UNIT 6: CONCEPT OF DISASTER

UNIT STRUCTURE

6.1 Learning Objectives

6.2 Introduction

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6.5 Difference between Hazard, Disaster, Risk and Vvulnerability

6.6 Causes, Effects and Mitigation Measures of Some Natural Disasters

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6.8 Let Us Sum Up

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6.1 LEARNING OBJECTIVES

After going through this unit you will be able to —

- define the concept of disasters and classify them
- learn the concept of some similar terms- hazard, disaster, disaster risk and vulnerability
- learn about the causes of some major natural disasters and the measures to mitigate them
- learn about man made disasters.

6.2 INTRODUCTION

In this unit we are going to discuss the concept of disasters and the difference that lies between disaster and some synonymous terms. You will get to know from this unit about these extreme calamities, their causes, their characteristic effects and the mitigation measures to be adopted. You may already have a fair experience of these natural or manmade hazards that commonly occur in N.E. India.

So, this unit will present to you a brief account of all these disasters and the measures to cope with them.

6.3 DEFINING DISASTER

"Disaster" is a sudden adverse and unexpected natural or manmade event which causes significant physical damage, loss of lives or property, sometimes permanent change of the natural environment. Disasters occur very rapidly, instantaneously and indiscriminately.

It is an unforeseen event which may cause great loss of lives and property and damage to the whole environment.

6.4 TYPES OF DISASTERS

It can be broadly divided into two types - Natural and Manmade or Anthropogenic.

- **Natural Disasters:** These are the results or responses to some extreme physical events which cause a significant loss of life, damage to property, and affect the whole environment.
- **Manmade Disasters:** These are the results of some extreme anthropogenic events which cause great loss or damage to life, property as well as the environment.

6.5 DIFFERENCE BETWEEN HAZARD, DISASTER, RISK AND VULNERABILITY

These four alternative terms viz Hazard, Risk, Disaster and Vulnerability, though they seem to be similar, as they all deal with the extreme events, yet these are actually different in their actual meaning and use. Let us discuss their differences below :

- **Environmental Hazard** *:* Environmental Hazard can be defined as those extreme events (anthropogenic/natural) which may cause catastrophic damage to property and loss of lives and degradation of environment. Hazards are considered the processes or the causal factors resulting from most extreme events.

- **Disasters:** Disasters are the results of these extreme events. The intensity of the environmental disaster is always measured in terms of the total damage done to human lives, property and the environment. Disasters are the results of hazards and are very rapid and instantaneous. Such events cause great damage to human society.
- **Risk:** Risk can simply be defined as the measured probability of occurrence of a hazard and its expected losses or some uncertain outcomes. It is the indicator of any kind of threat, uncertainty or negative impact. It is also written as the following—

  Risk= Probability of event occurring x impact of event occurring
- **Vulnerability:** It is the measurement of the capacity of the system to absorb and recover from any hazardous events. According to Peter Timmerman, "Vulnerability is the degree to which a system may react adversely to the occurrence of a hazardous event".



CHECK YOUR PROGRESS

Q 1. Give a definition of disaster.

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.....

Q 2. True or false -

a) Disasters are the responses to the hazards.

.....

b) Vulnerability is the probability of occurrence of a hazard.

.....

Q 3. Fill in the blanks -

According to Peter Timmerman, "Vulnerability is the degree to which a system may react adversely to the occurrence of a .....".

6.6 CAUSES, EFFECTS AND MITIGATION MEASURES OF SOME NATURAL DISASTERS

- **Flood Disaster:**
  - *Definition of Flood :* Flood simply means "inundation of extensive

land area with water for several days in continuation."

In other words, it is that condition of a river when the amount of water it carries is much larger than its carrying capacity and as a result the water cannot remain confined to the river and inundates the nearby low areas. It may be noted that flood is a natural phenomenon. It is caused by heavy rainfall but it causes loss to human lives and property.

