

FUNDAMENTAL OF ENVIRONMENTAL SCIENCE & ECOLOGY**Lesson Structure**

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1.0 Objective:

The basic objective of this unit is to provide comprehensive information to students about the meaning, scope and importance of environmental science and Ecology.

1.1 Introduction :

The term ‘environment’ etymologically means surrounding. Literally, it is an english word formed by two words, i.e., ‘environ’ and ‘ment’ which means ‘encircle’ or ‘all round’. Thus environment is a complex of many variables which surrounds man as well as living organism.

Environmental science is the field of science that studies the interactions of the physical, chemical and biological components of the environment and also the relationships and effects of these components with the organism in the environment. The field of environmental science can be divided into three main goals, which are to learn how the natural world works, to understand how we as humans interact with the environment, and also to determine how we effect the environment. The third goal of determining how human affect the environment also includes findings ways to deal with these effects on the environment.

1.2 Definition of Environmental Science :

Environmental Science is defined as a branch of biology focused on the study of the relationship of the natural world and the relationship between orgnism and their environments.

Some important definition of environment are as under :-

- C **Boring**—‘A person’s environment consists of the sum total of the stimulation which he receives from his conception until the death. Indicating that environment comprises various types of forces such as physical intellectual, mental, economical, political, cultural, social and moral and emotional.
- C **Douglas and Hollard**—The term environment is used to describe, in the aggregate, all the external forces, influences and conditions, which affect the life, nature, behaviour and the growth, development and maturity of living organism.

1.3 Scope of Environmental Science :

The environmental consists of four segments as under :-

1. Atmosphere—The atmosphere forms a distinctive protecting layer about 100 km. thick around the earth. A blanket of gases called the atmosphere surrounds the earth and protects the surface of earth from the sun’s harmful, ultra violet rays. It sustains life on the earth. It also regulates temperature, preventing the earth from becoming too hot or too cold. It saves it from the hostile environment of outer space. The atmosphere is composed of nitrogen and oxygen. Besides argon, carbon-dioxide and trace gases.

The atmosphere has a marked effect on the energy balance at the surface of the earth. It absorbs most of the cosmic rays from outer space and a major portion of the electromagnetic radiation from the sun. It transmits only ultraviolet, visible, near infrared radiation (300 to 2500 nm) and radio waves. (0.14 to 40 m) While filtering out tissue damaging ultra-violet waves below about 300 nm.

2. Hydrosphere—The hydrosphere comprises all types of water resources oceans, seas, lakes, rivers, streams, reservoirs, polar icecaps, glaciers and ground water. Oceans represent 97% of the earth’s water and about 2% of the water resources is locked in the polar icecaps and glaciers. Only about 1% is available as fresh water as surface water in rivers, lakes, streams and as ground water for human use.

3. Lithosphere—Lithosphere is the outer mantle of the solid earth. It consists of minerals occurring in the earth’s crusts and the soil e.g.—minerals, Organic matter, air and water.

4. Biosphere—Biosphere indicates the realm of living organisms and their interactions with environment, viz atmosphere, hydrosphere and lithosphere.

The scope of environmental studies is very wide and it deals with many areas like

- (i) Conservation natural resources
- (ii) Ecological aspects
- (iii) Pollution of the surroundings natural resources.
- (iv) Controlling the pollution
- (v) Social issues connected to it and
- (vi) Impacts of human population on the environment.

1.4 Importance of Environmental Science :

The environment studies make us aware about the importance of protection and conservation of our mother earth and about the destruction due to the release of pollution into the environment. The increase in human and animal population, industries and other issues have grown in size and made

the system more complex day by day, threatening the survival of mankind on earth. Environment studies have become significant for the following reasons :

1. Environmental issues are being Global—It has been well recognised that environment issues like global warming and ozone depletion, acid rain, marine pollution and biodiversity are not merely national issues but are global issues and hence require international efforts and cooperation to solve them.

2. Development and Environment—Development leads to urbanisation, industrial growth, telecommunication and transportation system, Hi-tech agriculture and housing etc. However, it has become phased out in the developed world. The north intentionally moves their dirty factories to south to cleanase their own environment. When the most developed, it did so perhaps in ignorance of the environmental impact of its activities. Development of the rich countries of the world has undesirable effects on the environment of the entire world.

3. Explosive increase in pollution—World census reflects that one in every seven persons in this planet lives in India. Evidntly with 16 percent of the world's population and only 2.4 percent of its and land area, there is a heavy pressure on the natural resources including land. Agricultural experts have recognized soil health problems like deficiency of micronutrients and organic matter, soil salinity and damage of soil structure.

4. Need for an alternative solution—It is essential, specially for developing countries to find alternative paths to an alternative goal. We need a goal as under—

- (i) A true goal of development with an environmentally sound and sustainable development.
- (ii) A goal common to all citizens of our plant earth.
- (iii) A goal distant from the developing world in the manner, it is from over-consuming wasteful societies of the “developed” world.

It is utmost important for us to save the humanity from extinction because of our activities constricting the environment and depleting the biosphere in the name of development.

5. Need for wise planning of development—Our survival and sustenance depend on resouces availability. Hence resources withdrw, processing and use of the products have all to be synchronised with ecological cycle. In any plan of development our actions should be planned ecologically for the sustenance of the envirnment and development.

