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COUNTRY REPORT

INDIA

A.General Information

Geography

India is one of the oldest civilizations in the world with a kaleidoscopic variety and rich cultural heritage. It covers an area of 3,287,590 sq. km extending from the snow-covered Himalayan heights to the tropical rain forests of the south. As the 7th largest country in the world, India stands apart from the rest of Asia, marked off as it is by mountains and the sea, which give the country a distinct geographical entity. Bounded by the Great Himalayas in the north, it stretches southwards and at the Tropic of Cancer, tapers off into the Indian Ocean between the Bay of Bengal on the east and the Arabian Sea on the west.

Lying entirely in the northern hemisphere, the mainland extends between latitudes 8° 4' and 37° 6' north, longitudes 68° 7' and 97° 25' east and measures about 3,214 km from north to south between the extreme latitudes and about 2,933 km from east to west between the extreme longitudes. It has a land frontier of about 15,200 km. The total length of the coastline of the mainland, Lakshadweep Islands and Andaman & Nicobar Islands is 7,516.6 km. The Indian peninsula is separated from mainland Asia by the Himalayas. The Country is surrounded by the Bay of Bengal in the east, the Arabian Sea in the west, and the Indian Ocean to the south. Indian neighbours consist of Afghanistan and Pakistan to the north-west; China, Bhutan and Nepal to the north; Myanmar to the east; and Bangladesh to the east of West Bengal. Sri Lanka is separated from India by a narrow channel of sea, formed by Palk Strait and the Gulf of Mannar.

Climate

The climate of India can broadly be classified as a tropical monsoon one. But, in spite of much of the northern part of India lying beyond the tropical zone, the entire country has a tropical climate marked by relatively high temperatures and dry winters. There are four seasons:

- ✧ Winter (December-February)
- ✧ Summer (March-June)
- ✧ South-west monsoon season (June-September)

- ✧ Post monsoon season (October-November)

PEOPLE

- India's population, as on 1 March 2011 stood at 1,210,193,422 (623.7 million males and 586.4 million females). India's population consists of approximately 16.7% (1/6th) of the world population.
- More than 50% of the population is below 25 years of age and more than 65% is below 35 years.
- The average annual exponential growth rate stands at 1.64 per cent during 2001-2011.
- The Crude Birth and death rates were 18.3 and 7.3 respectively in 2009.
- Sex Ratio - 940 females per 1000 males according to 2011 census.
- Population density is 382 persons/sq. km. as per 2011 census.

B.Natural Hazards in India

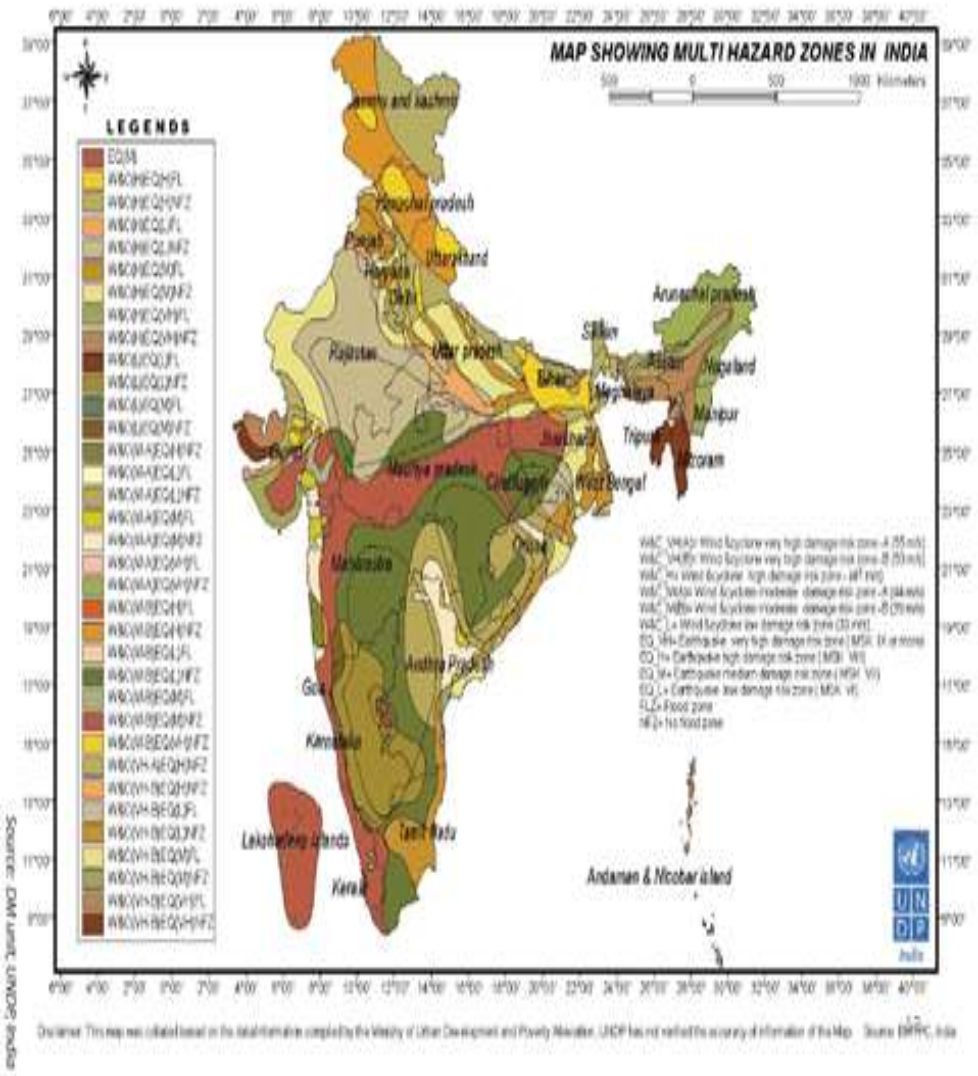
General

India, due to its, physio-graphic and climatic conditions is one of the most disaster prone areas of the world. It is vulnerable to windstorms from both the Arabian Sea and Bay of Bengal. There are active crustal movements in the Himalaya leading to earthquakes. About 58.7 % of the total land mass is prone to earthquake of moderate to very high intensity. The region was hit by Uttarkashi Earthquake (1991), Killari Earthquake (1993), Koyana Earthquake (1997), Chamoli Earthquake (1999), and Bhuj earthquake (2001), Jammu & Kashmir Earthquake (2005). The Himalayas being a fairly young mountain range is undergoing constant geological changes resulting in landslides. Floods brought about by heavy rain and drought in arid and semi arid areas. About 12 % of the total land mass is flood prone and 68 % of the arable land is vulnerable to drought. The Western region of the country is represented by the Thar Desert and the central India by the Deccan Plateau face recurring droughts due to acute shortage of rainfall. India has increasingly become vulnerable to tsunamis. India has a coastline running 7600 km long; as a result is repeatedly threatened by cyclones.

