1 NATURAL AND MAN MADE DISASTER

1.1 INTRODUCTION

From the very beginning of the existence of man on this earth, he has always been threatened by the fury of nature in one form or the other. Sometimes earthquakes, volcanic eruptions, cyclones, droughts and sometimes floods, etc., threatened his very existence and played havoc with his life and property.

☞ IMPORTANT TERMS

- **Hazard :** A hazard is an event occurring naturally or due to a human cause, which, if not faced properly, may result in loss of life and property.
- **Disaster :** A disaster is the form a hazard if it causes severe destruction of life and property.
- **Disaster Management :** Disaster management is the set of activities designed to minimise the effects of disasters.
- **Disaster-Proneness :** If a particular disaster is unusually likely to occur in a particular region, we say that the region to prone to that disaster.
- **Vulnerability :** It is the risk posed to human beings or a community in general due to a hazard.
- **Disaster Preparedness :** Disaster preparedness is a process involving activities that help us to face disasters more efficiently.
- **First Responders :** The first people to face the disaster happening in front of them and tackle it are the first responders.
- **Multi-hazard Zone :** A region where more than one hazard is likely to occur because of its geographical characteristics is called a multi-hazard zone.
- **Natural Hazards :** The hazards that occur naturally and can't be prevented are called natural disasters.
- **Man-made Disasters :** Man-made disasters are those which are caused by major accidents or inadvertent or deliberate actions of individuals, groups or governments.
- **Earthquake :** An earthquake is a hazard in which the earth around a certain region shakes for some seconds.
- **Tsunami :** A tsunami is an earthquake which occurs under water.
- **Drought :** A drought is a phenomenon in which there is deficiency of surface or subsurface water and rainfall.
- **Floods :** Floods are phenomena in which water rises above its normal level in a certain region.
- **Cyclones :** Cyclones are storms that occur due to pressure difference of air over the warm waters of oceans.
- **Mitigation :** Mitigation consists of actions that reduce the severity of damage caused by disasters to life and property.
- **Disaster-Resilient Society :** A disaster-resilient society is one that can endure the effects of a disaster, by minimising the occurrence where possible, and the destruction that can be caused by it.

- **Earthquake :** An earthquake is a sudden shaking movement of the earth's surface.
- **Focus :** The point of origin of an earthquake is called the focus. It lies beneath the earth's surface.
- **Epicenter :** The point on the earth's surface directly above the focus is called the epicenter.
- **Richter Scale :** Richter scale is the scale used to measure the intensity of an earthquake.
- **Mercalli Scale :** The Mercalli scale is the scale used to measure the damage caused by an earthquake.
- **Hypocenter :** The place deep down in the earth's crust where an earthquake starts.
- **Mantle :** The layer of semi-liquid rock on Which the rocks of the crust float.
- **Fault :** A fault is a place where two or more blocks of the earth's crust join.
- **Seismic Zone :** Seismic zones are designations for geographical regions into Zones 1-5 to identify the possibility of an earthquake occurring there.
- **Retrofitting :** Retrofitting is a technology which helps in strengthening buildings with respect to earthquakes.
- **Cyclones :** A cyclone is a region of low atmospheric pressure; it occurs as a swirling atmospheric disturbance.
- **Eye of the Cyclone :** The centre of cyclonic winds is called the eye of the cyclone.
- **Torrential Rains :** Heavy rains caused by cyclonic winds that do not seem to stop are called torrential rains.
- **Floods :** Floods are phenomena in which water rises above its normal level in a certain region.
- **Riverine Floods :** Floods caused by a river overflowing its banks are called riverine floods.
- **Channel Capacity :** The amount of water that a river can hold before a flood starts is known as channel capacity.
- **Sediment :** This refers to the small particles of soil carried in a river which settle on the river bed, or on floodplains.
- **Droughts :** A drought is a phenomenon in which there is deficiency of surface or subsurface water and rainfall.
- **Arid Regions :** Dry regions that receive scanty rainfall are said to be arid.
- **Water Stress :** Water stress occurs when the demand for water exceeds the available amount during a certain period or when poor quality restricts its use, and stress causes deterioration of fresh water resources.
- **Discharge :** The volume of water that passes a given location within a given period of time is called discharge.
- **Drip Irrigation :** Drip irrigation is an irrigation method in which pipes or tubes filled with water are made to slowly drip on crops.
- **Run-Off :** Run-off refers to the water flow in the topsoil layer.
- **Rainwater Harvesting :** Rainwater harvesting is a method of water conservation in which rain water is stored in appropriate storage places for times of scarcity of water.
- **Monoculture :** Monoculture is the use of land for growing only one type of Plant.

1.2 NATURAL HAZARDS AND NATURAL DISASTER COMPARED

Natural happenings or phenomena can take place anywhere, anytime. It has been estimated that on an average there are about 100,000 earthquakes, volcanic eruptions, thunderstorms, floods, landslides and cyclones every year. All these natural happenings are no doubt natural hazards. A natural hazard may be defined as any natural occurrence or event which is infrequent and is capable of threatening life and property. But so long as it is not effective and is harmless it is called a natural hazard. But as soon as it take furious form and begins to destroy life and property, it becomes a natural disaster. All natural hazard are not so harmful as to destroy life and property on a large scale. It is the fury and the intensity which makes a natural hazard a natural disaster.

Most of the natural events are cyclic and predictable, such as the coming of yearly floods. Such an occurrence is called a natural hazard. In such a case people adapt themselves to the hanging conditions.

1.3 MAJOR CATEGORIES OF NATURAL HAZARDS

Sometimes natural hazards are divided into two main categories :

(A) Geological Hazards (B) Weather Associated Hazards.

