TOPIC 1: INTRODUCTION TO ENVIRONMENT AND NATURAL RESOURCES

Objectives:

The learner should be able to:

a. Define Environment
b. Identify the various environmental systems and explain how they interact
c. Identify the various types of natural resources
d. Explain the importance of natural resources

1. Introduction to Environment

Environmental study is a multidisciplinary subject that can make us conscious and caring about our environment.

The primary objective of environmental education is to create an environment-friendly mindset and attitude among all sections of society. This will lead to the development of environmental ethics and increase the value people place on conservation of life and biodiversity in the environment.

Environmental studies provide sufficient knowledge about the philosophy, genesis and consequences of local and global environmental problems and the necessary knowledge for their abatement and control. Environmental protection requires both preventive and curative measures

This shows increased environmental awareness on part of both the government and the people. This was also reflected at the Earth Summit at Rio de Janeiro in June 1972, where Agenda-21, a Global Action Plan was adopted with the aim of integrating environmental imperatives with developmental aspirations.

1.1 Definition of Environment

The environment can simply be defined as the surroundings or conditions in which a person, animal, or plant lives or operates. It is he setting or conditions in which a particular activity is

carried on. It is the natural world, as a whole or in a particular geographical area, especially as affected by human activity. The environment must be viewed in its totality, as a set of interlocking systems which include the physical, biological, and social systems. The physical environment includes the atmosphere, the hydrosphere, and the pedo-lithosphere. The biological system consists of the living organisms (plants, animals and micro organisms).This includes the study of selected ecosystems and natural cycles. The socio-cultural system includes man, his activities as well as the effect of human activities on the environment. Environmental awareness is the process of learning about the environment so as to work with it and not destroy it i.e. learning how to sustain the environment.

1.2 Environmental Systems and the Interaction between them.

The atmosphere

The atmosphere plays an important role in the life of animals and plants. It consists of mainly naturally occurring gases and water vapor. It may also be contaminated by noxious gases from industries and traffic. Nitrogen is, along with carbon, hydrogen and oxygen vital in the formation of basic materials for all life. Carbon dioxide is important because all green vegetation depend on it for the manufacture of food (carbohydrates).As a consequence of human activities such as deforestation, agricultural practices, and burning of fossil fuels, there has been an increase in the volume of gases such as carbon dioxide and other trace gases (commonly known as green house gases) in the atmosphere. The atmosphere has a green house effect of shielding the earth from the extreme heat of the sun during the day and acting as a blanket to prevent the escape of heat at night thus providing a range of temperatures which living things need to survive. High concentrations of green house gases lead to global warming (a general rise in temperatures) and consequently bringing about the phenomenon known as climate change.

Weather is the state of the atmosphere at any instant in time and the weather elements of temperature, relative humidity etc are recorded by use of meteorological instruments. Climate refers to the general state of the atmosphere over a period of time, usually 30 to 40 years. Clean air is important for survival hence there is a need for knowledge of the atmosphere, its properties and how it relates to habitat.

Thus, the atmosphere must interact with other systems for nature to be complete. It helps in the process of weathering i.e. soil formation by providing heat (high temperature) and the pedo-lithosphere provides rain (cold and acidic) the conditions necessary for weathering.

Rocks break die to change in temperature and the acidic rain helps to corrode the rocks to break forming soil.

The pedo-lithosphere

This refers to the outer solid but this crust of the earth which is made up of lighter rocks. The material forming the earth's crust is known as rock which is composed of mineral matter. The rocks and minerals are important in the formation of soils through the process of weathering. They also have a role as far as soil texture (the size of particles which make up soil) and structure (the way in which the soil grains are grouped together).

This system must interact with the atmosphere and hydrosphere for the formation of soil, minerals and fossils. The atmosphere provides temperatures needed in the soil formation while the hydrosphere provides water. The biological system depends on this surface to provide the ecosystems and plants derive their nutrients from the pedo-lithosphere. So plants and animals depend on the pedo-lithosphere for their growth and nourishment i.e. food production.

The hydrosphere

The hydrosphere comprises of the oceans, lakes, rivers and other water bodies on the earth. Water covers about 71% of the surface. In nature, water is in a permanent movement from land into the sea as run-off and also to the atmosphere through evaporation and evapo-transpiration and back to the land as precipitation. The principal path way of water through the major systems of the earth is known as the water cycle. One way of measuring the overall water resources is via the use of the water balance. This is the relationship between the water gains of the soil-plants belt from precipitation (P), and the water loses from the same area through evaporation (E), surface run-off (R) and infiltration (I) i.e.

$$P = E + R + I$$

Human activities such as deforestation or building of dams and reservoirs have interrupted the water cycle, leading to water shortages.

So, water or the hydrosphere is found in all the systems i.e. the atmosphere as vapor, which helps to reduce heat, the pedo-lithosphere where it helps in soil formation, the biological systems where it's used by plants for growth and in animals for drinking, domestic use, generation of electricity and in food production i.e. irrigation.

The biological system

This is composed of the flora (plants) and fauna (animals) and the micro organisms.

The living things and their physical surroundings form an ecosystem. An ecosystem is the inter-relationship of living organisms and with the physical environment. Within the ecosystem, materials essential to life circulate from the physical to the living and back to the physical system forming dynamic relationships referred to as natural cycles. Ecosystems can either be natural (terrestrial or aquatic) or man made (irrigated land or urbanization).

The biological system depends on other systems like the hydrosphere. Plants and animals require water for various biological functions. The pedo-lithosphere – plants helps to reduce soil erosion, provides humus to the soil and acts as a cover on the surface. The atmosphere provides carbon dioxide to plants which they use in the making of their food. Animals too depend on oxygen and nitrogen from the atmosphere.

