13

NATURAL HAZARDS AND DISASTER

In the previous lesson you have learnt the role of climate. Many natural disasters are of climatic origin. In this lesson we would try to learn how natural extreme events of different origins like climate, hydrology, geology etc impacts humans and their structures resulting in disasters. The disasters have negative impacts on human beings and the environment. The negative impacts can be short or long lasting. The natural disasters cause death, injury, destruction of infrastructures, transport systems etc. It leads to financial losses of development and overall backwardness of the area.

Therefore, adaptation of suitable disaster mitigation and management strategies need to be taken up seriously. Among the top ten natural disaster-prone countries, India stands second after China. In this lesson, we will focus on some important disasters.

OUTCOMES

After studying this lesson, learner:

- differentiates between 'Hazard' and 'Disaster';
- explains various types of disasters;
- identifies disaster prone areas in India;
- suggests disaster management measures to reduce impacts of disasters and
- explains national and international measures adopted for Disaster Risk Reduction

13.1 HAZARD AND DISASTERS

Hazard is a danger defined as a phenomenon or natural condition having the potential of causing loss of lives, injury and destruction of properties. Overall it has the possibility of economic disruptions and environmental damage.

Notes

Hazard is called a disaster only when it really affects a certain population. The occurrence of natural disasters cannot be controlled by human beings but with better mitigation and management measures their impacts may be minimised.

Due to human intervention in the natural processes, the destructive magnitude and frequency of natural disasters have increased considerably in recent times. The severity of disasters depends on our preparedness. The scale of the impact in turn depends on the choices we do have. The choices are concerned with our capabilities to cope with the disaster. For example a well built house has a higher possibility of coping with the wrath of nature than ill-built houses. It is called vulnerability. Well built houses are less vulnerable while the ill-built houses are highly vulnerable to disasters.

Hence, disaster is defined as: "... a serious disruption of the functioning of a society, causing widespread human, material, or environmental losses which exceed the ability of the affected society to cope using its own resources." The United Nations defines disaster as "...the occurrence of a sudden or major misfortune which disrupts the basic fabric and normal functioning of a society or community."

It is an event or a series of events which gives rise to casualties and/or loss of property, infrastructure, essential services or means of livelihood on a scale that is beyond the normal capacity of the affected communities to cope with. Disaster is sometimes also used to describe a "catastrophic situation in which the normal patterns of life or ecosystems have been disrupted and extraordinary emergency interventions are required to save and preserve human lives and / or the environment".

a) According to an estimate, about 60,000 people per year are killed by natural disasters and are responsible for 0.1% of global deaths in last 100 years.

b) According to UN statistics, natural disasters cause property damage of around Rs 20,000 crores worldwide every year.

A disaster occurs when hazard impacts vulnerable people or communities of a certain area. It happens when their inability to reduce the potential negative consequences surpasses their capacity to cope.

(Natural Hazard + Vulnerability Risk)/ Capacity = DISASTER

The Characteristic of hazard and disaster are summarised in Table 13.1.

Notes

Table 13.3 Differences between Natural Hazard and Disaster

	Natural Hazard		Disaster
1.	Hazards are dangerous physical conditions or events.	1.	Most of the disasters occur rapidly, instantaneously and indiscriminately.
2.	Hazards have potential of damaging different forms of lives	2.	Disasters are largely viewed from a human perspective causing severe damage to human life and property.
3.	Hazard represents a latent threat to damage biotic and abiotic components of the environment.	3.	Disaster disrupts the normal functioning of society and the physical environment.
4.	Hazards may or may not turn into disasters.	4.	All disasters cause damage to property and loss of lives. A large number of people are affected.
5.	External aid is not required to damage biotic and abiotic components of the environment.	5.	It affects the society and socio, economic and physical environment to such an extent that external aid becomes necessary.
6.	Earthquakes, floods, cyclones, volcanic eruptions, landslides, droughts etc are called natural hazards before they cause loss of life and damage to property.	6.	Earthquakes, floods, cyclones, volcanic eruptions, landslides, droughts etc are called natural disasters after they cause loss of life and damage to property.
7.	People are not affected.	7.	People are affected
8.	Hazards also occur in areas not occupied by human beings.	8.	Hazards turn into disasters when they occur in the inhabited areas with infrastructures, buildings, telecommunications etc.
9.	Hazards are processes of the genesis of extreme events	9.	Disasters are the responses to the aftermath of natural hazards.

Notes

13.2 TYPES OF NATURAL DISASTERS

Natural disasters are those which are caused by nature and are beyond human control. But it is also true that rampant human activities accelerate the impact of natural disasters. For example a judicious use of mountain slope, over irrigation. Deforestation, road construction on slopes intensifies the impact of natural disaster landslides. There are several types of natural disasters like floods, cyclones, earthquakes and volcanic eruptions etc. the types of natural disaster are very clearly shown in figure.

