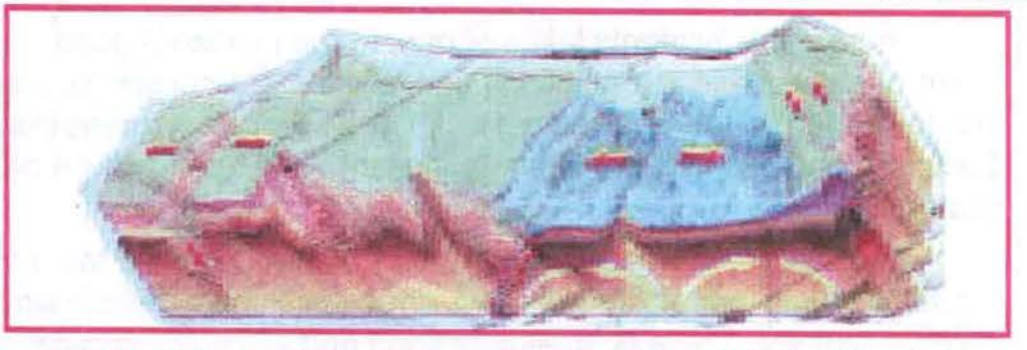
Section-3

NATURAL DISASTER AND MANAGEMENT: EARTHQUAKE AND TSUNAMI

Earthquake and Tsunami are two such natural disasters which are related to internal structure of the earth. We live on solid land surface but inside it fire waves are blowing. You will be surprised to know that inside the solid surface of the earth the temperature is more than 1000° C. Here the rising currents of energy develop vibrations in the rocks. When the focus of this vibration is on the land surface then it is known as earthquake but when it is on the ocean floor then it is known as Tsunami. The effect of Tsunami creates vibration in the sea water. This vibration generates horizontal motion in the water. When the internal energy generated horizontal movement created in the sea water strikes the coast then destruction or disaster created by Tsunami is seen on the coast.

Do You Know?

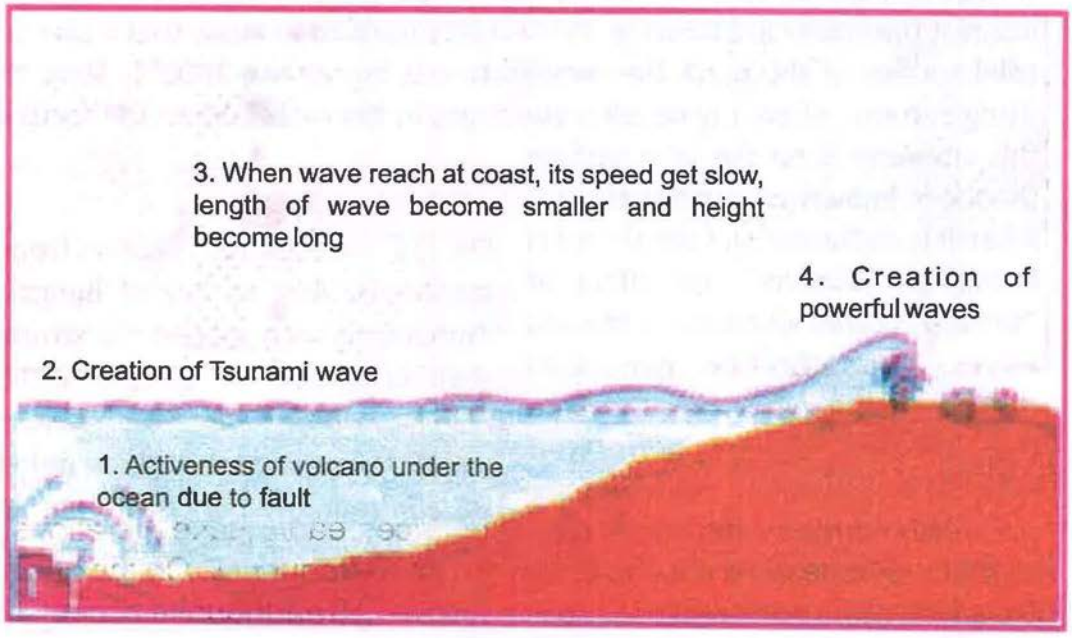
On 26th December, 2004 from south-east Asia to Bay of Bengal, Tsunami of such magnitude struck that hundreds of people were engulfed in it, numerous sailors went missing and Indira point situated south of Nicobar islands was lost once for all by the power of the Tsunami waves.



Through circular circles and arrow marks, origin point of earthquake/ Tsunami and effected land surface is shown.