(B) Geological Hazards : Natural hazards which are caused by such forces which original below the surface of the earth are called **geological hazards**. Earthquakes, volcanoes, landslides and avalanches are some forms of geological hazards. Such hazards do occur rarely but they are dramatic and more damaging in their results.

(B) Weather Associated Hazards : Natural hazards which are caused by such forces which originate and work above the surface of the earth are called weather associated hazards. Floods, cyclones and droughts are the important forms of weather associated hazards. As compared to geological disasters (like earthquakes, volcanoes, landslides and avalanches) they do occur quite frequently but they are not so dramatic in their impact and usually they are flat so severe in their results.

1.4 SOME MEASURES TO COPE WITH NATURAL DISASTERS/HAZARDS

Although many natural disasters/hazard cannot be predicted, many suitable measures can be taken to lessen the impact of these disasters. Some of them are the following:

(i) Better knowledge about these natural disasters/hazards can ·at least reduce the extent of damage.

(ii) People in the disaster/hazard prone areas can be more vigilant and get prepared to face them in a better way so that their ill-effects are reduced.

(iii) Immediate help from the national and international agencies can prove very helpful for the affected people

Table : SOME MAJOR NATURAL DISASTERS OF THE WORLD (1960-2005)

Year of the Major Event	Type	Place	Deaths
1960	Earthquake	Morocco (Africa)	About 12,000
1964	Floods	Vietnam (Asia)	About 8,000
1970	Cyclone	Bangladesh (Asia)	About 3,00,000
1970	Earthquake and Landslide	Peru (South America)	About 67,000
1976	Earthquake	China (Asia)	About 2,90,000
1985	Volcanic Eruption	Colombia (S.America)	About 25,000
1988	Earthquake	Armenia (Europe)	About 25,000
1991	Cyclone	Bangladesh (Asia)	About 1,39,000
1995	Earthquake	Japan (Asia)	About 1,00,000
1999	Earthquake	Turkey (Asia)	About 17,000
1999	Cyclone	India	10,000
2001	Earthquake	India	1,00,000
2004	Tsunami	South Asia	3,00,000
2005	Hurricane (Katrina)	United States	1,422
2005	Earthquake	Pakistan	79,000
		India	1,329
		Afghanistan	4

1.5 GEOLOGICAL HAZARDS

The major types of geological hazards are earthquakes, volcanoes and landslides and avalanches. Let us know something more about them.

1.5.1 Earthquakes

The sudden, mild or violent shaking of a part of the earth is called an **earthquake**. It is generally accompanied by a rumbling sound and tremors. One of the causes of earthquakes is the movement of the molten rock inside the earth's crust. Sometimes this molten rock is thrown out and volcanoes are caused. This eruption also causes earthquakes.

Earthquakes occur in places where the earth's crust is weak. Violent earthquakes are frequent in areas where there are volcanoes, e.g., the belt surrounding the Pacific Ocean.

The tectonic or horizontal, movements of the earth bring about disturbances in its interior as well. The point where these vibrations originate is called the focus of the earthquake. The point above the focus on the earth's surface is called the epicentre of the earthquake.

The Deccan Plateau was considered relatively free from earthquakes but in the same region a very severe earthquake occurred in Latur and Usmanabad districts of Maharashtra in October, 1993. A very severe earthquake took place in Gujarat on 26 January, 2001.

Now scientists have been able to record and measure the vibrations of the earthquake by an instrument called **seismograph**. The magnitude of the earthquake is measured by the Richter Scale. The numbers of this scale range from 0 to 9. An increase of one unit on the Richter Scale represents a ten-fold increase in the earthquake's strength.

DESTRUCTION AND CHANGES CAUSED BY EARTHQUAKES

An earthquake presents a heart-breaking sight. It brings about destruction and changes in many ways:

(i) The vibration cause extensive damage on the surface of the earth. Buildings are destroyed and rails and roads are damaged. On mountain slopes landslides occur.

(ii) Towns and cities are obliterated as a result of sudden and strong tremors.

(iii) When earthquakes originate near the coast, huge tidal waves cause submergence of land. As a result, some islands are permanently submerged and new islands are formed.

(iv) Many a times earthquakes cause landslides in hilly areas.

(v) Sometimes, the earthquakes cause sudden and permanent change in the river course.

(vi) Sudden uplift and horizontal displacements of the earth's crust sometimes reveal new sources of minerals which can be easily obtained and mined.

SUITABLE MEASURES TO COPES WITH THE EARTHQUAKE HAZARD

(i) An early warning of an earthquake can help people to evacuate their homes and other buildings to minimize the risk of life.

(ii) If one is indoors he should not run outside but move under tables and beds.

(iii) One should keep away from windows, mirrors and things that could break and fall.

(iv) If one is outdoors, he should move to an open area away from the buildings, trees, electric poles and wires.

