CHAPTER 8 ENVIRONMENTAL RESOURCES

Objectives

After studying this chapter, students should be able to:

- define environmental resources.
- discuss the different types of environmental resources and give examples of each type.
- relate human resource quantity to size, education, health, etc.
- explain the importance/uses of environmental resources.

8.1 Meaning of Environmental Resources

Environmental resources are naturally occurring materials that are useful to man and also the activities of man. They occur in nature in their original, untouched form. The earth contains vast reserves of natural resources. Environmental resources can be classified into six types namely: atmospheric, water, vegetation, mineral, land and human resources.

8.2 Atmospheric Resources

The atmosphere is the band of gases that surround the earth. The gaseous composition of the atmosphere by volume is as follows: nitrogen (78%), oxygen (21%), carbon dioxide (0.03%) and argon (0.97%). A very small amount of oxygen is present in allotropic form called **ozone**. This composition is maintained by natural cycles such as carbon, oxygen, nitrogen and hydrological cycles. Besides the gases, other atmospheric resources include, sun, wind, rainfall, temperature and water vapour.

Water Vapour

(i) Water vapour enters the atmosphere as a result of evaporation on the earth's surface and leaves it as precipitation (rain, snow etc.) after condensation.

(ii) It plays an important role in the heat balance of the atmosphere.

(iii) It is important for rain formation.

Oxygen

(i) All living organisms including animals and plants use oxygen present in the air for respiration also called **aerobic respiration**.

(ii) It is used for combustion to produce energy in automobiles, ships, generators, industrial process etc.

(iii) Liquid oxygen is used in the burning of fuel in spacecrafts for generating the required thrust in space where there is neither air nor oxygen.

(iv) In industry, it is used for melting, welding and cutting of metals.

(v) It is used in the manufacture of nitric acid, sulphuric acid etc. in chemical industries.

(vi) Production of iron and steel in blast furnaces.

Ozone

(i) It shields the earth from ultraviolet radiation.

(ii) It is used to improve the rate of chemical reactions and to ensure oxidation of undesired compounds.

Nitrogen

(i) It is used to make fertilizers.

(ii) It is used to make nitrous oxide (laughing gas) which is an anesthetic agent used in hospitals.
(iii) It is used to manufacture light bulbs.
(iv) It is used to process iron and steel.
(v) It combines with water to provide food for plants.

Carbon dioxide

(i) Carbon dioxide is used by plants for photosynthesis to produce food compounds such as glucose.
(ii) Plants and animals convert food compounds by combining it with oxygen to release energy for growth and other life activities.
(iii) It changes the pH of water.
(iv) It is used in soft drinks and beer to make them fizzy.
(v) It is used to make fire extinguishers because it is denser than air.

Rain

(i) It is the major source of freshwater.
(ii) It provides water for domestic uses.
(iii) It provides suitable conditions for many types of ecosystem.
(iv) Rain supply water to rivers which is used by hydroelectric plants to generate electricity.
(v) It provides water for crop irrigation and helps to dissolve mineral elements in the soil for plant use.

Sun (Solar Energy)

(i) The sun is the major source of energy that supports life systems.
(ii) It is used to generate electricity in residential buildings.
(iii) It is used to supply power in remote areas.

(iv) Sun is used for transportation signaling such as offshore navigation buoys, light houses, aircraft warning, light structure, road traffic warning signals.

(v) Used to power environmental monitoring equipments and corrosion protection systems for pipelines, bridges etc.

Wind

(i) Wind is air in motion. It is created by the sun's uneven heating of the atmosphere, earth rotation and the irregular surface of the earth.

(ii) Wind can be harvested using wind turbine and used to make electricity.

(iii) Wind turbines can convert energy in the wind into mechanical power used for pumping water.

(iv) It is used for drying crops.

(v) Wind is used for dispersal of seeds and plant pollination.