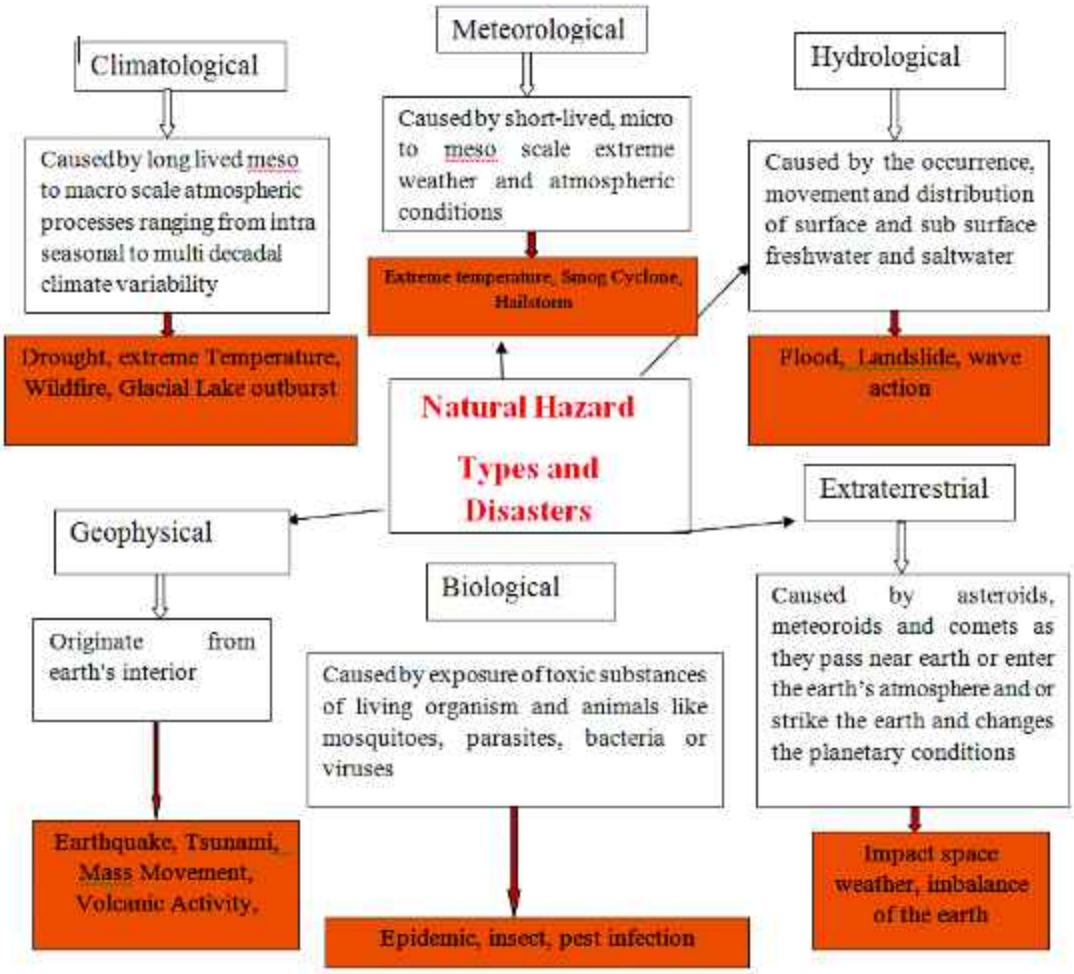


Fig. 13.1 Types of Natural Disaster

INTEXT QUESTIONS 13.1

1. Deaths and destruction for infrastructures happen in -

(i)..... (ii).....

Notes

2. Disaster equation

(.....+.....+.....).....= Disaster

3. Match the following

Type of natural disaster	Source of natural disaster
a) Meteorological	i. Surface and subsurface water - fresh and saltwater
b) Hydrological	ii. Outer space material fall of meteoroids and asteroids on earth
c) Extra-terrestrial	iii. Living organisms
d) Biological	iv. Short lived micro and meso atmospheric conditions
e) Geophysical	v. Long lived meso and macro atmospheric processes
f) Climatological	vi. Originate from earth's interior

4. True or false

a) All disasters cause damage to property and loss of life

b) People are affected by hazards

c) Hazards always become a disaster

d) People enjoy during disaster

A. Floods

Flood is the rise of water levels which are abnormally high and inundated neighbouring areas. This could be because of heavy precipitation in the river basin, dam failure, rapid snow melts, cloud bursts, glacial lake outbursts, storm surges etc.

Floods are of three types

a) River Floods

b) Flash Floods

c) Coastal Floods

Notes

Causes of flood

The causes of flood are:

(i) Heavy rainfall: Heavy rain in the catchment area of a river causes water rush downstream resulting in flooding in nearby areas.

(ii) Sediment deposition: Siltation in river course causes reduction in capacity to carry water. As a result, the heavy rain waters over flows the river banks.

(iii) Deforestation: Vegetation hampers the quick flow of water and forces it to percolate in the ground. Barren land surface is subject to soil erosion. Obstruction-free surroundings in the catchment area of a channel cause flooding during the rainy season.

(iv) Cyclones: It generates sea waves of abnormal height (storm surges) and causes spreads of water in the adjoining coastal areas.

(v) Interference in drainage system: Drainage congestion caused by badly planned construction of bridges, roads, railway tracks, canals etc. hampers the flow of water and the result is flooding.

(vi) Natural Change in the course of the river: As river changes, it course in inundated new areas

(vii) Tsunami: Large coastal areas are flooded by rising sea water because of underwater earthquakes.

(viii) Dam Failure: due to earthquake or human induced factors dams are damaged and broken causing flooding downstream.

B. DROUGHT

Drought has economic, environmental and social impacts. In India, around 68% of the country is prone to drought in varying degrees. Area receiving rainfall between 75 cm to 112.5cm is considered drought prone constituting 35% of total area. With rainfall less than 75 cm is chronically drought prone and it covers 33% of the total area of the country.

According to meteorologists the rainfall deficiency during a long period over a large area is called a drought. IMD defines Drought as a situation occurring in any area when mean annual rainfall is less than 75% of the normal rainfall. Some times in Hindi language famine Akal and Anavrishty are also used for drought. Drought can also occur when ground water level is not within reach of agricultural communities. The government also declares drought, if more than 50 percent crop loss happens in an area due to meteorological conditions.

Notes

Causes of Drought

Major cause of drought is scarcity of rain. But humans have interfered in the natural processes by their activities. People have filled up the natural resources like ponds and lakes. They have removed the vegetation cover. Vegetation cover impedes the flow of rainwater and forces it to percolate. Over utilisation of ground water resources through tube wells is drying ground aquifers. Inadequate rainfall changes in local landscape, meteorological, hydrological, agricultural factors cause drought.

Impact of Drought

Droughts cause scarcity of food and water. People die of hunger, malnutrition and epidemics. Crops fail due to scarcity of water. Cattle are either small nourished or die due to shortage of fodder and water. Farmers are deprived of their employment. People are forced to migrate out of their villages in search of livelihood.

C. CYCLONES

Cyclones are the centre of low atmospheric pressure. The air pressure increases from the centre to the outer areas. Consequently winds blow from outside to the centre. In cyclones, winds blow in an anticlockwise direction in the northern hemisphere and clockwise in the southern hemisphere. On the basis of their location and physical properties cyclones are of two types; temperate cyclones and tropical cyclones.

Cyclone is a violent circular storm, winds. It is associated with torrential rain, high speed winds and sea surges (water raises). Cyclones play an important role in the general circulation of the atmosphere.

Occurrence and movement of Cyclones

Cyclones have seasonal cyclic patterns. It originates over the sea surface and dissipates as they reach land. In India, most of the cyclone occurrence is concentrated in the post monsoon season, i.e. from October to December or in the pre-monsoon season from April to May. The lifespan of a cyclone can range between 7 to 14 days from its development to landfall. The cyclone moves forward from east to west in Bay of Bengal with an initial.

Speed of 15 to 30 km per hour. Later on the speed reaches to over 90 KM/hour and in extra cases it goes beyond 250 KM/hour. High sea waves are generated in the sea by speedy cyclonic winds. They strike the coastal areas like high walls of water and flood the areas upto 10-15 km from the coast. The impact can be felt upto 50 kms inland. The cyclone that struck Odisha originated near Andaman & Nicobar Islands and reached Orissa on 29-10-1999 after many days. The movement of a cyclone in a direction is like the movement of a spinning top.

Notes

Impacts of cyclones and floods

(i) Damage to build up structures: The violent winds of a cyclone destroy whatever comes in their way from; thatched huts to the palaces, houses, forts, lines of electricity and communication.

(ii) Natural Habitat: High speed winds cause damage to vegetation. Trees are uprooted. Salt water intrudes in coastal areas leaving the soil infertile.

(iii) Floods: Torrential rain causes floods. Floods wreak havoc all around.

D. Landslides

The youngest and the highest Himalayan fold mountain chain is the crown of our country. The Indian Plate is moving in a northward direction causing stress on the rocks making them weak and prone to landslides. Landslides take place in the form of earth flows, debris flows and rock falls.