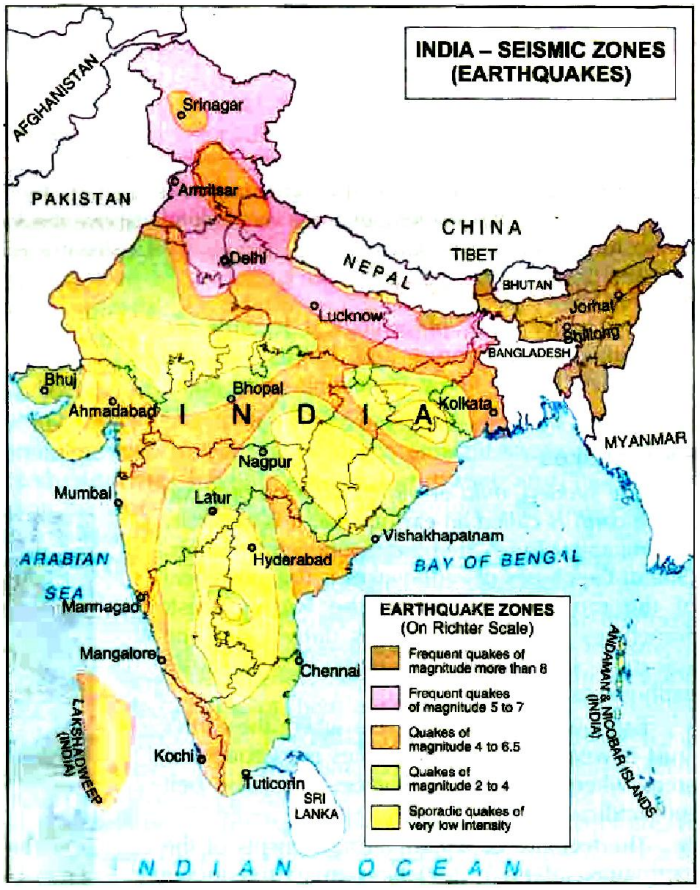
(v) To minimize the loss, earthquake resistant buildings should be constructed.

(vi) Existing buildings may be strengthened structurally.

(vii) if possible, in the earthquake prone areas, the houses should be made of wood. It would be better if the walls of such buildings do not touch the ground as was done by the ancient Japanese in building their temples.

(viii) Last but not the least, one should not panic but try to remain calm.

Immediate help should be rendered to such areas where an earthquake had occurred:



1.5.2 Volcanoes

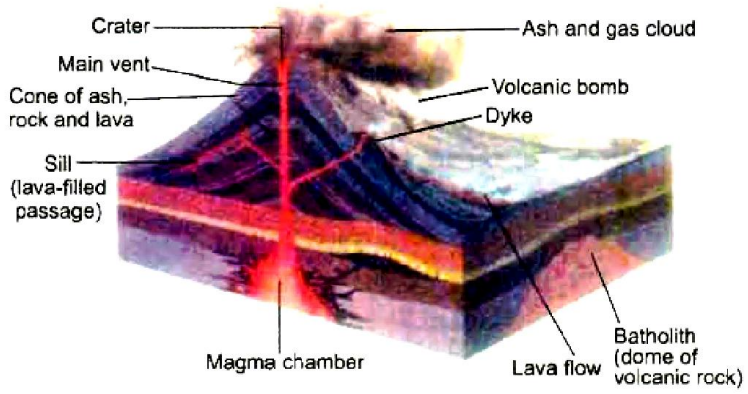
A volcano is a vent in the earth's crust through which molten rocks, gases and steam force their way out to the surface of the earth. A volcano is an important internal agent of change. The different materials erupted by volcanoes accumulate and form volcanic mountains. The neck through which lava, steam or ashes gush out is called the shaft or vent. The cap-shaped mouth of the shaft is called the crater. Fujiyama in Japan and Vesuvius in Italy are important volcanoes.

The liquid of the volcano, so long as it remains within the surface of the earth, is called magma. But when this liquid or magma rises slowly to the surface of the earth it is called lava.

Thus, both magma and lava are linked with the volcanoes.

CAUSES OF VOLCANOES

Volcanoes erupt due to various causes. The hot matter, i.e., lava, etc., in the interior of the earth is pressed down by the pressure of the crust. It comes out through a hole or a crack at a weak point and accumulates round it. With the passage of time, it cools down and becomes sol id. The layers of lava and other materials which accumulate in course of several years form conical mountains. Sometimes rain water or sea water enters the interior of the earth and because of the heat, it is converted into steam and gas. When these gases and steam assume enormous shape they come out with a bang, throwing with it large quantities of lava, ashes, etc., several kilometres up into the atmosphere. Sometimes, the interior movement of the earth round its axis and the sun, forces the lava to come out of earth's crust.



CLASSIFICATION OF VOLCANOES

Volcanoes are classified into three types on the basis of their composition and shape. They are:

1. **Shield Volcanoes :** Volcano formed by a quiet eruption of lava with a low silica content is called shield volcano. Such a volcano has a wide base and a cone with gentle slopes. Volcanoes off the Hawaii islands are of this type.
2. **Cinder-cone Volcanoes :** When volcanoes erupt, soot, gases, ash, etc., are thrown up several kilometres into the atmosphere with great velocity. Such volcanoes are known as cinder-cone volcanoes. They have steep slopes and are made of cinder and ash. Many volcanoes of Mexico and Central America are of this type.
3. **Composite Volcanoes :** Volcanoes which erupt different types of lava in successive series are known as composite volcanoes. Such volcanoes have undulating slopes and are made of alternate layers of lava, cinder and ash. Mt. Fujiyama is an example of such a composite volcano.

LOCATION OF THE ACTIVE VOLCANOES

On the basis of their activity and period volcanoes are sometimes classified into (i) Active Volcanoes; (ii) Dormant Volcanoes (iii) Extinct Volcanoes.

(i) **Active Volcanoes :** Active volcanoes always pose the greatest danger because they continuously go on erupting and become a nuisance for the people. A majority of the active volcanoes are located in the belt surrounding the Pacific Ocean known as the 'Ring of Fire'.

(ii) **Dormant Volcanoes :** Dormant, volcanoes, are those which have not erupted for a long time but can erupt again in future. Mt. Rainier in the Cascades (USA) last erupted since long-long ago.

(iii) **Extinct Volcanoes:** Extinct volcanoes, like those of Devil's Tower in Wyoming (USA), are such volcanoes which were active millions of years ago and have not erupted in the historical period.