Some Basic Facts at a glance:-

- ❖ Indian Subcontinent : amongst the world's most disaster prone areas
- ❖ 58.6% of land vulnerable to earthquakes
- ❖ 68% of cultivable area is prone to drought
- ❖ 8.5% land vulnerable to cyclones – 5700 KMs out of 7516 KMs of coastline
- ❖ 12% land vulnerable to floods
- ❖ Around 15% area is prone to landslides (0.49 million Sq. KMs) – around 20 states are affected

The map below prepared by the UNDP shows multi-hazards zones in India.



The table below shows major disasters in the known history of India:

		Name of Event	Year	Fatalities/Damages
1.		Maharashtra Earthquake	1618	2,000
2.		Bengal Earthquake	1737	300,000
3.		Bengal Cyclone	1864	60,000
4.		The Great Famine of Southern India	1876-1878	5.5 million
5.		Maharashtra Cyclone	1882	100,000
6.		The Great Indian famine	1896-1897	1.25 million to 10 million
7.		Kangra earthquake	1905	20,000
8.		Bihar Earthquake	1934	6,000
9.		Bengal Cyclone	1970	500,000 (include Pakistan and Bangladesh also)
10.		Lahul valley Avalanche	1977	200 people were killed
11.		Andhra Pradesh Cyclone	1977	10,000
12.		Drought in Haryana & Punjab	1987	300 million people affected
13.		Latur Earthquake	1993	7,928 death and 30,000 injured
14.		Orissa Super Cyclone	1999	10,000
15.		Gujarat Earthquake	2001	25,000
16.		Indian heat wave	2002	Killed more than 1000 people
17.		Indian Ocean Tsunami	2004	10,749 deaths 5,640 persons missing
18.		Kashmir Earthquake	2005	86000 deaths (include Kashmir & Pakistan)
19.		Mumbai Catastrophes	2005	Killing at leased 5000

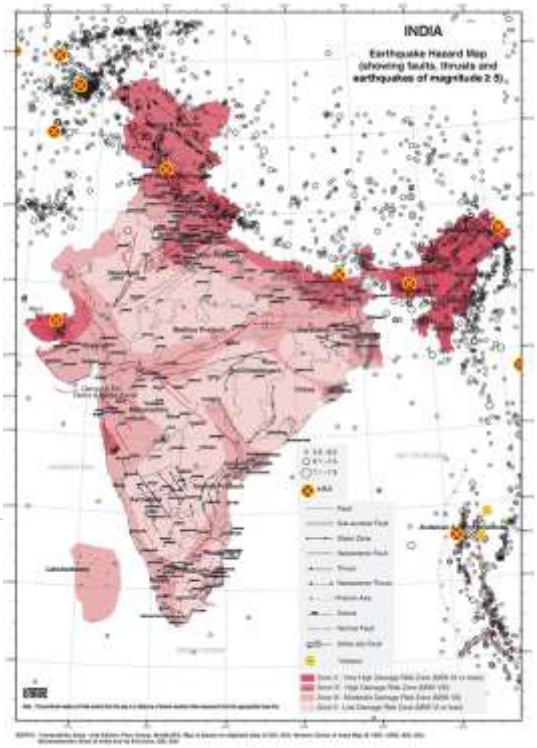
20.		Cyclone Nisha of Tamil Nadu	2008	204
21.		Eastern India Storm	2010	91,000 dwelling units were destroyed
22.		Sikkim Earthquake	2011	60 dead and huge economic loss to the tune of 7425 crore rupees
23.		Uttarakhand Flash Flood	2013	Killing more than 1000
24.		Maharashtra Drought	2013	Millions of people are risk of hunger
25.		Earthquake in the North East (Manipur)	2016	At least 11 people were killed and other 200 were injured

C.VARIOUS DISASTERs IN INDIA

(a) Earthquake

1. India has been divided into four seismic zones according to the maximum intensity of earthquake expected (Figure 4). 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 predominantly 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

2. 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 50years, four such major earthquakes have occurred in the region: Shillong, 1897 (M8.7);Kangra, 1905 (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 any time in the Himalayan Region, which could adversely affect the lives of several million people in India.



(b) Cyclone

India's long coastline of 7,516 kilometer is exposed to nearly 10 per cent of the world's tropical cyclones. Of these, the majority has their initial genesis over the Bay of Bengal and strike the east coast of India. On an average, five to six tropical cyclones form every year, of which two or three could be severe visit the coastal areas. Cyclones occur frequently on both the coasts (The west coast - Arabian Sea; and the east coast - Bay of Bengal). More cyclones occur in the Bay of Bengal than in the Arabian Sea and the ratio is approximately 4:1. An analysis of the frequency of cyclones on the east and west coasts of India between 1891 and 1990 shows that nearly 262 cyclones occurred (92 severe) in a 50 km wide strip on the east coast. Less severe cyclonic activity has been noticed on the west coast, with 33 cyclones occurring in the same period, out of which 19 of these were severe.

In India, Tropical cyclones occur in the months of May-June and October-November. The cyclones of severe intensity and frequency in the north Indian Ocean are bi-modal in character, with their primary peak in November and secondary peak in May. The disaster potential is particularly high at the time of landfall in the north Indian Ocean (Bay of Bengal and the Arabian Sea) due to the accompanying destructive wind, storm surges and torrential rainfall. Of these, storm surges are the greatest killers of a cyclone, by which sea water inundates low lying areas of coastal regions and causes heavy floods, erodes beaches and embankments, destroys vegetation and reduces soil fertility.

Wind and Cyclones

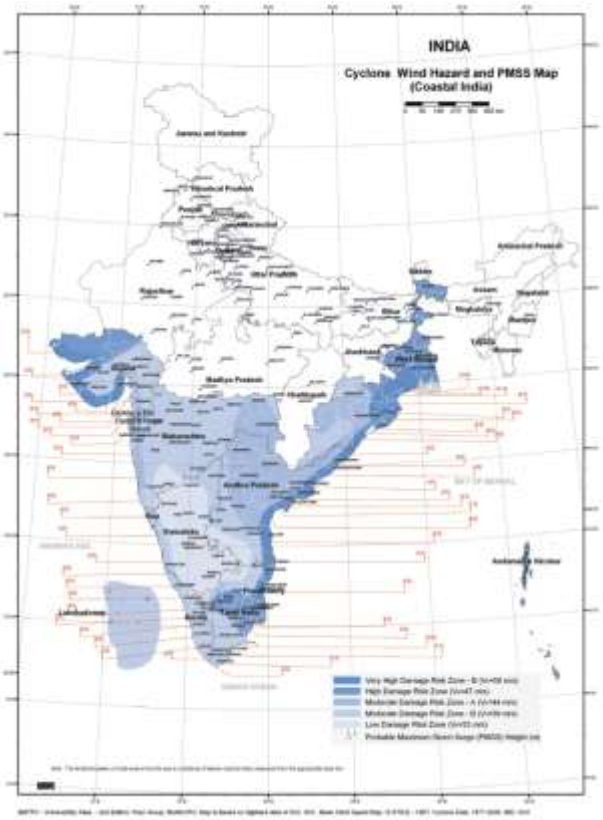
- ✓ 1877-2005: 283 cyclones (106 severe) in a 50 km wide strip on the East Coast
- ✓ Less severe cyclonic activity on West Coast (35 cyclones in the same period)
- ✓ In 19 severe cyclonic storms, death toll> 10,000 lives
- ✓ *In* 21 cyclones in Bay of Bengal (India +Bangladesh) 1.25 million lives have been lost

