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| **CHAPTER** | **Environmental Science : Definition, Scope and Importance** |
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**INTRODUCTION**

*Environmental science is the study of the interaction of humans with the natural environment. The environment includes all of the living and nonliving things that we interact with.*

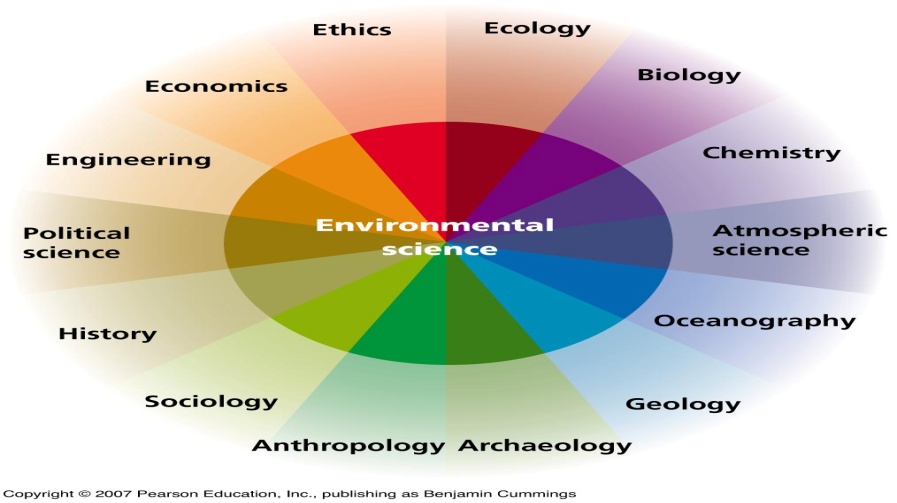
The science of Environment studies is a multi-disciplinary science because it comprises various branches of studies like chemistry, physics, medical science, life science, agriculture, public health, sanitary engineering etc. It is the science of physical phenomena in the environment. It studies of the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

**Environment Explained**

Literary environment means the surrounding external conditions influencing development or growth of people, animal or plants; living or working conditions etc.

Environment literally means surrounding and everything that affect an organism during its lifetime is collectively known as its environment.In another words “Environment is sum total of water, air and land interrelationships among themselves and also with the human being, other living organisms and property”.

Environmental science is a branch of science that deals with the environment, the climate and ecology. Environmental scientists are research scientists who analyze the environmental issues and find out the solutions for these problems. The science of Environment studies is a multi-disciplinary 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.



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***Douglas and Holland:*** ‘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 organisms.’

**Element of Environment**

Environment is constituted by the interacting systems of physical, biological and cultural elements inter-related in various ways, individually as well as collectively. These elements may be explained as under:

***Physical elements***

Physical elements are as space, landforms, water bodies, climate soils, rocks and minerals. They determine the variable character of the human habitat, its opportunities as well as limitations.

***Biological elements***

Biological elements such as plants, animals, microorganisms and men constitute the biosphere.