The slipping of masses of rocks, earth or debris downwards on the mountain slopes or banks of the rivers is called a landslide. Landslides occur when shear stress along the slope exceeds frictional force. It results in a landslide and gravitational force brightens the rock material down the slope. The occurrence of landslides in mountainous areas is increasing day by day.

Landslides are intensified by rain, earthquakes, volcanic eruption, deforestation and slope failure.

Causes of Landslides

i. Heavy rain: Heavy rain is the main cause of landslides.

ii. Deforestation: Deforestation is another major cause of landslides. Mountain slopes lose their protective cover by felling of trees. The rain water flows on such slopes with unimpeded speed causing landslides of barren slope fronts.

iii. Earthquakes and Volcanic Eruption: Tremors destabilise the mountains and the rocks tumble downwards. Volcanic eruptions also trigger landslides in the mountainous areas.

iv. Building of roads: During the process of the construction of roads, a large amount of rocks and debris has to be removed by blasting. This process dislodges the rock structure and changes the angle of slopes. Consequently landslides are triggered.

v. Shifting Agriculture and Irrigation Networks: In the North Eastern part of India, the number and frequency of landslides has increased due to the practice of shifting agriculture.

vi. Tourism, infrastructure, construction and increasing settlement sizes in fragile mountain ecosystems increases instances of landslides.

Notes

Impact of landslides

(i) Landslides are degrading the environment and natural beauty of mountains.

(ii) Sources of water are drying up.

(iii) Flooding in rivers is increasing due to debris flow from deposits brought by landslides.

(iv) Roads get blocked; power and communication lines get disrupted.

(v) Life and structural property loss.

E. EARTHQUAKE

Earthquakes can occur at any time. Its impact is very sudden. There are no warning signs of earthquakes. Earthquake is sudden shaking or trembling of the earth surface caused by passage of seismic waves. Most earthquakes are minor tremors. Larger earthquakes usually begin with slight tremors but suddenly they turn into violent shocks and after that they diminish. Tremors or shocks are felt for a few seconds only.

In spite of extensive research, it is not possible to forecast or predict earthquakes. INSAR (Interferometry Synthetic Aperture Radars) are used in certain earthquake prone areas but they can only predict just a few seconds before an earthquake strikes.

Impact of Earthquakes

(i) **Damage of Property:** When an earthquake occurs, buildings from cottages to palaces and skyscrapers are subject to damage. Underground pipelines and railway lines are damaged or broken. Dams on river collapse, resultant floods cause havoc. The earthquake in 1967 in Koyna damaged the Dam.

(ii) **Human Loss** - Normally the duration of earthquake tremors is only a few seconds, but thousands of people may die in this short period. The Bihar earthquake of 1934 killed 10,000 people and the Kangra earthquake of 1905 caused 20,000 people dead. Numerous people lost their shelter and many became orphans. The earthquake that occurred in Gujarat on 26 January 2001 was devastating. More than 25,000 people died due to the impact of this earthquake. The destruction of property was tremendous.

(iii) **Changes in River Courses:** Sometimes river channels are blocked or their courses are changed due to the impact of an earthquake.

(iv) **Tsunamis:** are caused by underwater earthquakes which trigger very high sea waves over the coastal areas. It wreaks havoc on settlements of coastal areas. It sinks large ships. Tsunami that occurred on 26-12-2004 near the coast of Sumatra (Indonesia)

Notes

damaged property worth billions of rupees. More than two lakh people lost their lives in Southeast Asia, India and Sri Lanka.

(v) **Fountains of Mud:** Due to the intense impact of the earthquake, water and mud appear on the surface and take the form of fountains. It leads to spreading sand on agricultural land and making it infertile.

(vi) **Cracks and Fissures:** Sometimes cracks and fissures develop in roads, railway tracks, and fields.

(vii) Landslides and avalanches are triggered by earthquakes

INTEXT QUESTIONS 13.2

1. Name the types of floods.

   (i) ..... (ii) .....(iii).....

2. Fill in the blanks

   a) Flood caused due to dam failure is because of .....or .....

   b) The movement of wind in cyclones is ..... in Northern Hemisphere and .....in Southern hemisphere

   c) Droughts are called .....and .....in Hindi.

   d) Droughts cause scarcity of..... and.....

3. Define landslide.

4. What is caused by underwater earthquakes?

5 True and False

   a) Calm centre of a cyclone is called "eye" of the storm

   b) Heavy rainfall is one of major cause of flooding

   c) It is easy to predict earthquakes

   d) Chronic drought prone areas receive less than 75 cms of rainfall

   e) Shifting agriculture reduces landslides

13.3 DISASTER RISK

Risk is the potential disaster which causes losses of lives, properties and infrastructures. It is dependent upon the situation of danger (hazard). Physical, socioeconomic and environmental coping capacity (vulnerability) and the quality of structures the community has exposure to. Hence a common overlapping of these three is called risk.

Fig. 13.2 Identification of Risk

A single disaster has a different impact on different people in the society. Poor people have less capacity to cope with the disaster in comparison to rich people. Because poor people have less strong houses constructed in low economic zones, situated in low lying areas with less economic power. All are making them more vulnerable to any disaster. They are more exposed to nature and subject to risk. On the other hand, the reverse is the case with rich people. Therefore risk is determined by hazard, vulnerability and exposure of the people to the disaster.

13.4 NATURAL DISASTERS PRONE AREA IN INDIA

India has a unique geo- climate, physiographic and socio- economic conditions. The country is vulnerable to droughts, floods, cyclones, landslides, earthquakes, avalanches, forest fires etc. Out of 28 states and 8 Union territories 27 of them are disaster prone. Almost 68% of cultivable area is prone to droughts; 58.6% of land is prone to earthquakes of moderate to severe intensity; 12% vulnerable to floods 76% of the total coastal length is prone to cyclones and tsunamis; around 8% of greater Himalayas and middle Himalayas is vulnerable to avalanches during winter months around 15% forest areas experience forest fires during dry season.

