programme India have developed Guidance Notes on Recovery on nine sectors namely Shelter**,** Infrastructure, Gender, Livelihood, Environment, Governance, Climate Change, Health and Psycho-social support. These are initial steps in documenting, collecting and sharing disaster recovery experiences and lessons. This collection of the successes and failures of past experiences in disaster recovery is expected to help in the planning and implementation of future recovery initiatives. The aim of the guidance notes is not to recommend actions, but to place before the personnel involved in the risk-reducing recovery process a menu of options. The sector specific Guidance Notes are primarily intended for use by policymakers, planners, and implementers of local, regional and national government bodies interested or engaged in facilitating a more responsive, sustainable, and risk reducing recovery process. Since the governments are not the sole actors in disaster recovery and IRP believes that the experiences collected in this document can benefit many other partners working together to build back better. These Guidance Notes on different sectors are available on their website www.recoveryplatform.org.

6.11 Some Indian Experiences in Recovery in the Last Two Decades

Few experiences of post disaster recovery rehabilitation and reconstruction works are illustrated in the subsequent paras. This shows the experiences which country as a whole has gathered in course of its recovery process after the event of different kind of disasters whether human induced or natural. This may guide the responders in the future such endeavors and may also help them to take corrective measures.

6.12 Bhopal Gas Tragedy (1984)

6.12.1 The Bhopal Gas Tragedy is one of the world's worst industrial catastrophes. It occurred on the night of 2-3 December, 1984 at the Union Carbide India Limited (UCIL) Pesticide plant in Bhopal which was the Indian subsidiary of Union Carbide Corporation, USA. The accident occurred due to leakage of Methyl Iso Cynate (MIC) and other chemicals due to ingression of water and the resulting reaction affected a large number of persons. Approximately 2000 people are known to have died in the first 72 hours and large proportion of the survivors suffered acute multi-system morbidities (eyes and lungs were the target organs). The ICMR estimated that approximately 62.58% of the total population in Bhopal suffered from inhalational toxicity. The people who resided in areas close to the carbide factory were exposed to higher concentration of potentially lethal toxic gases.

Department of relief and rehabilitation, Government of Madhya Pradesh

6.12.2 A large proportion of population who survived this tragedy developed morbidity of varying degree over the last 25 years. As an immediate response, the state government of Madhya Pradesh provided financial support to the affected families and an amount of ₹.12.80 crore was distributed as immediate relief. Food items were also distributed to the affected population and compensation was paid for livestock loss. An amount of ₹ 3.78 crore was spent to provide compensation to the families of a deceased.

6.12.3 During 1990 in the first five year action plan a sum of ₹ 258 Crore was sanctioned by the Central government and it got extended till 1999. This plan provided ₹ 150.35 crore for medical rehabilitation in addition to economic rehabilitation (₹ 21.18 crore), social rehabilitation (₹ 49.72 crore) and environmental rehabilitation (₹ 23.76 crore). The present action plan for Rehabilitation of Government of Madhya Pradesh is given in Table: 6.1 includes the following features:

Department of relief and rehabilitation, Government of Madhya Pradesh

Table 6.1: Action Plan for Rehabilitation of Government of Madhya Pradesh

Sl.No.	Item	Amount (in ₹ Crore)
1	Medical Rehabilitation	33.55
2	Social Rehabilitation	85.20
3	Economic Rehabilitation	104.00
4	Water Supply	50.00
	Total	272.75

6.12.4 Committee of Group of Ministers

A 'Group of Ministers' has been constituted by GOI under the chairmanship of Home Minister to take decisions on all issues related to Bhopal Gas tragedy vide note 47/1/7/93-CAB dated 26/05/2010. There are 10 members in the Group of Ministers.

The 'Group of Ministers' have come out with the ₹ 982.75 crore work plan (75:25 sharing pattern) for Economic, Social, Medical and Environmental rehabilitation of victim of Bhopal Gas Tragedy. Central Government has sanctioned ₹ 272.75 crore to Madhya Pradesh Government.

6.13 Kutch Earthquake (2001)

The Kutch earthquake of 26th January, 2001 was one of the worst natural disasters to strike in Gujarat. It posed enormous challenges because of its magnitude, intensity and geographical spread for rescue, relief and rehabilitation.

6.13.1 The devastation –a glimpse: Overall 7633 villages in 21 out of 25 districts of Gujarat were affected to varying degrees. The districts most affected were Kutch, Surendaranagar, Jamnagar, Rajkot, Patan and Ahmedabad. Almost 13, 805 human lives were lost, about 1,67,000 persons

Gujarat Earthquake 2001

Kutch earthquake 2001 and reconstruction of house

were injured and over a million houses were damaged and destroyed. About 10,000 small and medium industrial units went out of production, affecting income and employment. Inspite of the immediate sense of shock, confusion, helplessness and grief, the government and the community rose to the occasion and quickly responded to the event. Soon after, a holistic and comprehensive reconstruction and rehabilitation programme was put in place. A new organization, the Gujarat State Disaster Management Authority was established. The Government of Gujarat also announced the Reconstruction and Rehabilitation Policy (2001).

6.13.2 The Gujarat Earthquake Reconstruction Programme was designed to address the needs of the affected people comprehensively. It adopted a building back better approach, involved the community and encompassed a number of sectors such as housing physical infrastructure, social infrastructure (education and health), urban reconstruction, livelihood restoration, social rehabilitation and long term disaster risk reduction.

6.13.3 The reconstruction programme had the following objectives:

(i) Promoting sustainable recovery in disaster affected areas, and

(ii) Laying the foundation for sustainable disaster management capacity in Gujarat.

The phase-wise focus of the programme is summarised as follows:

(a) The short term focus of the reconstruction programme was to address the immediate needs such as temporary shelters before the onset of the monsoon, debris removal, repair of houses and public buildings and emergency repair of irrigation structures.

(b) The medium term objectives of the programme emphasised the repair and reconstruction of houses, public infrastructure, and social infrastructure and initiating efforts towards disaster mitigation and reduction.

(c) The long term objective of the reconstruction programme was further strengthening the capacity of government institutions and community towards disaster risk reduction (preparedness, response, mitigation and prevention) and implementation of risk transfer mechanism.

6.13.4 Some of the salient features of the Gujarat Reconstruction Programme are as follows:

(i) **Owner Driven Reconstruction:** The reconstruction of the houses was done by the owners themselves with technical assistance provided by the government. This involved minimum relocation and out of 215,255 houses that were reconstructed only 5720 houses were partially relocated. To provide technical guidance to the community and ensure that the newly built houses were hazard resistant, large number of engineers, architects and masons were trained and technical guidelines were developed. A third party audit mechanism was established to control quality.

(ii) **Housing Insurance:** The Housing Insurance Programme was incorporated as a compulsory component for all G-5 houses and optional for houses of other categories. The insurance covered 14 types of risks for 10 years and the premium was fixed at ₹ 349.10 for an insured sum of ₹1 lakh.

(iii) Urban reconstruction of all the four towns in Kutch ensured planning principles with improvement of basic services and urban environment.

(iv) A regulatory system for safe construction was strengthened and licensing of engineers and certification of masons were introduced.

(v) Mass awareness on disaster preparedness was undertaken to prepare the community to face similar future eventualities.

6.14 Tsunami (2004)

6.14.1 The Dec 26th 2004 Indian ocean tsunami caused extensive damage to the infrastructure including harbours, jetties, roads, bridges, power, telecom, hospitals, schools and other social sector buildings besides human loss of 9395 persons and 3,964 were missing after the disaster. The estimated loss in monetary terms including damage to property was reported at ₹ 11544.91 crore (Andhra Pradesh- ₹ 342.67 crore, Kerala- ₹ 2371.02 crore, Tamil Nadu- ₹ 4528.66 crore, Andman & Nicobar Islands ₹ 3836.56 and Puducherry – ₹ 466.00 crore). In terms of housing, 86,688 houses were damaged, with 53,192 vulnerable to damage. Approximately 12000 hectares of agricultural land was damaged and 3000 hectares of land was rendered unusable due to salinity in the soil. A total 47 Fishing Landing Centres (FLC) got damaged and approximately 28000 boats were damaged. The loss assessed by respective state government may be seen at Table 6.2.

Tsunami in Indian Ocean

Table 6.2: Loss in Tsunami 2004, India

Items damaged	TN	Kerala	AP	Puducherry	A&NI	Total
Financial Loss (₹ in crore)	4528.66	2371.02	342.67	466.00	3836.56	11544.91
Houses						
(i) Damaged	64976	3867	481	7567	9797	86688
(ii) Vulnerable	40248	11000	-	-	-	51248
Agricultural land (ha)	88451.72	2151	No damage	1145	8069	99816.72
Boats (nos.)	2727	3989	11394	7892	2065	28067
Roads (km)	1548.32	686	No damage	108	350.05	2692.37

6.14.2 It is not possible to prevent a tsunami. However, in some tsunami-prone countries, earthquake engineering measures have been taken to reduce the damage caused on shore.

(i) **Physical Measures:** The State Governments and District Administration rose to the occasion in its search & rescue operation besides providing relief. The Central Government initiated relief operation by deploying 20,800 personnel of armed forces as well as Central Armed Police Forces in the affected States and UTs. It also send supports to Sri Lanka, Maldives and Indonesia. In all 881 relief camps were set-up and a total of 6,04,335 people were housed

in these camps. About 12,735 tents were dispatched to the affected areas – mostly to A&N Islands. 64 special flights were operated between 27th Dec 2004 – 1st Jan 2005 to evacuate 6,318 stranded people including tourists in A&N Islands. In all 28,734 persons were rescued – 9950 in Kerala, 9284 in A&N Islands, and 9500 in TN including 1000 persons stranded at Vivekanand Memorial. 6.45 lakhs persons – Main Land (6.30 lakhs) and A&N Islands (0.15 lakhs) were moved to safer places.

(ii) **Financial Measures:** Government of India made immediate release of ₹ 700 crore for the Tsunami affected States and UTs. An amount of ₹ 450 crore was released as an immediate assistance from the National Calamity Contingency Fund (NCCF) to the States of Tamil Nadu (₹ 250 crore), Kerala (₹ 100 crore) and Andhra Pradesh (₹ 100 crore). In addition, an amount of ₹ 50 crore to Puducherry and ₹ 200 crore for Andaman & Nicobar Islands was also earmarked.

(iii) **Rajiv Gandhi Rehabilitation Package:** Government of India provided assistance to the Governments of Andhra Pradesh, Kerala, Tamil Nadu, and the Union Territories of Puducherry and Andaman & Nicobar Islands to implement the special package of ₹ 3644.05 crore named as "Rajiv Gandhi Rehabilitation Package for Tsunami affected areas" to provide assistance for immediate relief and response, revival of fishery and agriculture sectors, construction of temporary (intermediate) shelters and repair/restoration of infrastructure. The amount of ₹ 700 crore released immediately from NCCF became a part of this 'Package'. The details of release are given as under in Table 6.3.

Tsunami Reconstruction, Nagapattinam, Tamil Nadu

Table 6.3: Rajiv Gandhi Rehabilitation Package (₹ in crore)

State / UT	Amount allocated under RGRP	Amount Spent	Amount of RGRP which became part of TRP
Tamil Nadu	2347.19	748.12	1101.02
Kerala	249.36	103.19	109.38
Andhra Pradesh	70.00	63.34	29.96
Puducherry	155.62	69.14	82.21
Andaman & Nicobar	821.88	838.58	454.05**
Total	3644.05	1822.37	1776.62

(**) Increase in RGRP in A&NI is because of savings from relief funds utilized for reconstruction works.

Out of the total outlay of ₹ 3644.05 crore under RGRP some of the components like Housing, Livelihood & Fisheries etc. worth of ₹ 1776.62 crore were subsequently merged in the "Tsunami Rehabilitation Programme" (TRP).

6.14.3 **Long-Term Tsunami Reconstruction Programme (TRP):** After the completion of rescue and relief phase, the Government of India approved TRP at an estimated cost of ₹ 9870.25 crore which was to be implemented during 2005-06 to 2008-09. The GoI approved the revised TRP package, at an estimated cost of ₹ 9822.10 crore on 10.1.2007 comprising the following components:-

(i) ₹ 1776.62 crore under the Rajiv Gandhi Package.

(ii) ₹ 3332.43 crore through External Agencies viz World Bank, ADB and IFAD.

(iii) ₹ 4713.05 crore as Domestic Budgetary Support.

Table 6.4 shows that status of rehabilitation measures taken up under TRP. The TRP includes reconstruction activities in five major sectors such as housing fisheries, agriculture and livelihoods, ports and jetties and roads and bridges, in addition to power, water and sewerage, social infrastructure and welfare, environmental and coastal protection and tourism. The prime objective of the Tsunami Rehabilitation Programme is to reconstruct damaged infrastructure with value addition and restore livelihood of the people. An amount of ₹ 4171.98 crore had been allocated for housing under TRP which is about 42.5% of the total outlay. The GoI while reviewing the progress of TRP on 11.2.2010 has further modified the outlay to ₹ 9381.96 crore (₹ 6049.54 crore under ACA and ₹ 3332.42 crore under EAP). This includes an additional requirement of ₹ 108 crore for Puducherry and ₹ 138.30 crore for A&NI.

6.14.4. **Status:** The physical works are likely to be completed by December, 2011 except tourism works of Andaman & Nicobar Islands which is stated to be completed by March, 2012.

Table 6.4: Status of Rehabilitation (as on 30th June 2010)

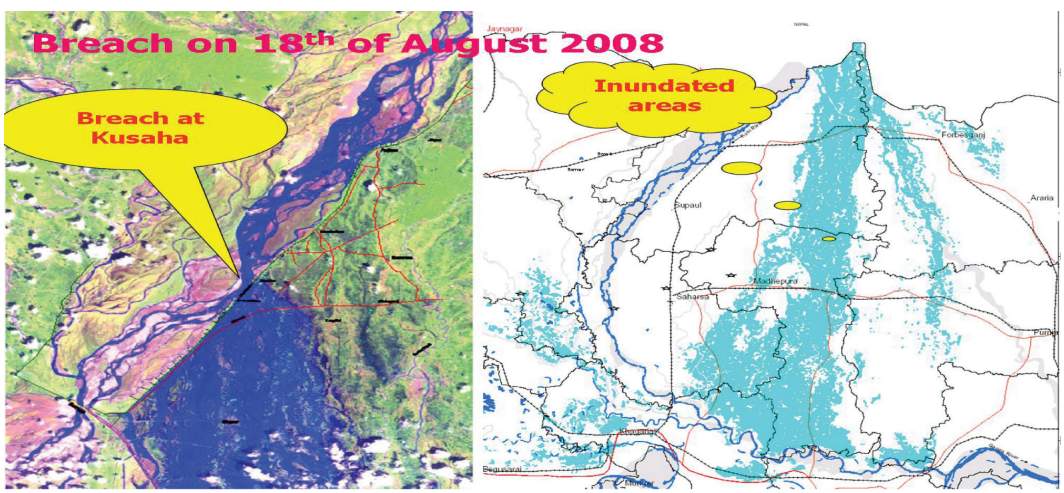
Initiatives taken up under TRP	TN	Kerala	Andhra	Puducherry	A&NI	Total
Houses completed (Nos.)						
Damaged	56466	3867	481	6032	9797	76643
Vulnerable	13408	6248				19836

Initiatives taken up under TRP	TN	Kerala	Andhra	Puducherry	A&NI	Total
Agricultural land (ha)	88451.72	2151	No damage	1145	4891.72	96639.44
Boats (nos.)	2727	3989	11394	7692	2012	27774
Roads (km)	1385.53	686	No damage	100.72	306.65	2478.9

6.15 Kosi Calamity (2008)

6.15.1 The Kosi (known as "Kaushiki" in Sanskrit) is one of the most ancient rivers of India. The river is notorious for its vagaries and known to change its bed very often. During the last two centuries, the river has been changing its course in the westerly directions and it has laterally moved nearly 70 miles. On 18.08.2008 the Kosi river started eroding the spurs on the eastern efflux bundh 12 km. up stream of the Birpur barrage in Supaul district and breached the embankment. After the breach, the entire river spilled out and started flowing along a new course running straight down south. The course of the river was approximately 15 to 20 km wide and 150 km long north to south. The entire country side within this 3000 sq. kms. was totally devastated by the rapid surging flow of the river along its new course. Houses, schools, roads, dispensaries were all flooded and swept away. A total of 35 blocks, 407 panchayats and 980 villages in five districts with a total population of 33, 89, 000 fell along the new course of the river. Totally, 217 people and 868 cattle were killed and 3,38,986 houses were partly or fully damaged due to the catastrophe.

6.15.2 **Immediate Response:** The affected areas had never experienced such a catastrophe and had not seen floods for the last 50 years, therefore they had inadequate arrangements to face the situation. The state administration deployed 1500 boats locally in addition to the 561 motor boats mobilised from NDRF, army, navy and other sources. About 12 helicopters carried out 314 sorties and air dropped about 1, 21, 892 packets of food, water and halogen tablets besides distribution of about 2, 39, 858 food packets by boats to the people in the affected areas. The state government carried out one of the largest evacuation operations of about 9, 93, 992 persons ever organised in the country. About 5000 civilian personnel, 3500 police men, 35



Source: Flood Management System, Water Resources Department Bihar

columns of army, 4 columns of the navy, 850 personnel of NDRF, 1500 boats and 560 motor boats were deployed for the evacuation.

6.15.3 **Mega Shelter Camps:** The State Government set up 362 relief camps in the buildings of schools and colleges. At the peak of the disaster 4, 40,739 people were living in the camps. Self help groups were constituted to look after the preparation and distribution of meals. A special thrust was on women and newly born babies; clothes and utensils were given to each camp inmate as relief measures. Other features of the shelter are outlined below:

- A total of 3,750 temporary toilets constructed, 2,155 hand pumps installed in the camps, generators and solar lamps provided for lighting in the camps,
- Schools set up for the children in the camp and 56,304 children enrolled in these schools,
- Anganwadi Centres set up in each major camp,
- Skill development programmes initiated and training provided to willing persons in handicrafts and cottage industries,

Kosi Flood 2008

- Health sub-centres set up in each camp with doctors on duty round the clock with provision for free medicines and camps were also covered by a mobile team. A total of 491 doctors and 1578 paramedical staff deployed on a daily basis. Maternity huts set up in relief camps and 183 deliveries reported in these maternity centres,
- A total of 108 ambulances were deployed.

Owner driven construction under Kosi recovery programme

6.15.4 **Livestock:** To cater to the affected livestock, 257 veterinary centres manned by 387 personnel were set up. As per the report 47,430 animals were kept in camps and 321630 animals were vaccinated.

Box 6. 2: Kosi Flood Reconstruction And Rehabilitation Programme

Background: The state government has formulated Kosi Rehabilitation and Reconstruction Project with the purpose of reconstructing the houses, providing community facilities, complete restoration of physical infrastructure, livelihood support based on the policy of sustained economy and environment etc for the people affected by the calamity. The project is based on the success of the pilot Kosi Recovery and Reconstruction project supported by the UNDP in two villages through the Owner Driven Reconstruction Collaborative network of civil society organisations.

Components: The World Bank aided project Kosi Rehabilitation and Reconstruction Project has the following major components:

(i) **Owner Driven Housing Reconstruction -** Using an owner driven reconstruction model, about 1000,000 houses will be built with a brick and concrete plinth, bamboo superstructure and corrugated galvanized iron (CGI) sheeting roof. The cost per house will be ₹ 55,000 with a currently estimated cost of ₹ 2,300 for a toilet and ₹ 5,000) for solar powered lighting.

(ii) **Reconstruction of Roads and Bridges –** Under this component, connectivity lost due to the Kosi flood would be restored by reconstruction of damaged roads and bridges/culverts, including construction of some new bridges. The project is expected to construct about 90 bridges and culverts on the State Highway and Major District Roads and reconstruct about 290 km of rural roads, which would benefit around 2.2 million people. New cross drainage structures will be provided where new streams have formed and where these were missing earlier.

(iii) **Strengthening Flood Management Capacity -** This component would strengthen the overall flood forecasting and flood and sediment management capacity in Bihar by enhancing knowledge, understanding, and capacity of flood and sediment management. This will be achieved by implementing both structural and non-structural measures, mainly focusing on the Kosi River Basin. The component has three subcomponents:

a. Knowledge management and capacity building;

b. Flood forecasting and early warning; and

c. Structural investments.

(iv) **Livelihood Restoration and Enhancement** – The component is to build social and financial capital and expand the livelihood opportunities of the affected people of Madhepura, Supaul and Saharsa. This component will have four subcomponents: (i) Community Institution Development; (ii) Community Investment Fund; (iii) Technical Assistance Fund; and (iv) Project Management.

(v) **Improving Emergency Response Capacity –** This component aims at making contingency funding available for civil works, consultant services and goods required to respond in case of future emergencies.

(vi) **Project Management and Implementation Support –**This component is to support project implementation through the provision of necessary offices including equipment.

Finance: Total Cost of the World bank aided project formulated by the Government is $220 million about ₹ 1,000 crores.

6.16 Leh Cloudburst (2010)

6.16.1 A rare phenomenon, a rainfall of 12.8mm during the intervening night of 5/6th August 2010 coupled with cloud burst resulted in flash floods and mud slides causing havoc and large scale loss of life and public infrastructure/private property particularly in Leh region. Besides the

Damage by cloud Burst, 2010

local population large numbers of tourists both Indian and foreign nationals, as well as labourers from outside the region who had gone there for earning a livelihood got trapped to face the most tragic and difficult circumstances.

6.16.2 **Response:** More than 6000 personnel of Army, Air Force, Border Roads Organization, National Disaster Response Force and Indo Tibetan Border Police were deployed along with rescue equipment to assist the civil administration in relief operations. Large quantities of relief material

Temporary Shelters, 2010

Community Centre at Leh, 2010

such as tents, blankets, tarpaulins, mattresses, food packets and bottled water were provided. Contributions from the charitable organisations and other sources were also sent. Apart from the medical teams available with army, CPMFs, state, etc. one medical team consisting of 08 Doctors and 04 Nurses along with 10 quintals of emergent surgical/medical consumables were deployed in the affected area from Delhi. Additional medical supplies and medical equipments were sent to the affected areas. A total of 55 civil aircrafts were operated and more than 8000 people were evacuated. The Air Force also carried out 226 sorties and airlifted 302 tonnes of relief material and equipments and 818 persons. Funds to the tune of ₹ 429.24 crore ($ 95 million) were available with the state government in their State Disaster Response Fund for undertaking immediate relief activities. The Prime Minister announced a rehabilitation package of ₹ 125 crore ($ 30 million).

6.16.3 **Lesson learnt:** The gap in the response to the remote hilly area and the disaster being of unprecedented requires strengthening of the National Emergent Reserve and placing it at similar vulnerable areas for prompt relief. Besides there is an urgent need to strengthen the communication system i.e. multi modal system and create an awareness among people about the cloud burst and its consequences.

6.16.4 **Rehabilitation:** Details of the houses/community shelters constructed by the various agencies is given in Table 6.5.

Table 6.5: Shelter construction in Leh (As on 23-11-2010)

Sl. No.	Agency responsible /Authority	Total no. of houses to be constructed	No. of houses constructed	No. of community shelters constructed
1.	Prime Minister's National Relief Fund	327	153	-
2.	Hindustan Pre-Fab Ltd.	434	331	17
3.	National Bamboo Mission Authority	91	48	10
4.	NGOs			44

6.17 Mayapuri Radiation Exposure Delhi (2010)

6.17.1 The National Radiation Regulatory Authority, Atomic Energy Regulatory Board (AERB) received a message in the afternoon of 7th April, 2010 from Indraprastha Apollo Hospital, New Delhi that one person, aged 32 years, the owner of a scrap shop in Mayapuri Industrial Area, New Delhi had been admitted on 4th April, 2010 with symptoms of radiation exposure.

Box 6.3: Recovery an Opportunity

Disaster can become a development opportunity if relief efforts do not merely restore the poor status quo ante, but rather put people on a path of sustainable development. The goal in the transition phase must be to avoid a 'circularity of risk'. This is what can happen when houses built with valuable international assistance get washed away during floods, dams left unrepaired after an earthquake aggravate drought conditions, and procedural delays in receiving rehabilitation packages from government and donor agencies leave the poor more vulnerable to the next disaster.

(Source: From Relief to Recovery: The Gujarat Experience: UNDP)

6.17.2 The Team of Atomic Energy Regulatory Board (AERB) visited the place immediately with radiation detection equipments and monitored the radiation levels at various positions near the scrap shop. They found that the particular shop as well as a couple of nearby shops had very high radiation fields. Next day, teams of Radiation Safety Experts from BARC, AERB & Narora Atomic Power Station were sent to Delhi with a wide range of radiation monitoring, detecting equipments and a lead flask to locate, identify, recover, safely secure and dispose radioactive sources.

6.17.3 The response team identified the radiation source as Cobalt-60, used mainly in industry for radiography and in teletherapy for cancer treatment. During the search operation, the team could locate, recover and secure eight sources of different intensities. These sources were placed in the lead shielded flask brought from Narora and sent for further examination and safe disposal. Subsequently the area was cleared for the public. A radiation survey of scrap metal shops in neighboring areas was carried out following the incident. It indicated elevated radiation levels in one more scrap shop about 500 m away from the ones where radiation sources were found

earlier. A joint team consisting of AERB and National Disaster Response Force (NDRF) recovered two more radioactive sources from this shop. Both the sources were safely transferred to a shielding flask and transported back to Narora.

