UNIT 2 UNDERSTANDING DISASTERS: CAUSES AND EFFECTS

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2.0 OBJECTIVES

After studying this Unit, you should be able to:

- describe the various elements of disasters.
- explain the causes of disasters; and
- discuss the effects of disasters.

2.1 INTRODUCTION

It is clear from the first Unit of this Block that disasters affect the development process adversity. For disaster management, it is essential to identify the causes of disasters and to know the effects. This Unit will identify and analyse the causes and discuss the effects of disasters.

2.2 TOWARDS UNDERSTANDING OF DISASTERS

Some disasters are of limited interest due to their restricted area extent, e.g., avalanches, snowstorms and tornadoes. As these hazards affect relatively few people and the countries in which they occur largely have sufficient resources and systems in place to respond without external assistance, the international interest is less.

There are several types of disaster for which there is a widespread concern. These can be classified as i) Rapid onset disasters, ii) Rapid/slow onset disasters, and iii) Slow onset disasters.

Table 1 shows the different types of disasters in India by nature of onset and cause based classification.
### Table 1

Types of disasters in India by nature of onset and cause based classification

<table>
<thead>
<tr>
<th>NATURE OF ONSET</th>
<th>TYPE OF DISASTER</th>
<th>CAUSES</th>
<th>STATES IN WHICH PREVALENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapid</td>
<td>Cyclone</td>
<td></td>
<td>AP, TN, ORISSA, WB</td>
</tr>
<tr>
<td></td>
<td>Storm surges</td>
<td></td>
<td>AP, ORISSA, WB</td>
</tr>
<tr>
<td></td>
<td>Floods</td>
<td></td>
<td>ASSAM, BIHAR, GUJARAT, ORISSA, TRIPURA, UP, WB, HARYANA, PUNJAB, AP, HP, J&amp;K, KARNATKA, MAHARASHTRA, MEGHALAYA, RAJASTHAN, Mizoram</td>
</tr>
<tr>
<td></td>
<td>Earthquake</td>
<td></td>
<td>ALL INDIA</td>
</tr>
<tr>
<td></td>
<td>Industrial</td>
<td></td>
<td>ALL INDIA</td>
</tr>
<tr>
<td></td>
<td>Fire</td>
<td></td>
<td>ALL INDIA</td>
</tr>
<tr>
<td></td>
<td>Landslides</td>
<td></td>
<td>HP, J&amp;K, ASSAM, UTARANCHAL</td>
</tr>
<tr>
<td>Rapid/Slow</td>
<td>Migration and Urbanization</td>
<td></td>
<td>ALL INDIA</td>
</tr>
<tr>
<td></td>
<td>War</td>
<td></td>
<td>BORDER AREAS</td>
</tr>
<tr>
<td></td>
<td>Epidemics</td>
<td></td>
<td>ALL INDIA</td>
</tr>
<tr>
<td></td>
<td>Civil unrest</td>
<td></td>
<td>ALL INDIA</td>
</tr>
<tr>
<td>Slow</td>
<td>Drought</td>
<td></td>
<td>AP, GUJARAT, KARNATAKA, MAHARASHTRA, RAJASTHAN, ASSAM, ORISSA, MP</td>
</tr>
<tr>
<td></td>
<td>Environmental</td>
<td></td>
<td>RAJASTHAN, HP, UP, MP</td>
</tr>
</tbody>
</table>

Above mentioned types of disasters can be classified into the Geological, Environmental, Epidemic, and Industrial accidents.

#### 2.2.1 Geological Disasters

1) **Earthquake**

It is a sudden movement shift of the Earth's crust below or at the surface that results in ground vibration and the potential collapse of buildings and possible destruction of life and property if the quake is of sufficient magnitude. Earthquakes are considered to be one of the most disastrous phenomena and its occurrence is usually sudden with little or no warning. It is not yet possible to predict earthquakes.
2) Tsunamis

Tsunamis are popularly called tidal waves. Tsunami is a Japanese word meaning "harbour wave". These are the waves, which often affect distant shores, originate from undersea or coastal seismic activity, landslides and volcanic eruption. Whatever may be the cause, sea water is displaced into a violent motion and swells up, ultimately breaking over land even at very long distances with great destructive power.