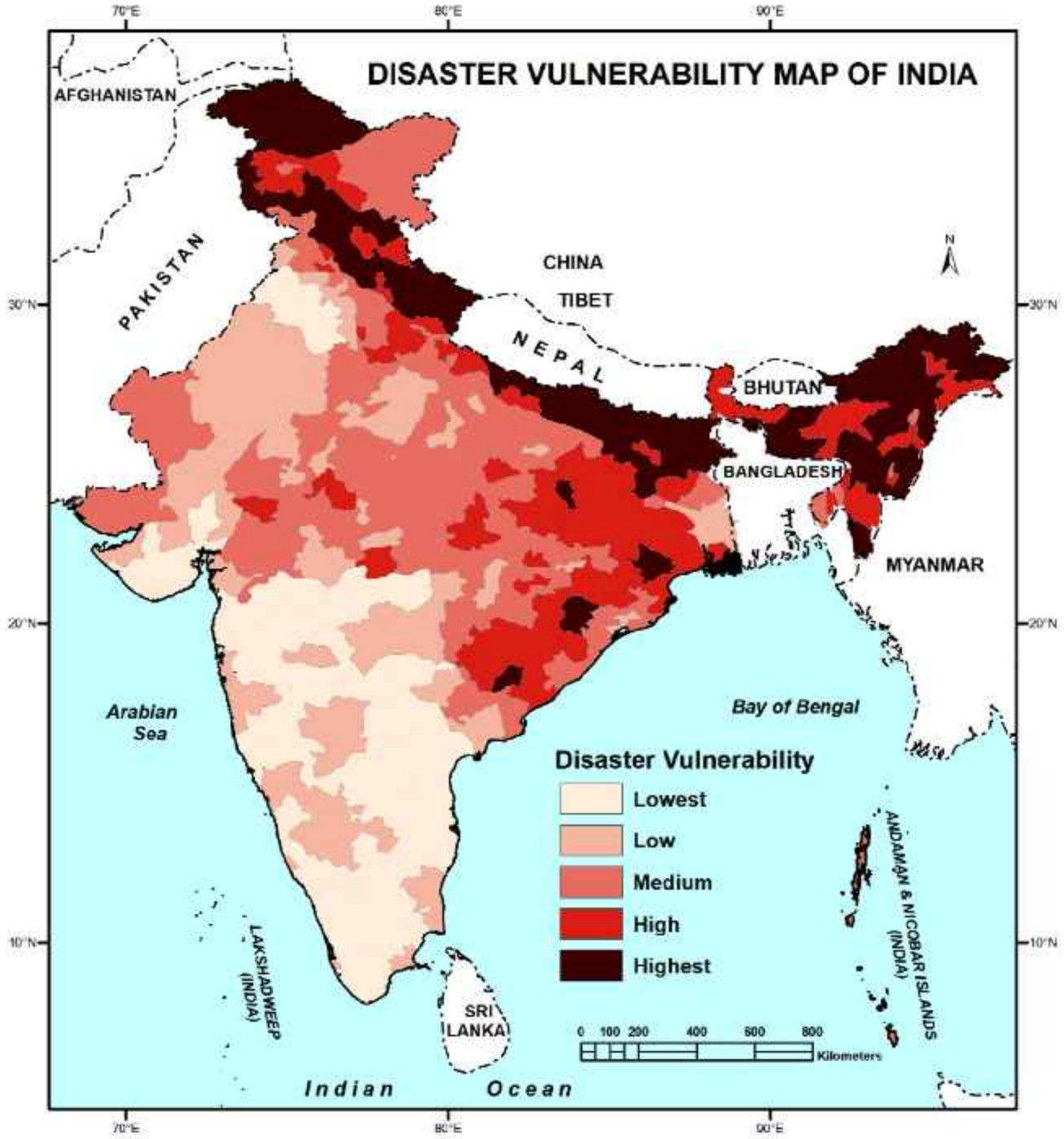


Fig 13.3 Disaster Vulnerability Map of India

India is one of the ten most disaster prone countries of the world. The country is prone to disasters due to a number of factors; both natural and human induced. The Himalayan region is prone to disasters like earthquakes and landslides The geo-tectonic features of the Himalayan region and adjacent alluvial plains make the region susceptible to earthquakes, landslides, water erosion, etc.

The plain is affected by floods almost every year. Major rivers bring a huge quantity of sediment

load and choke the river bed. Water carrying capacity is reduced and flooding becomes a regular feature. The desert part of the country is affected by droughts. The western part of Rajasthan, Gujarat and some parts of Maharashtra are hit very frequently by drought. The coastal zone is susceptible to cyclones. The Geo-tectonic movements going on in the ocean floor make the coastal region prone to tsunami disaster too.

A. Drought prone areas of India

Study the map carefully given below (Fig 6). There is a Major region between South Rajasthan and Tamil Nadu that is drought prone. It includes west Rajasthan, Gujarat, West Madhya Pradesh, central Maharashtra, Karnataka and Tamil Nadu. Due to deficiency in monsoon rainfall and environmental degradation, Rajasthan and Gujarat are generally affected by drought. Out of 640 districts (2011 census) 283 districts are in the rain-deficient category. They are drought prone districts according to the India Meteorological Department.