6.17.4 As a follow up to this incident, four joint teams of BARC, AERB and NDRF were formed and the surroundings of all remaining 800 shops in the market were scanned when the shops were closed on 14th April, 2010. The entire area was found to be free of elevated radiation fields except at the entrance of the market where the soil over a small patch was slightly contaminated. The contaminated soil showed Cobalt-60 contamination but of very low order. Subsequently, the contaminated soil up to a depth of few centimetres was removed to bring down the radiation field.

6.17.5 **Constitution of a Working Group:** In the backdrop of the discovery of radiation sources from the scrap in Mayapuri in New Delhi and also to minimise the possibility of such recurrences in future, NDMA constituted a working group headed by Shri B. Bhattacharjee, Member, NDMA to spell out the roles and responsibilities of various agencies in dealing with Radiological Emergencies. The committee has submitted its report with the title "Working Group for Formulating mechanisms to detect, prevent and respond to radiological emergencies in India" to the Cabinet Secretariat. Further follow up on the recommendations of the committee is being done by the Cabinet Secretariat and NDMA.

6.18 Conclusion

Recovery, early recovery, long-term recovery, lasting recovery, reconstruction and rehabilitation are critical phases of Disaster Management Cycle. They offer an opportunity to reduce risks from future hazards and the 'Build back better' approach followed in the recovery programmes after major recent disasters give us valuable lessons on how to approach this phase. It is anticipated that the experiences mentioned would help the stakeholders in planning effective, efficient and time bound action plan in the event of disasters.

7

Capacity Development

7.1 An Overview

Effective disaster management requires trained manpower to deal with complex situations effectively and speedily to reduce the impact of disaster on human life and property. It is necessary to continuously undertake measures to build capacity amongst those who are handling disaster prevention, mitigation, preparedness, response, reconstruction and also creating awareness amongst people. Therefore, capacity building needs to encompass all resources available within a community, society and organisation to reduce the level of risk or the effects of a disaster.

7.2 Definition

UNDP describes 'capacity building' as the creation of an enabling environment with appropriate policy and legal frameworks, institutional development, including community participation (of women in particular), human resource development and strengthening of managerial systems. It adds that capacity building is a long-term, continuing process, in which all stakeholders participate (ministries, local authorities, non-governmental organisations and water user association's professional associations, academics and others). Capacity may include physical, institutional, social or economic means as well as skilled personal or collective attributes such as leadership and management. Capacity may also be described as capability.

7.2.1 **Capacity building[31] is much more than training and includes the following:**

- Human resource development, the process of equipping individuals with the understanding, skills and access to information, knowledge and training that enables them to perform effectively,
- Organisational development, the elaboration of management structures, processes and procedures, not only within organisations but also the management of relationships between the different organisations and sectors (public, private and community),
- Institutional and legal framework development, making legal and regulatory changes to enable organisations, institutions and agencies at all levels and in all sectors to enhance their capacities.

7.2.2 **Following are considered as vital components of the capacity development:**

(i) **Training:** It is a learning process that involves the acquisition of knowledge, sharpening of skills, concepts, rules, or change of attitude and behavior to enhance the performance of individuals associated with different departments and institutions.

(ii) **Education:** Amidst changes of the past decades, school education sector, the most discussed topic of national importance, is planning for more contextual, practical and application oriented curriculum for students at different levels of schooling.

(iii) **Research:** Research is an organised and systematic way of finding answers to questions. Systematic because there are certain things in the research process which are always done in order to get most accurate result.

(iv) **Awareness:** Awareness is generally defined as knowledge created through interaction between an agent and its environment. It cannot be simply referred to as "knowing what is going on." This concept of awareness involves state of knowledge as well as dynamic processes of perception and action.

7.3 Approach

7.3.1 The National Policy on Disaster Management (NPDM) describes its approach to capacity development. A strategic approach to capacity development can be addressed effectively only with the active and enthusiastic participation of the stakeholders. This process comprises of awareness generation, education, training, research and development (R&D) etc. It further addresses to put in place an appropriate institutional framework, management systems and allocation of resources for efficient prevention and handling of disasters. The approach to capacity development includes-

- According priority to training for developing community based DM systems for their specific needs in view of the regional diversities and multi-hazard vulnerabilities,
- Conceptualisation of community based DM systems at the national level through a consultative process involving the States and other stakeholders with the state and local level authorities in charge of implementation,
- Identification of knowledge-based institutions with proven performance,
- Promotion of International and Regional cooperation,
- Adoption of traditional and global best practices and technologies,
- Laying emphasis on table-top exercises, simulations, mock drills and development of skills to test the plans,
- Capacity analysis of different disaster responder groups at State, District, and local levels.

7.3.2 NPDM has further elaborated on national priorities, institutional capacity development, training of communities, professional technical education, DM education in schools, training of artisans, training of other groups and licensing and certification. Besides NPDM guidelines issued by NDMA also lay emphasis on capacity development.

7.3.3 **Capacity development in India**: A realistic National Capacity Development Programme, commensurate with the intensity and extent of the hazard in India needs to be evolved and implemented, keeping in view the available resources. This programme of resource enhancement should encompass all institutions,organizations and individuals that have a role in any part of the disaster management cycle.

7.3.4 **Capacity gaps in disaster management :** To mitigate the impact of disasters, there is a need to work collectively through multidimensional channels combining the efforts, resources and expertise of the government, non- governmental organisations and civil societies. Managing such incidents holistically is a highly specialised and skilled job which cannot be approached in an ad hoc manner. Disaster Management comprises of multi sectoral issues and accordingly calls for all sectors that play pivotal role in managing exigencies to develop their human resource capacity accordingly. There seems to exist a wide gap in the knowledge, skill, and attitude of the disaster managers for efficiently managing emergency situations particularly at local and state level where according to one study made by NIDM, Capacity-Risk ratio is remarkably low. To bridge this gap, it is important to have specific capacity development plans and strategies.

7.3.5 **Target group:** In the field of capacity development, priority is to be given to training of DM officials, functionaries, trainers and elected representatives and community representatives. Due importance requires to be given to DM training and orientation of professionals like doctors, engineers and architects apart from those engaged in response and relief. DM training further

requires to be included in curricula of educational institutions at all levels of schooling and should include practical instructions as well.

7.3.6 Realizing the importance of Capacity Development of stakeholders in Disaster Management, NIDM has been given the task of preparing National Human Resource and Capacity Development plan, which is at the advanced stage of its formulation. The first draft has been prepared and presented before the MHA. NIDM is finalizing the plan after holding the discussion with MHA on its first draft.

Institutions for Capacity Development

7.4 National Institute of Disaster Management (NIDM)

7.4.1 **Background:** In the backdrop of the International Decade for Natural Disaster Reduction (IDNDR), a National Centre for Disaster Management was established at IIPA in 1995. The Centre was upgraded and designated as the National Institute of Disaster Management (NIDM) on 16th October 2003 and it has now achieved the status of a statutory organisation under the National Disaster Management Act, 2005. Section 42 of the Disaster Management Act, 2005 entrusts the institute with various responsibilities, namely to develop training modules, undertake research and documentation in disaster management, organise training programmes, undertake and organise study courses, conferences, lectures and seminars to promote and institutionalise disaster management, undertake and provide for publication of journals, research papers and books. Located centrally at the Indraprastha Estate on the Mahatma Gandhi Road, within the campus of the IIPA, the institute is equipped with state-of-the-art facilities of training and research on disaster management. It has training and conference halls, well stocked library, GIS laboratory, computer centre, and video conferencing facility. The institute also provides boarding and lodging facilities for participants during its programmes.

7.4.2 **Training Programmes of NIDM:** The different formats in which training is imparted by NIDM include:

(i) **Face-to-face training:** NIDM conducts both in campus and off-campus training programmes. In-campus programmes are conducted in the premises of the Institute while the off-campus programmes are conducted mostly in state capitals, at the premises of the Administrative Training Institutes. It conducts as many as 92 training programmes on diversified themes of disaster management, with many new programmes added continually. The participants of these programmes are usually middle and senior level government officers nominated by the state governments and concerned ministries and departments of the Government of India. The programmes constitute class room lectures and presentations, field visits, group exercises, panel discussions etc. It does not charge any course fees. Boarding and lodging arrangements are also made free of charge. During the year 2010-11, the institute has conducted 84 training programmes, which have been attended by 2142 participants.

(ii) **Web- based training:** In collaboration with World Bank Institute, Washington, the Institute conducts on-line training programmes on basic and specialised subjects on disaster management. The courses are open to all interested persons with a token charge of ₹ 1500 for the basic course of one and half months and ₹ 1000 for specialised courses of one month duration to cover the cost of reading materials, postage etc. Every participant is expected to take part in on-line discussions. The successful candidates are awarded certificates

signed jointly by the NIDM and WBI. In 2010-11, three online training programmes on Comprehensive Disaster Risk Management Framework and four specialised online programmes on Community Based Disaster Risk Management, Climate Change and Disaster Management, Risk Sensitive Land Use Planning and Safe Cities have been organized. A total of over 438 participants attended these online courses. The Institute has also started the process of customisation of eight modules to Indian context.

(iii) **Satellite based training:** The Institute has collaborated with Administrative Training Institutes, Bhopal and Mysore to conduct satellite based training programmes through the ISRO community centres that have satellite based one-way video and two-way audio communication system. More than hundred centres join the programme simultaneously in which thousands of grassroots level functionaries take part. The Institute is extending the programmes in number of other states where similar facilities have been seen set up.

(iv) **Self study courses:** The Institute is in the process of launching web based training courses on various themes such as basics of disaster management, earthquake, flood, cyclone, disaster management for civil defence volunteers, public health workers, school children and community preparedness, which anyone from anywhere at any time can log on. The aim of such courses is to create interest and raise the level of awareness of people regarding disaster management and in some cases supplement the existing class room based training programmes.

(v) **India Disaster Management Congress:** NIDM has taken the lead in organizing the India Disaster Management Congress (IDMC) on the pattern of India Science Congress to bring together scientists, scholars and practitioners from diverse disciplines on the same platform. The first such Congress was held in November 2006 which was inaugurated by Hon'ble Prime Minister of India. The Institute organized the Second India Disaster Management Congress in November 2009. The congress had twenty six thematic sessions around twelve different thematic clusters where over 300 technical papers were presented. Hon'ble Shri APJ Abdul Kalam, Former President of India graced the occasion and delivered the valedictory address.

(vi) **Capacity Building Programme for Engineers and Architects in Earthquake Risk Management:** Ministry of Home Affairs initiated this twin programmes for capacity building of engineers (National Programme for Capacity Building of Engineers in Earthquake Risk Management) and architects (National Programme for Capacity Building of Architects in Earthquake Risk Management) at the cost of ₹12.36 and .₹4.51 crore respectively in earthquake risk management. The programme which started in 2004-05 was implemented till 2008 by the MHA and has subsequently been transferred to the NIDM for implementation with effect from 01.4.2008.

7.5 National Disaster Management Authority

7.5.1 NDMA undertakes several initiatives in the process of capacity development. Few of them are illustrated as follows:

7.5.2 **Mock Exercises:** NDMA undertakes mock exercises in vulnerable districts and industries on various types of natural and man-made disasters to help the state governments and district administration in reviewing the adequacy and efficacy of the state and district level Disaster Management Plans and to identify gaps in resources and systems. So far NDMA has

conducted nearly 211 mock exercises including 90 similar exercises in schools. During the Commonwealth Games, similar exercises were under taken through coordinated conferences, table top exercises and the mock exercises on both natural and man-made disasters at different competition and practice venues and at accommodation areas of players and accompanying officials. Altogether, 55 such exercises were conducted at different venues of the Commonwealth Games including the Games Village.

7.5.3 **Mock Exercises on School Safety:** Mock exercises in schools are conducted to empower the schools to face the disasters squarely before the specialist response is affected. Details are given in the Table 7.1.

Table 7.1: Mock Exercises conducted by NDMA from 1.4.2009 to 31.3.2010

Sl. No.	Disaster	State/s	States where Mock exercises conducted
1.	Earthquake	Uttarakhand, Arunachal Pradesh, Meghalaya, Delhi, Himachal Pradesh, Mizoram, Nagaland, A&N Islands, J&K	11
2.	Cyclone	Gujarat	01
3.	Floods	Tamil Nadu, Bihar, Chhattisgarh, Maharashtra	04
4.	Urban Fire	Haryana, Karnataka, J&K and Sikkim	04
5.	Chemical (Industrial)	Karnataka, Tamil Nadu, Goa, Pubjab, Maharashtra, Madhya Pradesh, Gujarat	09
6.	Terrorist related	Delhi	05
		Total	39

7.5.4 **Table Top Exercise:** Table Top Exercises are also carried out to elicit the responses of the participants in simulated scenarios. These scenarios cover the entire gamut of the disaster management cycle.

7.5.5 **Training of Panchayati Raj Institutions(PRIs):** Capacity Building of PRIs is extremely important as they are the local authorities at the grassroot levels. For the PRIs in addition to their scheme based capacity building funds, the NDMA has undertaken a capacity building project in partnership with IGNOU and eleven states, the details of which are given in the Table 7.2.

Table: 7.2: Capacity building of PRIs: Capacity Building Project (in Partnership with IGNOU) and States

• States	11
• Districts	55
• Training of PRI/ ULB Representatives.	12,375
• Training of Government Functionaries.	4,125
• Total persons trained	16,500.
Training in SIRDs and NIRD for PRIs is under active planning – with the Ministry of Panchayati Raj. UNDP in association with the NIRD has also developed a training module in disaster management for the PRIs.	

Awareness Campaign through cycle rally at Patna

7.5.6 **Awareness Campaigns:** NDMA has launched a number of public awareness campaigns through electronic and print media. The focus is on building an appropriate environment for DM and creating a high level of impact on the target audience.

(a) **Audio Visual Campaigns:** The publicity campaigns were run through radio and video spots on AIR, Doordarshan, private TV channels like general entertainment channels, new channels and regional channels, FM radio channels through DAVP and National Film Development Corporation.

(b) **Earthquake Awareness Campaign:** Four Videos in 35mm and four audio spots were produced for conducting an earthquake awareness campaign across the states/ UTs prone to earthquakes.

(c) **Cyclone Awareness Campaign:** Three videos in 35 mm and three audio spots were produced in Hindi and regional languages for conducting cyclone awareness campaigns across the States/ UTs prone to cyclones.

(d) **Flood Awareness Campaign:** Four videos in 35 mm and four audio spots were produced for conducting flood awareness (Awareness programme through cycle rally - Patna) campaigns across the states/ UTs prone to floods.

(e) **Information, Education and Communication (IEC) Activities:** Financial assistance of ₹.2.33 crores has been released to 19 states/ UTs for awareness generation IEC activities like making posters, leaflets, hoardings, wall paintings, video/ audio spots, etc.

7.6 Disaster Management Centres in the States

7.6.1 The Government of India through NIDM supports a four member faculty and two support staff besides the programme expenses of the Disaster Management Centres of the Administrative Training Institutes or other nodal institutes nominated by the states under a Central Sector Non-Plan Scheme (2007-12). Thirty one such centres (Table 7.3) have been set up throughout the country, one in each state and two each in Assam and U.P. The training programmes of the centres and NIDM are developed through a consultative process at the Annual Training Conference attended by the Relief Commissioners of the states, Director Generals of the ATIs, and representatives of the concerned nodal ministries and departments of the Government of India. Every centre has to conduct a minimum of 25 training programmes and train at least 490 participants annually. Together the centres train more than 35000 cutting edge functionaries of the government. The training calendar of NIDM may be visited at website 'http://nidm.gov.in'.

Table 7.3: Disaster Management Centers in the State

Sl. No.	State	Location	Name of the Institute	Acronyms
1.	Andhra Pradesh	Hyderabad	AMR-Andhra Pradesh Academy of Rural Development	AMR-APARD
2.	Arunachal Pradesh	Itanagar	Administrative Training Institute	ATI
3.	Assam	Guwahati	Assam Administrative Staff College	AASC
4.	Assam	Tezpur	Tezpur University, Tezpur, NAPAAM	NAPAAM
5.	Bihar	Patna	Bihar Institute of Public Administration & Rural Development	BIPA&RD
6.	Chhattisgarh	Raipur	Chhattisgarh State Institute Academy of Administration	CSIAA
7.	Delhi	New Delhi	Directorate of Training, Union Territory Civil Services	DOT
8.	Goa	St. Inze, Panji	Fire Institute	FI
9.	Gujarat	Gandhinagar	Gujarat Institute of Disaster Management	GIDM
10.	Haryana	Chandigarh	Haryana Institute of Public Administration	HIPA
11.	Himachal Pradesh	Shimla	Himachal Pradesh Institute of Public Administration	HPIPA
12.	Jammu & Kashmir	Srinagar	J&K Institute of Management, Public Administration and Rural Development	J&K IMPARD
13.	Jharkhand	Ranchi	Shri Krishna Institute of Public Administration	SKIPA
14.	Karnataka	Mysore	Administrative Training Institute	ATI
15.	Kerala	Thiruvanan-thapuram	Institute of Land Management	ILM

Sl. No.	State	Location	Name of the Institute	Acronyms
16.	Madhya Pradesh	Bhopal	Disaster Management Institute	DMI
17.	Maharashtra	Pune	Yashwantrao Chavan Academy of Development Administration	YASHADA
18.	Manipur	Imphal	State Academy of Training	SAT
19.	Meghalaya	Shillong	Meghalaya State Administration Training Institute	ATI
20.	Mizoram	Aizawal	Administrative Training Institute	ATI
21.	Nagaland	Kohima	Administrative Training Institute	ATI
22.	Orrisa	Bhubaneswar	Gopabandhu Academy of Administration	GAA
23.	Punjab	Chandigarh	Mahatma Gandhi State Inst. of Public Administration	MGSIPA
24.	Rajasthan	Jaipur	Harish Chandra Mathur Rajasthan Institute of Public Administration	HCMRIPA
25.	Sikkim	Gangtok	G.B. Pant Institute of Himalayan Environment & Development	GBPIHED
26.	Tamil Nadu	Chennai	Anna Institute of Management	AIM
27.	Tripura	Agartala	State Institute of Public Administration & Rural Development	SIPARD
28.	Uttar Pradesh	Lucknow	Uttar Pradesh Academy of Administration & Management	UPAAM
*29.	Uttar Pradesh	Lucknow	Deen Dayal Upadhyaya State Institute of Rural Development	DDUSIRD
30.	Uttarakhand	Nanital	Uttarakhand Academy of Administration	UAOA
31.	West Bengal	Kolkata	Administrative Training Institute	ATI

** Approved as Additional Centre in U.P.*

7.6.2 **Additional DM Centres in the States**: Additional centres in 11 states namely, Andhra Pradesh, Bihar, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal and Orissa have been approved in principle by the Government of India. These centres are in the process of being set up in consultation with the concerned states, except that of UP, which has already been set-up

7.6.3 **Centres of Excellence**: The Government of India has further approved setting up of six centres of excellence on specific areas of disaster management (Table 7.4). These centres will conduct research; develop resources and network with related institutions at national, regional and international levels.

Table 7.4: Centres of Excellence

Name of Institution	Specific Types of Disaster
YASHADA, Pune	Drought
DMI, Bhopal	Industrial & Chemical Disasters
AASC, Guwahati	Earthquake
ATI, Kolkata	Flood
MCR HRDI, Hyderabad	Cyclone
UAOA, Nainital	Landslide

7.7 Training of the National Disaster Response Force (NDRF)

7.7.1 There are four training institutes of Central Para Military Forces (CPMFs), (Table 7.5) which impart training to NDRF battalions, namely:

Table 7.5: Location of Training centres

Institute	Acronyms	CAPF	Place
National Industrial Security Academy	NISA	CISF	Hyderabad
Basic Training Centre	BTC	ITBP	Bhanu, Chandigarh
Central Training College -II	CTC-II	CRPF	Coimbatore
BSF Insitute of Disaster Response	BIDR	BIDR	Tekanpur, Gwalior

Besides these institutions, eight battalion level training institutes in NDRF for imparting training to personnel of NDRF are functional.

7.7.2 The NDRF personnel are also trained by other specialised institutes in the country. The details of courses being conducted for the NDRF personnel are given in Table 7.6.

Table 7.6: Details of the Courses for NDRF

Basic courses	Advanced courses
• Basic training course for 1st responders of NDRF Bn, • NBC basic course, • MFR/ CSSR, flood rescue, • deep diving, • basic mountaineering search and rescue, • Heli- slithering.	• Practical training on radiological emergency, • ToT on radiological emergency, • management of industrial and chemical disaster, • radiation safety officer course and radiological and nuclear emergency course, • radiological and nuclear emergency, • chemical and biological emergencies course, • urban search and rescue, • advance course in CSSR, • ToT refresher in MFR/CSSR, • ToT in MFR and CSSR, • earthquake disaster response, • management of dead bodies, • capsule course on NBC emergencies, • TOT in NBC emergency, MOT in NBC, MOT in MFR/CSSR,

(NDRF in search and Rescue operation in Miyagi and Onagawa - Japan Earthquake and Tsunami (March 2011)

Basic courses	Advanced courses
	• MOT in chemical and biological emergencies, auxiliary fire fighting, basic life support, industrial disaster management, • incident management and command system, training programme on DM for NDRF commanders, • rock climbing and slithering, refresher deep diving, training of doctors in DM.

7.7.3 The status of the training of the NDRF personnel till 2009-10 is given in the following Table 7.7.

Table 7.7: Status of Training

Training	Training Partners	No.
CBRN	College of Military Engineering, Pune DRDE, Gwalior Singapore Civil Defence Academy	3,456
Heli-Borne Training	Indian Air Force Base at Nahan, Guwahati, Agra & Bangalore	4,200
Natural Disasters	INSARAG (UNOCHA)Trg. Standard USAID: PEER Programme Under INDO-SWISS Collaboration for Training (INSWIT) , Swiss Development Corporation (SDC) Safety Solutions Inc., Ocala, Florida (USA)	6,021
Water Rescue	Life Saving Society, Kolkata Sea Explorer Institute, Kolkata	5,120
Foreign Trained	Various Courses	61

7.7.4 **Programme for Enhancement of Emergency Response (PEER):** Trainers of Central Industrial Security Force (CISF) and Indo-Tibetan Border Police (ITBP) are trained under the PEER programme. Now they are engaged in conducting courses at their respective training centers i.e. National Industrial Security Academy (NISA) of CISF at Hyderabad and Basic Training Centre (BTC) of ITBP at Bhanu (Haryana), which have been designated as national level training institutes for search and rescue training. In addition, the personnel of BSF and CRPF have also been trained under the PEER programme at NISA, Hyderabad, BTC, Bhanu and BIDR, Tekanpur. Gradually all the four constituents/ components of Central Armed Police Forces of NDRF have been duly involved for getting their personnel on deputation to NDRF trained under this programme.

The programme is expected to facilitate parallel preparations by all the battalions of NDRF reorganised for natural disasters. The last PEER Country Planning meet was held at NDMA, New Delhi from 1-2 February 2010. PEER Regional Planning meeting was recently held at Manila from 29th to 1st April 2011

7.7.5 **Stages of PEER training in India:** India has been a PEER partner since 1998. It was also the first Country to institutionalize PEER courses in designated PEER training institutions. The programme has been held in the following stages-

- PEER Stage -1 1998 TO 2003
- PEER Stage -2 2003 TO 2009
- PEER Stage -3 2009 TO 2014

7.7.6 **PEER MFR and CSSR Graduates in India :** The number of Graduates and Instructors have been shown in the following diagram developed under the programme, till February 2011.

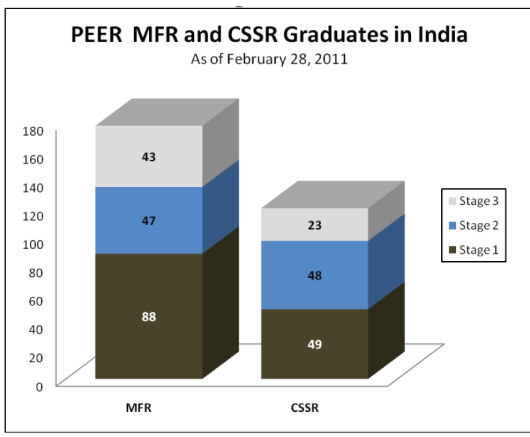


Fig. 7.1

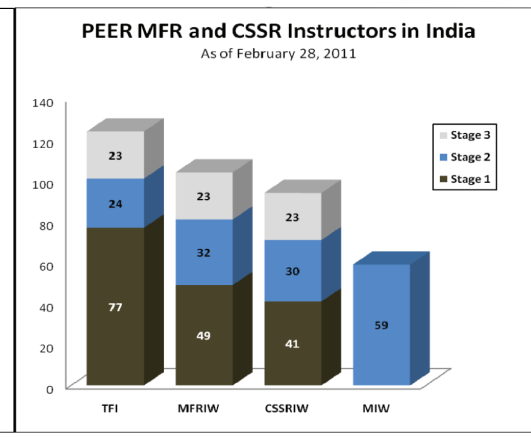


Fig 7.2

7.7.7 **Trainer Developed by Instructors, trained under PEER:** Table 7.8 shows the PEER training of instructors who in turn have developed trainer

Table 7.8: Trainer developed by PEER instructors

Organisation	Institute	Location	Trainers Developed
BSF	BSF Institute Of Disaster Response (BIDR)	Tekanpur	213
CRPF	Central Training College (CTC)	Coimbatore	86
CISF	National Industrial Security Academy (NISA)	Hyderabad	376
ITBP	National Institute for Training in Search, rescue & Disaster Response (NITSRDR)	Bhanu	71

7.7.8 **MFR & CSSR Responders Developed by Instructors Trained under PEER:** Similary these instructors have been used for developing the responder. The outcome may be seen in the Table 7.9.