8.3 Water Resources

Water resources are sources of water that are useful or potentially useful to humans. About 97% of the water on the earth is salt water while only 3% is fresh water. Two thirds of fresh water is found in glaciers and polar ice caps and the remaining occurs as groundwater (such as wells) and surface water (rivers and lakes). Sources of fresh water include surface water such as rivers and lakes, groundwater such as wells and boreholes and frozen water.

Uses of Water

1. Water is essential for human life.
2. It is used by plants for the production of crops.
3. Water is used to extract other natural resources like crude oil and tin.

4. It is used for the disposal of human waste.
5. It is a major ingredient in the manufacturing process of some products.
6. Plant and animal species which live in water are sources of food for human beings.
7. It is essential for the ecosystem as it plays a central role in biogeochemical cycles of carbon, nitrogen and phosphorus etc.
8. It is used for domestic purposes such as washing and cooking.
9. Water in rivers and lakes provide aesthetic beauty and attract tourists.
10. Water in rivers, oceans and seas is a medium of transportation.
11. It is used to generate hydroelectricity.
12. It is used for irrigation in arid areas.

8.4 Vegetation Resources

Vegetation resources are the resources that can be obtained from plants which are useful or potentially useful to man and animals. These include timber, leaves, bark of trees, fruits, fibre and firewood.

Uses of Vegetation Resources

1. Wood from trees is used to make furniture.
2. Vegetable, grains and fruits are used for human and animal consumption.
3. Timber is used for construction.
4. Wood is burnt as fuel in homes and industries.
5. Cotton is used to manufacture textile.
6. Plants are used to make medicine.
7. Forests are important habitats for animals.
8. Leaves absorb carbon dioxide in the atmosphere.

8.5 Mineral Resources

Minerals are naturally occurring substances obtained from the ground such as petroleum, coal, copper, etc.

Uses of Mineral Resources

1. They are sources of energy e.g. coal, crude oil.
2. They are used as ingredients to make other materials like iron ore, steel.
3. Gem minerals like corundum, beryl, gold, diamond are used to make jewelry.
4. They are used by artists to carve e.g. talc
5. They are used in industries to produce other products e.g. crude oil used in petrochemical industries to manufacture plastics, chemicals etc. Copper is used in electric cables.
6. Minerals are major sources of foreign exchange when exported.
7. They are sources of employment and income.

8.6 Land Resources

The soil is the thin outer layer of the earth.

Uses of Land Resources

1. They used for growing crops which support life.
2. They provide mechanical support for buildings, roads, etc, constructed by men.
3. They are sources of building materials e.g. sand, clay and gravel.
4. They are important habitats for micro and macro organisms.
5. They are reservoirs for nutrients and water.

8.7 Human Resources

Human resource is the set of individuals who make up the labour force/workforce of a country. The working age population comprises of people between 15 and 65 years of age. Factors which influence the size and quality of the workforce in a country include:

(i) Level of education
(ii) Health status
(iii) Technological development
(iv) Migration
(v) Standard of living
(vi) Age and sex composition of the population

8.8 Renewable and Non-Renewable Resources

Resources can be classified into two main categories namely renewable and non-renewable resources. Renewable resources are resources (useful materials) that can be replaced naturally such as timber, plants, water, animals etc. Atmospheric resources are important renewable resources because they cannot be permanently removed or exhausted e.g. rain, wind, solar, energy etc.

Non-renewable resources are those that take a long time to form, hence cannot be replaced after use such as fossil fuels. Since they are exhaustible, they must be used carefully so as to leave enough for future generations.

Advantages of Renewable Resources

(i) The major advantage is that they are renewable and sustainable.
(ii) They cannot be exhausted e.g. solar energy.
(iii) They are cheaper sources of energy.

(iv) Renewable resources like wind and solar are used to create power without any harmful effects to the environment.
(v) They reduce reliance on other countries since they are readily available.
(vi) Renewable energy facilities require less maintenance.

Disadvantages of Renewable Resources

(i) They do not generate as much electricity as fossil fuel generators.
(ii) Supply of resources is not reliable as renewable energy relies on the weather for its source of power.
(iii) Cost of renewable energy technology (installations) is higher than fossil fuel generators.