- *Causes of Flood:*
  - Heavy Rainfall: Continuous heavy rainfall for a long period is the main cause of flood. During heavy rainfall there is a larger accumulation of water in the upper catchment areas of the concerned river and it flows into the downstream areas, thereby causing flood in the plains below. Similarly, lower catchments areas are also affected by heavy rainfall. Assam experiences frequent flood caused by the Brahmaputra river.
  - River System Blockage: Blockage of river drainage system due to landslide or encroachment also creates severe inundation in the low catchments areas.
  - Meandering River Course: Sinuous and meandering river courses obstruct the normal flow system and reduces the velocity resulting in stagnation of water for prolonged periods which ultimately leads to the overflow of the surrounding areas.
  - Low Rainfall Areas: Sudden heavy rainfall in the arid and semi arid areas where rainfall is scanty and infrequent also causes flash floods as such areas have very poor drainage system.
  - Deforestation: Injudicious and indiscriminate destruction of forest resources in the upper catchment areas decreases the infiltration capacity of the soil and consequently increases the surface runoff resulting in severe flood.
  - Urbanization: Increasing urbanization increases the intensity and magnitude of floods. Construction of buildings, roads etc. reduces infiltration of water and considerably increases the surface runoff of water. This causes floods in the urban areas.

- Decay of Dams/Embankments: Due to natural and man-made causes sometime breach of embankment takes place and the resultant flow of water through the broken points of the embankment, causes seveire flood leading to severe damage to human lives, animals and properties.
- Reservoirs: Heavy rainfall causes increase of water volume in the reservoirs and the quick rise in the water level causes floods in the nearby areas.

➢ *Effects of Flood:* There are severe impacts of floods in the environment. Some of these include—

- Loss to Agriculture: The prolonged accumulation of water causes the agricultural land to remain under water continuously as a result of which many agricultural crops like rice etc. can not survive long. This results in great financial losses for a family.
- Destruction of Property: Severe floods can inundate and wash away homes as well as cause damage to vehicles, properties and lives.
- Diseases: The worst effect of flood is on one's health. Floods can cause the accumulation of various human wastes in the flood waters. Hence flood waters can spread to the other areas, resulting in the occurence of diseases such as Cholera and Malaria etc.
- Deaths: Floods also often result in loss of lives especially in low lying areas and along the river banks. Hundreds of deaths occur in our state on account of severe flood.
- Loss to Government: Floods damage public property such as roads, buildings, telephone lines and electrical equipment .Floods can also give rise to many kinds of diseases. The responsibility of repairing the damages and providing medical help lies mainly on the Government. This costs a lot and is a heavy economic loss to the government as well as to the public.

- *Mitigation Measures:*
  - Non structural long term measures
    1. Afforestation: It is the first step for controlling floods. Forest prevents the rain water from directly coming into the land. Rain water falls through tree leaves on the ground and forests also help in more percolation of rain water and reduce the surface run off. It significantly reduces soil erosion and helps in reducing the frequency of floods.
    2. Flood Forecasting and Early Warning System: Flood control organizations and forecasting centres set up in various parts of India help in the forecasting of floods in river basins like the Ganga, Brahmaputra and their tributaries. These flood forecasting centres collect the data regarding rainfall, and the level of flood water etc. and people living in the lower basins against the possible threat of flood.
    3. Zoning of Flood Prone Areas: The flood prone areas are classified into certain zones based on the levels of risk the different areas have and the probability of hazard they face. This type of classification or zonation is useful in the management of flood hazard in the flood prone areas.
  - Structural Measures (short term):
    1. Storage Reservoirs: The volume of water during the flood may be reduced through a series of engineering devices such as construction of storage reservoirs which help in irrigation as well as power generation.
    2. Straightening of Bends: The existence of too many of bends in the highly sinuous and meandering rivers retard the quick disposal of water. So, it may be necessary to straighten the meandering courses of a river by performing artificial cutoff of individual bends so that flood discharge may move downstream without causing flood along its banks.
    3. Diversion of Flood: Flood diversion system implies the diversion of flood water in low lying areas through artificially

constructed channels bordered by artificial dykes so that the devastation of floods can be reduced.