Table 7.9: Responders developed by PEER Instructor

Sl. No.	Organisation	Institute	Location	Responders Developed
1	BSF	BSF Institute Of Disaster Response (BIDR)	Tekanpur	1386
2	CRPF	Central Training College (CTC)	Coimbatore	1288
3	CISF	National Industrial Security Academy (NISA)	Hyderabad	2244
4	ITBP	National Institute for Training in Search, Rescue & Disaster Response (NITSRDR)	Bhanu	2297

7.7.9 **Capacity Development of community by NDRF:** The state-wise list of community capacity building and public awareness conducted by NDRF Bns (2006-10) are given in the Table 7.10.

Table 7.10: State-wise list of Community Capacity Development & Public Awareness

S.No.	State	Number of Beneficiaries
1.	Gujarat	147,018
2.	North-Eastern states	93,349
3.	Maharashtra	82,735
4.	Rajasthan	79,524
5.	Bihar	74,095
6.	Karnataka	31,809
7.	Haryana	31,349
8.	West Bengal	21,086
9.	Kerala	18,363
10.	Tamil Nadu	16,110
11.	Uttar Pradesh	14,490
12.	Uttarakhand	9,946
13.	Madhya Pradesh	9,550
14.	Himachal Pradesh	7,440
15.	Punjab	7,060
16.	Andhra Pradesh	6,345
17.	Other states	5,412
	Total	655,681

7.8 Incident Response System (IRS)

7.8.1 The incident response system is a standardised method of managing disasters, which is flexible and adaptable to suit any scale of natural as well as man made emergency/incidents.

It has common terminology, organisational flexibility, specialised training, unity and chain of command and well rehearsed coordination mechanism. The system provides specialist incident management teams with an incident commander trained in different aspects of incident management such as logistic, operations, planning, safety, media management etc.

7.8.2 A revised roadmap for training and institutionalisation of IRS in India has been prepared and is under consideration of MHA. The proposed roadmap envisages to increase the strength National Core Group to include all concerned national level training institutes, RTI's and ATI's; expansion of trained State Master Trainers, organising training programmes for Core Group Trainers, State Master Trainers, training of members of national, state and district headquarters and IC teams. The total period for implementation of the revised road map has been estimated at 30 months with a financial outlay of ₹.24.495 crore. The amount for its implementation is proposed to be met from the Capacity Building Grant of the states and Non-Plan fund of MHA.

7.9 National Civil Defence College (NCDC), Nagpur

7.9.1 The first Disaster Management Training Institution of the country was founded on 29th April 1957 at Nagpur as the Central Emergency Relief Training Institute (CERTI) to support the Emergency Relief Organization of the Government of India. This institute organised advanced and specialist training for revenue officials responsible for Disaster Relief Operations against any natural or manmade disaster. CERTI was renamed as National Civil Defence College on 1st April 1968.

7.9.2 Training programmes conducted by NCDC aim to train:

- Volunteers of Civil Defence about the aspects of civil defence so that they could further be trained for specialised jobs in various service in civil defence,
- Local volunteers in Civil Defence Wardens Service, duties before, during and after air raid,
- Staff of control and sub control centres except telephone and wireless operators,
- CD and Home Guards volunteers enrolled as ICO and wardens who have completed the CD Basic Course at a local level,
- Civil Defence Volunteers in basic rescue techniques
- All CD & HG volunteers in category-1A towns against NBC warfare,
- All CD volunteers for specialised jobs for various CD services,
- Civil Defence and Home Guards officers, volunteers and teachers of various, educational institutions to act as an training instructors at the local level,
- Civil Defence and Home Guards volunteers in advance fire fighting,
- Officers and volunteers of Civil Defence/ Home Guards to enable them to detect identify and report any unexploded bomb in the area,
- Civil Defence officers/ personnel in the science of NBC, warfare, possible ways and means of protection against the same and preparation of plan against nuclear threat,
- Civil Defence and Home Guards volunteer's officers and officials and members of rescue service in Disaster Management and relief during disasters,

- Civil Defence instructor's volunteers and Industrial Officers of various categorised towns and important industries in Civil Defence plan.

7.9.3 Various courses conducted by NCDC are given below in Table 7.11

Table 7.11: Courses conducted by NCDC

Category	Courses
General	Civil Defence Programmes
	Civil Defence Instructors (Foundation)
	Training of Trainers (TOT) in Civil Defence
	Disaster Management for Senior Executives from Government & Industries
	TOT in Disaster Psycho-social Intervention (TDPSI)
	Communication for CD Trainers
Response	Unexploded Bombs and Explosive Safety
	Auxiliary Fire Fighting
	Incident Management & Command System
	Flood and Cyclone Disaster Response
	Earthquake Disaster Response
	Advance Search and Response
	Collapse Structures Search & Location
	Emergency Response to Rail Transport Accidents
	Chemical Disaster First Responder
	Biological Incident First Responders
	Emergency Communication Programmes
	Emergency Operations Centre (EOC) Management
	Amateur Radio Communication for Responders
Mitigation	Training of Trainers (TOT) in Radiological & Nuclear Emergencies
	Disaster Management Programmes
	Civil Defence & Disaster Management
	Industrial Disaster Management
Medical	Emergency Medical Response Programmes
	Basic Life Support

7.9.4 The college has been upgraded to one of the main Centres for Disaster Management Training and a nodal center for Radiological, Nuclear, Biological and Chemical Emergency Response Training. It has also been recognised as a premier training establishment in Chemical Disaster Response Training by the Ministry of Environment & Forests. Its up-gradation into 'institution of excellence' at a national level to train a professional cadre of trainers for Disaster Response & Recovery Management is in the final stages of completion and will involve a total cost of ₹ 18.95 crore.

7.9.5 The activity wise progress of Centrally sponsored schemes of Revamping of Civil Defence as on March 2011 is given in the Box 7.1.

Emergency Medical Response training demonstrated by the NCDC

Box 7.1: Status of Programme of Civil Defence as on March 2011

Activities	Details of activities	Present progress
Strengthening of Physical Infrastructures of existing State Training Institutes in 17 States	Upgrading of Physical Infrastructure -₹.60 lakh, Procurement of equipments - ₹ 35 lakh and Transport - ₹11 lakh.	Renovation/ upgradadtion of physical infrastructure and the process for procurement of equipments commenced in 9 states viz Assam, Delhi, Gujarat, Himachal Pradesh, Jammu & Kashmir, Rajasthan, Karnataka, Maharashtra & West Bengal.
Creation of New Training Institutes in 10 States	Creation of Physical Infrastructure - ₹146 lakh, Procurement of equipments - ₹ 35 lakh and Transport - ₹ 11 lakh	Physical possesion of land taken in Bihar, Chattisgarh and Kerala, land earamarked in Arunachal Pradesh, land being identified in Jharkhand, Orissa, Tamil Nadu and Uttarakhand, no action taken by Chandigarh.
Creation of 100 Multi-Hazardous Districts (MHD). List of MHD is in Chapter No. 4 (Table 4.4)	Creation of Physical Infrastructure - ₹14 lakh, Procurement of equipments - ₹20 lakh +987 and Transport - ₹.11 lakh	States have identified the location for physical infrastructures in 100 MHDs.
Pilot project for involving Civil Defence in internal security matters in 40 towns	To train 214 Master Trainers at NCDC, Nagpur and 4280 Trainers in different states.	Training of 214 master trainers completed and 4018 CD volunteers have so far been trained.

Activities	Details of activities	Present progress
Training Camps/ Exercise and demonstrations	₹ 5.5 crore 50% to be borne by the States/ UTs	44 camps in Maharashtra. Goa and Assam were conducted and Firm commitment has been received from 06 state namely Assam (₹ 8 lakh), Gujarat (₹ 12 lakh), Karnataka (₹ 4 lakh), Orissa (₹ 4 lakh), Punjab (₹ 12 lakh) and Rajasthan (₹ 8 lakh) for contribution of matching fund on basis of 50 :50 between the Central Government and State Governments.
Re-orinetation of Civil Defence from a town-centric to district specific approach (100 district to be covered)	₹ 4 crore to be released to states with a view to spread the CD activities over the entire district.	Activity being initiated in 2011-12.
Publicity and Awareness	₹ 3 crore to be partly utilized by States/ UTs and DGCD	A video spot (30 seconds) on CD activities was aired on various TV channels during 16th December 2010 to 25th December 2010 and the process making of documentary film on Civil Defence in progress.

7.10 National Fire Service College (NFSC), Nagpur

7.10.1 The National Fire Service College was established in 1956 as a sub-ordinate establishment of Ministry of Home Affairs with the aim of providing training to the Fire Officers of the country in advanced techniques of fire fighting and rescue, and creating uniformity in the Fire Service organisations and their management across the country. The college initially offered only one course and subsequently additional courses were added to meet the growing need of training in the fire services of the country. The college has so far trained 15197 Fire Officers in the country.

7.10.2 **Courses:** Following courses are conducted by the college:

- Sub- Officers' course,
- Station Officer and Instructors course ,
- Divisional Officers' course.

7.10.3 The course enrollment capacity is variable and depends on the requirement of Fire Brigades in the country. The faculty includes Senior Fire Officers of various public and private sector undertakings, state government, municipal corporation, Fire Brigades, Port Trust, Air Port Authority and they impart comprehensive training on various aspects of fire prevention and fire protection.

7.10.4 **Training Programmes:** The training programmes aim to-

- Impart advanced level of training in Fire and Engineering and Fire Service Management for the supervisory level officers of the fires services of the country,
- Provide elementary knowledge needed for protection of life and property from fires and other natural disasters and to familiarise the trainee officers with the different fire fighting organisations,.
- Train the fire service personnel who are in charge of the fire station or likely to hold independent charge of fire station to look after the fire prevention and protection in the station jurisdiction

and impart training in the theory and practice of the fire prevention and modern fire protection methods.

7.10.5 **Upgradation of NFSC:** A scheme under non-plan head for Upgradation of National Fire Service College Nagpur has been launched in June 2010 for a period of three years at an outlay of ₹ 205 crore. The objective is to enhance the capacity of the National Fire Service College to meet the requirements of specialised professional training in all aspects, namely, fire prevention, fire protection, fire fighting, rescue, specialised emergency response in the event of disaster and also for research documentation and consultancy requirements in the field. The main components of the scheme are as follows:

(i) Construction of technical and non-technical buildings at a cost of ₹ 146.80 crore to be carried out by CPWD,

(ii) Procurement of equipments including training aids and laboratory items at an estimated cost of ₹ 58.20 crore.

Efforts of other Ministries in Capacity Development Programme on DM:

7.11 Ministry of Human Resource Development:

7.11.1 As an effort to mainstream disaster management concerns into the education curricula, NDMA has taken the initiative in conjunction with the Ministry of Human Resource Development, to ensure that DM curriculum forms part of the course curriculum in undergraduate science and humanities courses and medical, engineering, architecture courses besides in school education. It will also focus on the training of teachers and faculties in disaster management. Sarva Siksha Abhiyaan (SSA) will also include the concerns of disaster resilience in their adult literacy curriculum.

7.11.2 **The topics on Disaster Management aim to:**

i. Acquaint students about various disasters that India is vulnerable to and the hazard maps to enable them to visualize these vulnerabilities,

ii. Introduce a few key concepts in disaster management in simple terms, to orient them to the words used in media discussions, analysis etc. when a disaster strikes,

iii. Introduce the concept of being prepared for disaster through simple do-s and don'ts that school children can imbibe and spread to families and community,

iv. Develop interest in the subject through interactive activities in the classroom so that the student seeks more information on disaster.

7.11.3 **Syllabus of different classes from VIIIth to XIth** The Central Board of Secondary Education has taken the initiative of including disaster management topics as frontline curriculum in the subject of social science with effect from 2003-2004 in class VIIIth and extended it to class IXth and Xth in subsequent years. It was extended to class XI in 2005-2006 in the subjects of sociology and geography.

DM syllabus are being introduced in universities. Pune ,Madras, IGNOU, and Indraprastha and many other Universities has already started such courses and it is in the process of getting introduced in Symbiosis, Pune.

Mock drills in the schools by NDRF

7.11.4 NDMA has undertaken to get such courses introduced in undergraduate course. A module has been provided to UGC similarly for introducing such courses in technical institutes. Modules have been provided to AICTE in course of Engineering and architect. ICAR has introduced a DM module for its courses in Agriculture and Vetenary

7.11.5 **Organisation of training programme:** With the financial and technical support from Ministry of Home Affairs and the UNDP under the GOI_UNDP DRM programme (2002-2009), the Central Board of Secondary Education was able to successfully complete two master trainers programmes across the country during the year 2003-2006.These training programme helped the teachers to successfully transect the subject in the class room. Demonstrations were carried out on first aid, search and rescue, evacuation etc by the health department, fire services etc. An impact study on disaster management textbooks was conducted by CBSE in July, 2006 with the purpose of updating the textual material by incorporating recent developments and obtaining feedback from the teacher and students.,. Feedback questionnaires were sent to 180 schools all over the country. The information received from schools was analyzed with the purpose of reviewing and updating the existing text books.

7.12 Ministry of Panchayati Raj & Rural Development

NDMA has advised the Ministry of Panchayati Raj and Rural Development to address the concerns of disaster management in the training of representatives of the Panchayati Raj Institutions and local bodies. The Ministry of Panchayati Raj has also issued a letter N-11012/35/2007-P&J Vol III

dated 1.9.2010 in this regard. Accordingly, all the ongoing and future projects of this ministry should incorporate disaster resilient features into them. States efforts' towards training of Panchayati Raj functionaries and district level officials has been initiated in 11 states in association with IGNOU. Altogether 4,125 government functionaries and 12,375 PRI/ ULB representatives are targeted to be trained in disaster management under this project.

7.13 Conclusions

7.13.1 Disaster management requires trained human resources to deal with complex situation effectively to mitigate the impact of disaster on human life and property. Capacity Development is an integral process of knowledge and skill building. Capacity may include physical, institutional, social or economic means as well as skilled personal or collective attributes such as leadership and management. Capacity Development is much more then training and it includes human resource development, equipping individual with understanding, skills and access to information, knowledge and training that enables him to perform effectively.

7.13.2 National Policy on Disaster Management (NPDM) describes its approach to capacity development. NPDM further elaborates on National priorities, institutional capacity development, training communities, professional technical education, DM education in school, training to artisan and training to other group. Capacity development has focused on training of the DM officials, functionaries, trainers, elected representatives and community representatives. Various institutions like, NDMA, NIDM, NCDC, NFSC and ministries have developed the capacity development programme for disaster management.

7.13.3 The details included in this chapter are only illustrative and not exhaustive. Capacity Development strategies are now being mainstreamed in most of the ministries and Government department at National, State and District level to equip the DM personal and community with advance knowledge and skill in disaster management. It is expected that once the National Human Resource and Capacity Development Plan is adopted, it will help in mainstreaming the capacity development in different activities of the ministries of Government of India concerned, state government and other stakeholders.

8 Financial Arrangements

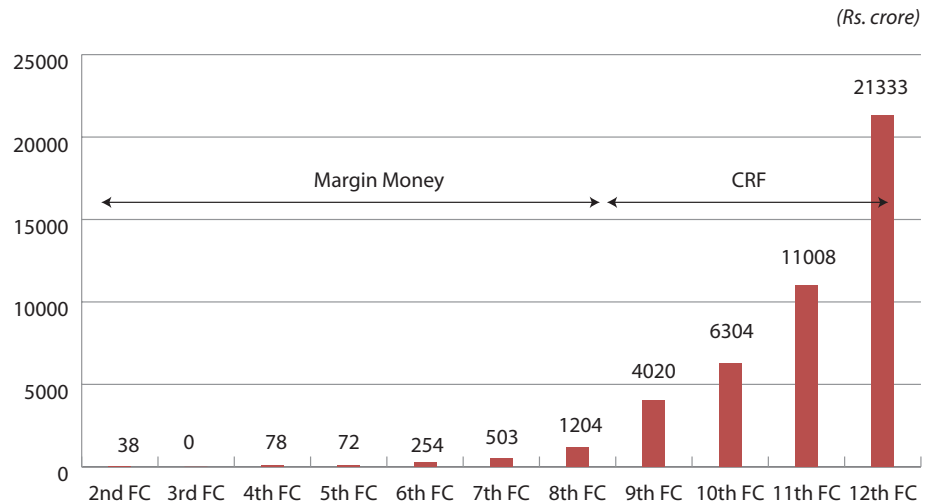
8.1 Financing the Relief Expenditure

Financial assistance in the wake of natural calamities is provided in accordance with the schemes of relief funds. These schemes are based on the recommendations of the successive Finance Commissions. While the budgetary provision of these relief funds is dealt with by Ministry of Finance, the processing of request of the state government for these funds is done by the Ministry of Home Affairs (DM Division). The present scheme of State Disaster Response Fund (SDRF) and National Disaster Response Fund (NDRF) are based on the recommendations of the 13th Finance Commission, operative from 1st April 2010 to 31st March 2015.

8.2 Recommendation of 13th Finance Commission

On the recommendation of the 13th Finance commission, the Minister of Finance GOI has allocated funds for strengthening disaster management institutions, capacity building and response mechanisms. Allocation made by Finance Commission towards erstwhile calamity Relief Fund may be seen from Fig. 8.1.

Figure 8.1: Allocation made by Finance Commission towards erstwhile calamity Relief Fund



The Central assistance in the form of Margin Money Scheme (MMS) has continued in operation from 2nd to 8th Finance Commission. Later MMS got revised for funding relief expenditure from CRF and NCCF with the objectives:

(i) the assistance extended to the State in accordance with their need,
(ii) relief to the victim is quick,
(iii) state to have greater functioning avenues,
(iv) state to be given more accessibility.

8.2.1 **State Disaster Response Fund:** Section 48 (1) of Disaster Management Act 2005 provides for constitution of State Disaster Response Fund (SDRF) by the state Governments. The Ministry of Home Affairs has issued the guidelines to the state for operation of SDRF. Allocations to the State Relief Funds have been made based on the recommendations of the successive Finance Commissions. While allocating the funds to various states for a period of five years the factors considered include the expenditure incurred by the state government on relief operations

during the last about 10 years, vulnerability of the state to natural disasters and economic status of the state. Currently, as per the recommendations of the 13th Finance Commission, the GoI has approved an allocation of ₹ 33580.93 crore in the State Disaster Relief Fund to all the states, comprising of ₹ 25847.93 crore as central share and ₹ 7733.00 crore as state share. The scheme of SDRF provides for release of the central share SDRF in two equal installments in the months of June and December. A statement showing the state- wise and year wise allocation to the SDRF for the period 2010-15 is given in the Table 8.1.

Table 8.1: State-wise Allocation of State Disaster Response Fund (₹ in crore)

Sl. No	States	2010-11	2011-12	2012-13	2013-14	2014-15	Total
1	Andhra Pradesh	508.84	534.28	560.99	589.04	618.49	2811.64
2	Arunachal Pradesh	36.74	38.58	40.51	42.54	44.67	203.04
3	Assam	263.77	276.96	290.81	305.35	320.62	1457.51
4	Bihar	334.49	351.21	368.77	387.21	406.57	1848.25
5	Chhattisgarh	151.32	158.89	166.83	175.17	183.93	836.14
6	Goa	2.96	3.11	3.27	3.43	3.6	16.37
7	Gujarat	502.12	527.23	553.59	581.27	610.33	2774.54
8	Haryana	192.9	202.55	212.68	223.31	234.48	1065.92
9	Himachal Pradesh	130.76	137.3	144.17	151.38	158.95	722.56
10	Jammu & Kashmir	172.46	181.08	190.13	199.64	209.62	952.93
11	Jharkhand	259.45	272.42	286.04	300.34	315.36	1433.61
12	Karnataka	160.96	169.01	177.46	186.33	195.65	889.41
13	Kerala	131.08	137.63	144.51	151.74	159.33	724.29
14	Madhya Pradesh	392.75	412.39	433.01	454.66	477.39	2170.2
15	Maharashtra	442.69	464.82	488.06	512.46	538.08	2446.11
16	Manipur	7.22	7.58	7.96	8.36	8.78	39.9
17	Meghalaya	14.65	15.38	16.15	16.96	17.81	80.95
18	Mizoram	8.55	8.98	9.43	9.9	10.4	47.26
19	Nagaland	4.97	5.22	5.48	5.75	6.04	27.46
20	Orissa	391.58	411.16	431.72	453.31	475.98	2163.75
21	Punjab	222.92	234.07	245.77	258.06	270.96	1231.78
22	Rajasthan	600.66	630.69	662.22	695.33	730.1	3319
23	Sikkim	22.75	23.89	25.08	26.33	27.65	125.7
24	Tamil Nadu	293.52	308.2	323.61	339.79	356.78	1621.9
25	Tripura	19.31	20.28	21.29	22.35	23.47	106.7
26	Uttar Pradesh	385.39	404.66	424.89	446.13	468.44	2129.51
27	Uttarakhand	117.66	123.54	129.72	136.21	143.02	650.15
28	West Bengal	304.83	320.07	336.07	352.87	370.51	1684.35
	Total	6077.3	6381.18	6700.22	7035.22	7387.01	33580.93

Source: Annex.11.1, Thirteenth Finance Commission Report, pp 450, Ministry of Finance, GoI

8.3. National Disaster Response Fund (NDRF)

8.3.1 Section 46(1) of DM Act 2005 provides for constitution of NDRF for meeting any threatening disaster management situation or disaster. Accordingly, DM Division issued notification for the constitution of NDRF on 28th September 2010. The Finance Ministry has also issued guidelines to the state for operation of NDRF.

8.3.2 **Sourcing of National Disaster Response Fund (NDRF):** The Government of India raised this Fund by levying the "National Calamity Contingency Duty" on imported petrol and products, crude oil, motor cars, imported multi utility vehicles, two wheelers, mobile phones, pan masala and certain specific tobacco products. The collection for year 2009-10 was ₹ 3160.00 crore and was expected to be around ₹ 3900.00 crore in the financial year 2010-2011. For the year 2011-12, the estimate is ₹ 4525.00 crores.

8.3.3 **Additional Financial Assistance:** Over and above the provisions of the SDRF, funding is provided from the NDRF in the wake of calamities of severe nature. On receipt of the memorandum from the affected states, an Inter Ministerial Central Team comprising of representatives of the central ministries/ departments is constituted and its report after examination by the Inter Ministerial Group (IMG) headed by Home Secretary is placed before the High Level Committee (HLC) for their consideration and approval of funds from NDRF. The composition of HLC is given in the Policy and Guideline, Chapter-2, which at present are headed by Finance Minister with Home Minister, Minister for Agriculture and Vice Chairman of Planning Commission as its member on the committee.

8.4 Monitoring of Expenditure from Relief Funds

The Ministry of Home Affairs oversees the operations of SDRF and monitors its compliance with these guidelines. A format for monitoring the relief expenditure in accordance with the extant items and norms of assistance has been prescribed. A web based computerized tracking system has also been developed for monitoring the relief expenditure. The Accountant General of the State maintains the accounts of the SDRF. The Comptroller & Auditor General of India audits SDRF every year.

8.5 Disaster Response Reserve

In the context of disaster relief, the 13th Finance Commission has observed that procurement of relief materials on short notice is often associated with premium in pricing and could adversely impact quality. The Commission also felt that a national inventory of equipment and material should be maintained for providing immediate relief. It is advisable to keep an inventory of items such as life saving equipment and tents etc. with the NDRF. The Commission has accordingly recommended an initial grant of ₹.250.00 crores in the form of a revolving fund to be provided to the NDRF for this purpose. Whenever these items are used for responding to a calamity, the cost (or rent for those items that can be reused) should be booked to the overall cost of relief operations incurred by the state government and the inventory replenished on a regular basis. A proposal to constitute this fund along with guidelines for its operations is under consideration of the government.

8.6 Capacity Building Grant

On the recommendation of the 13th Finance Commission, ₹ 525.00 crore has been allocated to the states for taking up activities for building capacity in the administrative machinery. The state wise allocation for the period 2010-15 is given in Table No- 8.2. The Ministry of Finance has issued the guidelines for the utilization of the fund. The guidelines provide for preparation of an action plan for the entire period of 2010-15 as well as action plans for each financial year. These plans would inter alia include items for training and capacity building of stakeholders and functionaries in states, preparation of disaster management plans based on hazard, risk and vulnerability analysis and setting up and strengthening of emergency operations centres in states.