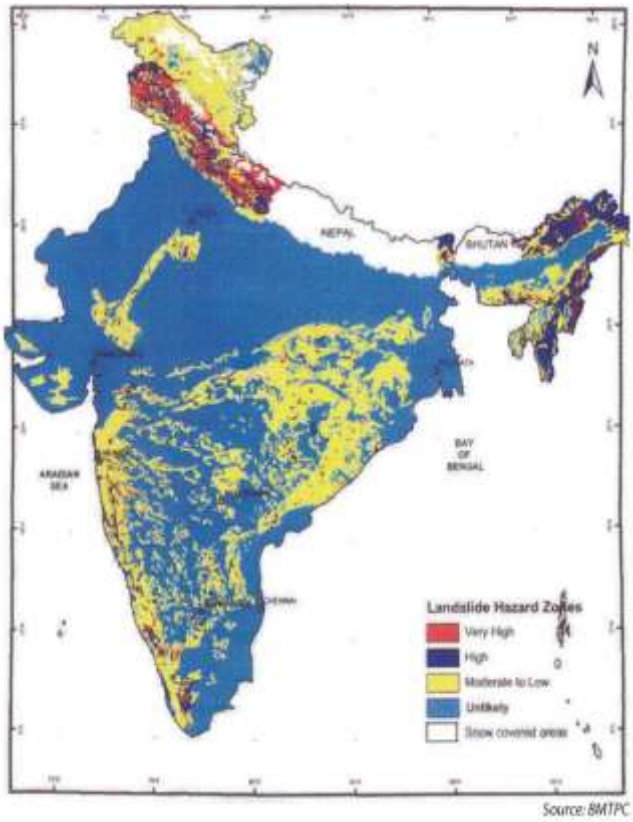
© .Land.slide

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.

Landslides mainly affect the Himalayan region, the western ghats of India and North East like Mizoram. 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 aseries 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 the western ghats. The State of Mizoram usually faced a serious problems due to landslide caused by heavy monsoon rain during summer. Heavy loss of life and property is reported every year in the state due to landslide. 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.





Source: BMTPC

(d)Avalanche

Avalanches constitute a major hazard in the higher reaches of the Himalayas. Heavy loss of life and property has been reported due to avalanches. Parts of the Himalayas receive snowfall round the year and adventure sports are in abundance in such locations. Severe snow avalanches are observed during and after snowfalls in Jammu & Kashmir, Himachal Pradesh and the Hills of Western Uttar Pradesh. Major causes of the avalanches are: Inclination of slope where avalanche occurs; scale of slope, shape of slope, location (ridge line or toe of slope); orientation of slope; depth of snow -cover, depth of snowfall, wind velocity, atmospheric and snow temperatures etc. In Himalayas, avalanches are common in Drass, Pir Panijat, Lahaul-Spiti and Badrinath areas. As per Snow and Avalanche Study Establishment (SASE), of Defence Research and Development Organisation (DRDO), on an average around 30 people are killed every year due to this disaster in various zones of the Himalayas. Beside killing people, avalanches also damage the roads and others properties and settlements falling in its way.

(e) flood

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,Mizoram 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.

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 2.

Twenty-three of the thirty five 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 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).

(f)Forest Fire

Forest or bush fire, though not causing much loss to human life, is a major hazard for forest cover in the country. As per Forest Survey of India report, 50 per cent of the forest cover of the country is fire prone, out of which 6.17 per cent is prone to severe fire damage causing extensive loss to forest vegetation and environment. Average annual physical loss due to forest fire in the country is estimated to worth Rs. 440 crores. The major loss due to forest fire is caused to the environment which gets adversely affected by this calamity. The degradation of climate, soil and water quality, loss of wildlife and its habitat, deterioration of human health, depletion of ozone layer, etc. along with direct loss to timber are the major adverse impact of forest fires. The coniferous forests in the Himalayan region are very susceptible to fire and every year there are one or more major fire incidences in these areas. The other parts of the country dominated by deciduous forest are also damaged by fire up to an extent. It is worth mentioning that in India 90 per cent of the forest fires are man-made. In India, the hilly areas vulnerable to forest fires lie in the States Arunachal Pradesh, Assam, Himachal Pradesh, Jammu & Kashmir, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura and Uttranchal Pradesh. Forest fire incidents are not very uncommon. In the recent past, the fire in 1995 in the Uttranchal had destroyed more 375,000 hectares of forest wealth.

(f)Pest Infestation

Food losses due to pests, disease, wild animals, insects and weeds are considerable. It is estimated that 35% of world crop production is lost in spite of pesticide and other control programs. The primary pests are insects, disease and weeds. Losses due to birds and wild animals are low

compared to these. Causes of pest infestation include temperature, monoculture of crops, and introduction of plants new locations, weather pattern and migration of pest's species.

In India the locust infestation prone States are: Rajasthan, Gujarat, Punjab, Haryana, Andhra Pradesh, Karnataka, and Maharshtra. A desert area of over 200,000 sq.km covers the States of Rajasthan, Gujarat, Punjab and Haryana. Locusts caused substantial damage in the past. In recent years Indian experienced large-scale locust invasion in 1978. Again during July 1993, the country experienced unprecedented level of locust invasion. The swarming activity continued till October1993 and a total of 172 swarms entered the country.