VOLCANOES AS AN AGENT OF CHANGE OR POTENTIAL THREATS OF VOLCANIC ERUPTIONS

As discussed above, mostly active volcanoes are dangerous and they pose a potential threat to existence in a number of ways:

(i) Material erupted from a volcano accumulates round the vent to form a low hill which grows up gradually with material added from later eruptions to form a volcanic cone.

(ii) Sometimes volcanic eruptions take place along fissures or cracks several kilometres long. As a result extensive sheets of lava are spread to form a plateau. In the Deccan region, the lava sheets are about 2,000 metres thick.

(iii) Sometimes whole cities or towns are covered by the thick lava sheets and are obliterated.

(iv) In case of explosive eruptions sometimes whole islands are submerged or new islands rise in the adjacent oceans.

WAYS TO MINIMIZE THE RISKS POSED BY VOLCANIC ERUPTIONS

There is no denying the fact that no one can prevent volcanic eruptions but we can devise ways and means to minimize their impact:

1. Most volcanic eruptions give a warning, so proper steps should be taken to evacuate the nearby people.
2. If different disaster response activities are taken in time, like effective warning and careful planning, major loss of life and property can be avoided.

1.5.3 Landslides and Avalanches

The sudden movement of the soil and the Weathered rock material down the slope due to the force of gravity is called a landslide. While turbulent masses of snow and ice mixed with debris, that rush down at high speed from steep mountain slopes are called **avalanches**.

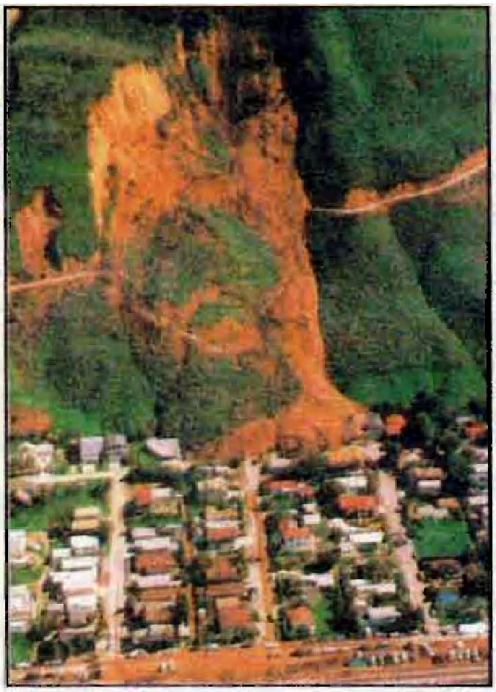
Some of the causes of the landslides are the following :

(i) When some mountain ranges, like those of the Shivalik hills in the Himalayas, are made up of unsolid sediments, they, or any part of their's, slide down due to rains or gravitational pull of the earth.

(ii) The rivers flowing through the unconsolidated ranges go on weakening the foundation of the hills, with the result they can collapse anytime.

(iii) Sometimes human beings also contribute to the landslides especially when they build heavy structures on such hills. Under the weight of these heavy structures sometimes these hills give way leading to landslides.

(iv) Sometimes deforestation also leads to landslides.



A Scene of a Landslide

Landslides are common in mountainous regions especially those which are situated along the river banks, or near the coastline. The flowing water continuously goes on performing the eroding work which results in landslides sooner or later. When the rivers are in flood they greatly add to landslides.

In India, landslides are common in the mountainous regions of the north and north-eastern parts.

The causes of avalanche are also more or less the same. Rainfall, earthquakes and volcanic eruptions play a major role is its occurrence.

1.5.4 Tropical Cyclones

Intense storms which develop over warm tropical oceans between 5° and 20° north latitudes and between 5° and 20° south latitudes are called **tropical cyclones**. The centre of these winds is a low pressure area, so winds with higher pressure all around rush towards the centre. But because of the rotation of the earth these winds assume a circular form. In the northern hemishpere these cyclones blow in an anti-clockwise direction and in the southern hemisphere they blow in a clockwise direction. These winds blow with a great velocity which often exceeds 100 km per hour. Because these winds blow with a great force towards the centre, so this centre goes on shifting. These winds are known by different names in different parts of the world. In North America they are known as 'hurricanes' but in Asia they are known as 'typhoons'.

1.5.5 Effect of Tropical Cyclones

Tropical cyclones blow with a great velocity so they produce important effects. They prove hazardous in a number of ways:

(i) When these cyclones blow far inland they cause much havoc to human settlements. They blow away roofs and walls of houses thus rendering many people homeless.

(ii) They cause much damage to crops and uproot many trees.

(iii) The whole civic life is disturbed by them especially when they destroy electricity and telephone lines.

(iv) These cyclones are often accompanied by torrential l rains which cause floods.

(v) They cause huge tidal waves which inundate coasts.

(vi) They cause not only much loss to property but also to the life of the people.

(vii) Those fishermen who are caught in the high seas by these cyclones are seldom able to save their lives.

MEASURES TO MINIMIZE THE DISASTROUS EFFECT OF TROPICAL CYCLONES

No doubt humans can do little to avoid natural hazards like the tropical cyclones, but certain precautions can be taken for safety and getting prepared to face such calamities.

(i) In such cyclone prone areas human settlements should not be too dose to sea coasts.