Table 8.2: State-wise Grant Allocation for Capacity Building for Disaster Response (₹ in crore)

Sl. No	States	2010-11	2011-12	2012-13	2013-14	2014-15	Total
1	Andhra Pradesh	6.00	6.00	6.00	6.00	6.00	30.00
2	Arunachal Pradesh	1.00	1.00	1.00	1.00	1.00	5.00
3	Assam	5.00	5.00	5.00	5.00	5.00	25.00
4	Bihar	5.00	5.00	5.00	5.00	5.00	25.00
5	Chhattisgarh	4.00	4.00	4.00	4.00	4.00	20.00
6	Goa	1.00	1.00	1.00	1.00	1.00	5.00
7	Gujarat	6.00	6.00	6.00	6.00	6.00	30.00
8	Haryana	5.00	5.00	5.00	5.00	5.00	25.00
9	Himachal Pradesh	4.00	4.00	4.00	4.00	4.00	20.00
10	Jammu & Kashmir	4.00	4.00	4.00	4.00	4.00	20.00
11	Jharkhand	5.00	5.00	5.00	5.00	5.00	25.00
12	Karnataka	4.00	4.00	4.00	4.00	4.00	20.00
13	Kerala	4.00	4.00	4.00	4.00	4.00	20.00
14	Madhya Pradesh	5.00	5.00	5.00	5.00	5.00	25.00
15	Maharashtra	5.00	5.00	5.00	5.00	5.00	25.00
16	Manipur	1.00	1.00	1.00	1.00	1.00	5.00
17	Meghalaya	1.00	1.00	1.00	1.00	1.00	5.00
18	Mizoram	1.00	1.00	1.00	1.00	1.00	5.00
19	Nagaland	1.00	1.00	1.00	1.00	1.00	5.00
20	Orissa	5.00	5.00	5.00	5.00	5.00	25.00
21	Punjab	5.00	5.00	5.00	5.00	5.00	25.00
22	Rajasthan	6.00	6.00	6.00	6.00	6.00	30.00
23	Sikkim	1.00	1.00	1.00	1.00	1.00	5.00
24	Tamil Nadu	5.00	5.00	5.00	5.00	5.00	25.00
25	Tripura	1.00	1.00	1.00	1.00	1.00	5.00
26	Uttar Pradesh	5.00	5.00	5.00	5.00	5.00	25.00
27	Uttarakhand	4.00	4.00	4.00	4.00	4.00	20.00
28	West Bengal	5.00	5.00	5.00	5.00	5.00	25.00
	Total	105.00	105.00	105.00	105.00	105.00	525.00

Source: Annex 11.3 of Thirteenth Finance Commission Report Vol. II, Ministry of Finance, GoI

8.7 Revamping of Fire Services

The 13th Finance Commission has recommended, a grant of ₹ 87519 crore to the Local Bodies including municipalities, a portion of which is available for revamping of fire services within their respective jurisdictions of municipalities. These bodies could provide financial support to the State Fire Services Department towards this objective. The states will be eligible to draw their

share from the grant only if they comply with nine conditions. One of these conditions is "All municipal corporations with a population of more than 1 million (2001 census) must put in place fire hazard response and mitigation plan for their respective areas." An additional fund of ₹ 472 crore has been allocated to seven states. The distribution of funds is given as follows:

Table 8.3: State-wise Grant Allocation for Revamping of Fire Services **(₹ in Crore)**

Sl. No.	States	Allocation of Funds
1	Andhra Pradesh	17.00
2	Haryana	100.00
3	Mizoram	20.00
4	Orissa	150.00
5	Tripura	15.00
6	Uttar Pradesh	20.00
7	West Bengal	150.00
	Total	472.00

Source: Thirteenth Finance Commission Report, Ministry of Finance, GoI

Guidelines: The Ministry of Finance has issued guidelines to the state governments vide its letter no. 12(2) FCD/2010 dated 23.09.2010 for utilization of the grant recommended by the 13th Finance Commission for rural and urban local bodies.

8.8 Environmental Relief Fund

8.8.1 In exercise of the powers conferred by Section 7(A) of the Public Liability Insurance Act, 1991, the Central Government has established the Environment Relief Fund Scheme on 4th November, 2008**.** The United India Insurance Company Ltd. (UIICL) is the "Fund Manager" of the ERF Scheme for a period of five years starting from the date of notification. UIICL has opened the Environment Relief Fund account with State Bank of Travancore, Chennai. As per the information available till February 2011 the amount in ERF account was about ₹ 322 crore (as on 31.03.2010). Funds in the ERF account is to be placed in fixed deposits. The interest earned from such investments is reinvested on a quarterly basis. The amount from all insurance companies is transferred to the ERF account on the last working day of every month.

Box 8.1: Public Liability Insurance Act, 1991

Relief to victim to Chemical Disasters

The Public Liability Insurance Act was notified to provide immediate relief to the persons affected by accidents occurring while handling of hazardous substances, on a "no fault basis".

Salient Features of the PLI Act and the associated Rules are as follows:

What is covered?

- Death and injury to persons (other than workmen)
- Damage to private property.

What is not covered?

- Damage to natural resources, (as it is difficult to quantify such damages)
- Damage to government property
- Relief to workmen; as workmen are covered under the Workmen's Compensation Act 1923.

Owner's Responsibility:

- It is mandatory for industries involved in operations or processes of hazardous substances in quantities notified under the Act to take Public Liability Insurance cover for immediate relief to victims or damage to property, on a scale prescribed in the Schedule to the Act.
- Notification dated 24.03.1992 issued under clause (d) of the Section 2 of the Act lists 179 explosive, toxic and highly reactive chemicals along with their quantities and defines flammable substances, which are within the scope of the Act.
- Those affected are free to approach the Courts of Law for compensation higher than the prescribed amount.
- Every owner to renew insurance policy before the expiry of the period of validity so as to ensure that the policy is in force during the period of handling of hazardous substances.
- Amount of insurance policy taken out by an owner shall not be less than the amount of paid up capital and may not exceed fifty crore rupees.
- Owner to pay an amount equal to the amount of premium of insurance policy to insurer for onward transfer to an Environment Relief Fund (ERF). The insurer is to remit this amount further to ERF.
- Owners exempted under section 4(3) of the Act to create Public Liability Insurance Fund with State bank of India or with any other nationalized bank for the purpose of meeting liability arising out of any claim awarded. No such exemptions have been granted so far by the government.

Who can claim?

- A person (other than workmen), who has sustained the injury
- Owner of property to which damage has been caused
- Legal representative of the deceased; in case of death.

Extent of Liability:

- Maximum aggregate liability of the insurer to pay relief under an award to several claimants;
  - (On any one accident) –₹ 5 crore.
  - (On more than one accident; Any one year)- ₹15 crores, in aggregate.
- Insurer's liability not to exceed sum insured under insurance policy.
- If an award exceeds the amount payable under the insurance policy; it is to be met from the Environmental Relief Fund (ERF).
- If an award exceeds the amount of insurance policy and the amount of ERF; the owner to pay shortfall.

Responsibility of District Collector and Agencies for Enforcement:

- The Collector may make an award determining the amount of relief which according to him is justified.
- The Collector has the powers of the Civil Court for the purpose of holding enquiry, etc.
- The central government has delegated its powers to issue direction to state governments and has authorized certain authorities/ officers for the purpose of checking enforcement.

Time Frame:

- Application for relief is to be made within five years of the occurrence of the accident.
- A claim for relief is to be disposed of as expeditiously as possible, preferably within three months of receipt of application.
- The amount of award is to be deposited within 30 days from the date of its announcement to the District Collector by insurer/owner.

Penalties:

- Whoever fails to comply with any direction issued under this Act or contravenes any of the provisions, is punishable for imprisonment of a term not less than one and half years, which can be extended up to six years or with a fine which shall not be less than Rupees One lakh or both.
- If any owner fails to comply with directions/order or obstructs discharge of duties/functions of prescribed authority under the Act, he/she is punishable with imprisonment, which may extend up to three months or with a fine of maximum ten thousand rupees, or with both.

8.8.2 **Immediate Relief as per the Schedule of PLI Act, 1991**

The scales of relief vide the Act is outlined as follows:

(a) For fatal accident: ₹ 25,000/-; in addition to medical expenses maximum up to ₹12,500/-

- For permanent total or permanent partial disability or other injury or sickness:
- Medical expenses up to ₹ 12,500/- in each case

(b) Cash relief on basis of percentage of disablement as certified by authorized physician

- 100 percent permanent disability-₹ 25,000/-
- For loss of wages due to temporary disability (in case of reduced earning capacity)

(c) Fixed monthly relief not exceeding ₹ 1000 per month up to maximum three months (provided time for hospitalization is more than 03 days and victim is above 16 years in age). For property damage - ₹ 6,000/-

8.9. Plan Schemes

8.9.1 **Strengthening of Fire and Emergency Services:** A Scheme for Strengthening of Fire and Emergency Service in the country was launched in 2009 with an outlay of ₹ 200 crores, (2009-2012). The state-wise allocation of funds for conducting activities under the scheme is given in Table 8.4.

Table 8.4: State-wise Allocations of Grants in Aid (₹ in lakh)

Sl. No.	States	Centre Allocation	State Government Contribution
1	Andhra Pradesh	837.00	209.25
2	Arunachal Pradesh	372.00	37.20
3	Assam	437.00	43.70
4	Bihar	703.00	175.75
5	Chhattisgarh	979.00	244.75
6	Goa	38.00	9.50
7	Gujarat	1250.00	312.5
8	Haryana	361.00	90.25
9	Himachal Pradesh	403.00	100.75
10	Jammu & Kashmir	266.00	66.50
11	Jharkhand	342.00	85.50
12	Karnataka	513.00	128.25
13	Kerala	266.00	66.50
14	Madhya Pradesh	2355.00	588.75
15	Maharashtra	665.00	166.25
16	Manipur	471.00	47.14
17	Meghalaya	483.00	48.30
18	Mizoram	327.00	32.70
19	Nagaland	552.00	55.20

Sl. No.	States	Centre Allocation	State Government Contribution
20	Orissa	970.00	242.50
21	Punjab	323.00	80.75
22	Rajasthan	1708.00	427.00
23	Sikkim	151.00	15.10
24	Tamil Nadu	1045.00	261.25
25	Tripura	76.00	7.60
26	Uttar Pradesh	1330.00	332.50
27	Uttarakhand	247.00	61.75
28	West Bengal	342.00	85.50

8.9.2.**Revamping of Civil Defence Setup:** The Government of India has launched a Centrally Sponsored Scheme in April 2009 with an outlay of ₹100 crore during the 11th Five Year Plan for revamping of Civil Defence setup in the country (2009-2012). The state-wise allocations of funds for conducting the above stated activities are given in Table 8.5.

Table 8.5: State-wise Allocations of Grants in Aid for revamping of civil defence (₹ in lakh)

Sl. No.	States/UTs	Centre Allocation	State Contribution
1	Andaman & Nicobar Islands	199.50	2.00
2	Andhra Pradesh	238.20	4.00
3	Arunachal Pradesh	195.50	0
4	Assam	556.20	16.00
5	Bihar	410.50	5.00
6	Chandigarh	202.50	2.75
7	Chhattisgarh	206.50	2.50
8	Delhi	270.20	17.50
9	Goa	108.00	3.50
10	Gujarat	742.20	27.50
11	Haryana	390.20	10.00
12	Himachal Pradesh	163.20	2.00
13	Jammu & Kashmir	792.20	15.00
14	Jharkhand	308.00	4.25
15	Karnataka	154.20	5.00
16	Kerala	195.50	0
17	Madhya Pradesh	143.20	3.50
18	Maharashtra	423.20	14.00
19	Manipur	7.00	2.00
20	Meghalaya	126.20	3.00

Sl. No.	States/UTs	Centre Allocation	State Contribution
21	Nagaland	8.00	4.00
22	NCDC, Nagpur	7.20	0
23	Orissa	467.00	9.00
24	Punjab	728.20	25.00
25	Rajasthan	325.20	22.50
26	Sikkim	114.20	2.00
27	Tamil Nadu	196.50	0
28	Tripura	114.20	2.00
29	Uttar Pradesh	10540	40.00
30	Uttarakhand	205.50	2.00
31	West Bengal	730.20	29.00

8.10. Non-Plan Schemes

The scheme for Financial Assistance to Administrative Training Institutes (ATIs) and other Training Institutes in states/UTs for the operation of Disaster Management Centres was approved in 2007 to be implemented during period 2007-2012.

Table 8.6: Year-wise Allocations of Grants in Aid (₹ in lakh)

Financial Year	Financial Assistance
2007-08	100.00
2008-09	400.00
2009-10	600.00
2010-11	650.00
2011-12	750.00
Total	2500.00

8.11. Externally Aided Schemes

Besides the fund which are available through pln and non-plan schemes, efforts have also been made by the centre to mobilize the resources from external funding agencies for vulnerabilities assessment, capacity development, Institutional strengthening of response mechanism and mitigation measures etc. In the past, the Government has supported the State for reconstruction and rehabilitation of Earthquake and Tsunami affected people for their rehabilitation through aid from Word Bank and other such external funding agencies.

8.11.1 **UNDP - GOI Disaster Risk Reduction Programme:** A programme with external aid form United Nations Development Program (UNDP) known as GOI- UNPD is being implemented by NDMA with an outlay of USD 12.6 million (approximately ₹ 63 crore) and by MHA with an outlay of USD 7.4 million (₹ 37 crore) for the period of 2009-2012. The Joint Secretary, Ministry of Home Affairs is the National Programme Director for URR component and Joint Secretary, NDMA is the National Programme Director for DRR component. The programme is being implemented in all the states, as per Table 8.7.

Table 8.7: State-wise Allocations of Grants in Aid (₹ in lakh)

Sl. No	States	Allocation for DRR	Allocation for URR
1	Andhra Pradesh	150	100
2	Arunachal Pradesh	150	75
3	Assam	150	100
4	Bihar	150	50
5	Chhattisgarh	150	50
6	Delhi	150	*
7	Goa	150	*
8	Gujarat	150	50
9	Haryana	150	50
10	Himachal Pradesh	150	50
11	Jammu & Kashmir	150	100
12	Jharkhand	150	75
13	Karnataka	150	25
14	Kerala	150	150
15	Madhya Pradesh	150	25
16	Maharashtra	150	125
17	Manipur	150	50
18	Meghalaya	150	50
19	Mizoram	150	125
20	Nagaland	150	50
21	Orissa	150	100
22	Punjab	150	50
23	Rajasthan	150	50
24	Sikkim	150	50
25	Tamil Nadu	150	50
26	Tripura	150	100
27	Uttar Pradesh	150	225
28	Uttarakhand	150	100
29	West Bengal	150	100

8.11.2 **GoI-USAID Disaster Management Support Project:** The Government of India has signed a Project Grant Agreement with U.S. Agency for International Development (USAID) for implementation of the Disaster Management Support (DMS) Project. The agreement was signed in 2003. The period of the agreement has been extended up to 2015.

Financial Support: The total outlay of the project is USD 4.715 million (comprising of USD 420,000 for training studies, USD 500,000 for equipments and USD 3.795 million for technical assistance) and USD 5.0 million to integrate Disaster Risk Reduction and Climate Change.

8.11.3 **National Cyclone Risk Mitigation Project:** The Government of India has approved a National Cyclone Risk Mitigation Project (NCRMP), to be implemented in cyclone prone coastal states/UTs with external aid from the World Bank during the period 2011 to 2015.

The allocation of funds activities wise and state wise is given as under in Table 8.8.

Table 8.8: Major Activities under NCRMP (₹ in crore)

(i)	Community mobilisation and training	72.75
(ii)	Cyclone Risk Mitigation Infrastructure (construction of cyclone shelters, roads/missing links and construction/repair of saline embankments etc.)	1164
(iii)	Technical assistance for capacity building on Disaster Risk Management (risk assessment, damage and need assessment)	29.1
(iv)	Implementation assistance (operational cost, technical assistance cost and IEC material etc.)	95.06
(v)	Others	135.8

The state-wise allocation of the funds is given as follows.

Table 8.9: State-wise Allocations of Grants in Aid for NCRMP (₹ in Crore)

Sl. No.	States	Centre Allocation	State Contribution
1	Andhra Pradesh	626.87	165.13
2	Orissa	520.93	132.85

8.12. Items and Norms of Assistance for Relief from NDRF and SDRF

The Ministry of Home Affairs has prescribed items and norms of expenditure for relief operations. These items and norms of assistance from relief funds are comprehensively reviewed after the receipt of the award of the successive Finance Commissions. These norms are revised based on report of the expert group constituted by MHA which consults all the state governments and concerned central ministries/ departments. The present Items and Norms of assistance for relief may be visited www.mha.nic.in.

8.13 Conclusion

While the post disaster relief and reconstruction is resource intensive, the Government has taken care to ensure that there are established financial mechanisms available both at the state and central level to address the resource requirements for such eventualities. The present scheme of State Disaster Response Fund (SDRF) and National Disaster Response Fund (NDRF) are based on the recommendation of 13th finance commission operated from 1st April 2010 to 31st March 2015. For disasters needing central support over and above the SDRF, the processing of the request of the state government for support from the Government of India is done by Ministry of Home Affairs (DM Division) while the budgetary provisions for the relief funds is dealt with by the Ministry of Finance. It is to be noted that the funds have also been allocated for strengthening of Disaster Management Institutions, Capacity Development of stakeholder's, prevention & mitigation and the response mechanism. Efforts are also underway to ensure that the mitigation and prevention of disaster are also given adequate importance by utilizing these funds so that the impact of the disasters is minimized.

9 International Cooperation

9.1 Overview

India has played an important role in global initiatives on disaster management. With multi dimensional initiatives and expertise, India is taking a leading role in strengthening regional cooperation among South Asian countries for reducing disasters. Further, India has hosted the SAARC Disaster Management Centre in New Delhi with a clear mandate for enhancing regional cooperation. India is a signatory to the Hyogo Framework of Action and is committed to achieving the goals set under it through systematic and sustained efforts under the five priority action areas mentioned in the framework. The succeeding paragraphs give a brief account of international and regional organisations working in the disaster management along with India's participation.

9.2 Hyogo Framework of Action

9.2.1 Representatives from 168 countries participated in the global conference on Disaster Risk Reduction in January 2005 in Kobe, Japan. The Hyogo Framework of Action (HFA) 2005-2015 was adopted to work globally towards sustainable reduction of disaster losses in lives and in the social, economic and environmental assets of communities and countries. The framework set three strategic goals and five priority action areas given as under:-

9.2.2 **Three Strategic Goals:** Followings are the goals as agreed to under the HFA-

(i) The more effective integration of disaster risk reduction into sustainable development policies, planning and programming at all levels, with a special emphasis on disaster prevention, mitigation, preparedness and vulnerability reduction.

(ii) The development and strengthening of institutions, mechanisms and capacities at all levels in particular at the community level that can systematically contribute to building resilience to hazards.

(iii) The systematic incorporation of risk reduction approaches into the design and implementation of emergency preparedness, response and recovery programmes in the reconstruction of the affected communities.

9.2.3 **Five Priority Action Areas:** Under the HFA the following priority areas have been identified for the countries to concentrate in their efforts for making the countries disaster resilent.

(i) Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation,

(ii) Identify, assess and monitor disaster risks and enhance early warning,

(iii) Use knowledge, innovation and education to build a culture of safety and resilience at all levels,

(iv) Reduce the underlying risk factors,

(v) Strengthen disaster preparedness for effective response at all levels.

9.2.4 **Key Activities:** Following key activities are envisaged under this framework

- Promote socio-economic development practices,
- Land-use planning and other technical measures,

- Strengthening of institutional and technical capacities,
- Review and implement preparedness and contingency plans,
- Promote voluntarism and community participation,
- Creation of provision of emergency funds,
- Dialogue, coordination and exchange of information between disaster managers and development sectors.

9.2.5 India is one of the participating countries and works closely with the UN-ISDR to implement the Priority Areas of HFA for DRR. There is a Biennial Monitoring Framework developed by UN-ISDR and a National Progress Report submitted accordingly with UN-ISDR. To implement the framework's activities, a Working Group has been constituted under the Chairmanship of Joint Secretary (DM), MHA. The group comprises representatives from Ministries of Rural Development, Panchayati Raj, Urban Development, Health and Family Welfare, Environment and Forests, Women and Child Development, Earth Sciences, Science and Technology and also from Planning Commission, NIDM and NDMA.

9.2.6 The responsibilities of the concerned ministry, agency and department to implement key activities as resolved in HFA are given in Box. 9.1.

Box 9.1: Ministries designated for HFA initiatives	
Priority Action - 1 Ensure that disaster risk reduction is a national and a local priority with a strong institutional basis for implementation.	Ministry of Panchayati Raj, NIDM for human resources, Planning Commission for financial resources, DM Division of MHA.
Priority Action 2: Identify, assess and monitor disaster risks and enhance early warning.	National Remote Sensing Agency, Central Water Commission, India Meteorological Department, Geological Survey of India, DM Division of MHA.
Priority Action 3: Knowledge, innovation and education to build a culture of safety and resilience at all levels.	NIDM,DM Division of MHA, CBSE, NCERT, other research organizations, NDMA, Ministry of Health, HRD, and
Priority Action 4: Reduce the underlying risk factors	Ministry of Environment and Forest, Rural Development, Science and Technology, Health and Family Welfare, Urban Development, Planning Commission, DM Division of MHA, NIDM and NDMA.
Priority Action 5: Strengthen disaster preparedness for effective response at all levels.	DM Division of MHA.

9.3 Agencies of United Nations involved in Disaster Management

There are various UN organizations engaged in the field of disaster management. Many of such organisation have direct linkages with UN's mainstream body, where as other's are evolved and are developed from the region of Asia, which have been most vulnerable to earthquake and cyclone. India has been actively involved in their setting up besides being members on the basis of its full time membership. A brief overview of such organizations has been presented in the following paras:

9.4 United Nations International Strategy for Disaster Reduction (UNISDR)

9.4.1 At the end of the International Decade for Natural Disaster Reduction in July 1999, the International Programme Forum adopted the Geneva Mandate on Disaster Reduction, together with the strategy document, "The Forum recommended that in international cooperative framework for disaster reduction be maintained and strengthened.

9.4.2 In December 1999, General Assembly Resolution 54/219 created the UNISDR, as a successor of the secretariat of the International Decade for Natural Disaster Reduction, in 2001. Assembly resolution 56/195 mandated the secretariat to serve as the focal point in the United Nations System for the coordination of disaster reduction and to ensure synergies among the disaster reduction activities of the United Nations Systems and regional organizations and activities in socio-economic and humanitarian field

9.4.3 In 2005, the assembly, through resolution 60/195, endorsed the" Hyogo Declaration" and "Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and communities to Disaster" adopted by the world conference on Disaster Reduction, held in Kobe, Hyogo, Japan. The Hyogo Framework for Action has tasked the ISDR Secretariat with supporting the implementation for the strategic objectives identified therein.

9.4.4 **Mission:** In order to build the resilience of nations and communities to disasters through the implementation of the HFA , the UNISDR strives to catalyze, facilitate and mobilise the commitment and resources of national, regional and international stakeholders of the ISDR system.

9.4.5 The mission of UNISDR is to be an effective coordinator and guide all its ISDR partners, globally and regionally, to:

- Mobilise political and financial commitments to disaster risk reduction and Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters (HFA);
- Develop and sustain a robust, multi stake-holder system;
- Provide relevant knowledge and guidance.

9.4.6 **Functions and Responsibilities:** The International Strategy for Disaster Reduction (ISDR) was adopted by United Nations Member States in 2000 and is owned by local, national, regional and international organisations. UNISDR is led by an Assistant Secretary-General for Disaster Risk Reduction and overseen by the Under-Secretary-General for Humanitarian Affairs, who also serves as the Chair for the wider ISDR system of partnerships. The mandate of UNISDR is to act as the focal point in the United Nations system for the coordination of disaster reduction and to ensure that disaster risk reduction becomes integral part to sound and equitable development, environmental protection and humanitarian action.

9.4.7 **ISDR mechanisms:** The various mechanisms have been developed to achieve the mission which are enumerated as follows:

- The biennial Global Platform for Disaster Risk Reduction (GFDRR) acts as the main global forum for continued and concerted emphasis on disaster reduction. Open to all states and the ISDR stakeholders, it primarily assesses the progress made in the implementation of the HFA, enhances awareness of disaster risk reduction, share experiences and learn from good practices, also identify remaining gaps and necessary actions to accelerate national and local implementation;

- It acts as Regional platforms for disaster risk reduction, including ministerial meetings, led by regional inter-governmental organisations.
- As an Inter-Agency Group it acts as a venue for ISDR system joint work programming among the participating organisations (currently FAO, IFRC, ILO, OCHA, UNDP, UNEP, UNESCO, UNICEF, WFP, WHO, WMO and the World Bank). Thematic platforms led by UN specialised agencies or technical institutions provide knowledge products and help to report on developments (for instance early warning, recovery, education, risk identification) etc.
- The Under-Secretary-General for Humanitarian Affairs also convenes a Management Oversight Board with his peers (from OCHA; UNDP representing UNDG; the World Bank; WMO; UNEP; and IFRC). This Board supports the Chair in providing UN system-wide leadership and high-level advocacy for disaster risk reduction.
- Several stakeholder groups and networks associated with ISDR – among them include a Scientific Technical Committee, Global NGO Network for DRR, Gender-and-Disasters, media groupings, an emerging Parliamentarian Network and member state, which participate actively in ISDR, are called upon in GA and HFA resolution to establish multi stakeholder national platform for disaster risk reduction to facilitate coordination across sector.