4. Embankments: Embankments, dikes and flood walls are used to confine the flood water within the valley or within a narrow channel. These engineering works include the building of artificial levees of earthen materials along the river banks. These are considered as short-tern measures for flood management. If these structures are used for a longer time, their usefulness is greatly reduced in managing flood flows.



CHECK YOUR PROGRESS

Q 4. What are the main causes of flood?

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Q 5. write about the steps involved in the process of structural flood mitigation.

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Q 6. Discuss the anthropogenic causes of flood.

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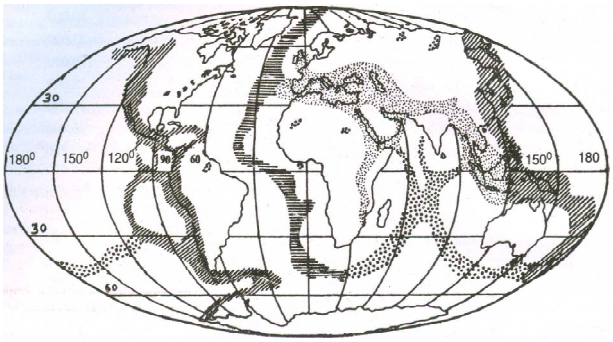
Stone spurs are also used to protect the towns; cities and other populated areas from severe erosion during flood .Semi permeable spurs, pile spurs are also constructed to protect against flood and erosion.

- **Earthquake Disaster:** The earthquake is a vibration of the surface of the earth with rocking energy of wave motion capable of shaking buildings apart and causing gaping fissures to open up in the ground.

  The magnitude or intensity of energy released by the earthquake is measured by the Richter scale.

  - *Causes of Earthquake:* A number of factors are thought to be responsible for causing disequilibrium or isostatic imbalance in the earth's crust. Mainly natural factors and occassionally manmade factors are responsible for this disequilibrium. Natural causes like Volcanic activity, Plate tectonic movements, Faulting and Elasticity

Figure. 6.1 : World Distribution of Earthquakes



cause the occurance of earthquake. Anthropogenic causes like high explosions, breaching of dams also induce earthquake disaster.

- *Impact of Earthquakes: T*he effects of earthquakes are divided as primary, secondary and transient effects depending upon the intensity, magnitude and severity of the occurance.
  - Primary Effects
    a. Regional geological changes,
    b. Displacement of and cracks in any matter
    c. Fissures and cracks in buildings, roads etc.
    d. Elevation and depression of land.
    e. Accumulation of water.
    f. Change in the direction of river current.
    g. Formation of stream tremors in ponds and water bodies.
    h. Displacement of well and spring.
  - Secondary Effects
    a. Landslide b. Minor slippage
    c. Uprooting of poles and posts d. Death of fishes
    e. Common damage to buildings f. Effects on glaciers
    g. Stopping of pendulum clocks h. Snapping of cables.
  - Transient Effects
    a. Perceptible tremors b. Sliche in rivers and ponds
    c. Tsunami d. Swaying of bridges
    e. Shaking of buildings f. Birds/animals disturbed

g. Fright and panic among human beings

h. Hearing of sounds.

- *Mitigation Measures:* The damages to property and loss of lives associated with earthquakes are due to the fact that the tremors often strike without warning .A great deal of research is being devoted to the problem of early forecasting and warning. Some of the mitigation measures are as follows—
  - Long Term Prediction: Prediction of earthquake is still found not possible. However, with increased precision in measurement and advancement in analytical techniques, the risks due to earthquake hazards faced by different locations on the earth surface are better known today based on which mitigation measures can be taken.
  - Hazard Mitigation Programme: (1) Development of awareness program for earthquake hazard, (2) To make the public aware of effects of earthquakes, (3) Aplication of various research results on earthquakes.
  - Adjustment to the Earthquake Activity: Structural protection—near the epicentral area damage is not very high. But outside areas are mostly affected and so structural protection is encouraged. Structures should be very light and should be able to absorb the shocks. The foundation of the buildings should be strong. Steel frame with reinforced concrete is most suitable.
  - Land use Planning and Earthquake Zonation: Identification of Earthquake prone areas is most important and microzonation studies are to be encouraged. Schools, hospitals and other public buildings should be made earthquake resistant and safe.
  - Warning System and Rescue Camps : Early warning systems as in other countries like USA (Loss Angels) should be used where seismometers, transmitters, satellite based technologies are employed for monitoring and transmission. Post disaster relief operations should be taken up properly with the help of the government.