(g) Tsunami

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.
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

Historical Tsunamis in India
• 12 Apr, 1762 (Earthquake in Bay of Bengal)
• 31 Dec, 1881 (Car Nicobar Earthquake)
• 27 Aug, 1883 (Eruption of Karkatoa volcano (Sunda Strait) Indonesia)
• 26 Jun, 1941 (Andaman Earthquake)
• 27 Nov, 1945 (Makran Earthquake)
• 26 Dec, 2004 (Sumatra Earthquake)

(h) Man made Disaster

In India there occurs a lots of man made disasters such as:

1. Industrial and chemical disaster
2. Stampede
3. Roads Accident
4. Rail Accident
5. Mine disaster

D. Disaster Management System

Institutional Setup and Legal framework

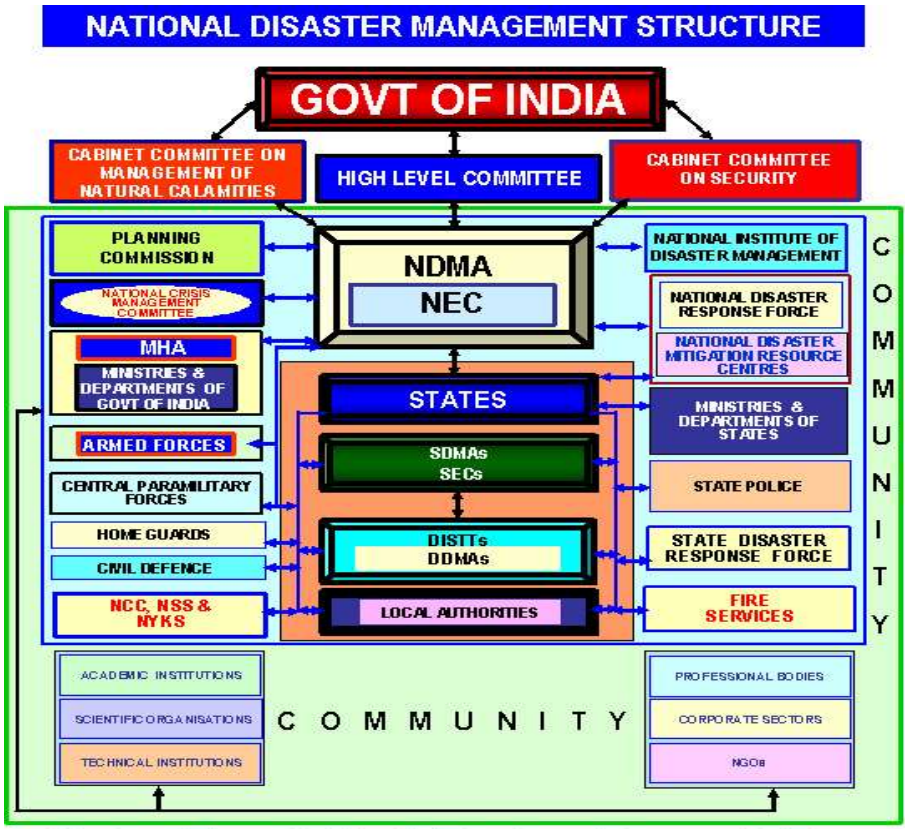
1.The National Disaster Management Authority

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.

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;
(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.

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.



2. Disaster Management Act 2005

The Disaster Management Act, 2005 (http://nidm.gov.in/DM_act2005.pdf) came into the statute book on 26 December 2005 by a Gazette notification, exactly on the first anniversary of the devastating tsunami of 2004, which killed nearly 13,000 people in India alone and affected 18 million people. The Act provides a legal and institutional framework for "the effective management of disasters and for matters connected therewith or incidental thereto." It provides for establishment of National Disaster Management Authority (NDMA), State Disaster Management Authority (SDMA) and District Disaster Management Authorities (DDMA) at the National, State and District levels with adequate financial and administrative powers and creation of the National Institute of Disaster Management (NIDM) with the mandate of undertaking training and capacity building, Develop Training Modules on various aspects of Disaster management, Undertake Research and Documentation, Formulate and implement comprehensive HRD Plan covering all aspects of DM, Provide assistance in national level policy formulation and Provide assistance to state governments and State Training Institutions. The act also provides guidelines for creation of National Disaster Response Fund, National Mitigation Fund, Establishment of funds by State Government and Allocation of funds by Ministries and Departments for Emergency procurement. The act also provides for establishment of National Disaster Response Force (NDRF).

3. National Policy on Disaster Management 2009

The National Policy on Disaster Management (http://nidm.gov.in/PDF/policies/ndm_policy2009.pdf) was approved by the Government in November 2009. This comprehensive policy document lays down policies on every aspect of holistic management of disasters in the country. The main aim the policy espouses to achieve is to minimize the losses to lives, livelihoods and property, caused by natural or manmade disasters with a vision to build a safe and disaster resilient India by developing a holistic, proactive, integrated, multi-disaster oriented and technology driven strategy. With this national Policy in place in India, a holistic and integrated approach will be evolved towards disaster management with emphasis on building strategic partnerships at various levels. The themes underpinning the policy include community based disaster management, capacity development in all spheres, consolidation of past initiatives and best practices and cooperation with agencies at national and international levels with multi-sectoral synergy.

The Policy is also intended to promote a culture of prevention, preparedness and resilience at all levels through knowledge, innovation and education. It encourages mitigation measures based on environmental sustainability. It seeks to mainstream disaster management into the developmental planning process and provides for Institutional and Financial arrangements at national, State, and District-levels for Disaster Prevention, Mitigation, Preparedness and Response as it ensures adequate budgeting for disaster mitigation activities in all Ministries and Departments.

The Disaster Management Act 2005 has provided the legal and institutional framework for disaster management in India at the national, state and district levels. In the federal polity of India the primary responsibility of disaster management vests with the State Governments. The Central Government lays down policies and guidelines and provides technical, financial and logistic support while the district administration carries out most of the operations in collaboration with central and state level agencies.

In the Central Government there are existing institutions and mechanisms for disaster management while new dedicated institutions have been created under the Disaster Management Act of 2005.

The Cabinet Committee on Management of Natural Calamities (CCMNC) oversees all aspects relating to the management of natural calamities including assessment of the situation and identification of measures and programmes considered necessary to reduce its impact, monitor and suggest long term measures for prevention of such calamities, formulate and recommend programmes for public awareness for building up society's resilience to them. The Cabinet Committee on Security (CCS) deals with the matters relating to nuclear, biological and chemical emergencies

The National Crisis Management Committee (NCMC) under the Cabinet Secretary oversees the Command, Control and Coordination of the disaster response.

The Disaster Management Act, 2005 has created new institutions at the national, state, district and local levels. The new institutional framework for disaster management in the country is as under:

The National Executive Committee (NEC) is mandated to assist the NDMA in the discharge of its functions and further ensure compliance of the directions issued by the Central Government. The NEC comprises of the Union Home Secretary as the Chairperson, and the Secretaries to the GOI in the Ministries/Departments of Agriculture, Atomic Energy, Defence, Drinking Water Supply, Environment and Forests, Finance (Expenditure), Health, Power, Rural Development, Science and Technology, Space, Telecommunications, Urban Development, Water Resources and the Chief of the Integrated Defence Staff of the Chiefs of Staff Committee as members. Secretaries in the Ministry of External Affairs, Earth Sciences, Human Resource Development, Mines, Shipping, Road Transport & Highways and Secretary, NDMA are special invitees to the meetings of the NEC. The National Executive Committee is responsible to prepare the National Plan and coordinate and monitor the implementation of the National Policy and the guidelines issued by NDMA.