9.5. United Nation Disaster Management Team (UNDMT)

The UNDMT in India is a team comprising of UN agencies such as FAO (Food and Agriculture Organization), ILO (International Labour Organization), UNDP (United Nations Development Programme), UNESCO (United Nations Educational, Scientific and Cultural Organization), UNFPA (United Nations Population Fund), UNHCR (United Nations High Commission for Refugees), UNICEF (United Nations Children's Fund), WFP (World Food Programme) and WHO (World Health Organization).

9.5.1 The primary purpose of the UNDMT in India is

- To ensure a prompt, effective and concerted country-level support to a governmental response in the event of a disaster, at the central, state and sub-state levels,
- To coordinate UN assistance to the government with respect to long term recovery, disaster mitigation and preparedness,
- To coordinate all disaster-related activities, technical advice and material assistance provided by UN agencies, as well as to take steps for optimal utilisation of resources by UN agencies.

9.5.2 UNDMT works very closely with the nodal ministries of the member agencies and provides support as per the established procedures. UNDMT joined the Asian Development Bank and World Bank to do an assessment of the reconstruction requirements after the tsunami in 2004 and Kashmir Earthquake in 2005. Based on the joint assessment of the damages in the tsunami affected states, UN formulated "Tsunami Recovery Programme" to support the tsunami affected states in their recovery and reconstruction programmes. UNDMT and NDMA have constituted a working group to undertake some pilot joint initiatives on various aspects of DM.

9.6 United Nations Disaster Assessment and Coordination (UNDAC)

9.6.1 The United Nations Disaster Assessment and Coordination (UNDAC) team is a stand-by team of disaster management professionals which are nominated and funded by member

governments, OCHA, UNDP and operational humanitarian United Nations Agencies such as World Food Programme (WFP), United Nations Children's Fund (UNICEF) and World Health Organization (WHO). UNDAC is designed to assist the United Nations and governments of a disaster-affected country in meeting international needs for early and qualified information during the first phase of a sudden-onset of emergency as well as in the coordination of incoming international relief at the national level and/or at the site of the emergency.

9.6.2 The UNDAC Team is a United Nations Team of multi-national personnel trained in disaster management for rapid assessment of priority needs and on-site coordination of international assistance. The team members are international disaster/emergency managers from all parts of the world. Under the UNDAC System, whenever a major disaster strikes a country and international assistance is warranted, the Office of the Coordination of Humanitarian Affairs (OCHA) deputes a team of experts trained in the UNDAC system to carry out an assessment of the requirements for assistance as well as coordinating such assistance with the host country. UN OCHA have empanelled and trained officers worldwide including officers from India. Upon request of a disaster-stricken country, the UNDAC team can be deployed within hours to carry out rapid assessment of priority needs and to support national authorities and the United Nations Resident Coordinator to coordinate international relief on-site.

9.6.3 Officers trained under the UNDAC system (who have attended the UNDAC Induction and Refresher courses) are on contract with the UNDAC for a period of two years (a token amount of 1 USD per year is given to the Officer) after some documentary formalities. After the expiry of the contract, it has to be renewed. Such officers are known as Active members in the UN OCHA parlance and they are liable to be requisitioned for disaster assessment by the UN OCHA in any disaster affected country.

9.6.4 The Government of India have joined the membership of United Nations Disaster Assessment & Coordination (UNDAC) system and has paid, an amount of US$ 50,000 (Fifty thousand) in 2001, with UNOCHA the implementing body of UNDAC programmes.

9.7 United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA)

9.7.1 The United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA) is a United Nations body formed in December 1991 by the General Assembly resolution 46/182. The resolution was designed to strengthen the response of UNO to complex emergencies and natural disasters by creating the Department of Humanitarian Affairs (DHA), and replacing the Office of the United Nations Disaster Relief Coordinator, which had been formed in 1972. The OCHA was therefore the result of a 1998 reorganization of the DHA and was designed to be the UN focal point on major disasters. Its mandate was also expanded to include the coordination of humanitarian response, policy development and humanitarian advocacy. OCHA is thus an inter-agency body, serving UN agencies and NGOs in the humanitarian domain. Its main product is the Consolidated Appeals Process, an advocacy and planning tool to deliver humanitarian assistance together in a given emergency.

9.7.2 OCHA is headed by the Undersecretary-General for Humanitarian Affairs and Emergency Relief Coordinator. OCHA has 1,064 staff located across the world. Major OCHA country offices are located in Afghanistan, Burundi, Central African Republic, Chad, Colombia, Democratic Republic of Congo, Guinea, Ivory Coast, Palestinian territories, Sri Lanka and Sudan (including a sub-office in Southern Sudan's capital Juba), while regional offices are located in Panama City,

Dakar, Cairo, Johannesburg, and Bangkok. OCHA also has some liaison and support staff in New York and Geneva.

9.8 International Search and Rescue Advisory Group (INSARAG)

9.8.1 INSARAG is a global network of more than 80 countries and disaster response organizations under the United Nations umbrella. INSARAG deals with urban search and rescue (USAR) related issues. INSARAG aims at establishing standards for international USAR teams and methodology for international coordination in earthquake response. Members of INSARAG are both earthquake-prone and responding countries and organisations. INSARAG was established in 1991, following initiatives of international search and rescue teams that responded to the 1988 Armenia earthquake.

9.8.2 **INSARAG Structure: INSARAG** policy is determined by its Steering Group**.** The Steering Group meets annually to review achievements and areas of improvement. It is composed of representatives from each INSARAG Regional Group (Africa, Europe, Asia/Pacific, and the Americas) and the INSARAG Secretariat (FCSS in OCHA-Geneva).

9.8.3 **Regional Groups:** To facilitate worldwide participation, INSARAG is organized in three regional groups: Africa & Europe, Asia & Pacific and the Americas. The regional groups meet annually to exchange information and experiences acquired in previous relief operations, plan SAR training and discuss methodology for cooperation among SAR teams. It makes recommendations to the Steering Group for further improvement of international cooperation and coordination in disaster response.

9.8.4 **Working Groups:** INSARAG creates regional and international working groups on an "as required" basis to develop solutions to problems that were identified in regional meetings. The working groups discontinue after delivering the requested result. All member countries and organizations are encouraged to participate in INSARAG Working Groups.

9.8.5 **INSARAG Membership:** INSARAG is a network of stakeholders of international earthquake response. Any country or organization with international urban search and rescue response capacity or countries that are prone to earthquakes may join the network. India is a member of INSARAG Asia Pacific Regional Group and has been participating in the INSARAG meetings at international and regional levels. Instructors from India participate in the mock exercises organized by the INSARAG.

9.8.6 India was the Chairman of INSARAG Asia Pacific Regional Group in 2005-06 and organized the meeting as well as the UNDAC Refresher Course during this period of the chairmanship. The INSARAG Guidelines provide guidance for the preparation and deployment of search and rescue (SAR) teams for international disaster response operations to earthquake-prone countries as well as checklists for the minimum requirements of USAR teams envisaged for international response operations. The INSARAG Guidelines define coordination and cooperation procedures for international and national responders in major disasters. The following phases are covered:

- Preparedness
- Activation
- Operation
- Reassignment/stand-down
- Return to home base.

In addition, the guidelines focus on topics of particular concern to any organisation that are deployed to international emergency response operations. These include background information about the international humanitarian environment and an explanation of the role of the United Nations system (i.e. OCHA and other UN Humanitarian Agencies) as well as the concept for the On-Site Operations Coordination Centre (OSOCC).

9.8.7 **USAR Exercises:** Each year, INSARAG organises regional USAR simulation-exercises and awareness training courses. These events provide a platform to introduce and practice disaster response coordination methodology as defined in the INSARAG Guidelines. The exercises and courses are typically hosted by earthquake-prone countries. The target audiences are national disaster managers, the UNDAC team, IHP Support Modules as well as domestic disaster response teams and international USAR teams. The recent INSARAG Asia-Pacific Earthquake Response Exercise was held in Agra, India from 3-6 May, 2011.

9.9 Global Facility for Disaster Risk Reduction (GFDRR)

9.9.1 GFDRR was set up in September 2006 jointly by the World Bank, donor partners (21 countries and four international organisations), and key stakeholders of the International Strategy for Disaster Reduction (UN-ISDR). It is a long-term global partnership under the ISDR system established to develop and implement the HFA through a coordinated programme for reversing the trend in disaster losses by 2015. Its mission is to mainstream disaster reduction and climate change adaptation in a country's development strategies to reduce vulnerability to natural hazards. At the national and local levels, it also includes other sectoral development strategies that the countries most vulnerable to natural disasters may undertake to alleviate poverty and address sustainable growth.

9.9.2 GFDRR has three main business lines (Box 9.2) to achieve its development objectives at the global, regional and country levels.

Box 9.2: Development Objective at Global, Regional and National Level	
Track-I	Global and Regional Partnerships (to strengthen and re-organise ISDR processes to increase its outreach)
Track-II	Mainstreaming Disaster Risk Reduction (DRR) in Development (benefits low to medium income countries; supports sectoral projects like health, education and research etc.)
Track-III	Standby Recovery Financing Facility (SRFF) for Accelerated Disaster Recovery (focuses in low income countries).

As and when required, India has been participating in the status of observer in the GFDRR programme.

9.10 ASEAN Region Forum (ARF)

9.10.1 The ASEAN Regional Forum **(**ARF) was established in 1994. The ARF membership including India, which joined in 1996 is 25 countries. The first ARF meeting in 1994 brought together Foreign Ministers from Australia, Brunei, Canada, China, European Union (Presidency), Indonesia, Japan, Laos, Malaysia, New Zealand, PNG, Philippines, Republic of Korea, Russia, Singapore, Thailand, USA and Vietnam. The current Chairman of ARF is H. E. Pham Gia Khiem, Deputy Prime Minister and Minister for Foreign Affairs, Ministry Govt. of, Vietnam. ASEAN established the ARF Unit at the ASEAN Secretariat, Jakarta, Indonesia on 26th June 2004.

9.10.2 Based on its Terms of Reference, the ARF Unit's role and functions are as follows:

- To support the enhance role of the ARF Chair, including interaction with other regional and international organizations, defense officials dialogue and Track II organizations,
- To function as depository of ARF documents/papers,
- To manage database/registry,
- To provide secretarial works and administrative support, including serving as the ARF's institutional memory.

9.10.3 The ARF is the Principle Forum for Security Dialogue in Asia and complements the various bilateral alliances and dialogues, which underpin the region's security architecture. The ARF is premised on the idea drawn from the ASEAN experience that a process of dialogue can produce qualitative improvements in political relationships. It provides a platform for members to discuss current regional security issues and develop cooperative measures to enhance peace and security in the region.

9.10.4 The ARF is characterised by consensus decision-making and minimal institutionalisation. The ARF concept paper set out a three-stage, evolutionary approach to the ARF's development, moving from confidence building to preventive diplomacy and, in the long term, towards a conflict resolution capability. While the ARF continues to focus on confidence building measures, ARF members have also agreed that preventive diplomacy should proceed in tandem with these efforts, particularly in areas of overlap between confidence building and preventive diplomacy. As all ASEAN members are automatically ARF members, India is actively participating in the ARF meetings and disaster relief exercises.

9.11 Asian Disaster Reduction Centre (ADRC)

9.11.1 A resolution was adopted at the United Nations General Assembly in 1997 to reduce damage from natural disasters substantially by designating the 1990s as the International Decade for Natural Disaster Reduction. Following a series of national conferences held during the period from 1994 to 1997 to discuss the cooperation for disaster reduction, a ministerial level conference was held in Kobe, Japan in 1995 in which 28 countries from Asia and other regions participated. It adopted the Kobe declaration which includes an agreement to consider the creation of a system which has the functions of a disaster reduction centre for the Asian region. The Asian Disaster Reduction Centre (ADRC) was thus established in Kobe in 1998 following an agreement among the participating countries with the Japanese government.

9.11.2 The mission of the ADRC is to enhance disaster resilience of the member countries, to build safe communities and to create a society where sustainable development is possible. The

Box 9.3: GOI-UNDP Disaster Risk management Programme

Programme Objectives:

- National capacity building to institutionalize and promote policy frameworks for disaster risk management programme
- Education, awareness programmes and strengthening capacities for natural disaster risk management and sustainable recovery from community level to State and National level
- Multi-hazard preparedness, response and mitigation plans for disaster risk management at state, district, block, village and cities in 169 most multi-hazard prone districts of 17 selected states
- Networking of knowledge among the DM Communities for disaster risk management

Programme Achievements:

- Disaster management and mitigation plans developed for 17 states, 176 districts, 1622 blocks, 32, 000 local governance bodies and 1,57, 000 villages,
- At the district level, 15, 613 Panchayati Raj Institutions members including 3506 women trained in the disaster management,
- At the Block level, 1,14,194 PRIs members including 15490 women and 2,25,819 village volunteers including 60,608 women trained in disaster management,
- At the Gram Panchayat level 4,06,809 Disaster Management Community (DMC) members including 74,139 women and 1,65,314 Disaster management Team (DMT) members including 34, 112 women trained in disaster management and search & rescue respectively,
- 7,18,141 village DMT members including 1,24,733 women trained in first aid, 6,94,712 village DMT members including 1,24,733 women trained in search and rescue,
- Textbooks on disaster management introduced nationally in school for students aged 12 to 15 years,
- Disaster Management introduced in school curriculum by 14 state education boards, and nearly 55,000 teachers trained in disaster preparedness,
- Capacities of over 1640 architects, 9,926 engineers and more than 38,000 mason developed in seismically-safe construction practices.
- Master trainers from hospital in 38 cities trained in hospital preparedness, and over 225,800 volunteers trained to undertake community- based disaster management activities,
- Awareness campaigns on disaster management undertaken at all levels by local volunteers and elected representatives,
- A web-enabled Disaster Resource Network, with over 126,000 records from 576 districts in 35 States/ UT of India created,
- Twelve Emergency Operation Centres (EOCs) at the state level and 89 EOCs at district level set up using disaster resistant technology and these act as coordination hub,
- Low cost IEC and training materials developed under the programme including manuals on safe construction practices, school safety guidelines and draft amendments to building by-laws.

Centre works to build disaster resilient communities and to establish networks among countries through many programmes including personnel exchanges in this field. Currently there are 29 member countries of ADRC. Each member country has to bear the annual contribution calculated on the basis of GDP. India is one of the founder members of ADRC. Presently India contributes about US $ 28,100 annually to ADRC as membership fees.

9.11.3 Key activities of ADRC are as under:

- Collaboration with UN organizations,
- To organise the Asian Conference on Disaster Reduction, an annual international conference for officials responsible for disaster reduction efforts in member countries and experts employed by the UN and other international agencies, for the purpose of sharing disaster information and reinforcing mutual cooperation between member countries and agencies,
- Systematic gathering of information on natural disaster and disaster reduction, setting up a database of Asian disaster-reduction information and sharing experiences for a Safer Asia including satellite data
- Development and application of the Global unique disaster Identifier Number (GLIDE) system:

ADRC proposed a globally common, unique identification scheme for disaster events, as a tool for facilitating the sharing of disaster information archived by organisations around the world

- Human Resource Development by visiting research programmes, disaster reduction seminars and training courses;
- Promoting cooperation with member countries, international organizations and NGOs through cooperative projects with member countries;
- Disaster Reduction Projects in SAARC countries. At present using a special fund of Japan-SAARC, the ADRC has been conducting projects for Earthquake Risk Reduction and Recovery Preparedness (ERRP) Programme for the South Asian Region.

9.12 Asian Disaster Preparedness Center (ADPC)

9.12.1 ADPC is established in 1986 at Bangkok,Thailand. It is a non-profit, non-political, autonomous, regional organisation serving as a regional centre in Asia-Pacific for promoting disaster preparedness, disaster mitigation, awareness generation, exchange of information, community participation etc. Prof. Dr Krasae Chanawongse, Minister to the Prime Minister's Office, Thailand is the current Chairman of the Board of Trustees (BoT) of ADPC.

9.12.2 India is a member of the Board of Trustees (BoT), since August 2000. Union Home Secretary is one of the Members of the BoT of ADPC, since the transfer of subject of Disaster Management to Ministry of Home Affairs from the Ministry of Agriculture in June, 2002. Secretary (BM) is member of the Advisory Council & Regional Consultative Committee of ADPC. In 2004, the ADPC became an international body (inter governmental organization). Officials of the Ministry of Home Affairs have been attending the meetings of the Regional Consultative Committee (RCC) of the ADPC and meetings of the Board of Trustees.

9.13 SAARC Disaster Management Centre (SDMC)

9.13.1 SAARC is association of South Asian countries for regional cooperation which was established on 16th January, 1987. It has eight member countries, namely Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka with its head quarters at Kathmandu. SAARC Disaster Management Centre (SDMC) was set up in October 2006 at the premises of National Institute of Disaster Management in New Delhi. The Executive Director of the NIDM is also the Director of SAARC Disaster Management Centre New Delhi.

9.13.2 The Centre has the mandate to serve all eight Member Countries of South Asia Association of Regional Cooperation (SAARC) - by providing policy advice and facilitating capacity building services including strategic learning, research, training, system development and exchange of information for effective disaster risk reduction (DRR) and management in South Asia. The Centre has developed its network with various organisations and institutions in the South Asian countries for research, documentation training and capacity building. and to promote better cooperation and understanding amongst the countries for holistic management of disasters.

9.13.3 The main functions of the SAARC Disaster Management Centre are:

- Document and disseminate date, information, case studies, indigenous knowledge and good practices relating to disaster management particularly from the member countries,

- To analyze information, undertake research and disseminate research findings on disaster management among the member countries,
- To develop educational materials and conduct academic and professional courses on disaster management,
- To organize training and awareness programmes for various stakeholders on disaster management for the member countries,
- To develop training modules on various aspects of disaster management and conduct programmes of Training for Trainers including simulation exercises,
- To provide assistance in the formulation of policies, strategies, disaster management frameworks and any other assistance as may be required by the member countries or organisations and institutions nominated by the member countries,
- To undertake, organise, facilitate and participate in workshops, conferences, seminars, lectures etc. on various aspects of disaster management in the member countries,
- To undertake publication of journals, research papers and books and establish and maintain an online resource centre in furtherance of the aforesaid objects, and
- To collaborate with other SAARC centres, particularly SMRC, SCZMC and SAARC Forestry Centre to achieve synergies in programmes and activities.

9.14 Engagement of UN Agencies in DRR

There are various other agencies working under the United Nations System, which are engaged in promoting the policies and programme in Disaster Risk Reduction (DRR). A summary sheet of such agencies based on the publication of UNISDR, Geneva is produced below in Table 9.1.

Table 9.1: Engagement of UN Agencies in Disaster Risk Reduction (DRR)

Name of agency	Head quarter	Disaster Reduction Goal
Food and Agriculture Organization (FAO)	Rome	FAO addresses DRR as integral part of its wider approach to disaster management, aiming to reduce the vulnerability of people before, during and after disasters.
International Labour Organization (ILO)	Geneva, Switzerland	ILO aims to reduce the impact of disasters on the employment and income by promoting risk reduction measures for productive livelihood and effective and efficient post-disaster recovery efforts.
International Telecommunication Union (ITU)	Geneva, Switzerland	ITU goal in disaster reduction is to strengthen emergency communications for disaster prevention and mitigation.
Office of the United Nation High Commissioner for Human Rights (OHCHR)	Geneva, Switzerland	OHCHR emphasizes the need for a human right-based approach to be integrated into DRR and programmes, HFA and post HFA activities.
United Nations Centres for Regional Development (UNCRD)	Japan	UNCRD focuses on various disaster management initiatives through multi-lateral collaboration at an international level through its disaster management planning office HFA office, Japan.

Name of agency	Head quarter	Disaster Reduction Goal
The United Nations Environment Programme (UNEP)	Nairobi, Kenya	Through its disaster risk reduction programme, UNEP aims to reduce the impact of Natural hazards on vulnerable communities and countries through sound environmental management.
United Nations Educational, Scientific and Cultural Organization (UNESCO)	Peris, France	UNESCO assists Member states in building capacities to withstand and cope with natural events and human induced disasters, including those of a technological nature.
The United Nations Framework Convention on Climate Change Secretariat (UNFCCC Secretariat)	Bonn, Germany	The Cancun Adaptation Framework includes specific provisions for Disaster Risk Reduction (DRR) and risk management as part of enhanced action on adaptation to climate change.
United Nation Population Fund (UNFPA)	New York City	To ensure adequate emergency preparedness and contingency planning at country level and improve environmental protection.
United Nations Human Settlements Programmes (UN-HABITAT)	Nairobi	UN-HABITAT's main goals related to disaster risk reductions are: Increasing investment in disaster risk reduction, addressing root causes of disasters, incorporating vulnerability reduction in development plan and building a culture of prevention.
United Nations Development Programme	New York, USA	UNDP supports disaster-prone countries to develop- comprehensive disaster risk reduction programmes, strengthen institutional and legislative systems, implement community-level disaster preparedness activities including contingency planning and early warning, establish coordination mechanisms to ensure the integration of risk reduction into human development as well as developing national capacities for recovery planning.
United Nations Children's Fund (UNICEF)	New York, USA	UNICEF has developed a global framework for disaster reduction. This focuses on protection and risk reduction for those who are most vulnerable to disasters: Children and Women.
United Nation Institute for Training and Research	Geneva, Switzerland	Develop capacities of Member States their local authorities to reduce disaster risks. Develop applied research applied research in the use of remote sensing and satellite based vulnerability and risk mapping
Office of the High Representative for the least Developed Countries, Landlocked Developing Countries and Small Island Developing States (UN-OHRLLS)	United State of America	To strengthen disaster mitigation and preparedness and promote the sustainable development of the Least Developed Countries (LDCs), Landlocked developing Counties (LLDCs) and Small Island Developing States (SIDS)

Name of agency	Head quarter	Disaster Reduction Goal
United Nation Office for Outer Space Affairs (UNOOSA)	Vianna	Ensure that all countries and international and regional organizations have access to and develop the capacity to use all types of space based information and solutions support the full disaster management cycle
United Nations University (UNU)	Tokyo	Knowledge generation, capacity development, knowledge transfer , networking are the four cornerstones guiding philosophy and work at UNU
United Nations Volunteers (UNV)	New York	To mobilize volunteers and strengthen volunteerism initiatives in support of disaster risk reduction and management, especially to strengthen the community capacity to respond to and prevent disasters
World Food Programme (WFP)	Nanaimo	WFP Disaster Risk Reduction policy aims at strengthening WFP's compliance with the HFA and mainstreaming DRR at all level within the organization
World Health Organization (WHO)	Geneva, Switzerland	TO support countries in building capacity in risk reduction and emergency preparedness.
World Meteorological Organization (WMO)	Geneva, Switzerland	To enhance the contributions of National Meteorological and Hydrological services, in a more cost-effective, systematic and sustainable manner, towards the protection of lives, livelihoods and property.
The world Bank	Washington DC	The overarching objective is main objective is to maintain disaster reduction and climate change adaptation in country development strategies.

Source: ISDR

9.15. India's engagement with external agencies on Disaster Risk Reduction

India is engaged with UNDP and US Aid for building the capacity of its response mechanism, mapping the vulnerabilities to different kind of disasters, besides strengthening the various institutions engaged in disaster management. It has entered in to MOU with the few countries in the field of disaster management and has been working closely with the several countries in the exchange of ideas and expertise developed to meet the challenges of several natural disasters. The efforts undertaken towards the aforesaid activities are given in the subsequent Paras.

9.16. United Nations Development Programme

9.16.1 UNDP established on 22nd November 1965 is the UN's global development network, with headquarters at New York to advocate for change and to connect countries through knowledge, experiences and resources to help people build a better life. In India, it works closely with the Government of India through its designated nodal department for different welfare programmes and the Department of Economic Affairs (DEA) in the Ministry of Finance.

9.16.2 In the field of disaster management, UNDP has been engaged with India since the Latur earthquake in 1993, followed by its involvement in the capacity development programme in 1996. In 1999, after the super cyclone in Orissa, it supported the community-based disaster risk management programme in 20 blocks in Orissa which ultimately led to the formulation and implementation of the Disaster Risk Management Programme aimed at building the community's resilience in disaster preparedness and mitigation measures. Under this programme, which was implemented in partnership with the Ministry of Home Affairs, assistance to the tune of US $ 41 million was provided to the central government and 17 state governments for disaster risk reduction primarily at the community level in 176 multi hazard prone districts. It also had an urban earthquake vulnerability reduction component implemented in 38 cities during 2002-2009.

9.16.3 After the successful implementation of this DRM Programme, the Government of India together with UNDP, has launched a new programme for Disaster Risk Reduction (DRR) with an outlay of $20 million (approximately ₹ 100 crores). At present the DRR Programme is being implemented in 26 states and 58 cities across the country under the overall supervision of Programme Management Board headed by Secretary (Border Management).

9.16.4 **The GOI-UNDP DRR Programme (2009-2012) has two components:**

(i) Institutional Strengthening and Capacity Building for Disaster Risk Reduction (DRR)

(ii) Urban Risk Reduction (URR).