CHECK YOUR PROGRESS

Q 7. Write the definition of earthquake.

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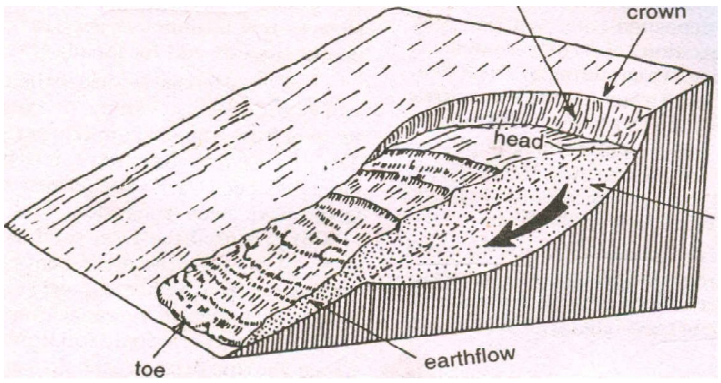
Q 8. Discuss the secondary effects of earthquake.

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- **Landslide Disaster:** A landslide is a slow or sudden downhill movement of soil , glacier and rock materials due to the force of gravity. Landslides as erosional processes not only modify the existing topography and landscape, but also cause immense damage to man made structures causing heavy loss of lives and properties.

Figure. 6.2 : Landslide Occurrence(After AL Bloom, 1978).



➢ *Causes of Landslides:*

❍ Natural Cause

(i) Internal Factors:

a. Increase in pore water pressure

b. Presence of Kaolinite, anhydric or expansive clays like montmorillonite

d. Weathering and physico-chemical reactions.

(ii) External Factors:

a . Gravitational force

b. Prolonged and continuous rainfall
c. Ground water flow through loose soils
d. Wedging action of plants and tree roots
e . Tremors due to earthquake.

- Manmade Causes:
  a. Clearing of vegetation and cutting of slopes.
  b. Vibration due to drilling, blasting and operations of earth moving machines.
  c. Excessive ground water tapping from slopes.
  d. Construction of buildings, roads, drainage and over loading of slopes, effect of septic systems.

- *Landslide Hazard Effects:*
  - Damage and destruction of highways, railways, canals, bridges, forest etc. in terrain.
  - Caving in of big buildings
  - Destruction of useful underground materials
  - Cracks in plasterers, brick and stone masonry, floor and foundations
  - Flow of water from pools, reservoirs towards the lower regions.
- *Landslide Mitigation:*

  Drainage, Grading reduces landslide occurrence. Slope modifications—-
  - Slope Modifications: Toe cutting ,terrace cutting should be stopped and the heavy pressure on the gradient should be minimized. Retraining structures—retraining walls, buttresses, pilings etc. and Grunting and grouting techniques are effective.
  - Afforestation: Afforestation programmes should be properly planned so that there is no effect on the slope.The selection of plant species should be such that it can withstand the pressure on the terrain.
  - Warning System: With the help of scientific experience, measurement of landslide-prone areas, geological data and weather and rainfall forecast and landslide warning system many

developed countries have developed methods which can forecast disasters and warn the people.