Figure showing the Institutional Framework for DM in India

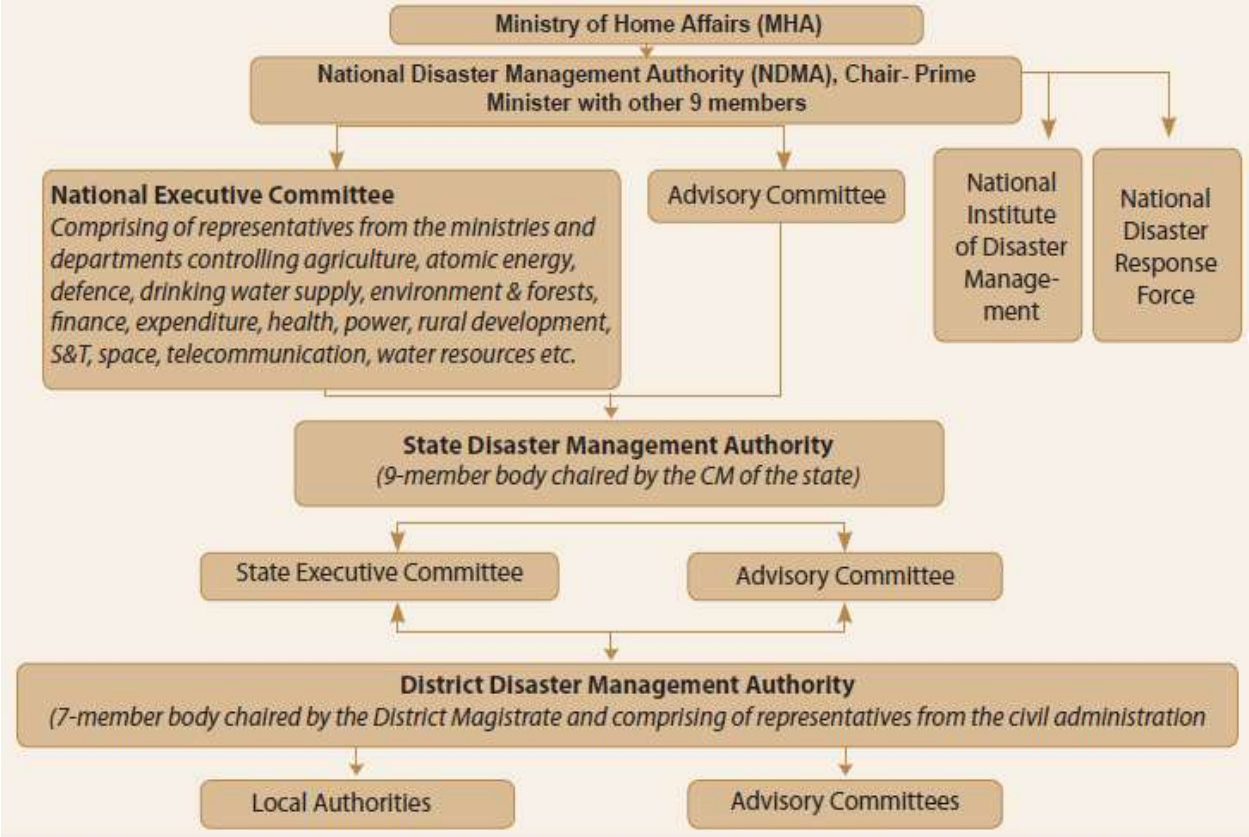


Figure showing the Institutional Framework for DM in India

The Ministry of Home Affairs (MHA) in the Central Government has the overall responsibility for disaster management in the country. For a few specific types of disasters the concerned Ministries have the nodal responsibilities for management of the disasters, as under:

Drought	Ministry of Agriculture
Epidemics & Biological Disasters	Ministry of Health and Family Welfare
Chemical Disasters	Ministry of Environment & Forests
Nuclear Disasters	Ministry of Atomic Energy
Air Accidents	Ministry of Civil Aviation
Railway Accidents	Ministry of Railways

4. State Policies on Disaster Management

At the State Level the State Disaster Management Authority (SDMA), headed by the Chief Minister, lays down policies and plans for disaster management in the State. It is also responsible to coordinate the implementation of the State Plan, recommend provision of funds for mitigation and preparedness measures and review the developmental plans of the different departments of the State to ensure integration of prevention, preparedness and mitigation measures. The State Disaster Management Department (DMD) which is mostly positioned in the Revenue and relief Department is the nodal authority.

State Relief Codes/ DM Codes

Many States have manuals and codes for management of drought, floods and other disasters and relief measures to be taken, etc. Now many states are in the process of changing their State Relief codes into Disaster Management Manuals.

5. In the district level the District Disaster Management Authority (DDMA) is headed by the District Magistrate, with the elected representative of the local authority as the Co-Chairperson. DDMA is the planning, coordinating and implementing body for disaster management at district level. It will, inter alia prepare the District Disaster Management Plan and monitor the implementation of the National and State Policies and the National, State and the District Plans. DDMA will also ensure that the guidelines for prevention, mitigation, preparedness and response measures laid down by the NDMA and the SDMA are followed by all departments of the State Government at the district level and the local authorities in the district.

6. **The Local Authorities** both the rural local self governing institutions (Panchayati Raj Institutions) and urban local bodies (Municipalities, Cantonment Boards and Town Planning Authorities) These bodies will ensure capacity building of their officers and employees for managing disasters, carry out relief, rehabilitation and reconstruction activities in the affected areas and will prepare DM Plans in consonance with guidelines of the NDMA, SDMAs and DDMAs.

7.National Institute of Disaster Management

The National Institute of Disaster Management (NIDM) functions as the nodal centre for Human Resource Development in the area of Disaster Mitigation and Response. It is a premier national organization working for human resource development at national level in the area of disaster mitigation and management. The NIDM came into existence since October 16, 2003 by a Government of India order upgrading the National Centre for Disaster Management (NCDM) located in New Delhi, and established by the Ministry of Agriculture, Department of Agriculture and Cooperation, Government of India, in March 1995. The DM Act, 2005 has brought the institute under the MHA and has assigned roles as per the Act.