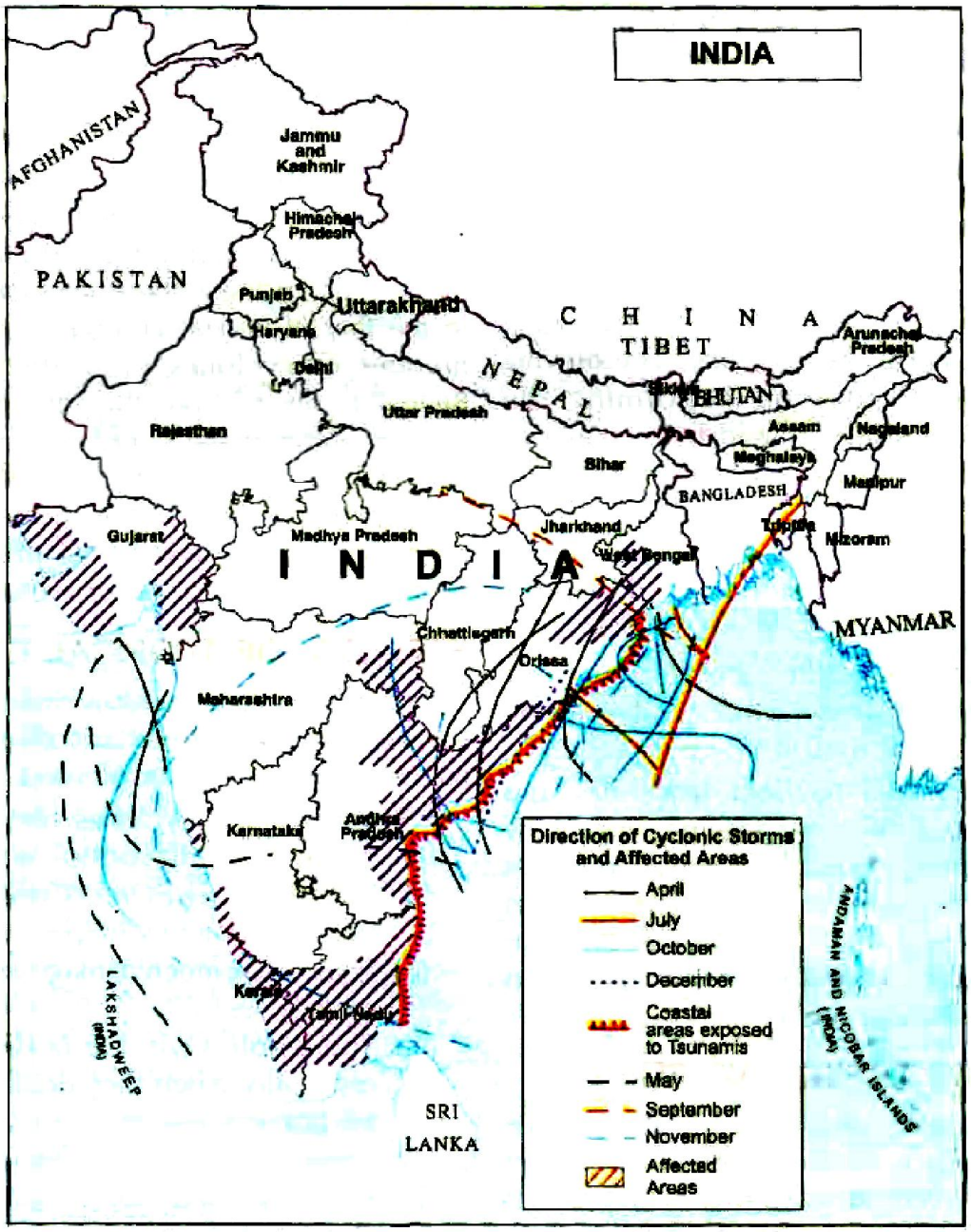
(ii) Early warning by the authorities can help people to evacuate such low-lying areas which would be hit hard.

(iii) Daily TV weather reports should be telecast so that fishermen dare not enter the high seas.

(iv) Safe shelters should be built by the government so that the affected population could be shifted there in time.

(v) Proper arrangements for providing all the necessities of life, like food and water should be made before and after the cyclonic catastrophe.

(vi) People should not be allowed to go near the sea-shore for any adventure or mis-adventure.



1.5.6 Drought

WHAT IS A DROUGHT?

Drought may be defined as a period of unusually prolonged and dry weather in such areas where rain is otherwise normally expected. The very word drought brings to our mind a picture of scarcity of water, food, fodder and unemployment.

*Flood Prone areas in India

FACTORS AFFECTING OCCURRENCE OF DROUGHT

Many factors contribute to the occurrence of drought, the chief being the following:

(i) The first and the foremost cause of drought is the prolonged scarcity of rainfall due to which scarcity of water, food, fodder and unemployment develops drastically.

(ii) Afforestation or cutting of trees indiscriminately not only affects rainfall but also allows the rainwater to run faster into the rivers and the seas.

(iii) Excessive use of ground water or surface water results in drought conditions.

(iv) It is also pointed out that global warming has begun to produce drought conditions. Global warming causes changes in the rainfall patterns and as a result once well-watered areas become drier.

(v) Too much pressure on the land for feeding the increasing population has destroyed the soil-cover causing severe desertification of the land.

DROUGHT PRONE AREAS

Drought is a perennial problem in many parts of the world. Droughts are widespread in Africa particularly in Ethiopia, Sudan, Chad, Mauritania, Burkina Faso, Mali, Senegel and Gambia to the south of the Sahara desert.

In India, according to an estimate, about 70% of the total cultivated area of the total country is drought prone. If monsoon rains are less than normal, many parts of Rajasthan, Chhattisgarh, Jharkhand, Orissa and parts of Gujarat, Maharashtra, Karnataka, Andhra Pradesh and Tamil Nadu, etc., face drought conditions frequently.

ILL-EFFECTS OF DROUGHT

Drought adversely affect us In a number of ways:

(i) Of all the sections of the society, drought affect the farmers most. They adversely affect their crops and their animal stock due to lack or fodder. .

(ii) Drought lead to reduction in agricultural production, as a result of which the poor sections of the society suffer the most. Because of the short food supply, the prices of foodgrains rise which often leads to starvation deaths.