LET US KNOW

For the movement of any mass, the most important factor to be considered is the 'safety factor' which is the ratio between shearing forces(stress)and resistance of the materials to these forces as expressed below —

$$Fs = \frac{\text{Shearing resistance of the material}}{\text{Magnitude of shearing forces}}$$

- **Drought Disaster:** A drought can be defined as an extended period of months or years which a region experiences. This condition is usually experienced due to the insufficiency in rainfall, lack of irrigation facilities, under exploitation of the available water sources and non availability of adequate amount of water for meeting the normal crop requirement for agriculture.
  - *Causes:* Drought is related to the failure of the normal rains at a particular time. All those natural and human activities which affect rainfall and water resources are the causes of drought. Some of these causes are—
    - Less amount of water vapor in the air due to the occurrence of hailstorms may result in drought.
    - Wind is another natural factor which helps in the shifting of air masses
    - El-nino which increases the temperature of the water in oceans also influences the climate of the different parts of the world.
    - Injudicious destruction of trees for agriculture or constructional activities combined with the resultant erosion causes the loss of moisture from the land areas and ultimately results in drought.
  - *Impacts:* The problems associated with drought can have economic, environmental, and social impacts. Because nature and human society depend on water. Lack of water results in the migration of

people. It is a very common occurence. The agricultural sector is particularly affected by drought. The lack of water can often cause a decline in crop yields, leading to the reduction in income for farmers and an increase in the market price of products. A prolonged drought, may cause unemployment of farmers and problems for the retailers of agricultural products, having a significant impact on the economy of the area. Health problems like malnutrition, dehydration and spread of various diseases become a common sight in a drought-hit area. Drought can also result in insect infestations and plant diseases, increasing erosion, habitat and landscape degradation, forest fire, wild fire etc. Prolonged drought like condition leads to desertification.

- *Mitigation Measures:* Afforestation is the most effective way to increase the content of air moisture, precipitation, rate of infiltration of rainwater and thus replenishment of ground water and raising of the water table. Soil and water conservation is another important step. Water conservation by desalination of seawater, water recycling, construction of reservoirs, rainwater harvesting, introduction of dry farming techniques to reduce the dependence of farming on rainwater, checking of desertification or desert spread and the development of horticulture and pastures are some of the measures that help in drought mitigation.

- **Tsunami Disaster:** Tsunami is a giant, vast ,rare and deadly series of sea waves produced by submarine earthquake or volcanic eruption or slides under water. Tsunami is a Japanese word meaning tsu (harbor) and nami (wave). The term is pronounced soo-NAA-mee. It is a natural phenomenon consisting of a series of waves generated when water in a lake or a sea is rapidly displaced on a massive scale. The effects of a tsunami can sometimes be quite insignificant but sometimes these are highly devastating.
  - *Causes:* The tsunami is caused by earthquakes, volcanic eruptions, explosions under the sea.
  - *Impact of Tsunami:* Tsunami has a devastating and catastrophic effect when it becomes a hazard. Tsunami affects the coastal areas

very harshly. The records of the tsunamis that have already taken place point to the destruction of huge number of coconut trees in the coastal areas besides causing a devastating impact on human lives and properties. The hazards of tsunami have taken a heavy toll of human lives. Many people had left their home and hearth in the tsunami affected areas and being homeless came to live in refugee camps.

- *Mitigation Measures:* Government has established a nationwide warning system after the devastating experience of tsunami and it is linked to the Pacific Tsunami Warning Centre (PTWC) in Ewa Beach, Hawaii. After an earthquake seismographic information is transmitted over satellite signals to the Central Station, which forwards it to the headquarters in Hawaii and Chiang Mai.. Finally, people are warned through warning towers, via radio . Another new system has been developed recently by the National Research Centre for Geosciences in Potsdam, Germany. This is the most effective, fast and better determination system and is based on the measurement of water pressure after an earthquake. This system has more advantages than all other systems.



CHECK YOUR PROGRESS

Q 9. Fill in the blanks

a) Prolonged drought like condition leads to .....

b) Tsunami is a Japanese word of which 'tsu' means ..... and 'namee' means .....