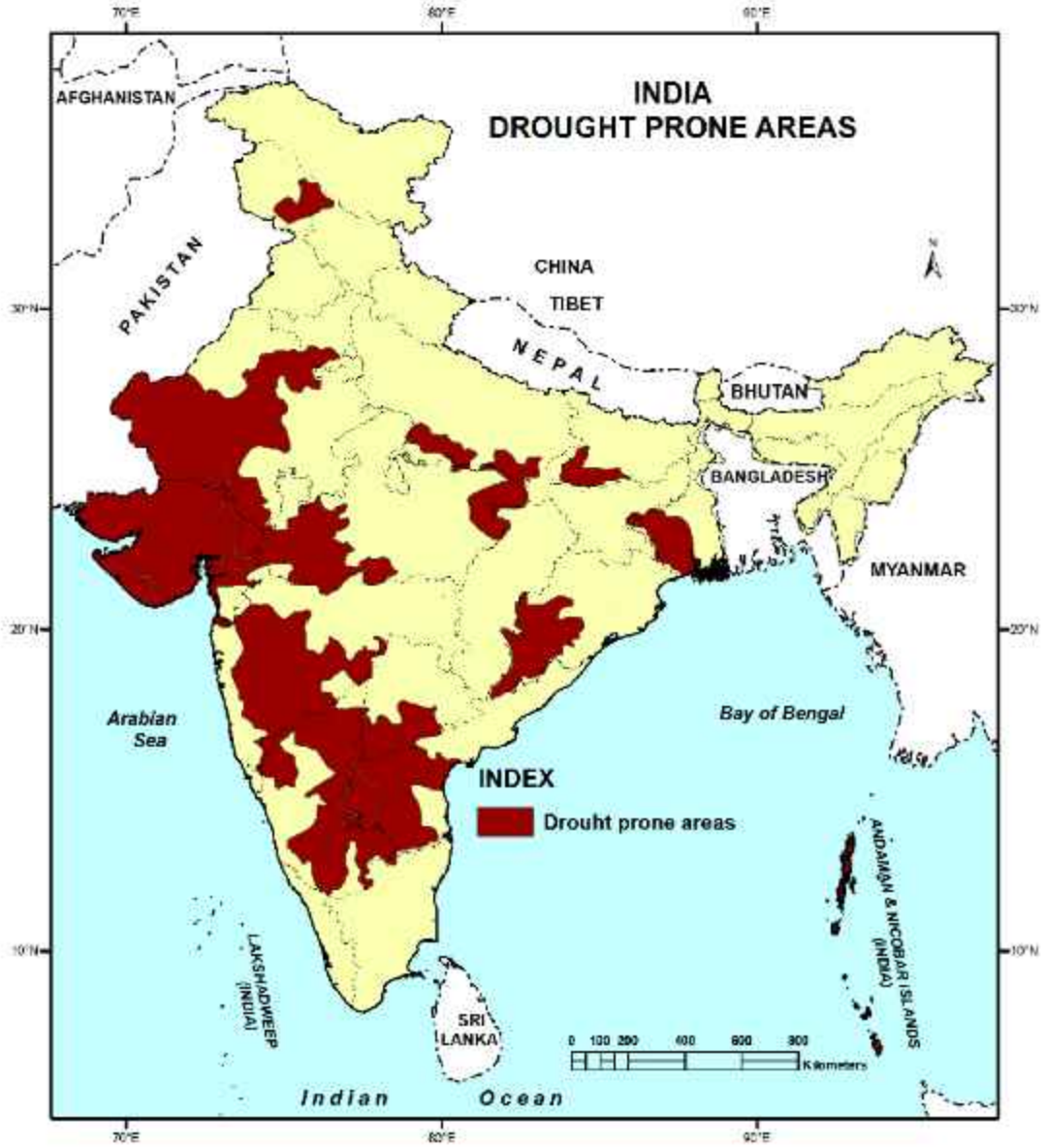


Fig 13.4 Drought Prone Areas

Notes

B. Flood Prone Areas

At present, about 12% of the country is assessed to be flood prone. Out of total damage by floods to crops and property about 75% occurs in northern plains and eastern India drained by Ganga, Brahmaputra and their tributaries. Uttar Pradesh, Bihar and Assam are chronically flood prone followed by Haryana, Punjab and Andhra Pradesh. Recently Rajasthan and Gujarat also feel the fury of floods. Karnataka and Maharashtra are no-longer immune to floods. Most recently added to the list are former Jammu & Kashmir (Kashmir floods of 2014) and Tamil Nadu (Chennai floods of 2015).

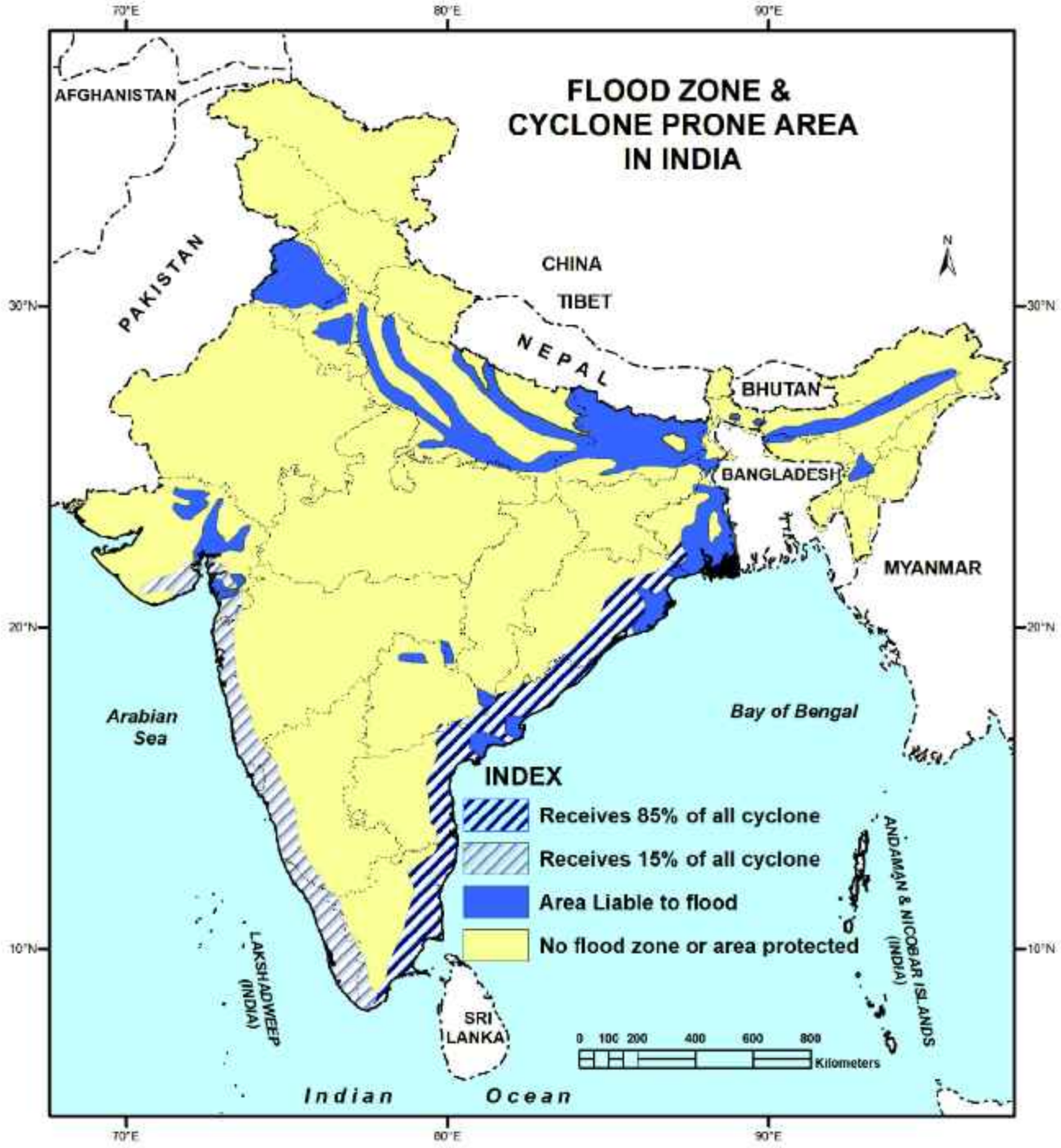


Fig. 13.5 Flood and Cyclone Prone Area

C. Cyclone Prone Areas

The eastern coast of India is the most cyclone affected region. On an average out of 100 cyclones 85 strike the east coast of India whereas the west coast receives only 15. The cyclone prone states are West Bengal, Odisha, Andhra Pradesh and Tamil Nadu. Western coast is affected by the cyclones which originate in the Arabian Sea. Gujarat is most affected on the west coast.

D. Landslide Prone Areas

Landslides come under hydro-geological hazards. The Himalayas, Northeastern Hills and Western Ghats, experience landslides especially in monsoon month. The landslides are a common feature in Western Ghats and Konkan hills (Kerala, Tamil Nadu, Karnataka, Goa and Maharashtra). The North West Himalayas (Jammu & Kashmir, Himachal Pradesh, Uttarakhand) and North East Himalayas Sikkim West Bengal Mizoram, Tripura, Meghalaya, Assam, Nagaland and Arunachal Pradesh experience chronic landslide problems. They are most vulnerable and bear the brunt of landslides. They are the cause of recurring economic and human losses.