The intensity of energy waves of earthquake and Tsunami is measured with the help of Richter scale. It is a logarithmic scale in which after every one unit there is ten times increase in the intensity.

The effect of earthquake and Tsunami is seen more in those areas where the rocks of the surface are destroyed. In other words regions of fold mountains, regions of faulted areas on the surface, oceanic deeps, mid oceanic ridges and other such regions where the rocks are weak, they come under energy flow and fell victim to earthquake and Tsunami.



In both the incidents lakhs of people are rendered dead. In the event of earthquake the buildings and bridges are collapsed, cracks are developed on the land and hot water gushes out from these cracks. Such incidents are very common during earth quake and cause heavy destruction.

The Tsunami waves cause heavy destruction on the coast. Tsunami affects tourists who are enjoying on the coast, fishermen and coconut farmers. There is erosion of sand and soil in the coastal bars and creates situation of ecological imbalance.

Earthquake Zones of India:

Almost every part of India experiences earthquake vibrations. But there is huge difference in its intensity and frequency. On the basis of this fact, India has been divided into following 5 earthquake zones:

1. Zone 1 In this zone come the southern plateau regions where the danger of earthquake is almost negligible.
2. Zone 2 Included in this zone are the coastal areas of peninsular India. Here there are chances of earthquake but due to less intensity the dangers are limited.
3. Zone 3 Mainly Indo Gangetic plains, Rajasthan and some parts of northern Gujarat come under this zone. Here the effect of earthquake can be seen but at times they are destructive. For

example, during the twentieth century in Bihar, 20 earthquakes of higher intensity experienced but only the earthquake of 1934 was destructive, in 2008 the earthquake was experienced but due to less intensity some people even did not take note of it.

2. Zone 4 There are chances of greater danger in it. In this mainly Shiwalik Himalayan regions, northern part of West Bengal, Assam valley and north-eastern India are included. In this category Andaman, Nicobar Islands are also included.
3. Zone 5 It is the most vulnerable earthquake zone and is the most dangerous earthquake region. Under this Kutch region of Gujarat, Jammu & Kashmir, Himachal Pradesh, Kumaun mountainous region of Uttarakhand, Sikkim and hilly regions of Darjeeling are included. These regions of India have experienced several destructive earthquakes.

Seismic Waves:

The vibrations arising at the time of the occurrence of the earthquake are mainly divided into Primary (P), secondary (S) and Long (L) waves.

P waves are the first to arrive on the surface of the earth.

S waves are transverse waves and their speed is less than the primary waves.

L Waves originate on the surface of the earth and their intensity is the least. It moves horizontally at a slow speed and that is why it reaches later at any place but it is the most destructive wave.

Do You Know?

(i) **Epicenter** That centre on the surface of the earth where the seismic waves are at first recorded.

(ii) **Focus** The place beneath the surface of the earth where the vibration of the earthquake originates.

(iii) **Pre and post vibrations** Low intensity vibrations occur before and after the occurrence of the earthquake. Normally without the support of the instrument this vibration is not even felt.

Preventive Measures from Earthquake:

Earthquake is a natural disaster and multi faceted measures are essential for its prevention. In fact, these efforts should be broad and farsighted. These efforts can be studied under following heads:

1. **Forecast of the Earthquake:** If the pre and post earthquake waves are measured properly on the seismograph then on the basis of the tendency of the waves, forecast of the expected high intensity earthquake can be done. In a country like China, on the basis of the movement and sound created by the reptiles, big animals and birds, forecast of the earthquake is being done but such forecast is not fully accepted.
2. **Construction of the Building:** Looking at the destruction caused by the earthquake, before granting permission for the construction of the building it is essential to check these facts whether these buildings are built on earthquake resistant techniques. In fact, in earthquake affected areas special economic package is also required for the construction of the buildings based on earthquake resistant techniques.
3. **Safety of the Life and Property:** Any earthquake directly affects life and property. Therefore, special protection force is required for the safety of the life and property.
4. **Administrative Work:** To minimise the destruction caused by the earthquake administrative alertness is very essential. For example, on the basis of pre vibrations if there are chances of earthquake then that area should be declared expected earthquake area immediately. For this, it is essential that modern media, police and district administration should become more active. Though the central and the state government have constituted disaster management committees, but it is essential that their participation should be made more active.
5. **Support of Non-Government Organisations :** In any type of disaster management including earthquake self help institutions, schools and common public can play an important role. Self help

institutions can not only help immediately but before earthquake it can train people in the construction of earthquake resistant houses and in immediate safety measures during the occurrence of the earthquake. For pulling out people buried under the debris, they can adopt normal measures with modern techniques with the help of government machinery and take out those people buried under debris who are still breathing and alive. In country like Norway dogs have been trained for this purpose. In Japan through small size video camera signals of live people is received and preventive work is done. Also the non - government organisations can train people that at the time of earthquake instead of running people should stand with the support of the wall because there they will be least affected by the falling debris.