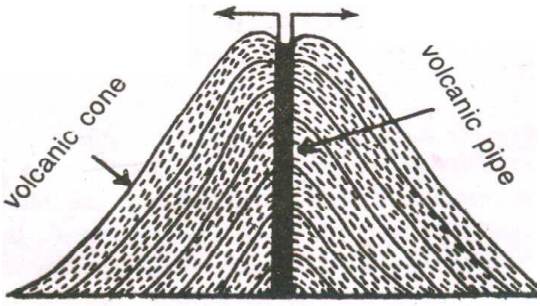
Q 10. Write in brief the natural causes of drought occurrence.

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- **Volcanic Disaster:** A volcano is essentially a fissure or vent ,communicating with the interior, from which the flows of lava, fountains of incandescent spray or explosive bursts of gases and volcanic ashes erupt at surface. Volcanism includes all phenomena connected with

the movement of heated material from the interior to or towards the surface of the earth.

Figure. 6.3 : Different Components of a Volcano



Volcanic vent *crater*

- *Causes:* Volcanoes are always associated with the weaker zones of the earth's crust. The main causes associated with the volcanic eruption are : mountain building, faulting and fracturing, Tectonic plates, the Pacific "Ring of fire" in the Pacific ocean and some spreading centers**.**
- *Hazardous Effects of Volcanic Eruptions:* Volcanic eruption causes heavy damage to human lives, property and all ecosystems through emitting hot lavas and volcanic materials. Huge volumes of hot and liquid lavas moving at considerably fast speed burry structures, kill people and animals, destroy agricultural farms, forests. These volcanic substances including dusts and ashes, smokes etc. cover the large ground surface and farm lands, forests, men and animals and create acid rains. Volcanic eruption also changes the radiation balance of the earth the and atmosphere and thus helps in causing climatic changes. According to some scientists volcanic eruptions cause mass extinction of a few species. Volcanos occuring before and after an earthquake generate destructive tsunamis seismic waves.
- *Mitigation Measures:* Regular measurement of seismic events and earth tremors is very much necessary. In the earthquake prone regions volcanic eruption can be predicted by using the Teltmeter. Constant measurement of the temperature of the crater lakes, hot

springs, geysers and fumaroles also give some indications about the possible eruption of a volcano in a particular locality. Measurement of the local gravity and the magnetic field and their trends may also help in the prediction of a volcano. The risk of a Volcanic eruption in densely populated areas may be considerably reduced only if governmental and nongovernmental organizations collaborate with the population at risk, and if economic incentives are provided for the reorganization of the productive resources on the territory.



CHECK YOUR PROGRESS

Q 11. Write the definition of volcano.

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Q 12. Write true or false.

a. Volcanoes are always associated with the weaker zones of the earth's crust.

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b. Volcanic eruptions and fallout of dusts and ash cause mass extinction of a few species.

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6.7 MANMADE DISASTERS

- **Industrial (Chernobyl Disaster):** Chernobyl is a city in Northern Ukarine, Soviet Union which was evacuated on 25th April,1986 due to the nuclear disaster at the Chernobyl power plant located 14.5 kilometer north-west. The power plant is within Chernobyl Raion.It was a sad day for all the people of ukarine. The explosion took place at around one in the morning while the neighboring town of Pripyat was asleep. Four workers were killed instantly.

  The Chernobyl Nuclear Power Plant near the town of Pripyat, Ukraine, exploded at around 1.23 A.M .A nuclear reactor burst through a 4000

ton steel concrete cover and the reactor's core temperature was 2000^0C. The accident spread all kinds of toxic substances in the nearby areas causing severe impact in the whole environment including plants and animals. The accident triggered the release of substantial amounts of radiation into the atmosphere in the form of both particle and gaseous radio isotops which were 400 times more radioactive.

- *Impact of the Accident: Short-term Effects:* As a result of the explosion radioactive cloud with fires drifted over Russia, Belarus, Ukarine and some other parts like Turkey, Romania, Finland, Denmark, Norway and Sweden. The inhalation of the air mixed with radioactive substances increased the risk of cancer to the affected people. 203 persons were hospitalized and 38 died. 135,000 people were evacuated from the area; 10 persons had already died of cancer after the accident. Chernobyl Unit 4 reactor contained about 180-190 metric tons of radioactive uranium oxide ..About 10,500 km ^{2} (4,000 mi^2) area was contaminated by caesium-137. Some other health hazards like blood abnormalities, thyroid damage, atrophy, cataract, fibrosis etc. had appeared. 10%of the trees were damaged immediately by the radiations.
- *Long term Effects:* This is a very controversial issue. Over 300,000 people of the area were rehabilitated in some other places after the disaster. There was evidence of increased mortality, cancers or birth defects among these people.