9.16.5 DRR project is being implemented by NDMA with an outlay of USD 12.6 million (approximately ₹ 63 crores) and URR project is being implemented by Disaster Management Division, MHA with an outlay of USD 7.4 million (₹ 37 crores). The Joint Secretary, MHA is the National Programme Director for URR component. The Joint Secretary, NDMA is the National Programme Director for DRR component.

9.16.6 The objective and major activities undertaken in the programme are as follows:

Objective: To strengthen the institutional structure to undertake disaster risk reduction activities at various levels (state, district, city, urban local body) including risks being enhanced due to climate change, and develop preparedness for recovery.

Major Activities:

- Strengthening the State and District Disaster Management Authorities to fulfil their responsibilities as stipulated in the Disaster Management Act, 2005
- Developing methodologies and modalities for ensuring risk reduction through integration in development programmes of all partners at national, state and community levels
- Enhancing the capacity for urban risk reduction by addressing planning capacity building, and ensuring suitable legislative and regulatory mechanisms to promote safe built environment
- To strengthen the recovery framework, through which the people affected by disasters (especially the most vulnerable) are able to access resources for rebuilding their lives and reviving their livelihoods, and
- To strengthen the knowledge and information sharing platform in disaster management.

9.17. Program for Enhancement of Emergency Response (PEER)

9.17.1 The Program for Enhancement of Emergency Response (PEER) is a regional training programme initiated in 1998 by the United States Agency for International Development's, Office of U.S Foreign Disaster Assistance (USAID/OFDA) to strengthen disaster response capacities in Asia. India, Indonesia, Combodia, Vieteman, Loa PDR Philippines, Nepal, Pakistan and Bangladesh are the participating countries under the programme. PEER is a five years training programme started in March 2009, funded by United States Agency for International Development (USAID) and identified outside the Disaster Management Support Project Grant.

9.17.2 **Programme Objectives: Following have been the objectives of the programme**

i. **Community Action for Disaster Response (CADRE):** This training program targets local, non-professional emergency responders, drawing upon PEER core trainings, i.e. Medical First Responder (MFR) and Collapsed Structure Search and Rescue (CSSR) Courses.

   Country coverage: Bangladesh, Cambodia, India, Indonesia, Lao PDR, Nepal, Pakistan, Philippines and Vietnam.

ii. **Hospital Preparedness for Emergencies (HOPE):** Designed for health-care personnel, both administrative and medical, to prepare health-care facilities and personnel to respond effectively to emergencies involving large numbers of casualties. The course will enable hospitals/health facilities to develop well-designed, facility-specific disaster preparedness plans to increase their ability to respond to emergencies and continue functioning to provide critical medical care.

   Country coverage: Bangladesh, Cambodia, India, Indonesia, Lao PDR, Nepal, Pakistan,Philippines and Vietnam.

iii. **Medical First Responder (MFR) and Collapsed Structure Search and Rescue (CSSR) Course:** The main goal under this objective is to establish and strengthen the capability of PEER Countries to provide collapsed structure search and rescue; and basic and advanced life, Support during emergencies by further strengthening and institutionalizing the Medical First Responder (MFR) and Collapsed Structure Search and Rescue (CSSR) courses. MFR Course provides individuals the knowledge and skills necessary to assess, treat and transport sick or injured patient, as a result of an emergency or disaster, thus training them for "First Response Task". CSSR Course provides individuals with collapsed structure rescue tasks the knowledge and skills necessary to search for, stabilize and extricate victims trapped in collapsed structures using the safest and most appropriate procedures, thus training them for "Collapsed structure rescue task."

   Country coverage: Bangladesh, India, Indonesia, Nepal, Pakistan and Philippines.

Box 9.4: PEER Hierarchy of Training for MFR-CSSR Stream

Line # 1	MFR → TFI → MFRIW → MFR Assistant Instructor → MFR Full Instructor A potential instructor candidate undergoes and complete MFR course then proceeds to TFI, gone to MFRIW. After completion of MFRIW, the same candidate may qualify to serve as Assistant Instructor, for at least in one MFR course prior to serving as Full instructor.

Line # 2	CSSR → TFI → CSSRIW → CSSR Assistant Instructor → CSSR Full Instructor A potential instructor candidate undergoes and completes CSSR course then proceeds to TFI, goes to CSSRIW. After completion of CSSRIW, the same candidate may qualify to serve as Assistant Instructor, for at least in one CSSR course prior to serving as Full Instructor
Line #3	MFR → CSSR → TFI → MFRIW → MFR Assistant Instructor → MFR Full Instructor In phase 2, MFR course has become a minimum requirement prior to completing CSSR. The potential instructor candidate who successfully completes MFR and CSSR shall be recommended to proceed to TFI then to MFRIW. Based on some, factor, he/she may be more effective as instructor for MFR courses
Line # 4	MFR → CSSR → TFI → MFRIW → CSSRIW → MFR and CSR instructor (Assistant then to Full Instructor) The potential instructor candidate who successfully completes MFR and CSSR course shall be recommended to proceed to TFI. The instructor candidate may be highly- skilled and has demonstrated capabilities to teach both courses, hence, she/he may qualify and take up MFRIW and CSSRIW after completing TFI

Source: NSET, Nepal

9.18. United States Agency for International Development (USAID) – Assisted Disaster Management (DMS) Support Project

9.18.1 USAID with its headquarters in Washington, D.C is a governmental agency of USA providing economic, development and humanitarian assistance around the world in support of the foreign policy goals of the United States of America. A bilateral agreement was signed between USAID and the Government of India in September 2003 with the objectives to reduce vulnerability to disasters and build capacity of key Indian institutions. However a final agreement (in the nature of second amendatory agreement) was signed on 4th April 2007. The period of the original Agreement ended on 31st March, 2010. The scope of this bilateral agreement broadly includes three activities viz., Incident Response System (IRS), procurement of equipment and capacity building.

Box 9.5: Achievements made under USAID project

- 49 faculties from Regional Training Institutes (RTIs) and Administrative Training Institutes (ATIs) were trained in IRS through Training of Trainers (TOT) Programmes.
- Under the activities of capacity building of Indian disaster management institutions, 472 officers of LBSNAA, NDMA, NIDM, NDRF, NCDC and district officials of four pilot districts trained in IRS.
- A comprehensive disaster management curriculum for Civil Defense cadre and a Disaster Communication for Public Information Officers developed.
- 12 study tours have been undertaken so far in the programme, thus providing exposure to 52 Government officials. Institutional study for NIDM completed while second study for CDM of LBSNAA is in final stages of completion.
- Pilot studies undertaken in two districts each in the states of Gujarat, Andhra Pradesh and Assam for testing the pilot project, which could be replicated by other states for speedier institutionalisation of IRS in the disaster response management in the country.
- Equipment for Advance Search & Rescue (ASAR) procured and supplied to the designated institute i.e. National Industrial Security Academy, Hyderabad.
- The process of procurement of the remaining equipment for Emergency Operation Centers in Ministry of Home Affairs, LBSNAA and NIDM is in the final stages.

The main activities during the extended period of the agreement i.e. up to 31st March 2015 are to be implemented in the broad areas of integration of disaster risk reduction and climate change.

9.18.2 The activities identified for technical assistance of USAID are as follows:-

- Down scaling climate modelling for local areas
- Analysing risk of sea level rise in coastal cities
- Hydro – meteorological risks of selected capital cities
- Screening of land use and investment plans in selected capital cities
- Training and capacity building.

9.19. INDO-SWISS Agreement

9.19.1 Against the backdrop of the earthquake in Gujarat and assistance given by the Government of Switzerland, an agreement with the Government of India and the Government of Switzerland was signed on 10th November 2003 for extending cooperation in the prevention and preparedness for handling natural disasters and assistance in the event of natural disasters or major emergencies.

9.19.2 The salient features of the agreement are as under:-

- Swiss Government may offer and place at the disposal of the GOI the Aid Unit of the Humanitarian Aid of the Swiss Agency for the Development and Cooperation (SDC) in the affected area subject to acceptance of offer by GOI
- Enhance Early Warning System, Human Resource Development and preventing and overcoming the baneful consequences of disaster by the exchange of relevant experience and information, and
- Enhancement of capacity building, preparedness and training of rescue teams.

9.19.3 As per the Agreement, a three year training programme in Canine Search and Urban Search & Rescue (USAR) under the Indo-Swiss Collaboration for Training (INSWIT) for specialised training of National Disaster Response Force is under implementation since November 2007.

9.18.4 Till date, eight training missions under the (INSWIT) in Urban Search have been organised by the Swiss Agency for Development Cooperation at National Industrial Security Academy, Hyderabad and Basic Training Centre, Bhanu. The programme will facilitate the development of infrastructure of INSARAG standards and capacities to replicate it further.

9.20 Indo-Russian Agreement in the Field of Emergency Management

A bilateral agreement has been signed with the Russian Federation during the visit of President of the Russian Federation for the Annual Indo-Russia Summit held on 21st December 2010. The salient features of the Agreement are as follows:

- Monitoring and forecasting emergencies and assessment of their consequences;
- Interaction, through competent authorities, between appropriate organisations involved in emergency management;

- Assessment of risks for environmental emergencies due to pollution caused by an emergency;
- Joint planning, development and implementation of research projects, exchange of scientific and technical publications and results of research works in the field of emergency management;
- Exchange of information, periodicals, methodological or any other publications, video and photo materials, as well as technologies, as mutually agreed within the scope of this Agreement;
- Organisation of joint conferences, seminars, workshops as well as exercises and training in the relevant fields;
- Joint preparation of publications and reports as mutually agreed;
- Exchange of expertise and experiences in emergency management;
- Training of specialists in the educational institutions of the other party, exchange of trainees and experts to facilitate capacity building in the field of emergency management;
- Rendering assistance, as mutually agreed, for providing technical facilities and equipment, enhancing early warning systems and capacity building of the parties in emergency management;
- Providing assistance, as mutually agreed, in emergency response, and
- Any other activities related to emergency management, which may be mutually agreed by the competent authorities of the parties.

9.21. Third Trilateral Meeting of Experts of India- Russia and China

9.21.1 As a follow up of the India-Russia-China (IRC) Foreign Ministers meeting held in Yekaterinburg (Russia) in May 2008, two trilateral meetings of experts of IRC were held at Samara, Russia (July, 2008) and at Sanya, China (November, 2009) respectively. The 3rd Trilateral Meeting of Experts of IRC was hosted by Ministry of Home Affairs, Government of India on 12th and 13th November 2010 at New Delhi.

9.20.2 An action plan for implementation for future trilateral cooperation between India, Russia and China as agreed includes:

- Visit of experts on geo-spatial technologies in the field of flood and drought
- Risk assessment and risk mapping of disasters
- Sharing of experiences in dealing with major emergencies
- Training and capacity development of disaster management.

The next trilateral meeting is agreed to be held in St. Petersburg, Russia in August September 2012.

9.22. Asian Minister Conference on Disaster Risk Reduction (AMCDRR)

9.22.1 Following the World Conference on Disaster Reduction in 2005, several initiatives were undertaken to strengthen the ISDR system to be able to better respond to current disaster trends and the increased expectations and demands by nations and communities for supporting implementation of the Hyogo Framework for Action 2005-2015 (HFA).

9.22.2 This has resulted in increased political commitment and financing of disaster reduction, including development sectors. At the global level more coherence and better coordination amongst ISDR system partners has been achieved through joint work planning and prioritized deliverables. A common approach to work programming in the ISDR system was developed during the 2006-2007 biennium in the context of the former Inter-Agency Task Force on Disaster Reduction and presented to the first session of the Global Platform.

9.22.3 Those consultations gave rise to an ISDR system joint planning framework for country, regional and global levels based on the priorities for action of the Hyogo Framework. To monitor and share the country's progress at a regional platform, AMCDRR was conceptualized. Since then four such conferences were held to enhance and promote regional cooperation for seamless implementation of HFA.

a. The 1st AMCDRR was held in China in August 2005 known as Beijing resolution with the strategic objective of enhancing regional cooperation in the implementation of HFA in Asian region and disaster management cooperation between governments.

b. The 2nd AMCDRR was hosted by India in November 2007 at New Delhi with the strategic objective of construction of joint response system through cooperation among each governments, regional cooperative bodies UN and international organizations.

c. The 3rd AMCDRR was held in December 2008- known at Kaulalampur, Malasiya, which focused on cooperative system through "mutual assistance with private sector" between various parties concerned in the Asian and Pacific region.

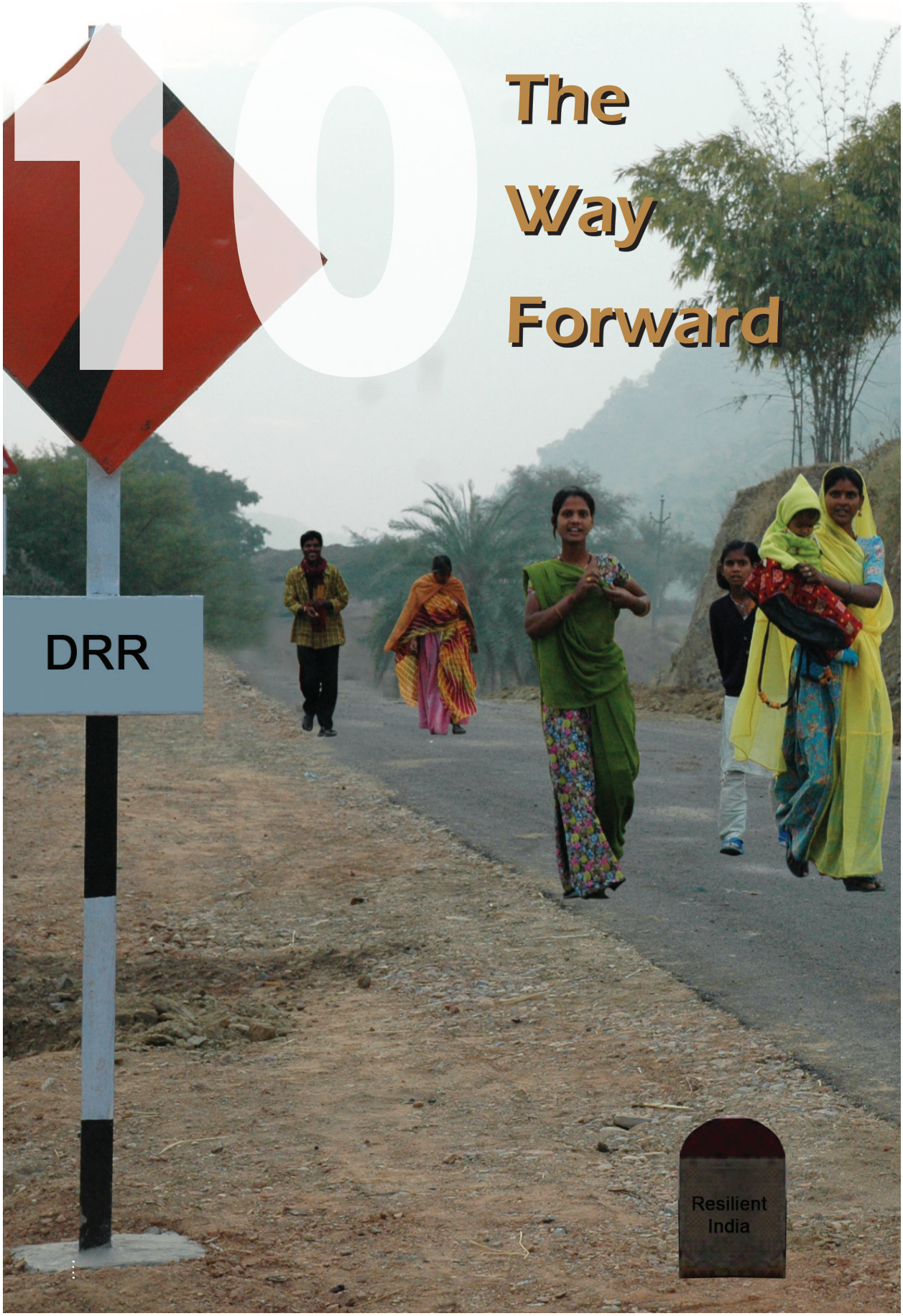
d. The 4th AMCDRR was held at Inchon, South Korea during October 2010 known as Incheon declaration focused on three main themes as mentioned below:

   - Raising awareness and building capacity for DRR & CCA
   - Developing and Sharing information, technology, sound practices and lessons learned in climate and disaster risk management.
   - Promoting integration of DRR & CCA into development for green growth.

9.23. Conclusion

This chapter has attempted to capture the various international cooperation initiatives. While India does not seek assistance during the relief and response phases, it welcomes sharing of expertise and also technical assistance based on various international developments. As a signatory to the Hyogo Framework of Action, India is also committed to achieve the priorities and the objectives through systematic and institutional efforts.

10 The Way Forward



10.1 Background

In the last decade there has been a paradigm shift in Disaster Management in India, a distinct move from the earlier approach of post disaster relief to pre-disaster preparedness, mitigation and risk reduction. The 10th Five Year Plan document emphasised that "*while hazards, both natural or otherwise, are inevitable, the disasters that follow need not be so and the society can be prepared to cope with them effectively whenever they occur*" and called for a "*multi-pronged strategy for total risk management, comprising prevention, preparedness, response and recovery, on the one hand, and for initiating development efforts aimed towards risk reduction and mitigation, on the other*". It is stated that only then we can look forward to "sustainable development." The country is also committed to mainstream disaster risk reduction into the process of development planning at all levels for sustainable development, as stated in *Hyogo Framework of Action 2005-15: Building the Resilience of Nations and Communities to Disasters*.

10.2 Recent Initiatives

The 11th five year plan document of Government of India gave impetus to mainstreaming disaster risk reduction as one of the priority programmes in the development planning process and disaster management. "Building Back Better" has become the underlining principle in any post disaster reconstruction and rehabilitation programme implemented by Government of India. As mentioned in the report of the working group on Disaster Management for the 11th plan and also in the various initiatives towards this effort, the way forward can be divided in the following major areas –

- Policy guidelines at the macro level that would inform and guide the preparation and implementation of disaster management and development plans across sectors,
- Building in a culture of preparedness and mitigation,
- Operational guidelines of integrating disaster management practices into development, and specific developmental schemes for prevention and mitigation of disasters,
- Having robust early warning systems coupled with effective response plans at district, state and national levels.
- Building capacity of all stakeholders,
- Involving the community, NGOs, CSOs and the media at all stages of DM,
- Addressing gender issues in disaster management planning and developing a strategy for inclusive approach addressing the disadvantaged sections of the society towards disaster risk reduction, and
- Addressing climate risk management through adaptation and mitigation.

10.3 Suggested Steps

To achieve results in these key identified areas, the following suggested steps should be integral to all stages of DM including developing a culture of prevention by introducing disaster management in school curricula , professional courses and enhancing the capacity of disaster managers by strengthening training facilities for disaster management; creating mass awareness by disseminating knowledge about the hazards and risks and promoting coping capacities of the communities through community based disaster risk management for better preparedness

and response; fostering social and gender equality in disaster risk reduction by planning and focusing on the needs of the disadvantaged sections of the society. The summarised list of actions that needs to be taken is as follows:

10.4 Developing a Centralised Database

In collaboration with the Central Statistical Organization (CSO) an integrated Centralised Disaster database requires to be developed. Data collection on standardised format should be the responsibility of the concerned state government. Such database would facilitate researchers and decision makers to undertake range of analyses to better understand the linkages between disaster management and other sectors that would help in taking up informed risk reduction activities as well as to understand the impact of disasters on economy.

10.5 Early Warning Systems and Communication and Connectivity upto the Last Mile

Early warning systems vary for the different types of disasters. Due to recent unprecedented devastation unleashed by tsunami, often early warning gets linked with tsunami only, masking the importance of early warning against other forms of disasters. Hazard- specific efficient 'early warning systems' is the need of the hour and it has to be put in place permanently, so that useful information flows throughout the year and is easily understood by the local community. There is scope for improvement in flood, cyclone and storm surge warnings. Such projects need further encouragement and newer projects should be accorded high priority. Even with the best of early warning systems, the impact may still be catastrophic if early warning signals are not properly interpreted and communities are not educated and trained to respond to the early warning signals in real time. Therefore, the technology to early warning, on the one hand and, community response to early warning to the other are urgently required. This needs to be coupled with the National Emergency Communication Plan to ensure real time dissemination of early warnings and information to the 'at risk' community and the local authorities.

10.6 Emergency Operations Centers (EOCs)

EOCs in the country could play a critical role in coordinating emergency activities as well as in providing information to various stakeholders. Effective functioning of these EOCs during emergencies continues to be a major challenge. "State of the art" EOCs at state and district levels with access to satellite based imageries need to be planned and established.

10.7 Mitigation Plans and Mainstreaming Disaster Management into the Development Planning Process

10.7.1 Three committees constituted by Government of India are working towards preparing the National Response Plan, National Human Resource and Capacity Development Plan and National Mitigation Plan in respective ministries that have been designated as nodal agencies for various disasters. The draft National Response Plan and National Human Resource and Capacity Development Plan are ready. Certain rectifications and modifications are underway before it is presented to the National Executive Committee for its finalisation.

10.7.2 It is expected that National Response Plan will be put in place once it is adopted by Government of India. It will pave the way for institutionalising the response plan in three tiers as envisaged in the Disaster Management Act.

10.7.3 Similarly, the Capacity Development Plan, once it is approved and adopted will provide the roadmap for undertaking the capacity building of persons engaged in different facets of disaster management and enhancing the capacities both at the individual and organizational levels.

10.7.4 So far, Ministries of Defence, Mines (Geological Survey of India), Department of Atomic Energy, Department of Agriculture & Cooperation, Railways and Water resources have submitted their mitigation plans which are under examination and finalisation. Once these mitigation plans are approved, the concerned Ministries will undertake the recommended prevention and mitigation measures to address the hazards and risks involved in the core activities of their sector. It is the endeavor of the Government to persuade the other ministries to bring their mitigation plans at the draft stage and take it further for its approval and adoption.

10.7.5 **Working Group on Disaster Management:** Planning Commission, GOI, has constituted a working Group on Disaster Management for providing inputs to the 12th Five year Plan (2012-2017) vide no. M-12016/03/2011-PAMD. The Terms of Reference (specific to working group) were as under;

a. To recommend measures to streamline existing institutional structure on disaster management in order to avoid multiplicity of structures keeping in view the provision of the Disaster Management Act 2005.

b. To review implementation of disaster management policy towards disaster risk reduction, preparedness and mitigation at Centre and State levels and in the private sector.

c. To explore innovative ways and means for applicable of Science & Technology in disaster risk reduction.

d. To draw a roadmap and policy framework to encourage public-private partnership and community participation in disaster management.

e. To assess integration of disaster management related concerned to be inbuilt central sector and centrally sponsored schemes/projects.

f. To suggest programmes for capacity building for disaster mitigation at Centre, State and district levels with special reference to rural and urban area.

g. To indentify priority areas and projects along with financial resources to be undertaken through NDMA. Central Ministries and State Govts in integrated manner during the 12th Plan period

10.8 Strengthening the Preparedness Phase

Some of the illustrative areas and activities that would reduce the risk from hazards in the preparedness phase are summarised as follows-

10.8.1 **Urban Planning and Zoning:** There is a need to enhance the efforts for integrating disaster risk reduction elements in settlement planning and land use zoning to mitigate flood and earthquake risks. This issue had been mentioned repeatedly at different for a by administrators, practitioners and NGOs working in the area of disaster management. Human settlements must be viewed not only from the perspective of their vulnerability, but also from the perspective of the disasters that they create or that they exacerbate. There is an urgent need to examine such settlements being developed by private builders and developers, which could increase flood

vulnerability in urban and rural areas of many states. Planned urban settlements and housing is the need of the day for disaster risk management that leads to sustainable development, particularly in ecologically sensitive regions, high risk locations and high population density pockets.

10.8.2 **Building Codes and Enforcement**: Building codes are adhered to only in engineered structures and not in the huge majority of houses across rural and urban India. The building codes have to be continually upgraded with the advent of new information and technology. The greatest challenge, however, is in respect to enforcement of the building codes.

10.8.3 **Housing Design and Finance:** It has been difficult to ensure compliance to disaster resistant technology at individual house level. There is need to find alternative ways to encourage and facilitate individual home builders to use disaster-resilient designs, materials and techniques in the construction of their homes. Publicity and audience friendly information emphasising appropriate designs and the cost differences will go a long way in creating awareness among people for their adoption. Some financial incentives or tool may motivate people, particularly poor people or first-time house owners, to incorporate safety features in their houses.

10.8.4 **Flood Proofing:** This is an approach adopted in parts of Bihar, Uttar Pradesh and few other flood prone states of the country for reducing flood vulnerability. Flood proofing involves constructing earthen mounds to raise entire homesteads—the house, the vegetable garden, livestock pen, grain stores, toilets and water wells above the flood level. Encouraging such good practices in other flood prone parts of the country, would go a long way to reduce the risk in such area.