The socio cultural system

The social environment results from the effect of human activities on the natural environment.

It refers to all the physical infrastructure built by people together with the social and institutional systems that they have developed. This system consists of people, institutions (rules), natural resources, technology, and organizations. When stress is exerted on any one environmental system (physical, biological or social) repercussions are felt in the other systems e.g. farming methods may degrade land, result into erosion, hence affecting the growth of plants.

1.3 Natural Resources.

Natural resources: These are materials and components that can be found within the environment. They occur naturally within environments that exist relatively undisturbed by mankind, in a natural form; and can be used to create wealth. They are characterized by **biodiversity**, that is, relative number of species, diverse in form and function and exist in various ecosystems. Natural resources are derived from the environment in the form of living organisms (e.g. wildlife, fish etc) air, water, land, vegetation, minerals, fuels etc. Natural resources exist in the environment and are both scarce and economically useful in production or consumption, either in their raw state or after a minimal amount of processing. They are natural capital assets, distinct from physical and human capital; as they are not created by human activity.

Natural resources are characterized by:

a) *Exhaustibility*

Renewable resources either increase in quality or renew itself over a short period of time. The rate of extraction/exploitation is more or less equal with the rate of regeneration. They can return to their previous stock levels by natural processes of growth or replenishment. Non-renewable resources exist in finite quantities, so every unit consumed reduces the amount available for future consumption e.g. fossil fuels and minerals. They cannot be easily regenerated after exploitation.

Note that even renewable resources may become exhaustible if they are over-exploited.

b) *Uneven distribution Across Countries*

*M*any natural resources are concentrated in a small number of countries; e.g. 90% of oil reserves are concentrated in only 15 countries of the world. Water is also unevenly distributed, and many nations are faced with drastic problem of water scarcity. The world's limited reserves of clean, fresh water for human consumption are shrinking fast, posing a serious threat to public health, political stability and the environment. Among the factors leading to water scarcity are population growth, increasing urbanization, high levels of per capita consumption, climate change, droughts, desertification etc.

c) *Externalities*

This is when outcomes of certain activities may impose external costs on, or provides external benefits to consumers or firms not involved in relevant production or consumption decision. Natural resource economics is concerned with negative externalities arising from extraction or consumption of resources e.g. over-fishing, deforestation, pollution from burning of fossil fuels etc.

d) *Price volatility*

Most natural resources experience extreme price volatility; for example, fossil fuels, minerals, forest products and fish. The possible explanations for large changes in oil prices include geopolitical uncertainty, changes in demand, etc.

1.4 Types of Natural Resources

They are categorized according to:

a) *Chemical nature*

Natural resources can be;

i. Inorganic resources, including air, water, and metallic minerals.

ii. Organic resources including plants, animals, micro-organisms and fossil fuels.

iii. Mixed resources e.g. soil, which is both an inorganic and organic resources.

b) Abundance and availability

Can either be exhaustible, that is, renewable and non-renewable.

Inexhaustible include air, soil, precipitation and tidal energy. These are not likely to be exhaustible by human race.

c) *Distribution*

Resources can be confined within natural boundaries, e.g. minerals and land, can be shared by many nations, e.g. rivers, lakes and migratory animals; or can be international resources, e.g. air and solar energy.

Generally, there are many types of natural resources, each with several subtypes:

i. *Geological resources*- include minerals, oils, gas, rocks, mountains and valleys.

ii. *Hydro geological resources*- include all underground water, surface water and ice.

iii. *Edaphic resources*- include different types of soils, their fertility and the vast biological wealth in them.

iv. *Atmospheric resources*- air, temperature, sunlight and rainfall patterns.

v. *Forest resources*- all types of forests and other naturally grown plant resources.

vi. *Marine and aquatic resources*- plants, animals and mineral resources in marine and other aquatic ecosystem of the world.

vii. *Wildlife resources*- all types of wild animals including those which are not friendly with the human society.

viii. *Human resources*- include different types of human population, their distribution and potentialities.

1.5 Importance of Natural Resources

Natural resources are important for sustaining life and providing many everyday needs. They are essential to the survival and growth of the human race. For example, land is essential for

food production. Food grown through farming is important for development, as the basic necessity to survival. Water is essential to life. Humans, plants and animals require water for various biological functions. Water is important for irrigation in order to boost crop production. The society relies on water for sanitation, personal hygiene and electricity is harnessed using the power of running water.

Plants (flora) cure important in that they act as natural air filter; they are food sources for humans and animals. Trees are the lifeblood behind the logging industry, providing wood and timber for building, construction and numerous products.

Fauna (animals) are a natural resource, providing food. Fish and seafood are important. Meat and dairy farmers rely on this resource as a source of income. Animals help with various aspects of labour (e.g. horses, mules, donkeys etc.)

Minerals, though not renewable, are important to society. Metals are used in building structures, automobiles, electric wiring etc. Fossil fuels, especially oil, natural gas and coal play a very important role in society. Oil is the basis for fuels and motor oil is used in transportation. Natural gas is a common fuel source for many household appliances. Coal is used in the generation of electricity.

Wind and sunlight are both renewable and play multiple roles in people's lives. Both provide renewable energy sources. As non-renewable sources become depleted, the ability to capture and harness energy from sunlight and the wind becomes more important. Wind, solar and water provide us worth limitless energy.

Despite creation of many artificial resources, the dependence on natural resources is inevitable because most human activities use natural resource as inputs for their growth. Human activities draw support directly or indirectly form natural resources. Natural resources are important to the economy of a community. The nature of resource available determines the kind of activity a community engages in.

Reflection Questions:

a) Distinguish between renewable and non renewable resources, giving examples of each.

b) Highlighting their importance, discuss the main components of the environment (environmental systems)

References

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