The National Institute of Disaster Management (NIDM) has the mandate for human resource development and capacity building for disaster management within the broad policies and guidelines laid down by the NDMA. NIDM is required to design, develop and implement training programmes, undertake research, formulate and implement a comprehensive human resource development plan, provide assistance in national policy formulation, assist other research and training institutes, state governments and other organizations for successfully discharging their responsibilities, develop educational materials for dissemination and promote awareness among stakeholders in addition to undertake any other function as assigned to it by the Central Government

Vision

• To be a premier Institute of Excellence for training and research on disaster risk mitigation and management in India and to be recognized as one of the leading Institutions at the international level.
• To strive relentlessly towards making a disaster free India by developing and promoting a culture of prevention and preparedness at all levels,

Mission

• To work as a think tank for the Government by providing assistance in policy formulation
And
;To facilitate in reducing the impact of disasters through:▪ Planning and promoting training and capacity building services including strategic learning.
▪ Research, documentation and development of national level information base.▪ System development and expertise promo- tion for effective disaster preparedness and mitigation.
▪ Promoting awareness and enhancing knowledge and skills of all stakeholders.

▪ Strengthening institutional mechanisms for training and capacity building of all

8.National Disaster Response Force (NDRF)

The Disaster Management Act has mandated the constitution of a Specialist Response Force to a threatening disaster situation or a disaster. This Force functions under the National Disaster Management Authority which has been vested with its control, direction and general superintendence. This is a multi-disciplinary, multi-skilled, high-tech force for all types of disasters capable of insertion by air, sea and land. All the eight battalions are equipped and trained for all natural disasters including four battalions in combating nuclear, biological and chemical disasters.

Presently this Force is constituted of eight battalions, two each from the BSF, CRPF, CISF and ITBP. Each battalion will provide 18 self-contained specialist search and rescue teams of 45 personnel each including engineers, technicians, electricians, dog squads and medical/paramedics. The total strength of each battalion will be approximately 1,158. These NDRF battalions are located at nine different locations in the country based on the vulnerability profile to cut down the response time for their deployment. During the preparedness period/in a threatening disaster situation, proactive deployment of these forces is carried out by the NDMA in consultation with state authorities.

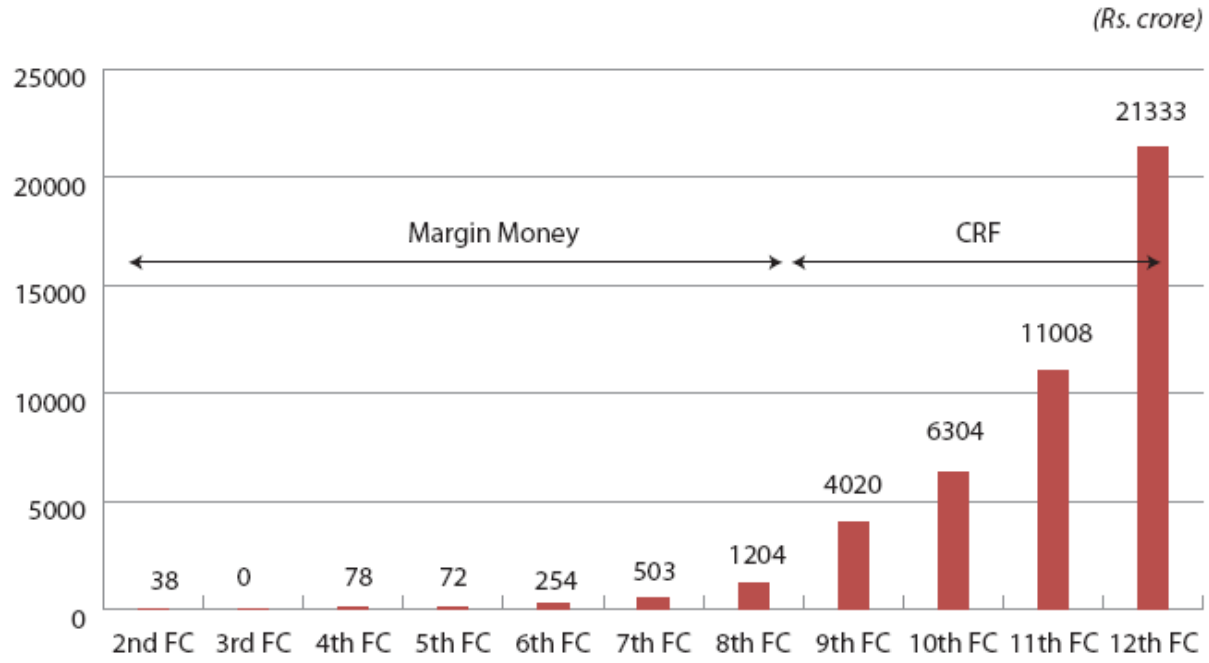
E. Financing the Relief Expenditure:-

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 31stMarch 2015.

1. 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 is given in figure below.

Allocation made by Finance Commission towards erstwhile calamity Relief Fund



2. National Disaster Response Fund (NDRF):-

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.
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.

3. 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 inthe months of June and December.

4. Capacity Building Grant:-

On the recommendation of the 13th Finance Commission, Rs 525.00 crore has been allocated to the states for taking up activities for building capacity in the administrative machinery. 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.

5. National Disaster Mitigation Fund:-

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.

The modalities of constitution of NDMF have been discussed by MHA with the MoF, Planning Commission(NITI) 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 HomeAffairs with other concerned Ministries.

Mizoram

Since India is very large in term of size and population, it is very difficult to cover each and every states and its people. It is therefore suggested to touch the state of Mizoram in a bit detail.

Area of the State : 21,087 Sq. kms

Length and width : north to south- 277kms, east to west- 121 kms

Nos. of districts : 8 nos.

Population : 10,91,014

Density : 42 per sq.m

Total nos. of inhabited villages :704 nos.

Total nos. of household : 2,14,705 (As on 31.3.2009)

Rainfall : 254 cm per annum

Av temp : 11-21c in winter; 20-33c in summer

ABOUT THE STATE :

Mizoram is a mountainous region which became the 23rd State of the Indian Union in February, 1987. It was one of the districts of Assam till 1972 when it became a Union Territory. Sandwiched between Myanmar in the east and south and Bangladesh in the west, Mizoram occupies an area of great strategic importance in the north-eastern corner of India. It has 722 km. long boundary with Myanmar and Bangladesh.

Mizoram has a pleasant climate. It is generally cool in summer and not very cold in winter. During winter, the temperature varies from 11^0 C to 21^0 C and in the summer it varies from 20^0C and 33^0C. The entire area is under the direct influence of the monsoon. It rains heavily from May to September and the average rainfall is 254 cm per annum. Winter in Mizoram is rain-free and is very pleasant; the skies are wonderfully blue, and in the morning the mist formed between the hills gives an enchanting view of wide stretches of a vast lake of cloud. Mizoram has great natural beauty and an endless variety of landscape and is also very rich in flora and fauna. Almost all kinds of tropical trees and plants thrive in Mizoram.