10.8.5 **Promoting development of new financial tools:** There is need to work for development of new financial tools such as catastrophic risk financing, risk insurance, catastrophic bonds, micro-finance etc. Risk transfer and risk insurance mechanisms would be needed for infrastructure, crops and other assets. Making risk insurance mandatory at least in highly hazard prone states in the country needs to be encouraged. Insurance distributes disaster risk among the broader society and makes great sense when risk has been reduced to some acceptable level.

10.8.6 **Agriculture and Aquaculture**: These projects should be assessed from the perspective of the flood hazards. Much of the flooding that affects large rural habitats and agricultural lands is because of reduced drainage as a result of the expansion of agricultural activities into wetland areas that previously served an important drainage function. Mainstreaming disaster risk management such development of agriculture practices should have compensatory drainage factored into agricultural expansion plans.

10.8.7 **Roads and Infrastructure:** Standards are generally set to protect roads, railways, power and communication infrastructure from being damaged or destroyed by a 10 or 20 or 50 year flood level. Any new infrastructure project should conduct a disaster impact analysis and ensure that construction does not impede water flow and cause deeper or prolonged floods. Designing the roads to the higher standards requires factoring of not only the vulnerability of the roads to floods but also their contribution to hazard.

10.8.8 **Logging activities:** These activities in the hilly areas destabilise slopes, cause landslides and increase mudflow and silting in the nearby rivers. The revenue generated by logging is far lesser than the losses incurred due to the serious problems of landslides, silting and ecological disturbance caused. There should be a plan for afforestation in the logging area before or just after the logging.

Box 10.1: Risk Transfer mechanisms-Insurance as a financial tool for Disaster Management

For decades, the financing of disasters has relied on a reactive approach consisting of the diversion of funds from the domestic budgets. Such "ex post" funding approaches are inefficient, often poorly targeted and insufficient. Moreover, they provide no incentive for proactive risk reduction measures such as improved urban planning, higher construction standards, etc.

Reactive approaches to risk financing are becoming increasingly unsustainable as vulnerability is increasing and emerging economies grow and accumulate more assets. The funding gaps between available donor resources and post-disaster funding will grow if disaster prone countries do not engage in risk reduction and pre-disaster risk financing.

Insurance markets in the majority of developing countries are underdeveloped. Where hazard coverage exists, it is usually limited to major industrial and commercial properties and some wealthier households.

For a number of years, efforts are on to promote a more proactive approach to risk financing. A number of examples come from World Bank led efforts, including the provisions of technical support to Mexico in issuing a cat bond; contingency financing arrangements in Cambodia, the Caribbean Catastrophe Risk Insurance Facilities (CCRIF - the first regional institution which allows the eighteen participating countries to pool their risk and save on individual premium payments), the Turkish Catastrophe Insurance Pool (TCIP - a mandatory earthquake insurance pool for homeowners). These initiatives provide much needed, immediate liquidity after a disaster for more effective government response.

Micro disaster Insurance: It has great potential, but faces several challenges before it becomes a sustainable mechanism for effective risk management for the poor. The study by ProVention Consortium and the International Institute of Applied System Analysis found that micro Insurance holds great potential to protect the poor from disaster shocks.

Financial Viability: Disaster Insurance should be based on sound estimates of low-probability, high-consequence risks so that the premium can be priced and the requisite capital reserve or reinsurance can be assured. Where there is a high degree of ambiguity with the risk estimates of extreme events, international donors may need to provide incentives for the private sector involvement in such schemes.

Affordability: Micro insurance needs to be affordable to low income-clients. Disaster insurance premiums include the costs of handling many small contracts, distributing the product often to remote areas, as well as assuring sufficient capital to cover dependant claims. There are several ways to reduce disaster insurance premiums. The most obvious is subsidies from the public authorities, international donors or those at lower risk in the insurance pool (cross subsidies in insurance systems). The Hungarian government is providing subsidies to poor households as part of a recently legislated flood insurance pool. In the UK, extensive cross subsidies in the private flood insurance systems make it affordable to low income households. In developing countries, transaction costs can be minimised by offering policies to groups or communities through established microfinance institutes. The high costs of capital reserves and reinsurance can be lowered through government or donor provision of reinsurance. An example is the Turkish Catastrophe Insurance Pool, where the World Bank reinsures a layer of risk for the pool.

Source: Reinhard Mechler and Joanne Linnerooth-Bayer with David Peppiatt; Disaster Insurance for the Poor? A review of micro-insurance for natural disaster risks in developing countries, IIASA / ProVention Consortium, 2007

10.8.9 **Design and construction of critical infrastructure and lifeline facilities (hospitals/ schools etc):** It has been observed in the past disasters that schools and hospitals are badly affected. Therefore, construction of all new schools and hospital needs to be brought under the regime of disaster resistant technology.

10.8.10 Medical Preparedness for recovery of affected person in any kind of disaster is of paramount importance. There exits huge gap between demand and supply of medical care, particularly in the area of trauma care. This needs to be strengthened and capacity augmented at every level from primary to referral level. The capacity of doctors and Paramedical staff also needs to be strengthened and to be geared to meet the challenges of post-disaster recovery.

10.9 Capacity Building Plan

In addition to development of National Human Resource Plan, a training calendar of Disaster Management institutes and agencies at the international, national and sub-national levels needs to be compiled and publicised so that the stakeholders could avail of the opportunities to build capacities.

10.9.1 Concerted efforts are required to work closely with UN agencies, bilateral agencies and NGOs for DRR. Bilateral and Multilateral Cooperation with countries prone to hazard and those having developed expertise in management of different disasters and international institutions for DRR would facilitate and encourage participation of professionals and officials in national and international events in enhancing their capacities.

10.9.2 International collaboration in the field of disaster management should be strengthened. The NDMA and NIDM have to play a key role in awareness generation and engage with print, electronic and folk media to carry forward programmes for public awareness. There is also a great need to develop the capacity and sensitise the media to comprehend disaster awareness and reporting, so that it plays a positive role in creating awareness and in handling disaster information and news during emergencies.

10.9.3 In order to address the issue of structural safety against multi-hazards, steps that lead to improvement of construction on the ground need to be initiated. This would entail enhancing community awareness, capacity building of architects and masons, strengthening of enforcement, etc.

10.9.4 Inter-state sharing of resources has been very effective in the past. Such sharing should be facilitated by encouraging states to enter into mutual agreements with each other on possible nature and type of resources that can be shared and set up administrative mechanisms for implementing these effectively.

10.10 National, State and District Level Response Plans

The recent Japanese earthquake, tsunami, followed by fire and the nuclear energy crisis is a pointer to the fact that despite best preparedness and mitigation and capacity building plans being in place, response and crisis management plans continue to be relevant. To put things in place an effective response plans at the National, States, Districts and the Sub-districts level should therefore, be encouraged to strengthen review and update the existing capacity for response and crisis management.

10.11 Corporate Social Responsibility

Business entities are expected to shoulder responsibilities for the impact of their activities on the consumers, employees and community as a whole. Efforts are therefore needed to engage corporate bodies in undertaking disaster risk reduction activities as a part of their corporate social responsibilities. NDMA and NIDM have to actively engage with the corporate sector in mainstreaming DRR within their CSR framework.

10.12 Integrating Climate Change and Disaster Risk Reduction

The current trends of climate change are expected to increase the frequency and intensity of existing hazards, an increased probability of extreme events, spur the emergence of new hazards and vulnerabilities with differential spatial and socio-economic impacts. This is likely to further degrade the resilience and coping capacities of poor and vulnerable communities, who make up from a quarter to half of the population of most Indian cities Vulnerability has typically contributed more to overall risk in India than hazard exposure. The efforts for integrating climate change and DRR measures needs to be further strengthened and institutionalised and community be sensitised to take up such adaptive measures, which reduces their vulnerability.

10.13 Conclusion

The above mentioned initiatives are only an indicative list of actions requiring attention. Every stakeholder involved needs to contribute his bit in order to ensure that the increasing hazards and risks and the vulnerabilities get addressed in a planned and systematic manner, thereby increasing the coping capacities of the communities at large and making them resilient to the impacts of disasters. The Government is committed to structure and convert these requirements into actionable format to place them on a roadmap and source the funding for their implementation.

Glossary

Acceptable Risk

The level of potential losses that a society or community considers acceptable given existing social, economic, political, cultural, technical and environmental conditions.

Adaptation

The adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.

Biological Hazard

Process or phenomenon of organic origin or conveyed by biological vectors, including exposure to pathogenic micro-organisms, toxins and bioactive substances that may cause loss of life, injury, illness or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

Building Code

A set of ordinances or regulations and associated standards intended to control aspects of the design, construction, materials, alteration and occupancy of structures that are necessary to ensure human safety and welfare, including resistance to collapse and damage.

Capacity

The combination of all the strengths, attributes and resources available within a community, society or organization that can be used to achieve agreed goals.

Capacity Development

The process by which people, organizations and society systematically stimulate and develop their capacities over time to achieve social and economic goals, including through improvement of knowledge, skills, systems, and institutions.

Climate Change

(a) The Inter-governmental Panel on Climate Change (IPCC) defines climate change as: "a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings, or to persistent anthropogenic changes in the composition of the atmosphere or in land use".

(b) The United Nations Framework Convention on Climate Change (UNFCCC) defines climate change as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods".

Contingency Planning

A management process that analyses specific potential events or emerging situations that might

threaten society or the environment and establishes arrangements in advance to enable timely, effective and appropriate responses to such events and situations.

Coping Capacity

The ability of people, organizations and systems, using available skills and resources, to face and manage adverse conditions, emergencies or disasters.

Corrective Disaster Risk Management *

Management activities that address and seek to correct or reduce disaster risks which are already present.

Critical Facilities

The primary physical structures, technical facilities and systems which are socially, economically or operationally essential to the functioning of a society or community, both in routine circumstances and in the extreme circumstances of an emergency.

Disaster

A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources.

Disaster Risk

The potential disaster losses, in lives, health status, livelihoods, assets and services, which could occur to a particular community or a society over some specified future time period.

Disaster Risk Management

The systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster.

Disaster Risk Reduction

The concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.

Disaster Risk Reduction Plan *

A document prepared by an authority, sector, organization or enterprise that sets out goals and specific objectives for reducing disaster risks together with related actions to accomplish these objectives.

Early Warning System

The set of capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities and organizations threatened by a hazard to prepare and to act appropriately and in sufficient time to reduce the possibility of harm or loss.

Ecosystem Services

The benefits that people and communities obtain from ecosystems. ecosystems can provide include "regulating services" such as regulation of floods, drought, land degradation and disease, along with "provisioning services" such as food and water, "supporting services" such as soil formation and nutrient cycling, and "cultural services" such as recreational, spiritual, religious and other non-material benefits. Integrated management of land, water and living resources that promotes conservation and sustainable use provide the basis for maintaining ecosystem services, including those that contribute to reduced disaster risks.

El Niño-Southern Oscillation Phenomenon

A complex interaction of the tropical Pacific Ocean and the global atmosphere that results in irregularly occurring episodes of changed ocean and weather patterns in many parts of the world, often with significant impacts over many months, such as altered marine habitats, rainfall changes, floods, droughts, and changes in storm patterns.

Emergency Management

The organization and management of resources and responsibilities for addressing all aspects of emergencies, in particular preparedness, response and initial recovery steps.

Emergency Services

The set of specialized agencies that have specific responsibilities and objectives in serving and protecting people and property in emergency situations.

Environmental Degradation

The reduction of the capacity of the environment to meet social and ecological objectives and needs.

Environmental Impact Assessment

Process by which the environmental consequences of a proposed project or programme are evaluated, undertaken as an integral part of planning and decision-making processes with a view to limiting or reducing the adverse impacts of the project or programme.

Exposure

People, property, systems, or other elements present in hazard zones that are thereby subject to potential losses.

Extensive Risk *

The widespread risk associated with the exposure of dispersed populations to repeated or persistent hazard conditions of low or moderate intensity, often of a highly localized nature, which can lead to debilitating cumulative disaster impacts.

Forecast

Definite statement or statistical estimate of the likely occurrence of a future event or conditions for a specific area.

Geological Hazard

Geological process or phenomenon that may cause loss of life, injury or other health impacts,

property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

Greenhouse Gases

Gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation of thermal infrared radiation emitted by the Earth's surface, the atmosphere itself, and by clouds.

Hazard

A dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

Hydrometeorological Hazard

Process or phenomenon of atmospheric, hydrological or oceanographic nature that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

Intensive Risk *

The risk associated with the exposure of large concentrations of people and economic activities to intense hazard events, which can lead to potentially catastrophic disaster impacts involving high mortality and asset loss.

Land-use Planning

The process undertaken by public authorities to identify, evaluate and decide on different options for the use of land, including consideration of long term economic, social and environmental objectives and the implications for different communities and interest groups, and the subsequent formulation and promulgation of plans that describe the permitted or acceptable uses.

Mitigation

The lessening or limitation of the adverse impacts of hazards and related disasters.

Preparedness

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

Prevention

The outright avoidance of adverse impacts of hazards and related disasters.

Prospective Disaster Risk Management *

Management activities that address and seek to avoid the development of new or increased disaster risks.

Public Awareness

The extent of common knowledge about disaster risks, the factors that lead to disasters and the

actions that can be taken individually and collectively to reduce exposure and vulnerability to hazards.

Recovery

The restoration, and improvement where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors.

Residual Risk

The risk that remains in unmanaged form, even when effective disaster risk reduction measures are in place, and for which emergency response and recovery capacities must be maintained.

Resilience

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

Response

The provision of emergency services and public assistance during or immediately after a disaster in order to save lives, reduce health impacts, ensure public safety and meet the basic subsistence needs of the people affected.

Retrofitting

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

Risk

The combination of the probability of an event and its negative consequences.

Risk Assessment

A methodology to determine the nature and extent of risk by analysing potential hazards and evaluating existing conditions of vulnerability that together could potentially harm exposed people, property, services, livelihoods and the environment on which they depend.

Risk Management

The systematic approach and practice of managing uncertainty to minimize potential harm and loss.

Risk Transfer

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

Socio-natural Hazard *

The phenomenon of increased occurrence of certain geophysical and hydro meteorological hazard events, such as landslides, flooding, land subsidence and drought, that arise from the interaction of natural hazards with overexploited or degraded land and environmental resources.

Structural Measures

Any physical construction to reduce or avoid possible impacts of hazards, or application of engineering techniques to achieve hazard-resistance and resilience in structures or systems;

Non-structural Measures

Any measure not involving physical construction that uses knowledge, practice or agreement to reduce risks and impacts, in particular through policies and laws, public awareness raising, training and education.

Sustainable Development

Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Technological Hazard

A hazard originating from technological or industrial conditions, including accidents, dangerous procedures, infrastructure failures or specific human activities, that may cause loss of life, injury, illness or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.

Vulnerability

The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard.

*emerging concepts

For details on Glossary refer www.unisdr.org

Footnotes

[1] *Dictionary.reference.com*

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Abbreviations and Acronyms

AAI	Airport Authority of India
A & NI	Andman & Nicobar Island
AASC	Assam Administrative Staff College
ACA	Additional Central Assistance
ACD	Anti Collision Device
ADB	Asian Development Bank
ADPC	Asian Disaster Preparedness Centre
ADRC	Asian Disaster Reduction Centre
AERB	Atomic Energy Regulatory Board
AGM	Assistant General Manager
AICTE	All India Council for Technical Education
AIDS	Acquired Immune Deficiency Syndrome
AIM	Anna Institute of Management
AJL	Ahmedabad Janmarg Limited
AMC	Ahmedabad Municipal Corporation
AMCDRR	Asian Ministerial Conference on Disaster Risk Reduction
AMR-APARD	AMR-Andhra Pradesh Academy of Rural Development
ARF	Asean Regional Forum
ARG	Automatic Rain Gauge
ART	Accident Relief Trains
ASAR	Advance Search & Rescue
ATI	Administrative Training Institute
AUWSP	Accelerated Urban Water Supply Programme
AWS	Automatic Weather Station
BAPMoN	Background Air Pollution Monitoring Network
BARC	Bhabha Atomic Research Centre
BIDR	Border Security Force Institute of Disaster Response
BIPA&RD	Bihar Institute of Public Administration & Rural Development
BIS	Bureau of Indian Standard
BMPTC	Building Material & Technology Promotion Council
BoT	Board of Trustees
BRGF	Backward Regions Grant Fund

BRTS	Bus Rapid Transit System
BSF	Border Security Force
BTC	Basic Training Centre
CADRE	Community Action for Disaster Response
CBRN	Chemical, Biological Radiological and Nuclear
CBSE	Central Board of Secondary Education
CCA	Climate Change Adaptation
CCRIF	Caribbean Catastrophe Risk Insurance Facilities
CDM	Centre for Disaster Management
CEO	Chief Executive Officer
CERTI	Central Emergency Relief Training Institute
CISF	Central Industrial Security Force
CM	Chief Ministry
CMG	Crisis Management Group
CMIP	Crisis Management Plan
CoE	Centre of Excellence
CPWD	Central Public Works Department
CR	Central Railways
CRED	Centre for Research on the Epidemiology of Disasters
CRIDA	Central Research Institute for Dry Land Agriculture
CRPF	Central Reserve Police Force
CS	Chief Secretary
CSIAA	Chhattisgarh State Institute Academy of Administration
CSO	Chief Security Officer
CSO	Central Statistical Organization
CSSR	Collapsed Structure Search & Rescue
CTC	Central Training College
CWC	Central Water Commission
CWDS	Cyclone Warning Dissemination System
DAC	Department of Agriculture & Cooperation
DAE	Department of Atomic Energy
DAT	Distress Alert Transmitter
DC	District Collector
DDMA	District Disaster Management Authority

DDP	Desert Development Programme
DDUSIRD	Deen Dayal Upadhyaya State Institute of Rural Development
DDWS	Digital Disaster Warning System
DEA	Department of Economic Affairs
DGCA	Directorate General Civil Aviation
DGMS	Directorate General of Mines Safety
DIG	Director Inspector General
DM	Disaster Management
DM	District Magistrate
DMC	Disaster Management Community
DMD	Disaster Management Department
DMI	Disaster Management Institute
DMS	Disaster Management Support
DMSAR	Airborne SAR for Disaster Management
DMT	Disaster Management Team
DOS	Department of Space
DOT	Directorate of Training
DPAP	Drought Prone Area Programme
DPR	Detailed Project Report
DRDE	Defence Research & Development Establishment
DRDO	Defence Research & Development Organization
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
DSC	Decision Support System
DTR	Diurnal Temperature Range
DWR	Doppler Weather Radar
EAP	Externally Aided Programme
ECIL	Electric Corporation of India Limited
ECR	East Central Railways
EM-DAT	Emergency Database
ENSO	El Nino-Southern Oscillation
EOC	Emergency Operation Centres
ERF	Environmental Relief Fund
ERRP	Earthquake Risk Reduction and Recovery Preparedness

EWS	Early Warning System
FAO	Food and Agriculture organisation
FI	Fire Institute
FLC	Fishing Landing Centre
FMP	Flood Management Planning
GAA	Gopabandhu Academy of Administration
GAW	Global Atmosphere Watch Stations
GBPIHED	G.B. Pant Institute of Himalayan Environment & Deptt
GDP	Gross Domestic Product
GFDRR	Global Facility for Disaster Risk Reduction
GHG	Greenhouse Gases
GIDM	Gujarat Institute of Disaster Management
GIS	Geographic Information Systems
GLIDE	Global Unique Disaster Identifier Number
GM	General Manager
GOI	Government of India
GSI	Geological Survey of India
GSLV	Geosynchronous Satellite Launch Vehicle
H5N1	Highly Pathogenic Avian Influenza Virus
HCMRIPA	Harish Chandra Mathur Rajasthan Institute of Public Administration
HFA	Hyogo Framework of Action
HFL	Highest Flood Level
HIPA	Haryana Institute of Public Administration
HIV	Human Immuno Deficiency Virus
HLC	High level Committee
HOPE	Hospital Preparedness for Emergencies
HPIPA	Himachal Pradesh Institute of Public Administration
HRD	Human Resource Development
HUDCO	Housing and Urban Development Corporation
I & B	Information and Broadcasting
IAS	Indian Administrative Service
ICAO	International Civil Aviation Organization
ICAR	Indian Council of Agricultural Research
ICMR	Indian Council of Medical Research

ICRISAT	International Crop Research for Semi-arid Tropics
ICS	Incident Command System
ICZM	Integrated Coastal Zone Management Project
IDMC	India Disaster Management Congress
IDNDR	International Decade for Natural Disaster Reduction
IDSMT	Integrated Development of Small and Medium Towns
IDSP	Integrated Disease Surveillance Project
IEC	Information, Education and Communication
IFAD	International Fund for Agriculture Development
IFRC	International Federation of Red Crescent
IFS	Indian Forest Service
IGNOU	Indira Gandhi National Open University
IIPA	Indian Institute of Public Administration
IIRS	Indian Institute of Remote Sensing
IIT	Indian Institute of Technology
ILM	Institute of Land Management
ILO	International Labour Organisation
IMD	Indian Meteorological Department
IMG	Inter Ministerial Group
INCOIS	Indian National Centre for Oceanic Information System
INSARAG	International Search and Rescue advisory Group
INSAT	Indian National Satellite System
INSWIT	INDO-SWISS Collaboration for Training
IPCC	Intergovernmental Panel on Climate Change
IPS	Indian Police Service
IR	Internal Review
IRC	India-Russia-China
IRS	Indian Remote Sensing Satellites
ISDR	International Strategy for Disaster Reduction
ISRO	Indian Space Research Organization
ITBP	Indo-Tibetan Border Police
J&K IMPARD	The J&K Institute of Management, Public Administration and Rural Development
JICA	Japan International Cooperation Agency

JNNURM	Jawaharlal Nehru National Urban Renewal Mission
JST	Japan Standard Time
LBSNAA	Lal Bhadur Sashtri National Academy of Administration
LPA	Long Period Average
MAH	Major Accident Hazards
MCE	Mass Casualty Event
MCR HRDI	Dr. Marri Channa Reddy Human Resource Development Institute
MFR	Medical First Responder
MGSIPA	Mahatma Gandhi State Inst. of Public Administration
MHA	Ministry of Home Affairs
MHRD	Ministry of Human Resource Development
MIC	Methyl Iso Cynate
MNES	Ministry of Non-conventional Energy
MoA	Ministry of Agriculture
MoCA	Ministry of Civil Aviation
MoD	Ministry of Defence
MoEF	Ministry of Environment and Forest
MoES	Ministry of Earth Sciences
MoH & FW	Ministry of Health and Family Welfare
MoRTH & S	Ministry of Road Transport and Highways and Shipping
MPC	Mitigation Plan Committee
MSK	Medvedev-Sponheuer-Karnik
MST	Ministry of Science & Technology
MWR	Ministry of Water Resources
NAPAAM	Tezpur University, Tezpur, NAPAAM
NAPCC	National Action Plan on Climate Change
NARL	National Atmospheric Research Laboratory
NBC	Nuclear Biological and Chemical
NBC	National Building Code of India
NCC	National Cadet Corps
NCCF	National Calamity Contingency Fund
NCDC	National Civil Defence College
NCERT	National Council for Educational research and Training
NCMC	Natural Crisis Management Committee

NCR	National Capital Region
NCRMP	National Cyclone Risk Mitigation Project
NDEM	National Database for Emergency Management
NDMA	National Disaster Management Authority
NDMF	National Disaster Mitigation Fund
NDRF	National Disaster Response Fund
NDRF	National Disaster Response Force
NEC	National Executive Committee
NEOC	National Emergency Operation Centre
NER	North Eastern Railways
NERMP	National Earthquake Risk Mitigation Project
NE-SAC	North Eastern-Space Applications Centre
NFR	North East Frontier Railways
NFRMP	National Flood Risk Mitigation Project
NFSC	National Fire Service College
NGO	Non Governmental Organisation
NICD	National Institute of Communicable Disease
NIDM	National Institute of Disaster Management
NIOT	National Institute of Ocean Technology
NISA	National Industrial Security Academy
NITSRDR	National Institute for Training in Search, Rescue and Disaster Response
NLRMP	National Landslide Risk Mitigation Project
NPDM	National Policy on Disaster Management
NPP	Nuclear Power Plan
NR	Northern Railways
NREGS	National Rural Employment Guarantee Scheme
NRSA	National Remote Sensing Agency
NRSC	National Remote Sensing Centre
NSS	National Service Scheme
NVBDCP	National Vector Borne Diseases Control Programme
NYKS	Nehru Yuva Kendra Sangathan
OASTC	Ocean and Atmospheric Science & Technology Cells
ODA	Official Development Assistance
OECD	Organisation for Economic Cooperation and Development

OFDA	Office of U.S. Foreign Disaster Assistance
OHE	Overhead Equipment
PEER	Programme for Enhancement of Emergency Response
PLI Act	Public Liability Insurance Act
PMO	Prime Minister's Office
PRI	Panchayati Raj Institutes
PRL	Physical Research Laboratory
PSLV	Polar Satellite Launch Vehicle
R & D	Research and Development
RCC	Regional Consultative Committee
RDD	Radiological Dispersal Device
RDSO	Research, Design and Standard Organisation
RISAT	Spaceborne Radar Imaging Satellite
RNBC	Radiological, Nuclear, Biological & Chemical disasters
ROB	Road Over Bridges
RPF	Railways Protection Force
RS	Radiosonde
RSMC	Regional Specialized Meteorological Centre
RSMC	Regional Specialized Meteorological Centre
RTI	Regional Training Institute
RUB	Road Under Bridges
RW	Radiowing
SA	Sentinel Asia
SAARC	South Asian Association for Regional Cooperation
SAR	Synthetic Aperture Radar
SAR	Search And Rescue
SARPs	Standard and Recommended Practices
SASE	Snow and Avalanche Study Establishment
SAT	State Academy of Training
SCL	Semi-Conductor Laboratory
SCMG	State Crisis Management Group
SCR	South Central Railways
SCZMC	SAARC Coastal Zone Management Centre
SDC	Swiss Agency for the Development and Cooperation