3) Volcanic eruption

Volcano is like a vent or chimney to the earth's surface from a reservoir of molten rock, called magma, deep in the crust of the earth. A study shows that approximately 600 volcanoes are active or have erupted. On an average, about 50 volcanoes erupt every year. At present, about 10% of the world's population live on or near potentially dangerous volcanoes.

Usable short term forecasts, within hours or days may be made through volcano monitoring techniques including seismic monitoring, ground deformation studies and observation and recording of geoelectrical, and geochemical changes. Structures with roof designs which do not resist ash accumulation are vulnerable even at large distance from a volcano.

4) Landslides

Landslides generally occur as secondary effects of heavy rain storms, earthquakes and volcanic eruptions.

It occurs as a result of changes, either sudden or gradual, in the composition and structure of rocks or hydrology or vegetation on a slope.

It covers a wide variety of land forms and processes involving the movement of soil under the influence of gravity.

2.2.2 Climatic Disasters

Climatic disaster include the following types:

1) Cyclone

It is a tropical storm in which the winds can reach speeds of over 120 kph. The cyclone blows in a large spiral around a relatively calm centre or eye. Every year, these, violent storms with torrential rain and very strong winds bring widespread devastation to coastlines and islands lying in their paths. Cyclones pose a major threat to lives and property in many parts of the world. While such storms are called cyclones in India and neighborhood, they have different nomenclature in other parts of the world, e.g., hurricanes in the Americas and typhoons in Japan and the Philippines.

2) Flood

It can arise from abnormally heavy precipitation, dam failures, rapid snow melts, river blockages or even burst water mains. It is usually sudden in onset.
Types of floods are as follows:

i) Flash floods

ii) River floods and

iii) Coastal floods due to tsunami, tidal wave or storm surge in the wake of a cyclone.

Major floods result in physical damage, deaths and injuries, problems in drinking water supply and food shortages, and displacement of population.

3) Drought

Droughts have disastrous and long term impacts on the economy and can affect a large segment of the society which may last for months and in some cases several years. Generally, drought situation may be defined as a temporary reduction in water or moisture availability significantly below the normal or expected amount for a specific period. Drought is a slow onset phenomenon.

There are three types of droughts, viz.,

i) Meteorological drought when rainfall is appreciably below normal.

ii) Hydrological drought when the water scarcity result in reduction in the available water in inland water bodies.

iii) Agricultural drought when the scarcity results in partial or total loss of crops and effects agricultural activity adversely.

2.2.3 Environmental Disasters

Environmental disasters are the result of:

1) Environmental pollution

There are five aspects of the environmental pollution hazard:

(i) air and water pollution

(ii) ozone depletion and

(iii) global warming

(iv) sea level rise

(v) forest fires

People in developing countries are much more vulnerable to the effects of environmental degradation because they often directly depend on the land.

2) Deforestation

It can be explained as the removal of vegetation in a region that is predominantly tree covered. Deforestation may contribute to disasters caused by flooding, landslides and drought. The spread of agriculture, firewood collection, and unregulated timber harvesting are the main reasons for deforestation. Trees inhale carbon dioxide and give out oxygen. Depreciation contributes to increase of carbon dioxide on the atmosphere.
3) Desertification

Broadly speaking desertification can be defined as the decline in biological productivity or production potential due to a long term process of degradation or change in climate. Desertification worsens the condition of the poor, brings malnutrition and disease, and destabilizes the socio-economic base of a country.

4) Pest Infestation

A pest may be defined as any animal or plant causing harm or damage to people, their animals, crops etc. The primary pests are insects, diseases and weeds.

2.2.4 Epidemics

An epidemic is the occurrence of a disease, known or suspected to be of infectious or parasitic origin. An epidemic usually evolves rapidly into an emergency situation. Epidemics may be hazard in themselves, but may also occur in the aftermath of disasters. Epidemics such as, cholera, typhoid and hepatitis pose considerable threat to the people.

2.2.5 Industrial and Technological Accidents

Chemical and industrial emergencies may arise due to disaster/explosion in a plant handling or producing toxic substances, accidents in storage facilities, accidents during transportation of chemicals, misuse of chemicals, improper waste management, failure of plant safety design or plant components, technological system failure, fire, earthquakes, landslides and human error. People are becoming victims of these types of accidents (chemical and industrial) that release hazardous substances into the environment.