Advantages of Non Renewable Resources

(i) Large amount of electricity can be generated.
(ii) Supply of resources is reliable.

Disadvantages of Non Renewable Resources

(i) They are limited in supply.
(ii) They are not easily accessible.
(iii) They are expensive to exploit.
(iv) Prices of non-renewable energy such as petroleum is high and fluctuated overtime.
(v) Burning of non-renewable resources create harmful emissions which contribute to the buildup of green house gases.
(vi) Resources require mincing which has a harmful effect on rivers, soil and wildlife.

8.9 Factors Limiting the Use of Environmental Resources of Nigeria

Nigeria is naturally endowed with atmospheric, water, vegetation, mineral, soil and human resources. However, the country has not been able to harness some of these resources while those that are exploited have not been managed properly. As a result, the presence of the resources has not translated to high standard of living for the people and economic growth for the country.

Factors which limit the use of environmental resources in Nigeria are discussed below:

1. **Inadequate funds:** The country does not have sufficient funds required for the exploitation of its vast mineral and atmospheric resources.
2. **Low level of technology:** The generation of power from renewable resources for example requires the use of high level technology which is not available in the country.
3. **Low skilled manpower:** The number of skilled personnel with expertise in the exploitation and conversion of the natural resources is relatively low.
4. **Inadequate data:** Lack of adequate information on resources hinder its full utilization. Data on climatic parameters and other resources are only available in large urban centres and there is no efficient means of communicating to these remote villages.
5. **Poor transportation:** Some of the resources are located in remote places which are not easily accessible.

8.10 Effects of Exploitation of Environmental Resources

1. **Air pollution:** Mining activities cause the release of harmful gases into the atmosphere which are injurious to human health.

2. **Soil/land pollution:** Waste products from mining activities and the use of herbicides, pesticides etc. pollute the soil and water bodies.
3. **Development of wastelands:** Mining makes land unsuitable for agriculture and other economic activities.
4. **Deforestation:** The cutting of trees for timber exposes the soil to erosion and destroys wildlife.

Summary

- Environmental resources are naturally occurring materials that are useful to man and also the activities of man.
- Environmental resources can be classified into six types namely: atmospheric, water, vegetation, mineral, land and human resources
- Renewable resources such as plants, water and animals can be replaced naturally while non-renewable resources such as fossil fuels are exhaustible.
- Factors which limit the use of resources in Nigeria are inadequate funds, low level of technology, low skilled manpower, inadequate data and poor transportation facilities.

Objective Questions

1. Environmental resources are usually
   A. man-made
   B. natural
   C. artificial
   D. limited in quantity
2. Which of the following is not an environmental resource?
   A. Vegetation

B. Water

C. Mineral

D. Industries

3. Which of the following gases has the highest volume in the atmosphere?

A. Argon

B. Carbon dioxide

C. Nitrogen

D. Oxygen

4. The major source of energy on earth is

A. sun

B. plants

C. animals

D. crude oil

6. Which of the following is not a source of fresh water?

A. rivers

B. groundwater

C. glacier

D. oceans

7. Vegetation resources are used for the following except

A. Human and animal consumption

B. Construction

C. Plant respiration

D. Raw materials for industries

8. Major advantages of atmospheric resources over mineral resources is that they are

A. renewable

B. abundant

C. source of energy

D. limited in supply

9. Which of the following is a renewable resource?
   A. crude oil
   B. water
   C. coal
   D. tin
10. The use of environmental resources in Nigeria is limited by all EXCEPT
   A. inadequate capital
   B. political instability
   C. language barrier
   D. none of the above

Essay Questions

1a. Define environmental resources.

b. State the types of environmental resources.

2. Explain five uses each of any two atmospheric resources.

3. List five uses of water resources.

4. State the advantages and disadvantages of renewable resources.

5. Highlight five effects of exploitation of resources to the environment in Nigeria.