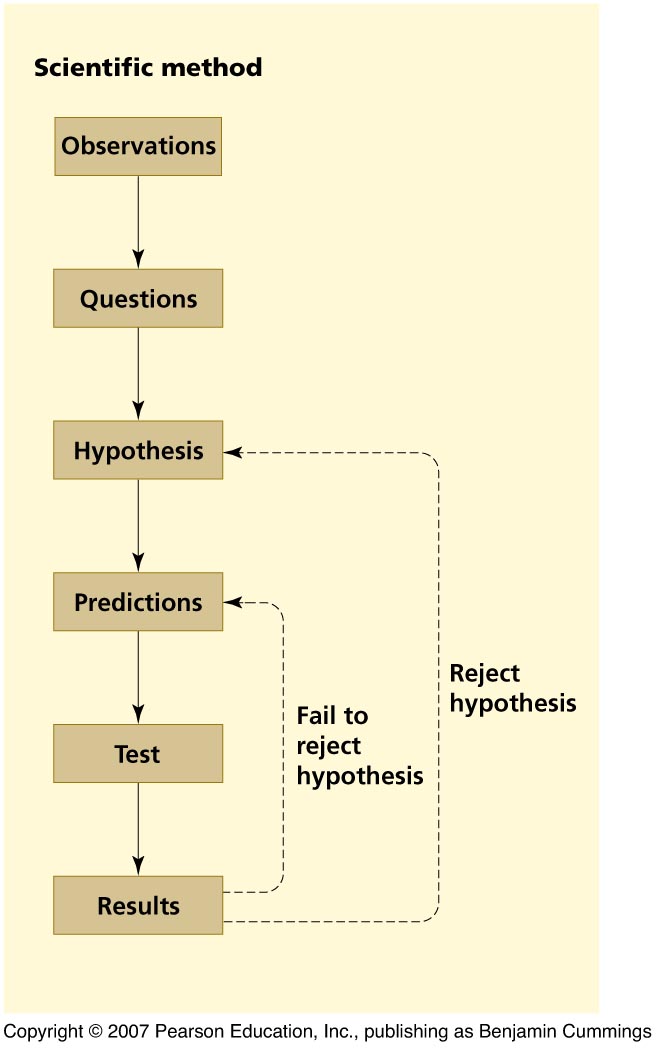
***Cultural elements***

Cultural elements such as economic, social and political elements are essentially man made features, which make cultural milieu.

**SCIENTIFIC METHOD**

Environmental scientists use a variety of scientific and research tools to collect data about various climates and ecological areas throughout the world, such as surveys and research projects. They develop solutions and plans that may control or fix certain environmental problems such as air pollution, water pollution and global warming.

It is a series of steps used to help solve a problem. A technique for testing ideas. A scientist makes an observation and asks questions of some phenomenon. The scientist formulates a hypothesis, a statement that attempts to answer the question. The hypothesis is used to generate predictions: specific statements that can be tested. The results support or reject the hypothesis. Results may reject or fail to reject a hypothesis. Results never confirm a hypothesis, but only lend support to it by failing to reject it.



* **Step 1. Make an Observation**. After making an observation of the natural world, define the problem and make sure only one problem is being studied. ALL scientific experimentation starts with observation.
* **Step 2. Research the problem (question).** Use all available resources to collect data on the subject being covered. Libraries, Internet, books, magazines, personal interviews, etc.
* **Step 3. Develop a hypothesis (educated guess).** Make it a short definitive statement. It may be an "if" then" statement. The “if” part will become the hypothesis and the then part should be the results received at the end of the controlled experiment. Remember your hypothesis can be changed if the results do not support it.
* **Step 4. Develop a controlled experiment.** A controlled experiment is an experiment that contains only one experimental variable. An experimental or independent variable is the thing being tested (what the scientist changes). Everything else in the experiment or all other variables must be the same. These variables are also called the controlled variables. Keeping these variables the same allows the experimenter to show that it was the experimental variable that caused the results. The dependent variable is what changes when the independent variable changes - the dependent variable depends on the outcome of the independent variable.  Data should be organized into charts, tables, or graphs.
* **Step 5. Analyze the data and come up with a conclusion.** Data may be quantitative (numbers) or qualitative(appearance, properties, etc.).  The conclusion may or may not support the hypothesis. Additional experimentation must then take place to build documentation concerning the problem. If the hypothesis is proven wrong, change the hypothesis, not the data. Scientists must be unbiased.

**SCOPE OF ENVIRONMENTAL SCIENCE**

Environmental science is a multidisciplinary science whose basic aspects have a direct relevance

to every section of the society. Its main aspects are:

* Conservation of nature and natural resources.
* Conservation of biological diversity.
* Control of environmental pollution.
* Stabilization of human population and environment.
* Social issues in relation to development and environment.
* Development of non-polluting renewable energy system and providing new dimension to nation’s security.

**ENVIRONMENT STUDIES: IMPORTANCE**

Importance of Environment Studies: The environment studies enlighten us, about the importance of protection and conservation of our indiscriminate release of pollution into the environment.

At present a great number of environment issues, have grown in size and complexity day by day, threatening the survival of mankind on earth. We study about these issues besides and effective suggestions in the Environment Studies. Environment studies have become significant for the following reasons:

***1.Environment Issues Being of International Importance***

It has been well recognized 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 must be tackled with international efforts and cooperation.

***2.Problems Cropped in The Wake of Development***

Development, in its wake gave birth to Urbanization, Industrial Growth, Transportation Systems, Agriculture and Housing etc. However, it has become phased out in the developed world. The North, to cleanse their own environment has, fact fully, managed to move ‘dirty’ factories of South. When the West developed, it did so perhaps in ignorance of the environmental impact of its activities. Evidently such a path is neither practicable nor desirable, even if developing world follows that.

***3.Explosively Increase in Pollution***

World census reflects that one in every seven persons in this planted lives in Pakistan. Evidently with 16 per cent of the world's population and only 2.4 per cent of its land area, there is a heavy pressure on the natural resources including land. Agricultural experts have recognized soils 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, especially for developing countries to find alternative paths to an alternative goal. We need a goal as under:

(1)A goal, which ultimately is the true goal of development an environmentally sound and sustainable development.