SDF	Self Defence Force
SDMA	State Disaster Management Authority
SDMC	SAARC Disaster Management Centre
SDRF	State Disaster Response Force
SDRF	State Disaster Response Fund
SEC	State Executive Committee
SECR	South East Central railways
SFAC	Standing Fire Advisory Council
SIPARD	State Institute of Public Administration & Rural Development
SIRD	State Institutes for Rural Development
SKIPA	Shri Krishna Institute of Public Administration
SMRC	SAARC Metrological Research Centre
SMS	Safety Management Systems
SOP	Standard Operating Systems
SPARMV	Self Propelled Accident Relief Medical Van
SPART	Self Propelled Accident Relief Trains
SPURT	Self-Propelled Ultrasonic Rail Testing
SRFF	Standby Recovery Financing Facility
SRSF	Special Railway Safety Fund
SSA	Sarva Siksha Abhiyaan
SST	Sea Surface Temperatures
SW	South West
SWR	South Western Railways
TAWD	Train Actuated Warning Device
TCAC	Tropical Cyclone Advisory Centre
TCIP	Turkish Catastrophe Insurance Pool
TDPSI	TOT in Disaster psycho-social Intervention
TEWS	Tsunami Early Warning System
TOT	Training of Trainers
TRP	Tsunami Reconstruction Programme
TVU	Train Vehicle Units
UAA	Uttarakhand Academy of Administration
UD	Urban Development

UIDSSMT	Urban Infrastructure Development Scheme for Small and Medium Towns
ULB	Urban Local Bodies
UNDAC	United Nations Disaster Assessment and Coordination
UNDG	United Nations Development Group
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UN-ESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations Children's Fund
UNISDR	United Nations for International Strategy for Disaster Reduction
UNO	United Nations Organisations
UNOCHA	United Nation office for Coordination of Humanitarian Affairs
UPAAM	Uttar Pradesh Academy of Administration & Management
URR	Urban Risk Reduction
USA	United States of America
USAID	United States Agency for International Development
USAR	Urban Search & Rescue
UT	Union Territory
VOS	Voluntary Observing Ships
VPN	Virtual Private Network
WFP	World Food Programme
WHO	World Health Organisation
WILD	Wheel Impact Load Detector
WMO	World Metrological Organisation
WR	Western Railways
YCADA	Yashwantrao Chavan Academy of Development Administration

Tables, Boxes and figures

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Boxes

Figures

Important Telephone Numbers

A. Disaster Management Division

(Ministry of Home Affairs)

S. No.	Name / Designation	Telephone	Fax
1.	Shri P Chidambaram, Home Minister	011-23092462 011-23092631	011-23094221
2	Shri Mullappally Ramachandran, Minister of State	011-23093235 011-23092595	011-23094896
3	Shri Gopal K Pillai Home Secretary	011-23092989/23093031 23013058 (R)	011-23093003
4	Shri A E Ahmad, Secretary (Border Management)	011-23092440 (o) 011-24602518 (R)	011-23092717
5	Shri R K Srivastava Joint Secretary (DM)	011-24638206	011-24610906
6	Shri Dev Kumar, Director (DM-I)	011-24642853 (O) 011-26266708 (R)	011-24642853
7	Shri J P Misra, Director (DM-II)	011-24622543	011-24622543
8	Shri Sanjay Agarwal, Director (DM-III)	011-24642381(O)	011-24641559
9	Shri Om Prakash, Technical Officer (DM-I)	011-24642379	011-24603033
10	Mrs Promilla Sen Gupta, Under Secretary (DM-II)	011-24640391	011-24640391
11	Shri Ashok Shukla, Under Secretary (DM-III)	011-24640391 011-23812646(R)	011-24640391
12	Shri Vishwanathan, Under Secretary	011-24691941	011-24691941
13	Control Room	011-23093563-66	011-23093750

B. National Disaster Management Authority (NDMA)

	Name	Tel (office)	Fax
1	Shri M Shashidhar Reddy, Vice Chairman	011-26701701	011-26701706
2	Dr. Noor Mohammed Secretary, NDMA	011-26701710	011-26161106
3	Ms Sujata Saunik, Joint Secretary (Adm & NDRF)	011-26701867	011-26701820
4	Shri Amit Jha Joint Secretary (Policy & Plan),	011-2670 1718	011-26701717
5	Dr. P K Tripathi Joint Secretary (Mitigation)	011-26701816	011-26701820
6	Control Room	011-26105912	011-26701729

C. Members / Alternate Members of the National Crisis Management Committee (NCMC)

S.No.	Name/Designation & Telephone Numbers of the Member	Alternate Members
1	Shri KM Chandrasekhar Cabinet Secretary Tel : 011-2301 6696/23011241, Fax: 011-2301 8638 Res : 011-23013272/23012494	
2	Shri T K A Nair Principal Secretary to PM Tel : 011-2301 3040, Fax: 011-23017475 Res : 011-2338 4230	Shri Sanjay Mitra Joint Secretary to PM Tel : 011-2301 8876 Fax : 011- 2301 6857 Res : 011-26277609
3	Shri Gopal K Pillai Home Secretary Tel : 011-2309 2989/2309 3031 Fax : 2309 3003 Res : 2301 3058	Shri AE Ahmad Secretary(Border Management) Tel : 011-2309 2440 Fax : 011-2309 2717 Res : 011-24602158
4.	Shri Pradeep Kumar Defence Secretary Tel : 011-23012380 Fax: 011-23010044 Res : 011-23014489	Shri RK Mathur Additional Secretary, MOD Tel : 011-2301 7678 Fax : 011-2301 9658 Res : 2467 1294
5.	Shri Ajit Seth Secretary (Coordination) Cabinet Secretariat Tel : 011-2301 7075 Fax : 2301 8949 Res : 2626 5595	Dr. Mrutyunjay Sarangi Special Secretary Cabinet Secretariat Tel : 011-2301 2697 Fax : 2301 8470 Res : 2338 8215
6	Shri Rahul Dua Director (Security) Tel : 2309 3648 Res : 2567 1048	
7	Ms. Vijaya Latha Reddy Deputy NSA & Secretary National Security Council Secretariat Tel : 011- 2334 5287 Fax : 2374 2811 Res : 24129585	Shri H.Upadhyay Chairman JIC National Security Council Sectt. Tel : 011-2334 9314 Fax : 011-2334 9314 Res : 011-2687 2464
8	Shri Nehchal Sandhu Director, IB Tel : 2309 3330/23092892 Fax : 23093117 Res 23012252/23012161	Shri Ajit Lal Special Director IB Tel : 23093492/26872431 Fax : 23093492 Res : 26872289

S.No.	Name/Designation & Telephone Numbers of the Member	Alternate Members
9	Shri S.K. Tripathi Secretary (R) Cabinet Sectt. Tel : 2379 6470/2379 6647 Fax : 2379 6462 Res : 2338 5900	Shri A.K. Arni Special Secretary Cabinet Sectt. Tel : 23796562 Fax : 23796848 Res : 26267028
10	Dr. Noor Mohammed Secretary, NDMA Tel : 2670 1710/26701711 Fax : 2670 1716 Res : 26876622	Shri Amit Jha Joint Secretary (Plan & Policy), NDMA Tel : 2670 1718 Fax : 26701717
11	Shri Raghu Menon Secretary Ministry of Information & Broadcasting Tel : 2338 2639/2338 6530 Fax : 2338 3513 Res : 2410 6252	Shri D.P. Reddy Joint Secretary (F P&A) I&B Tel : 2338 4453 Fax : 23387823 Res : 2464 7424

D. National Disaster Response Force (NDRF)

	Name	Tel (office)	Fax
1	Shri Rajiv, DG	011-26712851, 011-24101450	011-26715303
2	Shri Mukul Goel, IG	011-26160252	
3	Shri J K S Rawat, DIG	011-26105910	
4	Control Room	011-26107953	011-26105912

D.1. NDRF Battalions

1st	Commandant (BSF) Kamrup (Assam)	0361-2841464	09435545951	0361-2840284
2nd	Commandant (BSF) Kolkata	033-25264394	09434742836	033-25264394
3rd	Commandant (CISF) Mundali (Orissa)	0671-2879710	09437964571	0671-2879710
4th	Commandant (CISF) Vellore (TN)	04177-246269 04177-246233	09442105069	04177-246269
5th	Commandant (CRPF) Pune (Maharashtra)	02114-231245 02114-231509	09423506765	02114-231245
6th	Commandant (CRPF) Gandhinagar (Gujarat)	079-23262540 079-23262587	09427304100 09427304218	079-23262587 079-23262549
7th	Commandant (ITBP), Bhatinda (Punjab)	0164-2246030	09417802031	0164-2246269
8th	Commandant (ITBP), Gautum Budh Nagar NOIDA	0120-2935114	09968610011	0120-2351087
9th	Commandant, (BSF) Bhita Distt, Patna	06115-253939	09968659905 08986909490	06115-253939
10th	Commandant, Malkanagiri, Vijayawada (AP)-Proposed	01955253013 01955252646	09419217790	01955252646

E. National Institute of Disaster Management

Tel.: 011-23702432, 23705583, 23766146 TeleFax: 011-23702442, 23702446

F. Nodal/Alternate Officers of Central Nodal Ministries/Departments

	Tel (O)	Mobile	Fax	Res.
Ministry of Agriculture				
Shri Atanu Purkayastha Joint Secretary (DM)	011-2338 1503	9899772227	011-2338 7669	
Shri CM Sharma Deputy Secretary (DM)	011-2338 4752	9810640845	011-2338 4555	011-2616 7345
Shri Pankaj Kumar Joint Secretary (A)	011-2307 0306	9868933325		011-2626 6126
Atomic Energy (BARC)				
Dr. MM Adtani Head, BARC	022-2559 8752	09757163201	022-25519209	022-2556 8357
Shri K Narayana Kutty Head, Trg Group, BARC	022-2559 8697	09969191398		022-2555 4983
Department of Space (National Remote Sensing Centre)				
Dr. VS Hegde Scientific Secretary, HQ.	080-2341 6356	09845389131	080-23415298	080-2666 5477
Shri V. Bhanumurthy Project Director, NDEM	040-2388 4252	09441286607	040-23870445	040-2776 8542
Ministry of Civil Aviation				
Shri Rohit Nandan Joint Secretary	011-2461 7692	9560876677	011-2465 4055	011-2410 6344
Shri Prashant Sukul Joint Secretary	011-2461 0386	9810866142	011-2465 5839	011-2461 0044
Shri LRS Reddy Director	011-2461 0366	9958877322	011-2461 0366	011-2625 4963
Ministry of Coal				
Shri AK Bhalla Joint Secretary(C)	011-2338 4224	9650422244	011-2338 5652	011-2688 9386
Shri PR Mandal Adviser (Proj)	011-2338 6347	9818315656	011-2338 7738	011-2332 9374
Ministry of Communication & Information Technology				
Dr. Gulshan Rai DG CERT-In	24368544		24366806	22323085
Shri B J Srinath Senior Director	24363138	9899576710	24366806	26187415
Ministry of Defence				
Shri Subhash Chandra Joint Secretary(G/Air)	011-2301 1410	9717790920	011-2301 3709	011-2410 3862

	Tel (O)	Mobile	Fax	Res.
Ministry of External Affairs				
Shri Malay K Sinha Joint Secretary (CNV)	011-2301 5749	9818550246	011-2379 4427	011-23384104
Shri RK Tyagi Joint Secretary(CNV)	011-2301 1357		011-2379 2285	0124-2577469
Ministry of Environment & Forest				
Shri CD Singh DIG Forests(FPD)	011-2436 3984	9999440680	011-2436 3984	011-2610 9513
Ms. Prakriti Srivastava Joint Director (Wild Life)	011-2436 1795	9999163337	011-2436 1795	
Ministry of Health & Family Welfare				
Dr. RS Shukla Joint Secretary,	011-2306 1706	9910334726	011-2306 1398	011-2469 2410
Ms. Shalini Prasad Joint Secretary	011-2306 1773	9968283478	011-2306 1767	011-2469 7277
Dr. P. Ravindran Director(EMR), DGHS	011-2306 1302	9868619799	011-2306 1457	011-4563 9559
Dr. L. Swasticharan CMO(EMR), DGHS	011-2306 1469	9818988281	011-2306 1469	011-2410 7325
Ministry of Information Technology				
Dr. Gulshan Rai DG	011-2436 8544		011-2436 6806	011-2232 3085
Shri B J Srinath Senior Director	011-2436 3138	9899576710	011-2436 6806	011-2618 7415
Ministry of Mines				
Shri G. Sriniwas Joint Secretary	011-2338 4886		011-2338 8487	
Shri R K Malhotra Deputy Secretary	011-2338 3958	9810476390	011-2338 3958	011-2554 9949
Ministry of Petroleum & Natural Gas				
Shri LN Gupta Joint Secretary	011-2338 6935	9717205888	011-2338 2673	011-2461 7600
Shri PK Singh Director	011-2307 3165	9899969618	011-2338 3682	
Ministry of Power				
Shri Sudhir Kumar Joint Secretary (OM)	011-2371 0389	9650293193	011-2373 1266	011-2687 6633
Shri AK Saxena Director(OM)	011-2371 6674	9868156166	011-2371 6674	011-2626 6166
Ministry of Railways				
Shri DP Pandey Adviser TT(M)	011-2338 9500	9717647033		011-2410 0402
Shri HD Gujrati EDTT(S)	011-2338 4260	9910487464	011-2330 3872	011-2410 5568

	Tel (O)	Mobile	Fax	Res.
Ministry of Road Transport & Highways				
Shri SK Dash Joint Secretary(T)	011-2371 7294	9310144446	011-2331 1802	011-2616 6805
Shri Raghav Chandra Joint Secretary(Highways)	011-2371 9209	8826277007	011-2335 9477	011-2656 1483
Ministry of Shipping				
Shri Rakesh Srivastava Joint Secretary	011-2371 1873	9810505633	011-2332 8549	011-2410 1078
Shri Rajeev Gupta Joint Secretary	011-2371 0189	9910600334	011-2372 2885	011-2412 2685
Ministry of Water Resources				
Shri Sudhir Garg Joint Secretary(A)	011-2371 0343	9899447877	011-2371 0253	011-2307 4284
Shri Ram Sharan Deputy Secretary(A)	011-2373 8126	93129 71431	011-2373 8126	011-2511 3583

G. Forecasting agencies

Tsunami Warning Centre, Hyderabad

	Name	Tel (office)	Mobile	Fax
1	Dr.S S C Shenoy, Director	040-23895004	09441013377	040-23895001
2	Shri T Srinivasa Kumar Scientist Incharge,	040-23895006, 23886006 040-23892022 (R)	09441229297	040-23895012
3	Control Room	040-23895011/19		040-23895001

Snow & Avalanche Study Establishment, Chandigarh

	Name	Tel (office)	Mobile	Fax
1	Sh Ashwagosha Ganju, Director	0172-2699804-806 Extn – 203	09872083117	0172-2699802
2	Dr. M R Bhutiani, Joint Director	0172-2699804-806	09463999980	0172-2699970

Geological Survey of India

	Name	Tel (office)	Mobile	Fax
1	Dr. A Sundara Moorthy Director General	(033)22861676 (033)22861661	09872083117	033-2699802
2	Shri Probhash Pande, Additional DG	033-22861693	09432647708	
3	Control Room (Delhi)	011-29962671		011-29962671

Indian Meteorological Department

	Name	Tel (office)	Mobile	Fax
1	Shri Ajit Tyagi Director General	011-24611842 (o), 011-24633692 (R)	9313982396	011-24611792
2.	Shri A K Bhatnagar ADG (M)	011-24697473 (o) 011-24654939 (R)	9868880134	011-24697473
3.	Control Room – Seismology	011-24619943, 24624588		
4.	Control Room – Flood	011-24631913		
5.	Cyclone warning	011-24652485		

Central Water Commission

	Name	Tel (office)	Mobile	Fax
1	Shri C Lal (FMP)	011-26168258	9811054117	011-26106523, 26102935
2.	Control Room	011-26106523		

Integrated Defence Staff

	Name	Tel (office)	Mobile	Fax
1	DCIDS (Ops)	011-23013947 (Exch-35886)	9868890769	011-23013947
2	ACIDS (Ops)	011-23011442		
3.	Control Room	011-23005131, 23005114		011-23005137, 24605147

H. Telephone Number of Chief Secretaries (CS) and Relief Commissioners (RC) of States/UTs as on 15/06/11

State / UT		Name /Designation officer	Telephone (O)	Mobile No.	Fax No.
Andhra Pradesh	CS	Shri. V.S. Prasad	040-234526500 40-23455340		040-23453700
	RC	Shri N. Siva Sankar Commissioner for DM	040-23456005	09963944416	040-23451819
Arunachal Pradesh	CS				
	RC	Mr. Tabom Bam Chief Secretary/PS Relief	0360--2212595	09436040035	0360-2215719
Assam	CS	Shri N K Das	0361-2261403 0361-2261120		0361-2260900
	RC	Shri V K Pipersenia, Principal Secretary/DM	0361-2237255	09435552145	0361-2260900
Bihar	CS	Shri Anup Mukherjee	0612-2215804 0612-2215085		0612-2215983
	RC	Shri Vyas ji Principal Secretary(Rev) & DM	0612-2215600 0612-2213855	09431800732	0612-2217305 0612-2217786

State / UT		Name /Designation officer	Telephone (O)	Mobile No.	Fax No.
Chhattisgarh	CS	Shri P. Joy Oommen,	0771-2221207		0771-2221206
	RC	Shri Sunil Kumar Kujur Principal Secretary (Rev)	0771-2221120	09425208500	0771-4034823
Goa	CS	Shri Sanjay Kumar Srivastava	0832-2419402		0832-2415201
	RC	Shri B. Vijayan Principal Secretary (Rev)	0832-2419440	09527002327	0832-2419687
Gujarat	CS	Shri Achal Kumar Jyoti	079-23220372 079-23250301 079-23250302		079-23250305
	RC	Shri P.K. Parmar Principal Secretary /RC	079-23251611	09978406123	079-23251568
Haryana	CS	Ms. Urvashi Gulati	0172-2740118		0172- 27403147
	RC	Mr. Naresh Gulati Fin.Comr & Principal Secretary DM	0172-2711925	09815970530	0172-2711925
Himachal Pradesh	CS	Ms. Rajwant Sandhu	0177-2621022		0177-2621813
	RC	Shri Deepak Sanan Principal Secretary (Rev)	0177-2621894	09816022740	0177-2621894
Jharkhand	CS	Dr. S K Chaudhary	0651-2400240 0651-2400250		0651-2403255
	RC	Mrs. M.N. Karketta Secretary(DM)	0651-2400218	09470521008	0651-2400231
J&K	CS	Shri Madan Lal	0194-2455353 0194-2452257 (Srinagar) 0191-2546773 (Jammu)		0194-2452356 (Srinagar) 0191-2546188 (Jammu)
	RC	Sheikh Ejaz Iqbal Secretary(Rev)	0194-2452268 (Srinagar) 0191-2544543 (Jammu)	09419184131	0194-2481703 (Srinagar) 0191-2579981
Karnataka	CS	Shri S.V. Ranganath	080-22252442 080-22092476		080-22258913
	RC	K.S. Prabhakra Secretary (Rev)	080-22353980 080-22032582	09448137645	080-22354321
Kerala	CS	Dr. P. Prabakaran	0471-2333147 0471-2327376		0471-2327176
	RC	Dr (Mrs) N P Haran, Add CS, Revenue and DM	0471-2325239 0471-2518549	09447132755	0471-2335467
Madhya Pradesh	CS	Shri Avani Vaish	0755-2441848		0755-2441521
	RC	Shri Anil Srivastava Principal Secretary (Rev)	0755-2551836	09425014155	0755-2440033

State / UT		Name /Designation officer	Telephone (O)	Mobile No.	Fax No.
Manipur	CS	Shri D. S. Poonia	0385-2451144		0385-2452629
	RC	Dr. Suhel Akhtar Commissioner Relf. &DM	0385-2440736	09402414682	0385-2443443
Mizoram	CS	Shri Vanhela Pachuau	0389-2322411		0389-2322745
	RC	T.V. Fambawl Secretary(DM) & Rehabilitation	0389-2324512	09436142334	0389-2306518
Maharashtra	CS	Shri Ratnakar Gikwad	022-22025042 022-22028762		022-22028594
	RC	Mr. J S Saharia Additional CS and RC	022-22025274	09821128083	022-22855920
Meghalaya	CS	Shri W.M.S. Pariat	0364-2224801 0364-2222250		0364-2225978
	RC	Mr. K S Krufa Principal Secretary(Rev)	0364-2224184	09402196384	0364-2225978
Nagaland	CS	Shri Lalthara	0370-2240082 0370-2270076		0370-2270057
	RC	Shri J. Alam Home Commissioner & DM	0370-2270068	09402489749	0370-2270071
Orissa	CS	Shri B K Patnaik	0674-2536700 0674-2534300		0674-2536660
	RC	Mr. N K Sundaray Special Relief Commissioner	0674-2534180	09437078780	0674-2534176
Punjab	CS	Shri Subodh Chandra Agrawal	0172-2740156 0172-2740860		0172-2742488
	RC	Shri A.R. Talwar Financial Commissioner (Revenue)	0172-2743854	09815722260	0172-2747798
Rajasthan	CS	Shri Salaudin Ahmed	0141-2380254 0141-2227254		0141-2227114
	RC	Shri Tanmay Kumar Secretary (Relief)	0141-2227390	09414181018	0141-2227155
Sikkim	CS	Shri Tseten Dorji	03592-222315 03592-224323		03592-222851
	RC	Shri P.K. Kharel Commissioner -cum- Secretary (Rev & DM)	03592-202664	09733159460	03592-202932
Tripura	CS	Shri S. K. Panda	0381-2323200 0381-2324392		0381-2324013
	RC	Shri Sushil Kumar Principal Secretary, Revenue and DM	0381-2419520	09436120043	0381-2413474

State / UT		Name /Designation officer	Telephone (O)	Mobile No.	Fax No.
Tamil Nadu	CS	Shri Debendranath Sarangi	044-25671555		044-25672304 044-25677128
	RC	Shri K Gnanadesikan, Principal Secretary & CRA	044-28523299	9940266114	044-28546624
Uttar Pradesh	CS	Shri Atul Kumar Gupta	0522-2221599 0522-2238212		0522-2239283
	RC	Shri K K Sinha Principal Secretary & Relief Commissioner.	0522-2238107	09335299758	0522-2238084
Uttrakhand	CS	Shri Subhash Kumar	0135-2712094		0135-2712113
	RC	Dr. Rakesh Secretary, Revenue & DM Shri Bhaskakranand AS (Rev), Relief & DM	0135-2712008 0135-2656130	09412050249 09837542221	0135-2711881 0135-2712800
West Bengal	CS	Shri Samar Ghosh	033-22145858 033-22145047		033-22144328
	RC	Shri Indiver Pandey Principal Secretary, Disaster Management	033-22143674	09007154222	033-22144005
Andaman & Nicobar	CS	Shri Shakti Sinha	03192-233110 03192-234087		03192-232656
	RC	Shri V. Abraham Secretary, DM	03192-234880	09434284798	03192-233629
Chandigarh	CS	Shri Pradip Mehra	0172-2740118		0172-2740317
	RC	Shri Brijendra Singh DC & RC	0172-2700109	08427202555	0172-2700053
Daman & Diu	CS	Shri Narendra Kumar	0260-2642777		0260-2642702
	RC	Shri Majoj Kr Sahu Collector & RC	0260-2230698	09726185900	0260-2230689
Dadra & Nagar Haveli	CS	Shri Narendra Kumar	0260-2642777		0260-2642702
	RC	Shri Sanjay Goel Collector & RC	0260-2642721	09913577711	0260-2642787
Delhi	CS	Shri Rakesh Mehta	011-23392101 011-23392100		01123392102
	RC	Shri Dharmender Divisional Commissioner	011-23962825	09811848809	011-23931269
Laksha-dweep	CS	Shri J. K. Dadoo	04896-262255		04896-262184
	RC	Dr. Vasanta Kumar Collector & RC	04896-262256	9446562278	04896-263180
Puducherry	CS	Shri R. Chandra Mohan	0413-2334145 0413-2335512		0143-2337575
	RC	Mrs. K R Meena	0413-2334144	9585506968	0413-2334145

सर्वे भवन्तु सुखिनः

(Brihadaaranyaka Upanishad)

Suggestions for improving the book and / or corrections, if any may be sent to jsdm@nic.in

This book has been prepared under the
GoI-UNDP Disaster Risk Reduction Programme (2009-2012)