The students should also be trained about the safety measures to be adopted at the time of earthquake. It should be permanently imprinted on their mind that in the event of disasters like earthquake they should forget the cast, creed and religious divide and come forward to help each other. It is necessary for the common people that they come forward for the management of the relief camps and do not allow cast and gender divide happen. In this Panchayats can play an important role. Because there are more chances of physical damage to the victims in the earthquake affected areas, so without waiting for the arrival of the administration, the nearby hospital or nursing home should be informed through telephone immediately and arrangement of treatment should be made. If someone is having car, tractor or other vehicle in the village then they should take seriously injured people to the hospital. In fact in the event of disaster like earthquake community can perform immediate management work, in real sense.

In the event of death due to accident then his last rites should be performed as per the rules of the religion. D.D.T. and other chemicals should be sprinkled to check the spread of any epidemic.

Preventive Measures from Tsunami:

The destructive effect of Tsunami is seen on the coastal regions. The currents rise up to several meters and strike the coast with such an impact that they destroy fishing boats, motor boats and settlements situated along the coast. Not only this, the Tsunami does not give time to tourists sitting on the sea beaches to escape. It even uproots the coconut trees along the coastal areas. The management of this disaster is very essential. Like earthquake waves, pre and post vibrations occur also in Tsunami and so its forecast is possible. For this, a station/platform needs to be made in mid sea which after analysing the horizontal movement beneath the surface of the sea water can send signal to the coast. Thus the people can be moved to safer places and fishermen on the coast could be warned of not going to coast and they can go to mid sea. Fishermen in the mid of the deep sea remain safe because there horizontally moving currents in absence of any hindrance cause no destruction. Right forecast can save people from Tsunami.

Construction of Embankments and Development of Mangrove Bushes:

To minimise the destructive effect of Tsunami, construction of concrete embankments is essential because the Tsunami waves striking the coast will have limited effect on coastal plains. Also along the coast vegetation like Mangrove should be planted because it minimises the impact of the Tsunami waves so that there is less pressure on the embankments. On the coastal wetlands, only dense Mangroves can be useful.

Training of People Living in Coastal Regions:

Arrangement should be made to train people living in coastal areas to prevent themselves from Tsunami by state government and non-government organisations. As soon as the Tsunami signal is received preparations should be made to run either towards sea or towards land; as soon as the Tsunami waves subside they must

participate in relief operations collectively, Apart from providing medical facility to the injured, clean drinking water and food must be arranged for the injured people, help of common people should be taken to check loot by the anti social elements is very essential. For the resettlement of the settlements such building designs should be adopted for the construction of the houses that there is least impact of the Tsunami water.

Support of local people, self help groups and participation of administrative institutions can only provide relief from the disasters like earthquake and Tsunami.

QUESTIONS

OBJECTIVE TYPE QUESTIONS

1. By which name the vibration that occurs on the sea floor is known?
   (a) Earthquake (b) Cyclone
   (b) Tsunami (d) None of these

2. In which part of the world did disastrous Tsunami struck on 24th December, 2004?
   (a) West Asia (b) Pacific Ocean
   (c) Atlantic Ocean (d) Bay of Bengal

3. What is the name given to the earthquake wave that reaches the surface of the earth first?
   (a) P - Waves (b) S - Waves
   (c) L - Waves (d) T - Waves

4. What do we call the origin point of the earthquake situated on the surface of the earth?
   (a) Focus (b) Epicenter
   (b) Pre center (d) None of these

5. Which of the following is not a correct measure of rescue from earthquake or Tsunami?
   (a) To take the forecast of the earthquake seriously.
   (b) To construct earthquake resistant buildings
   (c) The non-government organisations to remain vigilant for relief work
   (d) To sit idle depending on god.

SHORT ANSWER TYPE QUESTIONS:

1. Differentiate between Focus and Epicenter of the earthquake.
2. What do you understand by earthquake waves? Write the names of important earthquake waves.
3. Differentiate between earthquake and Tsunami.
4. Suggest any three preventive measures to be adopted to escape from the effect of Tsunami?

LONG ANSWER TYPE QUESTIONS:

1. What is earthquake? Divide India into major earthquake zones and describe each one of them briefly.
2. What do you understand by Tsunami? Describe preventive measures to be adopted to escape from the effect of Tsunami.
3. Describe the measures to be adopted to escape from the disastrous effect of earthquake and Tsunami.