(2)A goal common to all citizens of our earth.

(3)A goal distant from the developing world in the manner it is from the over-consuming wasteful societies of the “developed” world.

***5.Need To Save Humanity From Extinction***

It is incumbent upon us to save the humanity from extinction. Consequent to our activities constricting the environment and depleting the biosphere, in the name of development.

***6.Need For Wise Planning of Development***

Our survival and sustenance depend. Resources withdraw, processing and use of the product have all to by synchronized with the ecological cycles in any plan of development our actions should be planned ecologically for the sustenance of the environment and development.

**NEED FOR PUBLIC AWARENESS**

It is essential to make the public aware of the formidable consequences of the Environmental Degradation, if not retorted and reformative measures undertaken, would result in the extinction of life. We are facing various environmental challenges. It is essential to get the country acquainted with these challenges so that their acts may be eco-friendly. Some of these challenges are as under:

***1.Growing Population***

A population of over thousands of millions is growing at 2.11 per cent every year. Over 17 million people are added each year. It puts considerable pressure on its natural resources and reduces the gains of development. Hence, the greatest challenge before us is to limit the population growth. Although population control does automatically lead to development, yet the development leads to a decrease in population growth rates. For this development of the women is essential.

***2.Poverty***

Pakistan has often been described a rich land with poor people. The poverty and environmental degradation have a nexus between them. The vast majority of our people are directly dependent on the nature resources of the country for their basic needs of food, fuel shelter and fodder. About 40% of our people are still below the poverty line. Environment degradation has adversely affected the poor who depend upon the resources of their immediate surroundings. Thus, the challenge of poverty and the challenge environment degradation are two facets of the same challenge. The population growth is essentially a function of poverty. Because, to the very poor, every child is an earner and helper and global concerns have little relevance for him.

***3.Agricultural Growth***

The people must be acquainted with the methods to sustain and increase agricultural growth with damaging the environment. High yielding varieties have caused soil salinity and damage to physical structure of soil.

***4.Need to Ground water***

It is essential of rationalizing the use of groundwater. Factors like community wastes, industrial effluents and chemical fertilizers and pesticides have polluted our surface water and affected quality of the groundwater. It is essential to restore the water quality of our rivers and other water bodies as lakes is an important challenge. It so finding our suitable strategies for consecration of water, provision of safe drinking water and keeping water bodies clean which are difficult challenges is essential.

***5.Development And Forests***

Forests serve catchments for the rivers. With increasing demand of water, plan to harness the mighty river through large irrigation projects were made. Certainly, these would submerge forests; displace local people, damage flora and fauna. As such, the dams on the river Narmada, Bhagirathi and elsewhere have become areas of political and scientific debate.

Forests in India have been shrinking for several centuries owing to pressures of agriculture and other uses. Vast areas that were once green, stand today as wastelands. These areas are to be brought back under vegetative cover. The tribal communities inhabiting forests respects the trees and birds and animal that gives them sustenance. We must recognize the role of these people in restoring and conserving forests. The modern knowledge and skills of the forest deptt. should be integrated with the traditional knowledge and experience of the local communities. The strategies for the joint management of forests should be evolved in a well planned way.

***6.Degradation of Land***

At present out of the total 329 mha of land, only 266 mha possess any potential for production. Of this, 143 mha is agricultural land nearly and 85 suffers from varying degrees of soil degradation. Of the remaining 123 mha, 40 are completely unproductive. The remaining 83 mha is classified as forest land, of which over half is denuded to various degrees. Nearly 406 million head of livestock have to be supported on 13 mha, or less than 4 per cent of the land classified as pasture land, most of which is overgrazed. Thus, our of 226 mha, about 175 mha or 66 per cent is degraded to varying degrees. Water and wind erosion causes further degradation of almost 150 mhaThis degradation is to be avoided.

***7.Reorientation of Institutions***

The people should be roused to orient institutions, attitudes and infrastructures, to suit conditions and needs today. The change has to be brought in keeping in view Pakistan’s traditions for resources use managements and education etc. Change should be brought in education, in attitudes, in administrative procedures and in institutions. Because it affects way people view technology resources and development.

***8.Reduction of Genetic Diversity***

Proper measures to conserve genetic diversity need to be taken. At present most wild genetic stocks have been disappearing from nature. Wilding including the Asiatic Lion are facing problem of loss of genetic diversity. The protected areas network like sanctuaries, national parks, biosphere reserves are isolating populations. So, they are decreasing changes of one group breeding with another. Remedial steps are to be taken to check decreasing genetic diversity.

