

# OUR ENVIRONMENT

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## 1.1 INTRODUCTION

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Earth is the only planet known for supporting life. Despite the vastness of earth, life exists only in a very narrow zone of the earth called biosphere. Sun is the only source of energy which enables continuous interaction among various life forms. This unit, being the first in the course, brings out the holistic meaning of the word 'environment'. In broad terms, environment includes everything external to an organism that affects it, including physical as well as living factors. The action and interaction of the physical and living factors makes a system of relationships called ecosystem. This unit will also focus on how we as living beings interact with other living and non-living components of the ecosystem. The concept of sustainable development came into existence that explains symbiotic relationship between human being and environment.

For centuries humans have considered the earth and environment as virtually unlimited resources but subtle and gradual changes have altered our environment in many different ways. Special mention has been made of human population within the changing scenario over the years, particularly since the industrial revolution. We hope that this unit will give you a better understanding of the environment and its various components. This unit would also enable you to use your intelligence and skills for managing our environment and keeping it healthy for future generations. This unit will further explain the multi-disciplinary nature and scope of environmental studies.

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## Expected Learning Outcomes

After completing the study of this unit you should be able to:

- ❖ explain the importance of environment in our life and surroundings;
- ❖ recognise the importance of the concept of sustainability and sustainable development;
- ❖ analyse the multidisciplinary nature of environmental studies; and
- ❖ appreciate the importance and scope of environmental studies.

## 1.2 CONCEPT OF ENVIRONMENT

Each and every living organism has a specific surrounding or medium with which it continuously interacts, derives its sustenance and to which it is fully adapted. This surrounding is the 'natural environment'. The word 'natural environment' brings to mind broad aspects of landscape, such as soil, water, desert or mountains which can be more exactly described in terms of physical or abiotic influences such as differences in moisture, temperature, texture of soil, and air quality. It also includes the biological or biotic influences in the form of microbes and animals. Thus, environment is defined as, **“the sum total of living and non-living components; influences and events surrounding an organism”**.

Let us begin by asking what is environment? Environment is derived from French word *environ* which means to encircle or surround while *ment* means auctioning, i.e., environment is the interaction between organism and the nature. For humans, there are several kinds of environment such as home environment, business environment, political environment and so on. But we are going to discuss only about natural environment: air, water, land, plants, animals and other organisms. Any individual in nature interacts with its environment, influences it and in turn is influenced by it. Thus environment is the sum total of air, water and land interrelationship among themselves and also with the human beings, plants, animals and other organisms. The most significant attribute of the effect of environment on life of an organism is the interaction of environmental elements. These abiotic and biotic factors are dynamic in nature and interact with each other in every moment of life.

No organism can live alone without interacting with other organisms, so each organism has other organisms as a part of its environment. You must be aware that all animals are directly or indirectly dependent upon plants, basically the green plants that manufacture their own food. Plants also depend on animals for a few things such as pollination of flowers and dispersal of fruits and seeds.

Let us try to understand the concept of environment with an example (Refer Fig.1.1.). Can you identify the environment of a carp fish in the pond? Its environment consists of abiotic components such as light, temperature, and water in which nutrients, oxygen, other gases and organic matter are dissolved. The biotic environment consists of microscopic organisms called planktons as well as aquatic plants and animals and decomposers. The plants are of different kinds such as floating, submerged and partly submerged plants, and trees growing around the edge of the pond. The animals consist of insects, worms, molluscs, tadpoles, frogs, birds and various kinds of fishes. The decomposers are the saprotrophs like bacteria and fungi.