- **Fires:** Though fires sometimes occur due to some natural causes yet most of the time human activities are primarily responsible for the incidence of fire. Many human activities like camp fires, explosions, careless handling of machines in industries, chemical laboratories ,wars and social conflicts, atomic researches cause fire. This is a very frequent and common problem in the highly industrial metropolitan areas.

  Fire accidents cause severe economic loss as well as environmental degradation. The forest fires used in connection with agricultural activities inflict great loss to the wild life habitats. Hundreds

of trees are destroyed and animals lose their habitat. Infact, some species of animals and trees may totally get extinct leading to a huge biodiversity loss. Fire accidents in some industries take hundreds of lives, cause loss of properties and affect the whole environment.

Therefore, some steps need to be taken to cope up with this disaster. People should be very careful while handling machines, using chemicals and lighting fire in camps. Emergency services should always be kept ready to face such eventualities

- **Accidents:** An accident is an instantaneous, unexpected and unplanned sequence of events that cause ruinous effect on property, lives and the environment.

  Accidents are caused due to both natural and manmade activities. Natural causes include mainly natural geological processes like earthquake, landslides, erosion etc. On the other hand, accidents due to manmade causes include sudden explosions in the industries, head on collision of motor vehicles etc.

  These sudden accidental events can be mitigated through the emergency services provided by the government and NGOs, proper planning of the cities and awareness of the people.

- **Oil Spills:** The release of liquid petroleum hydrocarbon into the water bodies due to anthropogenic activities is referred to as oil spills which cause severe pollution of the water body and the whole environment as well. This type of incident is very common in the marine environment only.

  Oil spill is mostly caused by sudden accidents or leakage of oil tankers, cleaning of the tankers in shore areas, leakage of oil from the refinery and other fuel industries.

  - *Effects***:**
    - Effects on Birds: This oil penetrates through the feathers to the body of a bird and impairs the bird's flight abilities, making it difficult or impossible for it to defend itself against predators. This oil also damages. kidneys and the liver function, poisoning the digestive tract. Seals and Dolphins are also affected while

feeding on the contaminated species. The reproductive function of the animals is also affected by the oil spill.

- Effects on Fishes: Fish species are badly affected by this kind of pollution. Oil enters into their bodies through gills, affects the eggs and the larval survival. Reduced growth, enlarged livers, changes in heart and respiration rates, fin erosion, and reproductive impairment are the other adverse effects of oil spills on fishes noticed. Oil has the potential to impact the spawning success, as eggs and larvae of many fish species, including Salmon, are highly sensitive to this toxic substance.
- Effects on Invertebrates: Oil can directly affect the invertebrates by altering their metabolic activities.
- Effects on Plants: Some small plants, algae, and other aquatic plants are also affected badly.

The pollution caused by oil spills can be reduced by some bioremediation and phyto remediation techniques using some bacteria to remove the oils from the water body. Some chemical methods are also used to reduce this pollution.



CHECK YOUR PROGRESS

Q 13. Write True or False.

a. Chernobyl disaster was a nuclear power plant accident.

b. Oil spills cannot affect plants.

Q 14. Fill in the blanks.

a. The release of liquid petroleum..... causes oil spill problem in water bodies.

b. In oil spills penetrates through the feathers of a bird and affects its activities.

c. Oil can directly effect the invertebrates by altering its .... activities.