Mizoram has a population of 8,91,058 according to 2001 Census, out of which 94.46% belong to Scheduled Tribe. According to the 2001 census, 52.57% of the people of Mizoram are working under the classification of main and marginal workers. However, only 10% are in the Government service. About 70% are engaged themselves in jhum cultivation in their fields. Mostly people belonging to rural areas take up farming as their main source of livelihood. Per capita income of the state has seen a steady increase from Rs. 17,489 per annum in 2000 – 2001 to Rs. 21,327 per annum in 2003 – 2004 (at current prices).

VULNERABILITIES OF MIZORAM TO VARIOUS NATURAL HAZARDS :

The unique geology and geographical conditions of Mizoram make the State vulnerable to various natural disasters. The main hazards in the State are Earthquake and Landslides. High winds and floods damage houses and properties during the monsoon season.

i)Vulnerability to floods:

The State, being hilly does not have major flood problem. However, during rainy season floods damage river banks thereby causing land erosions. In September 2007, severe rainfall caused flooding in Bairabi town of Kolasib district and Tlabung town of Lunglei district, disrupting normal life and communication network for a month and a number of houses were also damaged. The minor problem of flash floods are being witnessed in some parts of Mizoram, especially in low lying areas causing some damage to house, property and crops.

ii) Vulnerability to cyclones/windstorm:

The speed of windstorm in the whole State is 55m/s (198 km/h) which is the highest value specified in the country. In such events weakly built homes of wood, bamboo, thatched etc, as in Category X in the atlas and sloping roofs such as thatched and tiles and those of AC sheet and Corrugated Galvanised Iron (CGI) sheet roofs which are not fully anchored and integrated suffer much damage. The damages which occur in such high winds usually are of localised nature.

During the summer, the Sub-tropical high pressure belt and the thermal equator are displaced northward in response to the changing pattern of heating of the earth. From the ocean, particularly from the north Indian Ocean or Bay of Bengal, they move towards the land mass and blow over the Asian continent. These are called South-West monsoon and they usually reach Mizoram between May and October. The summer monsoon is characterised by highly variable weather with frequent spells of drought and heavy rains. Besides this, the winter monsoon also prevails, which is a gentle drift of air in which the winds generally blow from the north east. This retreating monsoon causes sporadic rainfall especially in Mizoram and other north eastern States, sometimes producing heavy cyclonic rains. Mizoram is vulnerable to the impact of tropical cyclone which develops in the North Indian Ocean (Bay of Bengal) and the cyclones of the post monsoon season (October to December) are more intense than those of pre monsoon season (April & May). Cyclones are associated with strong winds, torrential rains and storms. The impact of cyclone/windstorm and hailstorm has often led to damage houses, power line cut-off, blockage of road, damage to crops and plantation, loss of live stocks, etc. **(Source : Environmental studies of Aizawl City using Remote Sensing And GIS, A project report, 2005, Mizoram State Remote Sensing Centre, S&T, Planning Dept' Mizoram)**

iii) Vulnerability to Earthquakes:

The State is located in Zone V which is one of the most severe seismic zones in the country and which is referred to as Very High Damage Risk Zone. A large number of moderate to high intensity earthquakes occurred within the State boundary as well as within a 100 km distance around it.

The entire N.E. India lies in the consumable Plate Boundaries as per Plate Tectonic Hypothesis and many of the epicentres of the past earthquakes lie at the Plate boundaries in the Arunachal Himalayas in the north, and in the Naga-Patkoi and Lushai ranges in the south. which extends from Mediterranean Sea in the west to Myanmar in the east.. In this wide diffuse continental zone, shallow and intermediate earthquake focuses are common.

N.E. India is situated in one of the most geologically unstable regions of the world, mainly because the Main Boundary Fault line which runs in a East-West direction along the Foot Hills of the Sub-Himalayas as a boundary of the North Brahmaputra Plain, while another thrust fault runs in the same East-West direction along the southern margin of the Shillong Plateau, and merges with the North East – South West trending thrust zone in Nagaland & Assam, known as Belt of Schuppen. The great earthquake of 1897 occurred due to slipping along this fault. The Himalayas and the folded geosynclinals belt of Nagaland and Manipur are located on an orogenic active belt where numerous complicated thrusts and faults are in active condition. Hence it is one of the most earthquake-prone zones not only in India but also in the world. N.E. India experienced devastating earthquakes in 1869, 1897, 1930 and 1950, which were 6-8 intensity on the open-ended Richter Scale'

The seismic zoning map of India as per Indian Standard Seismic Zoning recent re-categorisation of zones by the GSI, the country has been divided into four zones and Mizoram falls under Zone V i.e. very high damage risk zone.

iv) Vulnerability to Landslide :

Mizoram, being a hilly terrain is prone to landslides. Every year a number of landslides have been reported from various localities. This causes a lot of misery to the public resulting in loss of life and property, disruption of communication network and also economic burden on the society. This is primarily attributed to high slope and relief, immature geology, neo-tectonic activity, heavy rainfall and unplanned and improper land use practice in the state. (Source : Environmental studies of Aizawl City using Remote Sensing And GIS, A project report, 2005, Mizoram State Remote Sensing Centre, S&T, Planning Dept' Mizoram). In 1992, landslide in the stone-quarry at South Hlimen locality claimed 66 lives (Tiwari & Kumar, 1996). 17 houses were destroyed. In 1993, Aizawl Venglai, Ramthar and Armed Veng localities were sinking, that caused severe damage to 65 houses. Since 1991, there was a long-line crack at Hunthar locality

alongside Aizawl to Sairang road (National Highway 54). In May, 2011, massive "Ngaizel Landslide" stranded the national highway for many days (Verma, 2012, 2013).

***v) Vulnerability to Biological Hazards**:*

Bamboo Flowering : Bamboo flowering is the main biological hazard causing famine in Mizoram which occurrs in a cycle of about 48 years interval.

Mizoram has a large expanse of bamboo forest which covers about 6446 sq.kms. This area represents about 31% of the total geographical area of the state. About 26 bamboo species are found in Mizoram. Among these, *Melocanna baccifera (Mautak)* accounts for about 90% of the bamboo found. According to history, Mizoram has experienced gregarious flowering of *Melocanna baccifera* and *Bambusa tulda* at a cycle of 48 years interval. The incidence of flowering of bamboo in Mizoram has been accompanied by severe famine which is called *Mautam* in Mizo due to flowering of *Melocanna baccifera* and *Thingtam* due to flowering of *Bambusa tulda.* Documents regarding bamboo flowering and accompanying famine are scanty. The last incident of *Mautam* Famine occurred in 1959 when Mizoram was a district in Assam. Documented records are not available for this famine as well. However, testimonies of people who were present at the last *Mautam* can be of major significance. According to these

testimonies, bamboo flower created abundance of food for rodents, who in turn multiply at very fast pace and destroy crops , paddy etc thus in turn leading to famine.