(iii) Those people who depend on animal husbandry have to suffer a lot because of the scarcity of fodder and water for the animal stock.

(iv) As a result of drought, the agricultural activities almost come to a halt as a result of which many farm-labourers are rendered unemployed.

(v) Drought lead to dislocation of people. Many of them have to leave their homes and hearths to save their lives. Such an experience is really very heart-rending.

(vi) Last but not the least, as a result of drought, mostly women and children have to suffer from malnutrition and they become more prone to various diseases.

HOW TO COPE WITH DROUGHT?

In this direction the following steps can be taken :

(i) In drought prone areas water-harvesting structures should be constructed to conserve rain water there and then on the spot where it rains so that stored water could be used in times of need.

(ii) Small dams should be constructed to store water in sufficient quantities.

(iii) Afforestation or planting of trees should be undertaken to conserve rain water and attract more rains.

(iv) Drought resistant crops should be developed which could be grown in dry conditions.

(v) Too much dependence on agriculture and animal husbandry should be avoided and other livelihood options must be introduced.

(vi) Farmer's should be encouraged to join seed and crop insurance schemes which would enable them to cope with droughts in a better way.

1.5.7 Floods

WHAT ARE FLOODS?

When the discharge of water is greater than the capacity of river channel, due to rains or fast melting of snow on the hill tops or any natural catastrophe, the excess water begins to flow over the river banks and submerges the adjacent areas. In India most of the flood are seasonal. They mostly occur during the monsoon season.

CAUSES OF FLOODS

(i) Heavy and prolonged rainfall is the most important cause of floods. The amount of water becomes so much that it begins to flow over the river banks.
(ii) Sometimes excessive melting of snow and ice on the hill tops due to hot weather also leads to the flooding of rivers.
(iii) Blocking of river channels by landslides or silting of river beds also leads to floods because in such a situation water goes on collecting in large volumes and when it finds its way it assumes the form of a flood.
(iv) At other times the change in the course of a river also results in flooding the surrounding areas.
(v) Again the collapse of dams due to faulty engineering designs may also cause floods.
(vi) Many human activities like overgrazing, deforestation and paving of a very large expanse of land area increases the chance of surface runoff ultimately leading to floods.
(vii) Sometimes storms at sea, strong tides and cyclones may cause flooding.

FLOOD-PRONE AREAS

Floods occur in almost all countries but Bangladesh, China and India are more prone to floods. In India the most flood prone basins are those of the Ganga in the Northern plains, the Brahmaputra in Assam and the deltas or the Mahanadi, Godavari, Krishna and the Kaveri. The regions watered by rivers Narmada and Tapi are also included in the flood prone areas.

EFFECT OF FLOODS/FLOODING

Of all the forms of natural disasters flooding is one of the most destructive. It leaves far reaching effects:
(i) Floods have the most damaging effect on the crops and livestock which are simply washed away by the strong currents of the flood.
(ii) Equally damaging is its effects on houses and property.
(iii) People are not only rendered homeless but they are also killed by thousands.
(iv) Floods also lead to the shortage of food and drinking water, and as a result starvation shows its ugly head.
(v) There is a great loss of transport and communication links. Many railway lines and roads are simply washed away by the fury of floods.
(vi) Even after the flood water recedes people become prey to many water-borne diseases.

FLOOD PREPAREDNESS OR CONTROL OF FLOODS

Floods are a natural hazard but if we are prepared to deal with them in time we can check them from becoming a disaster.
(i) If proper warning is given to the people, many lives and properties can be saved. In this connection TV and radio can be of great help.
(ii) Proper arrangement should be made in advance for evacuating people to safer places.
(iii) For those people who are still caught in floods, food and water supplies should be dropped to them by helicopters.
(iv) To check floods from entering certain parts of villages and towns, proper embankments should be made.

1.5.8 Man-made Disasters

Some man-made disasters are of mild nature, such as rail, road and air accidents. But there are some serious man-made disasters like those of the development and use of nuclear bombs such as the Atom Bombs or the Hydrogen Bombs. Such weapons of mass destruction (WMD) can destroy the whole human race.

Besides the nuclear man-made disasters, there are two other kinds of man-made disasters as well. They are biological and chemical warfare. Thus man-made disasters are classified into three categories - nuclear, biological and chemical warfare.

Chemical disasters can be caused by irresponsible handling of chemicals, industrial accidents or their deliberate use for destruction. The Bhopal Gas Tragedy which took place on December 3, 1984 was one of such chemical disasters. In this accident about 2500 people died and about 3,00,000 people suffered from agonising injuries when the Methyl Isocyanate Gas spread throughout the sleeping city.

Biological disasters are caused by the release of germs or other biological substances. In 2001, some postal workers in Washington DC died of the anthrax disease after coming into contact with its bacteria.

With little care and certain precautions one can minimize the ill-effects of man-made disasters like those of natural disasters.

In case of nuclear explosions one may stay indoors and close all doors and windows till further communication from the government.

Illustration 1

What would you do if you were going home from school and there was an earthquake?

Solution

If an earthquake occurs while going home from school, I shall run to open areas, away from buildings.

Illustration 2

Where would you go if you were in the games field and there was an earthquake?

Solution

While in a games field, I shall stay there in the event of an earthquake.

Illustration 3

What activities would you do with children who have witnessed and experienced an earthquake when they come to a relief camp or shelter?

Solution

Such children should be calmed down and first aid should be provided to them.

Illustration 4

What are the hazards associated with cyclones?

Solution

Hazards associated with cyclones include torrential rains, floods and high tidal waves.

Illustration 5

What is the eye of a cyclone and what are its characteristics?

Solution

The eye of the cyclone is nothing but the centre of the cyclonic winds. The eye is characterised by a calm zone with a good weather.