Check Your Progress 1

Note: i) Use the space given below for your answers.
   ii) Check your answers with those given at the end of the unit.

1) Discuss the main types of disasters with special reference to Geological Disasters.

   ______________________________________
   ______________________________________
   ______________________________________

2) Briefly explain the types of climatic disasters.

   ______________________________________
   ______________________________________
3) Discuss briefly the various types of Environmental disasters.

2.3 CAUSES OF DISASTERS

Each type of disaster has its own cause. Here is a brief description of natural phenomena which may lead to disasters.

1. Earthquakes may arise either due to the release of energy from strained rocks inside the Earth, or tectonic movements or volcanic activity. The sudden release of accumulated energy or stresses inside the earth or sudden movement of massive land areas on the earth’s surface cause tremors, commonly called earthquakes.

2. Tsunami could be the after effect of undersea earthquake due to which the abrupt movement of ocean floor generates waves which travel at high speed in the ocean. As approach land, their speed decreases while their height increases. It can be highly destructive to coastal areas.

3. Tropical cyclones, typhoons or hurricanes are the names given to the same phenomenon in the different parts of the world. They are weather systems with strong winds that circulate anti-clockwise around a low pressure area in the northern hemisphere and clockwise in the southern hemisphere. Tropical cyclones form in certain tropical areas over the open seas where the sea surface temperature is around 26°C.

4. Floods are excessive accumulations or flow of water which results from heavy rainfall, snow melt or high tides and other causes such as dam burst, embankment failure etc. They include flash floods which are rapidly rising and falling river and overland flows resulting from the rapid run off of rainfall from upland areas; river floods in which river water spills over adjoining areas, tidal flooding usually saline from the backflow of sea waters into coastal rivers at high tides, and storm surge floods associated with the landfall of tropical cyclones.

5. Drought or scarcity of water to satisfy the normal needs of agriculture, livestock or human population is generally associated with semi-arid or desert climates, but drought can also occur in areas that normally enjoy adequate rainfall and moisture levels.

6. Volcanic eruptions are vents in the crust of the earth through which the molten rock is extruded as lava or ejected as ash, sometimes accompanied by steam or hot gases.

7. Landslide can be caused by heavy rainfall, earthquakes or undercutting of the base of slopes by rivers. They are common in mountainous areas where they frequently destroy the infrastructure, agriculture and buildings.
Disasters vary in terms of their severity, disruptive potential, frequency, predictability and duration. In turn, remedial needs differ according to the nature of the disaster and the magnitude of the resultant destruction. The effects of disaster depend upon the types of disasters.

1. Disasters may be categorised as sudden or cataclysmic, with immediate destruction. Natural phenomena like earthquakes, floods, wind storms, tidal waves, volcanic eruptions, landslides and avalanches can suddenly destroy important parts of the housing stock, physical and social infrastructure, production facilities and crops. Disasters may disrupt the productive base of the economy by impounding on its capital stock. Its timely repair and replacement, of course, diverts the national savings which otherwise might have been allocated to the infrastructure and productive capital stock.

2. Some disasters may be slow in materialising and showing their effects. These may be categorised as continuing disasters. As time passes, the situation may further deteriorate. For instance, continuing disasters include prolonged droughts and crop failure. While in cataclysmic disasters the affected area is relatively small, it may be very large in a continuing disaster situation. For example, droughts may compound long standing problems of deforestation, encroaching desertification and soil erosion over vast stretches of land for many years. Agriculture may suffer severe setback and large groups of affected population may have to migrate. In turn, it may cause pressure on urban centres, creating new demands and infrastructure.

3. Man made disasters like wars, civil strife, population explosion, environmental degradation and major industrial accidents. The direct destruction caused by war and civil strife is similar to that of a sudden natural disaster. A period of war and civil strife results in diversion of resources, affecting infrastructure as well as production facilities.

4. Disasters disrupt economic activities. Physical damage after catalysmic disasters temporarily halts developmental activities. Continuing disasters require changes to the infrastructure. In either case, repair and response take time and require additional resources. These resources may not be immediately available without dislocating ongoing development activities in priority sectors.