BRIEF OF PAST DISASTER EVENTS IN THE STATE :

Mizoram, like other parts of northeast India, is highly prone to natural disasters, viz., earthquake, cyclone, flood, landslide etc. Shocks of small amplitude are quite common in the State. Some of the past disaster events in the State are briefly mentioned here under :

1) Earthquake, 1950 : The northeast region was struck by an earthquake with magnitude of 8.5 on 15th August, 1950 with an epicenter at 322 miles north of Sadiya in Assam. At that time, Mizoram was under the administrative control of Government of Assam. This earthquake is one of the greatest earthquakes in human history both in magnitude and destruction in many places near the epicentre. But documented records are not available on how Mizoram was affected by this earthquake. However, testimonies of people who were present at that time can be of major significance. But the casualties and loss of property was not much in Mizoram. This may be due to less population concentration and physical resources at that time. Population has increased many times since then and a great number of development projects have come up in the State. If the earthquake of matching magnitude hits the region now, the devastation would be enormous.

2) Landslides :

a) Hlimen Landslide, 1992 : Large scale landslide occurred on the fateful morning of 9th August, 1992 involving complete collapse of a stone quarry of 300m length and 250m thick. Due to this disastrous incident, 67 persons lost their lives including villagers and labourers. The incident took place at Hlimen village, about 5 Km south of Aizawl city, the capital of Mizoram. This quarry was considered one of the best in the State due to it's hard and compact cubes of sandstones which were used in the building constructions.

b) Saiha and Lawngtlai Landslides, 1995 due to Cloudburst : Heavy rains and cyclonic storms occurred during 16th – 18th May, 1995 at Saiha and Lawngtlai districts. This caused large scale destruction of houses and blockade of roads to both Saiha and Lawngtlai towns. The following paragraphs illustrate in brief the damages in these districts.

- **i)** 150 houses were totally damaged and 20 people lost their lives in Saiha town alone. In Lawngtlai town, 72 houses were totally damaged and 14 people lost their lives.
- **ii)** Heavy landslide totally disrupted internal town communication in Saiha and Lawngtlai. No vehicle could initially move including light vehicles. As such, Saiha and Lawngtlai towns were cut off from the rest of the State for more than a week.

iii) Shortcut road from Saiha to Lawngtlai was seriously affected and PWD suspension bridge at Tuisumpui was washed away.

iv) Hydel Power Station at Tuipui Ferry, which supply the electric power to Saiha and Lawngtlai was totally destroyed and the engines were under mud.

v) Landslides blocked the road from Saiha to Kawlchaw village and Kawlchaw village to Lawngtlai. In fact, the blockade continued upto Mat river in Lunglei District.

vi) BRTF suspension bridge at Tuitlawk near Saiha and two other culverts were washed away.

vii) Apart from destruction to properties/assets, the incessant rains and soil erosion has caused heavy loss to standing crops and also damage to permanent cultivable land including terrace/WRC and horticulture crops.

3) Landslide and Flood, 2007 : Torrential rains started from the third week of August 2007 and lasted up to the first week of September. Rainfall was heavy and lasted for unusually long periods. Due to the rains, all corners of the state witnessed road blocks due to landslides, electrical power lines and houses damaged or endangered and water sources being affected .There were also reports on lives lost due to flash flood, landslide and lightning. As per the report and assessment made by the Government of Mizoram, the damages seen by the State during this period are given below:

- Due to landslides and flood, 690 houses were fully damaged, 396 severely damaged and 1157 were partially damaged. The estimated value of the damage was Rs.1354.68 lakhs.
- The cost of slide clearance and estimated cost of restoration for damaged road were Rs.1741.77 and Rs.3551.84 lakhs respectively.
- Public infrastructures like cobbled stone pavements, masonry steps link roads and public drains were also damaged. The estimated amount required for restoration work was Rs.760.07 lakhs.
- Paddy cultivation was damaged due to floods in low lying areas and by landslides in the hilly regions. The total damaged area was 2547.40 hectares with approximate value of loss at Rs.496.16 lakhs.
- Minor irrigation also reported damages requiring restoration worth Rs.270.67 lakhs.
- Horticulture and sericulture departments reported damages worth Rs.7825.26 and Rs.15 lakhs respectively.
- Electric lines were damaged at many places. Damage to power infrastructure required restorations worth Rs.830.20 lakhs.
- Water supply system suffered severe damages due to landslide in various areas. The only public water supply scheme at Aizawl also suffered heavily due to collection of debris and silt in the main intake chamber. Restoration of public water supply system is estimated at Rs.576.68 lakhs.

4). Laipuitlang Rockslides :- On 11 May 2013 (Saturday) early morning around 3.24 A.M, a rockslide occurred at the confluence of Laipuitlang and Ramhlun Venglai

locality located between $23^0$44’60’’ N & $92^0$43’16’’ S i.e at the eastern side of Aizawl, Mizoram at 1120 m above mean sea level. 17 persons were died and 8 persons were rescued by the State Disaster Response Force. The rockslide completely destroyed 15 houses (7 RCC buildings and 8 Assam type buildings) including community hall and an evacuated 4 storeyed RCC building of Public Works Department (PWD) of Mizoram. Seventeen vehicles, including eight four-wheelers, have been buried under the debris.

Various set up for disaster and its related matters in Mizoram:

1. State Disaster Management Authority.
2. State Steering Committee.
3. District Disaster management Authority.
4. Block Disaster Management Committee.
5. Village/ local Disaster management Committee.

All the set ups has its own responsibilities and authority etc. Mizoram is very fortunate that there is a very active and strong Non-governmental Organization called Young Mizo Association(YMA).

This YMA is the real work force other than designated staff and forces of DM in case of disasters at the local level. Now with the enforcement of DM Act 2005,the village/local DM team is arranged in a more suitable and effective committee as under:

Village DM Teams

- **Evacuation, Search & Rescue Team**
- ***First Aid & Medical* Team**
- **Shelter Management & Sanitation Team**
- **Food & Water Supply Team**
- **Relief Coordination Team**
- **Information & Damage Assessment Team**
- **Trauma Counselling Team**
- **Carcass Disposal Team**
- **Patrolling Team**

ADRC Counterpart

Disaster Management Division
Ministry of Home Affairs
Government of India
NDCC-II New Delhi
Website: www.ndmindia.nic.in

(Country"s Report prepared by : Andrew Lalhruaia, Deputy Director, Government of Mizoram, India, Visiting Researcher, 2015B, ADRC, Kobe, Japan.)