Illustration 6

Which are the cyclone prone areas of our country?

Solution

Coastal areas of India are cyclone-prone. The eastern coastline is more prone than the western coastline.

Illustration 7

What causes man-made disasters?

Solution

Man-made disasters are caused by major accidents or inadvertent or deliberate actions of individuals, groups or governments.

ASSIGNMENT - I [VERY SHORT ANSWER TYPE QUESTIONS]

Q.1 What are Natural Hazards?

Ans. Natural hazards such as cyclones, earthquakes, droughts, floods, landslides, etc. occur in different parts of India frequently. In other words, India is a hazard-prone count .

Q.2 What do you mean by Disaster Preparedness?

Ans. Disaster preparedness is a process involving activities that help us to face disasters more efficiently.

Q.3 Who are first responders?

Ans. Whenever a disaster occurs, the first people to face it are the local people. They are called the first responders.

Q.4 What is Earthquake?

Ans. An earthquake is a sudden shaking movement of the earth's surface (crust).

Q.5 What is a Cyclone?

Ans. A cyclone is a region of low atmospheric pressure. It occurs as a swirling atmospheric disturbance.

Q.6 What do you know about the Eye of the Cyclone?

Ans. The centre of the cyclone is called the eye of the cyclone. Cyclones have diameters of several hundred kilometres.

Q.7 Which department is responsible for forecasting Cyclones?

Ans. The Indian Meteorological Department (IMD) is responsible for forecasting cyclones and warning people against them.

Q.8 What do you mean by flood?

Ans. Floods are phenomena in which water rises above its normal level in a certain region.

Q.9 What do you mean by riverine flood?

Ans. When a river overflows its banks and causes floods, we call it a riverine flood.

Q.10 When does a hazard transform into a disaster?

Ans. A hazard is not necessarily a disaster. It becomes a disaster when it causes a huge amount of loss to life and property.

ASSIGNMENT - II [SHORT ANSWER TYPE QUESTIONS]

Q.1 What do you understand by disaster preparedness? In India, which are the common disasters we have to be prepared for?

Ans. Disaster preparedness is a process involving activities that help us to face disasters more efficiently. Different parts of India are prone to earthquakes, floods, cyclones, droughts, etc. depending on the location.

Q.2 Discuss methods to organise yourselves to manage disasters.

Ans. Some methods to organise ourselves to manage disasters:

(i) Making the community aware of the disasters which the region is prone to.

(ii) Educating the community about how to tackle a disaster when it comes.

(iii) Trying to evade a disaster if it can be prevented.

Q.3 List simple do's and don'ts in the event of tremors or an earthquake.

Ans. Do's:

- Use the drop, cover and hold method to protect yourself.
- Move to open areas if outdoors.
- Helmets can be used to protect the head.

Don'ts:

- Don't move near things that can fall and damage.
- Don't stay near buildings, trees, poles, etc.

Q.4 How does preparedness help you and your community when an earthquake occurs?

Ans. Being prepared beforehand is a very significant thing in the event of a hazard. If people are prepared, the damage done by the hazard can be minimised. People can be ready to volunteer and save survivors. This reduces the damage and number of casualties.

Q.5 What causes a cyclonic storm?

Ans. A cyclonic storm is caused by a low pressure zone surrounded by cyclonic winds. Cyclones are caused due to a combination of warm sea temperature, high relative humidity and atmospheric instability.

Q.6 Besides natural causes, what are the man made reasons, which have contributed to increase in the impact of cyclones?

Ans. Besides natural impact of cyclones, human activities like deforestation and encroachments in coastal areas contribute in increasing its ill-effect, since forests present on coasts help in shielding the communities living in residential areas from the impact of cyclonic winds.

Q.7 What should a community do before every flood season, to be prepared?

Ans. When the season of floods arrives, people in flood-prone areas can prepare by identifying nearest safe shelters and evacuation spots. Emergency kits containing useful objects like a first-aid kit, torch, water-proof bags, etc. should be kept handy.

Q.8 Write a caption for the given picture.

Ans. Students are advised to use their own imagination to think a caption for the picture. Two sample captions are given here:

"In an ocean of troubles"

or

"Water, water, everywhere"

Q.9 How does drought affect our lives?

Ans. Droughts create acute shortage of water, food, fodder, crop failure and employment, thus affecting lives of people in drought-affected areas.

Q.10 List ways to conserve water in day to day use.

Ans. On a day to day basis, water can be conserved by promoting community-based rainwater harvesting and watershed programmes. Some traditional methods of water conservation include guhls in the western and central Himalayas, bamboo pipes in Meghalaya, ahar-pyne irrigation system in Bihar, Kunds in Thar Desert and surangam in Malabar area.

Q.11 Find out how potassium iodate tablets can be used to counter exposure to radioactivity.

Ans. Potassium iodate can be used to protect the thyroid against accumulation of radioactive iodine. It does this by saturating the body with a stable source of iodine prior to this exposure.

Q.12 How do man-made disasters affect us?

Ans. In comparison to natural disasters, man-made disasters cost more in terms of human suffering, loss of life and they long-term damage to a country's economy and productive capacity. Not only the survivors of tragedies like the Bhopal Gas Tragedy and the Hiroshima and Nagasaki atomic bomb explosions, even newborns in these places still bear the brunt in the form of disabilities.

Q.13 How would you protect yourself and your family in the case of a nuclear disaster?

Ans. Nausea, dizziness, vomiting and disorientation are symptoms in case of nuclear attacks. An explosion is followed by a blast. Doors and windows should be closed. Radioactive rays do not penetrate solid structures, although buildings may be damaged by fires.

ASSIGNMENT - III [LONG ANSWER TYPE QUESTIONS]

Q.1 Make a chart of simple Do's and Don'ts in the event of a chemical disaster based upon information gathered from the industry.