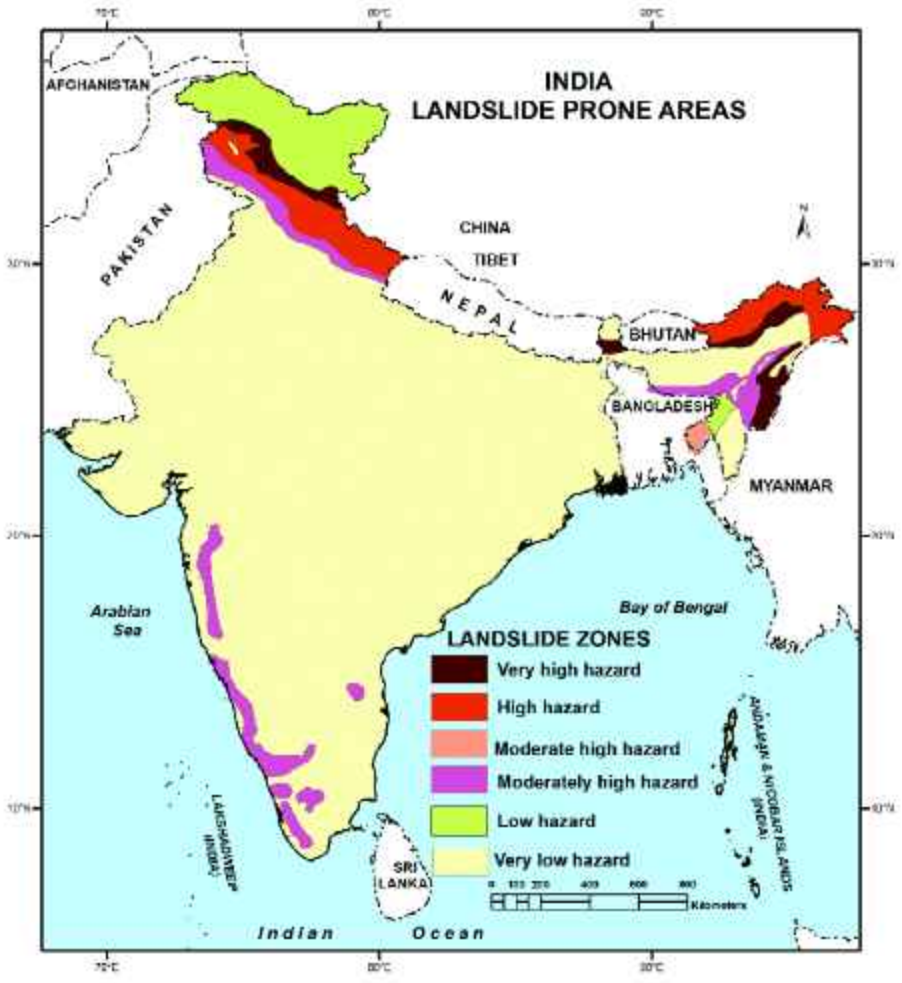


Fig. 13.6 Landslide Prone Area

E. Earthquake Prone Areas

Earthquakes are generated due to internal processes of the earth. Primarily, it is caused by earth movements. Depending upon the internal activities, its distribution is clearly marked by spatial patterns. Server earthquakes are associated with plate tectonics and plate boundaries. With increasing distance, its intercity keeps on reducing. Based on the intensity of the earthquakes, India is divided into four seismic Zones. They are;

- Zone - V Highest risk of damage - The area includes northeastern India, parts of Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Rann of Kutch in Gujarat, part of North Bihar and Andaman & Nicobar Islands).
- Zone - IV High damage risk - the area includes some parts of Jammu and Kashmir and Himachal Pradesh, National Capital Territory (NCT) of Delhi, Sikkim, northern parts of Uttar Pradesh, Bihar and West Bengal, parts of Gujarat and Maharashtra.
- Zone -III Moderate damage risk - The area includes Kerala, Goa, Lakshadweep islands, southern parts of Uttar Pradesh, Gujarat and West Bengal, parts of Punjab, Rajasthan, Madhya Pradesh, Bihar, Jharkhand, Chhattisgarh, Maharashtra, Orissa, Andhra Pradesh, Tamil Nadu and Karnataka.
- Zone - II Low damage risk - the area includes remaining parts of the country.

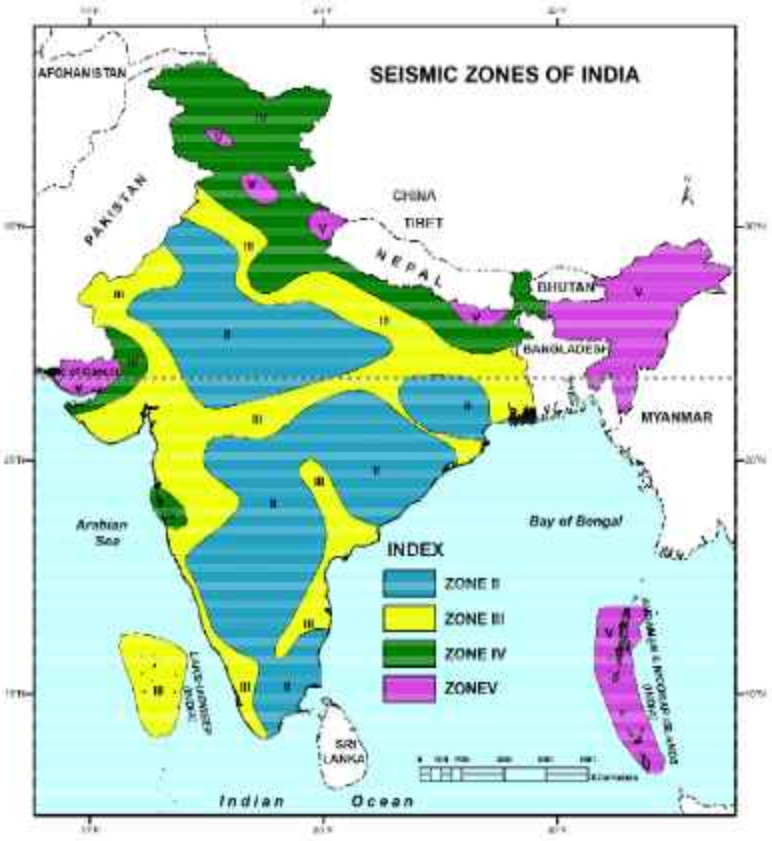


Fig. 13. 7 Earthquake Prone Areas

INTEXT QUESTIONS 13.3

1. Match the following

	Disaster		Area affected in percent
1	Drought prone	A	58.6 % land area
2	Earthquake prone	B	8% land area
3	Floods prone	C	68 % land area
4	Avalanche prone	D	15% land area
5	Forest fire prone	E	12% land area

2. East coast of India witness ..... of total cyclones along Indian coast.

3. At present ..... of the total land area of the country is assessed to be flood prone.

4. Out of 640 districts (2011 census) .....districts in the country currently fall in the rain-deficient category.

13.5 CONCEPTS OF DISASTER MANAGEMENT

Disaster management includes various activities for avoiding or reducing ill effects of disaster. It also helps in providing better recovery, bringing normally after disaster as well as preparing for disaster too. All government, non-governmental and community-based organisations play vital roles in the process. It now includes pre-disaster planning and preparedness activities, organisational planning, training, information management and public relations. Disaster management includes precaution, mitigation, preparedness, response, recovery and reconstruction.

Pre-disaster	During -disaster	Post-disaster
Preparedness	Response	Response
Prevention	Relief	Recovery
Mitigation		Reconstruction

1. **Disaster Preparedness :** It is a set of measures adopted well in advance for response and to cope with disaster in a better way. Its prime concern is to reduce the loss of human life and property.