***9.Evil Consequences of Urbanization***

Nearly 27 per cent Indians live in urban areas. Urbanization and industrialization has given birth to a great number of environmental problem that need urgent attention. Over 30 percent of urban Indians live in slums. Out of India’s 3,245 towns and cities, only 21 have partial or full sewerage and treatment facilities. Hence, coping with rapid urbanization is a major challenge.

***10.Air and water Population***

Majority of our industrial plants are using outdated and population technologies and makeshift facilities devoid of any provision of treating their wastes. A great number of cities and industrial areas that have been identified as the worst in terms of air and water pollution. Acts are enforced in the country, but their implement is not so easy. The reason is their implementation needs great resources, technical expertise, political and social will. Again the people are to be made aware of these rules. Their support is indispensable to implement these rules.

**HUMAN NEEDS**

Needs are frequently defined as a lack of something that is required or desired. From the moment of birth to the moment of death, every human being has needs. Needs motivate the individual to behave or act so that these needs will be met, if at all possible.

# Maslow’s Hierarchy of Needs

# Abraham Maslow attempted to synthesize a large body of research related to human motivation. Maslow set up a hierarchical theory of needs. This hierarchic theory can be seen as a pyramid.



Maslow’s Hierarchy of Needs: the lower needs must be met before the individual can try to meet the higher needs.

# *Physiological Needs*

Physiological needs are often called physical, biological, or basic needs. These needs are required by every human being to sustain life. They include food, water, oxygen, elimination of waste materials, sleep, and protection from temperature extremes. These needs must be met in order for life to continue. If any of these goes unmet, death will occur. Other physiological needs include sensory and motor needs. If these needs are unmet, individuals may not die, but their body functions will be affected. Sensory needs include hearing, seeing, feeling, smelling, tasting, and mental stimulation. When these needs are met, they allow the individual to respond to the environment. If these needs are not met, the person may lose contact with the environment or with reality. An example is motor needs, which include the ability to move and respond to the environment. If muscles are not stimulated, they will atrophy (waste away), and function will be lost.

# *Safety Needs*

Safety becomes an important issue when physiological needs have been met. Safety needs include the need to be free from anxiety and fear and the need to feel secure in the environment. The need for order and routine is another example of an individual’s effort to remain safe and secure. Individuals often prefer the familiar to the unknown. New environments, a change in routine, marital problems, job loss, injury, disease, and other similar events can threaten an individual’s safety. Adults feel safety needs during emergencies and periods of disorganization in the social structure (such as widespread rioting), whereas they are felt more frequently by children who often display signs of insecurity and a need to be safe.

# *Love and Affection*

The need for love and affection occupy the third level of Maslow’s Hierarchy of Needs. When an individual feels safe and secure, and after all physiological needs have been met, the individual next strives for social acceptance, friendship, and to be loved. The need to escape loneliness and alienation and give (and receive) love and affection and experience the sense of belonging motivates an individual’s actions at this point. The individual may now attend a social function that was avoided when safety was more of a priority. Individuals who feel safe and secure are more willing to accept and adapt to change and more willing to face unknown situations. The need for love and affection is satisfied when friends are made, social contacts are established, acceptance by others is received, and the individual is able to both give and receive love.

# *Esteem Needs*

Maslow’s fourth level includes the need for esteem. Esteem includes the need for a stable, firmly based, high level of self-respect, and respect from others in order to feel satisfied, self confident and valuable. When others show respect, approval, and appreciation, an individual begins to feel esteem and gains self-respect. The self-concept, or beliefs, values, and feelings people have about themselves, becomes positive. Individuals will engage in activities that bring achievement, success, and recognition in an effort to maintain their need for esteem. If these needs are not met, the person feels inferior, weak, helpless and worthless. The first four levels of needs are sometimes referred to as deficiency needs.

# *Self-Actualization*

Self-actualization means that people have obtained their full potentials, or that they are what they want to be. People at this level are confident and willing to express their beliefs and stick to them. They feel so strongly about themselves that they are willing to reach out to others to provide assistance and support. Maslow describes self-actualization as an ongoing process. Maslow also describes self-actualization as a person's need to be and do that which the person was born to do. It is his "calling". "A musician must make music, an artist must paint, and a poet must write." If these needs are not met, the person feels restlessness, on edge, tense, and lacking something. Lower needs may also produce a restless feeling, but here is it much easier to find the cause. If a person is hungry, unsafe, not loved or accepted, or lacking self-esteem the cause is apparent. It is not always clear what a person wants when there is a need for self-actualization.