Ans. Do's during a chemical disaster:

- Keep calm and do not panic.
- Stay inside if at home. Close all doors and windows.
- Protect your mouth and nose with wet cloth or a protective mask.
- Remain inside a building until you get instructions from the authorities.
- Eat only the food stored inside a building such as tinned and preserved food.

Don'ts during a chemical disaster:

- Do not consume open food.
- Do not smoke, eat or drink in areas exposed to the disasters.
- Do not kneel, lie or sit on the ground.
- Do not walk barefooted or in open footwear.

Q.2 What simple do's and don'ts can you list in case of a biological disaster?

Ans. Do's in the event of biological disasters:

- Implement hygienic methods of living. Wash hand with soap properly before consuming food.
- Follow active immunization.
- Wash all vegetables properly before cooking.
- Report any case of sickness to health authorities without delay.
- Use mosquito nets or repellents at night.

Don'ts in the event of biological disasters:

- Do not allow waste food material to accumulate in or around your premises.
- Do not allow collection of stagnant water in surrounding area.
- Do not panic and stay calm.
- Do not consume stale food material.

Q.3 What actions will help us to mitigate drought, individually as well as collectively?

Ans. Since droughts give ample time to prepare before they come, we can try to mitigate the ill-effects. We can reduce the intensity and impact of droughts through collective and individual actions. In the long term, effects of drought can be controlled by promoting community-based rainwater harvesting, watershed programmes. We should increase forest cover, sow drought-resistant crops like paddy, and encourage seed insurance schemes. Students can also contribute by conserving water, promoting rainwater harvesting and planting trees.

Q.4 How can communities prepare to face floods?

Ans. In seasons of flooding, people in flood-prone areas should identify nearest safe shelters. An emergency kit containing useful objects like a first-aid kit, torch, water-proof bags, etc. should be kept handy. After a flood warning is issued, the radio and the TV should be constantly used for further information. Dry food, drinking water and warm clothes should be kept handy. Taking these steps can be helpful in minimising damage due to floods.

Q.5 List the steps in preparing for a cyclone.

Ans. During seasons when cyclones are possible, people in coastal areas should always be alert. They should update themselves about approaching laves through TV and radio. Fishermen should avoid going to the sea after warning has been issued. Safe shelters should be identified so that people are ready to evacuate any time. An easily accessible emergency kit is advisable. Adequate food grains should be stored in safe places so that they come of use in times of cyclones.

Q.6 Are there Ham Radio Operators in your village or area? Find out more about Ham Radio.

Ans. Amateur radio, often called ham radio, is both a hobby and a service in which participants, called "hams," use various types of radio communications equipment to communicate with other radio amateurs for public service, recreation and self-training. Amateur radio operators enjoy personal (and often worldwide) wireless communications with each other and are able to support their communities with emergency and disaster communications if necessary, while increasing their personal knowledge of electronics and radio theory. An estimated six million people throughout the world are regularly involved with amateur radio.

ASSIGNMENT - IV

SECTION - A

- **FILL IN THE BLANKS**

Q.1 In the 20th century there were 30 major _____.
Q.2 Turbulent masses of snow rushing down the mountain slope are called _____.
Q.3 In India cyclones originate in _____.
Q.4 Rain causes floods and_____.

SECTION - B

- **MATCH THE COLUMN**

Q.1

	Column A		**Column B**
(1)	Vesuvius	(a)	Extinct Volcano
(2)	Mt. Rainier	(b)	Active Volcano
(3)	Devil's Tower	(c)	Cyclones
(4)	Natural disaster in Morocco in 1960	(d)	Dormant Volcano
(5)	Natural disaster in Bangladesh in 1991	(e)	Volcanic Eruption
(6)	Natural disaster in Colombia in 1985	(f)	Earthquake

SECTION - C

- **MULTIPLE CHOICE QUESTIONS**

Q.1 The sudden, mild or violent shaking of a part of the earth is called a/an
(A) volcano (B) Earthquake (C) Landslide (D) None of these

Q.2 A devastating earthquake took place in Latur and Usmanabad districts of Maharashtra in the year
(A) 1992 (B) 1993 (C) 1994 (D) 1995

Q.3 Magma and lava are linked with
(A) volcanoes (B) earthquake (C) landslide (D) None of these

Q.4 Which of the following is not a natural hazard?
(A) Volcano (B) Earthquake (C) Landslide (D) Chemical disaster

Q.5 The greatest amount of fresh water on the Earth is found in _____ .
(A) the oceans (B) ice caps and glaciers
(C) aquifers (D) surface water

Q.6 Groundwater is _____ .
(A) not usable because it is dirty
(B) another name for watershed
(C) too far beneath the Earth's surface to be used
(D) another name for an aquifer

Q.7 Surface water _____.
(A) is used to produce electricity (B) can be easily contaminated
(C) can be used for recreation (D) all of the above

ANSWER KEY

ASSIGNMENT - IV

SECTION - A

Q.1 Natural Disaster Q.2 Avalanches Q.3 Bay of Bengal and Arabian Sea
Q.4 Riverine flood

SECTION - B

Q.1. (1)-(b); (2)-(d); (3)-(a); (4)-(f); (5)-(c); (6)-(e)

SECTION - C

Q.1 B Q.2 B Q.3 A Q.4 D Q.5 B Q.6 D Q.7 D

ASSIGNMENT - V [SELF APPRAISAL]

Q.1 Distinguish between :
(1) Natural hazards and Natural disasters
(2) Shield volcano and Cinder-cone volcano
(3) Landslides and Avalanctles
(4) Active volcano and Dormant volcano
(5) Geological hazards and Weather associated hazards.

Notes

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