Notes

2. **Disaster Prevention :** Avoidance of ill impact of disaster is termed as prevention of disaster. It is quite obvious that complete avoidance of any disaster is not possible but it could be minimised. Its compounding effects could be avoided/prevented by building the capacity of individual/society or community.

3. **Disaster Mitigation :** It is the reduction of harmful effects of disasters. It refers to ongoing efforts at different levels starting from individual, local community, to state and national. It includes hazard and disaster mapping and zonation building specific plans for disasters in certain areas prone to it execution of the plan in needed hours is very important for mitigation.

4. **Disaster Relief :** It is immediate help and support made available to affected people. It is of great importance to minimise suffering and extend basic minimum needs to support life. It includes providing food, water, shelter and medical care.

5. **Disaster Response :** It refers to the action taken up immediately after the disaster happened. This includes many efforts like rescue, establishment of marginal health care, treating injured supplying eatables, shifting people to safe places etc. the first and immediate response is generally provided by local youths, volunteers and later on, the action of district, state or local level help arrives.

6. **Recovery after Disaster:** It refers to providing help to affected people in a shortest possible time. It depends upon the ability of the organisation/efforts taken by the NGOs district state or national level disaster management authority

7. **Disaster Reconstruction :** it refers to the construction of a situation again after its destabilisation/imbalance due to disaster. It involves partial or complete relocation and reestablishment of essential infrastructures and shelter. It helps in reducing the trauma to some extent, especially related to physical facilities needed for infected people.

INTEXT QUESTIONS 13.4

1. Name any five disaster management activities.

2. What are three stages of Disasters.

13.6 MANAGEMENT AND MITIGATION OF MAJOR NATURAL DISASTERS IN INDIA

Disaster	Mitigation and Management of Disasters
Floods	(i) **Reservoirs:** By constructing reservoirs in the course of rivers could store extra water at the time of flood.

Notes

(ii) **Embankments:** By building flood protection embankments, flood water can be controlled from overflowing the banks and spreading in nearby areas.

(iii) **Afforestation:** The fury of flood could be minimised by planting trees in catchment areas of rivers.

Some important precautions:

- Avoid building houses in flood prone areas unless you elevate and reinforce your home.
- Elevate the furnace, water heater, and electric panel if susceptible to flooding.
- Install "Check Valves" in the sewer to prevent backing floodwater.
- Contact community or government officials to find out if they are planning to construct levees or floodwalls.
- Seal the walls in your basement with waterproofing.
- Listen to the radio or television for information.
- Be aware of flash flooding. If there is any possibility of flood, move immediately to higher ground.
- Be aware of streams, drainage channels and other areas known to flood suddenly.
- Secure your home. If you have time, shift outdoor furniture and essential items to the upper floor.
- Disconnect electrical appliances. Do not touch electrical equipment if you are wet or standing in water.
- Do not walk through running water.
- Do not drive into flooded areas. If floodwaters rise around your car, abandon the car and move to higher ground.

Droughts (i) **Suitable farming methods for arid areas:** Production of coarse and hardy cereals; conservation of soil moisture by deep ploughing, storing water behind small dams, collecting water in ponds and tanks and use of sprinklers for irrigation.

(ii) **Sowing drought resistant crops:** By sowing drought resistant crops like cotton, moong, pearl millet, wheat etc, the impact of drought could be minimised to a certain extent.

Notes

(iii) **Rain water harvesting:** Collection of each and every drop of rain could help in coping with the drought.

(iv) Making high bunds around the fields, planting trees on the bunds of fields, the use of rainwater can be maximised.

(v) Irrigation canal construction with mortar and bricks

(vi) Small quantity of water can irrigate a comparatively larger area by using a drip irrigation method.

Landslide

- Database of vulnerable sites and location
- Awareness and development of both indigenous and modern methods
- Detailed landslide hazard zonation mapping
- Afforestation : Trees and brushes help in binding the soil particles.
- Ban on quarrying of stones and mining of minerals in fragile areas
- Permanent crops like orchards of fruits should replace the seasonal or annual crops.
- Retaining walls can be built on mountain slopes.
- Ban construction activities in landslide prone areas/spots.

Earthquake

- Analysis of seismic risk and its zonation;
- Design and construction of earthquake resistant structures.
- Retrofitting of existing structures strengthening them.
- Earthquake insurance for houses to reduce the economic impact on individuals.
- Installation of seismological observations for monitoring seismic activity.

Cyclones

- Check the house; secure loose tiles and carry out repairs of doors and windows
- Remove dead branches or dying trees close to houses;
- Fixing of removable objects such as lumber piles, loose tin sheets, loose bricks, garbage cans, sign-boards etc.

Notes

- Keep some wooden boards ready so that glass windows can be boarded if needed
- Keep a cyclone lantern filled with kerosene, battery operated torches and enough dry cells
- Demolish condemned buildings
- Keep some extra batteries for transistors
- Keep some dry non-perishable food always ready for use in emergency
- Listen to the radio for weather warnings.
- Keep monitoring the warnings. This will help you prepare for a cyclone emergency.
- Pass the information to others.
- Believe in the official information
- When a cyclone alert is on for your area, stay alert to the warnings.

INTEXT QUESTION 13.5

1. Write major plans and programmes adopted by government of India to control floods
2. Landslide Hazard Zonation -micro zonation on ..... scale
3. Give three main measures adopted to control floods.

13.7 NATIONAL AND INTERNATIONAL INITIATIVES FOR DISASTER RISK REDUCTION

In 2005 the Indian government took its first major initiatives known as Disaster Management Act-2005. Later on, it is National Disaster Management Policy-2009 and National Disaster Management Plan-2016.

New Directions for Disaster Management in India

- A National Disaster Mitigation Fund will be administered by the National Disaster Management Authority (NDMA). States and districts will administer mitigation funds.
- A National Disaster Response Fund will be administered by NDMA through the National Executive Committee. States and Districts will administer state Disaster Response Fund and Disaster Response Fund respectively.

Notes

- 8 Battalions of the National Disaster Response Force (NDRF) are being trained and deployed with CSSR and MFR equipment and tools in eight strategic locations. National Institute of Disaster Management (NIDM) is a national level training institute which trains professional, educationalist, government organisations, school and college students.
- A National Disaster Management Policy and National Disaster Response Plan will also be drawn up.
- Strengthening of State Disaster Management Authorities (SDMAs) and District Disaster Management Authorities (DDMAs)

Future Directions

- Encourage and consolidate knowledge networks.
- Aapda Mitra Scheme
- Mobilise and train disaster volunteers for more effective preparedness, mitigation and response (NSS, NCC Scouts and Guides, Civil Defense, Home Guards).
- Increased capacity building leads to faster vulnerability reduction.
- Learn from best practices in disaster preparedness, mitigation and disaster response.

The Sendai Framework for disaster risk reduction (2015-30) was adopted at the 3rd United Nations World Conference on Disaster Risk Reduction (WCDRR) on 18th March, 2015 at Sendai, Japan. It was the successor to Hyogo Framework for Action (HFA) 2005-15- Building the Resilience of Nations and Communities to Disasters.