6. Misra's Report—Misra (1991) recognised four basic principles of ecology as under—

- (i) Holism
- (ii) Ecosystem
- (iii) Succession
- (iv) Consernvtion

Holism has been considered as the real base of ecology. In hierarchial levels at which interacting units of ecology are discussed, are as under :—

Individual < population < community < ecosystem < biome < biosphere

Misra (1991) has recognised four basic requirements of environmental management as under.

- (i) Impact of human activities on the environment.
- (ii) Value system
- (iii) plan and design for sustainable development.
- (iv) Environment education.

Keeping in view the goal of planning for environmentally sustainable development. India contributed to the United Nations Conference on Environment and Development (UNCED), also referred to as “Earth summit” held at Rio De Janeiro, the capital of Brazil, 3rd-14th June, 1992

1.5 Ecology :

Ecology is the science of the relations of all organisms to their environment. The two components of nature, organisms and their environment, are not only complex and dynamic but also inter dependent. Ecology is a relatively new science dealing with the various principles which govern such relationships between organisms and their environment.

The term ‘ecology’ was coined by combining two Greek words, Viz, ‘oikos’ (meaning ‘house’ or ‘dwelling place’) and ‘logos’ (meaning ‘the study of’) to denote the relationships between organisms and their environment. Although there is some controversy about the original coining of the term but there is consensus that German biologist, Ernst Haeckel first gave substance to their term. He used this term first in 1886 but defined for the first time in 1870 as follows : ‘By ecology we mean the body of knowledge concerning the economy of nature the investigation of the total relations of the animal both to its aorganic and to its organic environment, including above all, its friendly and inimical relations with those animals and plants with which it comes directly and indirectly into contact.

Now ecology is a systematic and well developed science. Some of the definitions of ecology are as follows :

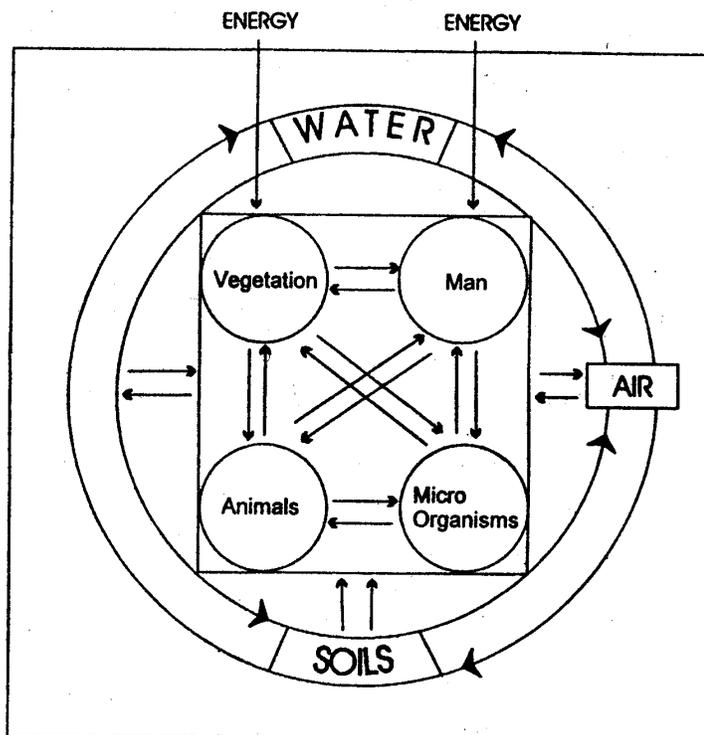
Odum–Ecology is defined as the study of the relations of organisms, or groups of organisms to their environment., or the science of the interrelations between living organisms and their environments.

Taylor–Ecology is the science of all the relations of all organisms to their environments.

Haggett–Ecology is the study of plants and animals in relation to their environment.

It becomes clear from the above definitions that ecology is the study of the interrelationship between all living organisms and environment. All its components i.e., energy, air, water, soil, vegetation, animals as well as man have mutual relations, responsible for the development of a particular ecological system. The interrelationship of ecological elements has been depicted in following figure.

Figure 1.1
Ecological Relationship



1.6 Summary :

Environment is the source of life on earth and it not only directs but also determines the existence growth and development of mankind and all its activities.

The science of environment studies is a multidisciplinary science because it comprises various branches of studies like chemistry, physics, medical science, life science, agriculture, public health, sanitary, engineering etc. It is the science of physical phenomena in the environment. It studies of the sources, reactions, transport, effect and fate of physical a biological species in the air, water and soil and the effect of human activity upon these.

Ecology is the science dealing with the relationship of organisms to one another and to other factors that comprise their environment.

1.7 Questions for Exercise :

1. What is Environmental science ?
2. Define Fundamental of Environmental science and its scope.
3. What is ecology ?
4. Describe the importance of Environmental science and ecology.

1.8 Suggested Readings :

1. Odum, E.P. : Fundamentals of Ecology
2. Smith, L.R. : Man and Environment : An Ecosystem Approach
3. Sharma, P.D. : Ecology and Environment
4. Santra, S.C. : Environmental Science
5. Saxena, H.M. : Environmental Geography

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