5. The impact of disasters on the physically weak and socioeconomically disadvantaged sectors of the society is tremendous, e.g., on subsistence farmers, small shopkeepers, casual labourers and marginal fishermen. Their capital stock or savings may be completely wiped out by disasters, pushing them into the poverty group. Migration to urban centres in search of work as a result of disasters, in turn tends to increase the urban plight and the demand for remedial action. They may even halt or slow the chances of the poor coming out of the poverty net. The physically weak, such as children, pregnant and lactating mothers, the aged and infirm bear the brunt of the adverse impacts of disasters.

Check Your Progress 2

Note:  
1) Use the space given below for your answers.  
2) Check your answers with those given at the end of the Unit.
1) Explain briefly a few disasters that are caused due to heavy rain or lack of rain.

2) Discuss the causes of an earthquake.

3) Describe the effects of disasters.

2.5 LET US SUM UP

This Unit has described the different categories of disasters viz. geological disasters, climatic disasters, environmental disasters, epidemics and the industrial accidents.

Further, the various causes of disasters have also been discussed. The earthquakes may arise due to the release of energy from the strained rocks inside the earth, or tectonic movements. Tsunamis could be due to the abrupt movement of ocean floor and tropical cyclones are caused by the circulation of strong winds anti-clockwise around a low pressure area in the northern hemisphere and clockwise in the southern hemisphere. Similarly, floods occur due to many reasons like the heavy flow of water, high tides, embankment failure etc. Droughts occur mostly in areas that do not enjoy adequate rainfall and moisture levels. Landslides can be caused by heavy rainfall, earthquakes or undercutting of the base of slopes by rivers.

The effects of disasters are felt especially on the socio-economic front. Disasters can cause loss of life, loss of property and the disruption of social and economic activity. Agriculture may also receive a major setback due to disasters like
2.6 KEY WORDS

Drought: Situation created generally insufficient levels of rain resulting in water shortage that affect the economic and physical well being of a community.

Earthquake: Sudden movement of the Earth's crust below or at the surface that results in ground vibrations and the resultant collapse of buildings and possible destruction of life and property if the quake is of sufficient magnitude.

Rapid onset disasters: These type of disasters are very fast moving and are consequently very difficult to predict or prevent. They strike quickly and briefly, e.g., earthquakes and flash floods.

Slow onset disasters: These type of disasters are more lengthy in duration, e.g., droughts. They are easier to foresee and provide time to take preventive measures.

Tectonic: Earth's crust is divided into various "plates" which have their own directions of movement. These are known as tectonic plates. Tectonic movement. Such movement of plates often results in earthquakes.

Tsunami: Japanese term for sea waves generated by undersea earthquakes.

2.7 REFERENCES AND FURTHER READINGS


2.8 ANSWERS TO CHECK YOUR PROGRESS EXERCICES

Check Your Progress 1

1) The main types of disasters are as follows:

- Geological disasters
- Climatic disasters
- Environmental disasters
- Epidemics
- Industrial Accidents

Geological disasters are:

- Earthquakes
- Tsunamis
- Volcanic eruptions
- Landslides
Understanding Disasters: Causes and Effects

2) Your answer should include the following points:
   - Tropical cyclones
   - Floods
   - Droughts

3) Your answer should include the following points:
   - Environmental pollution
   - Deforestation
   - Desertification
   - Pest Infestation

Check Your Progress 2

1) Your answer should include the following points:
   - Floods
   - Drought
   - Landslides

2) Your answer should include the following points:
   - Earthquakes may arise either due to the release of energy from strained rocks inside the earth or volcanic activity or tectonic activity.
   - The sudden release of accumulated energy or stresses inside the earth or sudden movement of massive land areas on the earth's surface cause earthquake.

3) Your answer should include the following points:
   - Disasters may disrupt the productive base of the affected economy through damaging or destroying. The existing infrastructure and halting the development process.
   - It may cause pressure on urban centres, creating new demands and infrastructures.
   - Diversion of resources, deteriorating infrastructure as well as production facilities.
   - Disrupt economic activities.
   - Disasters may halt or slow the chances of the poor coming out of the poverty net.