The framework outlines four priorities for action to prevent new and reduce the existing disaster risk.

(i) Priority 1: Understanding disaster risk

(ii) Priority 2: Strengthening disaster risk governance to manage disaster risk

(iii) Priority 3: Investing in disaster risk reduction for resilience

(iv) Priority 4 : Enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction

The framework recognizes the primary role to reduce disaster risk is with the state but the responsibility should be shared with other stakeholders including private sector and local government with other stakeholders. It focuses on taking measures addressing three dimensions of disaster risk to prevent. They are (a) creation of new risks and vulnerabilities, (b) reduction of the existing risks and (c) enhancing resilience.

Notes

The Sendai Framework monitors 38 indicators towards Seven global targets through online tools that collect self-reports by member countries. Seven global targets for guidance to assess progress are.

- Substantially reduce global disaster mortality by 2030, aiming to lower average per 100,000 global mortality between 2020-2030 compared to 2005-2015.
- Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 between 2020-2030 compared to 2005-2015.
- Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030.
- Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030.
- Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020.
- Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of this framework by 2030.
- Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to people by 2030.

The purpose is to provide multi-hazard management of disaster risk in development at all levels across all sectors and within. The aim is to achieve substantial reduction of disaster risk.

To prevent new and reduce existing disaster risk by implementation of integrated and inclusive structural, economic, social, health, legal, cultural, educational, environmental, political, technological and institutional measures. They prevent and reduce hazard exposure and vulnerability to disaster, increase recovery and preparedness for response towards disasters. In this way strengthening in resilience is aimed at.

INTEXT QUESTIONS 13.6

1. Write the full form of the abbreviations-

   a) NDMA-

   b) NDRF-

c) SDMA's-

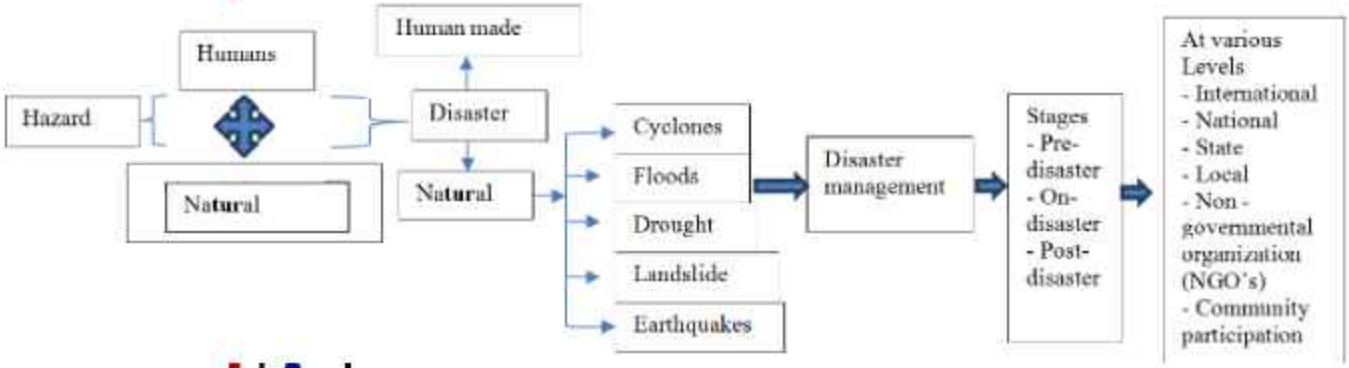
d) DDMA's-

e) WCDRR-

f) NIDM-

Notes

WHAT YOU HAVE LEARNT



TERMINAL QUESTIONS

1. Differentiate between Hazard and disaster
2. Identify various types of Disaster and their causes with help of flow chart
3. Briefly explain the initiatives taken by the Indian government in the field of Disaster management.
4. What are practices involved in managing following disasters? Explain in detail.
   - Flood
   - Earthquake
   - Cyclone
   - Landslides
   - Droughts
5. Identify Flood Disaster-prone areas in India, also distribution on map of India.
6. Identify Drought Disaster-prone areas in India.
7. Identify Earthquake Disaster-prone areas in India.

Notes

8. Identify Cyclone Disaster-prone areas in India.

9. Identify Landslide Disaster-prone areas in India.

10. On the map of India show Levels of Disaster vulnerability.

11. Explain in detail three stages of Disaster Management.

12. Elaborate on Sendai Framework on Disaster Risk Reduction.

ANSWERS TO INTEXT QUESTIONS

13.1

1. (i) natural (ii) human-made

2. Natural Hazard Vulnerability Risk)/ Capacity= DISASTER

3.

	Type	Source
a)	Meteorological	Short lived micro and meso atmospheric conditions
b)	Hydrological	Surface and subsurface water - fresh and saltwater
c)	Extra-terrestrial	Outer space material fall of meteoroids and asteroids on earth
d)	Biological	Living organisms
e)	Geophysical	Originate from earth's interior
f)	Climatological	Long lived meso and macro atmospheric processes

4. a) True

b) False

c) False

d) False

13.2

1. (i) River (ii) Flash (iii) Coastal

2. Fill in the blanks

Notes

a) Flood caused due to dam failure is because of Earthquake or human induced

b) The movement of wind in cyclones is anti- clockwise in Northern Hemisphere and clockwise in Southern hemisphere

c) Droughts are called Akal and Anavrishty in Hindi

d) Droughts cause scarcity of food and water.

3. The slipping of masses of rocks, earth or debris downwards on the mountain slopes or banks of the rivers is called a landslide.

4. Tsunamis

5 True and False

a) True

b) True

c) False

d) True

e) False

13.3

1. Match the following

S. no	Disaster	Area affected in percent
1	Drought	68 % land area
2	Earthquake	58.6 % land area
3	Floods	12% land area
4	Landslide and avalanche	15% land area
5	Cyclone and tsunami	8% land area

2. 85%

3. 12%

4. 283 districts

Notes

13.4

1. Disaster management includes-
   (i) Prevention,
   (ii) Mitigation,
   (iii) Preparedness,
   (iv) Response
   (v) Recovery and
   (vi) Rehabilitation. (any five)
2. Three stages of Disasters
   (i) Pre- Disaster
   (ii) On- Disaster
   (iii) Post- Disaster

13.5

1. Major plans and programmes adopted by government of India to control floods
   a) River Management Activities and Works related to Border Areas (RMBA)
   b) National Flood Commission
   c) National Commission for water resources
   d) National water policy 2012
2. Landslide Hazard Zonation -micro zonation on 1:10,000 scale
3. Three main measures adopted to control floods and also useful in cyclone prone areas
   a) Reservoirs
   b) Embankments
   c) Afforestation

13.6

1. Write the full form of the abbreviations

Notes

a) NDMA- National Disaster Management Authority

b) NDRF- National Disaster Response Force

c) SDMA's- State Disaster Management Authorities

d) DDMA's- District Disaster Management Authorities

e) WCDRR- World Conference on Disaster Risk Reduction

f) NIDM- National Institute Disaster Management