6.8 LET US SUM UP

- After going through this unit you must have learnt to define disaster, how it differs from hazard, risk and vulnerability, and the types of disasters. This unit has also discussed the major disasters, the causes, effects and the mitigation measures in the event of a major disaster. Disaster is the result of the hazardous events causing economic loss, loss of lives and environmental degradation.
- Basically there are two types of disasters – natural and manmade. Both natural causes and manmade activities are behind the incidence of major disasters like floods, earthquake, landslides, volcanoes. They cause severe damage to the environment.
- This unit has helped you to learn about the specific causes ,effects and mitigation measures of these ruinous events. The structural and non structural mitigation measures against floods, landslide disasters etc. have been elaborately discussed along with some other severe forms of disasters like tsunami, volcanoes, drought etc. The measures to be taken to mitigate their severe effects are also mentioned in course of this discussion.
- Finally, the unit acquaint the learners with the Chernobyl disaster with its devastating oil spills impact occurring due to manmade activities. People should be made aware about the effects of these hazards and their mitigation measures. We have also given some questions and examples to enable you to have a better understanding of the concept of disasters.



6.9 FURTHER READING

1) Singh, R.B. (2009). *National Hazard & Disaster Management. Vuluerability and Mitigation.* Delhi: Rawat Publication.
2) Singh, S. (2008). *Environmental Geography.* Allahbad: Prayag Pustak Bhawan.
3) Talwar, A. K. & Juneja. S. (2008). *Encyclopaedia of Disaster Management (Set of 10 Vols.).* Commonwealth Publishers.
4) Talwar, A. K. & Juneja. S. (2009). *Hazardous Materials Disaster Management.* Commonwealth Publishers.
5) Talwar, A. K. & Juneja. S. (2009). *Human Made Disaster Management.* Commonwealth Publishers.
6) Talwar, A. K. & Juneja. S.(2009). *Natural Disaster Management.* Commonwealth Publishers.



6.10 ANSWER TO CHECK YOUR PROGRESS

Ans to Q No. 1: "Disaster" is a sudden, unexpected and adverse natural or manmade event causing significant physical damage, loss of life or property, including permanent changes of the natural environment.

Ans to Q No. 2: a. True b. False

Ans to Q No. 3: Hazardous event

Ans to Q No. 4: a. Natural causes b. Manmade causes

Ans to Q No. 5: a. Storage reservoirs b. Cutting of sinuses

c. Diversion of flood d. Embankments

Ans to Q No. 6: a. Deforestation b. Urbanization

c. Breach of Dams/Embankments

d. Reservoirs e. Agricultural practices

Ans to Q No. 7:. The earthquake is a vibration of the surface of the earth with rocking energy of wave motion which is capable of shaking the buildings apart and causing gaping fissures to open up in the ground.

Ans to Q No. 8: a. Perceptible shaking b. Sciche in rivers and ponds

c. Tsunami d. Swaying of bridges

e. Shaking of buildings.

Ans to Q No. 9: a) unemployment of farmers.

b) harbor, wave.

Ans to Q No. 10: a) Less amount of water vapour in the air due to the occurrence of heavy rainfall and hail storms results in dryness of the air. This sometimes causes drought.

b) Wind is another natural factor which helps in the shifting of air masses

Ans to Q No. 11: A volcano is essentially a fissure or vent,communicating with the interior, from which erupt the flows of lava, fountains of incandescent spray or explosive bursts of gases and volcanic ashes.

Ans to Q No. 12: a. True b. True

Ans to Q No. 13: a. True b. False

Ans to Q No. 14: a. hydrocarbon b. plumage c. metabolic



6.11 POSSIBLE QUESTIONS

VERY SHORT ANSWER QUESTIONS

Q 1. Bring out the differences between hazard and disaster.

Q 2. What are the primary, secondary and transient effects of earthquake?

SHORT ANSWER QUESTIONS

Q 1. Elaborate on the structural and non structural mitigation measures for flood disaster.

Q 2. How does oil spill affect the wild life?

LONG ANSWER QUESTIONS

Q 1. Write briefly about the internal and external factors associated with landslide hazards.

Q 2. What are the environmental impacts of drought?

Q 3. Describe the causes and effects of Tsunami.

Q 4. Briefly describe the effects of volcanic hazard on the environment.

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