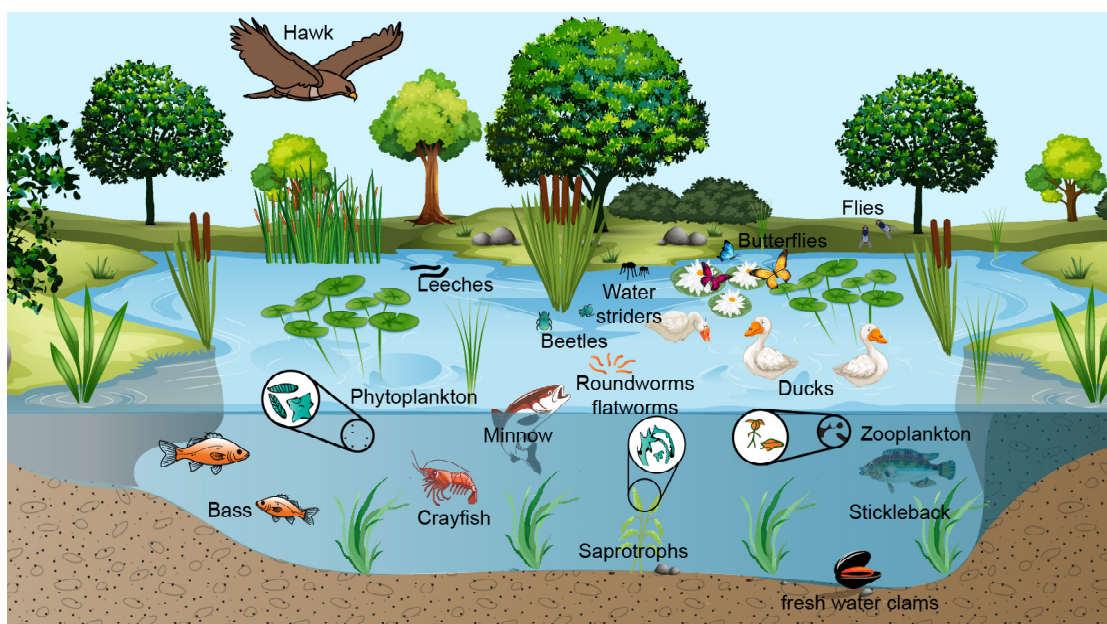


Fig. 1.1: Environment of a Carp in a Pond.

Till now, you might have realised that the environment is not static. The biotic and abiotic factors are in a flux and keep changing continuously. **The organisms can tolerate changes in environment within a certain range called 'range of tolerance'.**

## 1.3 COMPONENTS AND TYPES OF ENVIRONMENT

After discussing about the concept of environment. In this section, we will discuss about components, types and significance of environment.

### 1.3.1 Components of Environment

Broadly the environment comprises of abiotic (non-living) and biotic (living) components. Some examples of abiotic and biotic components of environment are listed below in Table 1.1

Table 1.1: Components of Environment

Abiotic Components	Biotic components
Light	Plants
Precipitation	Animals including humans, parasites and micro organisms
Humidity and Water	Decomposers
Temperature	
Atmospheric gases	
Seasonal changes	
Topography	

The physical components set the condition for the survival of the biotic components, which in turn take care of the maintenance of the environment. Linkages among components of the environment are pathways for the flow of energy and cycling of materials. For example, green plants obtain essential resources from the physical realm – water and minerals from the soil, carbon dioxide from the atmosphere and light energy from the sun, and manufacture their food. Animals depend on plants and other animals for their source of

food. We, the human being, in turn harvest the land and the seas for our food; and obtain minerals and fuel from the Earth's crust. We will learn more about these later in this course.

### 1.3.2 Types of Environment

Recall the definition of the environment, and consider a fish living in a natural pond which we have already discussed in the previous section. Its **external environment** will be the water in the pond which it primarily inhabits. The water would contain nutrients, oxygen and other organisms that the fish requires to sustain its life. As opposed to the external environment, the body cavity within the fish provides an **internal environment** quite separate from the outside environment. The body surface act as an exchange barrier between the internal and the external environment of the fish. The internal environment is relatively stable as compared to the external environment. However, illness and injury or even environment stress can upset it. But when the cause of the disturbance is removed, the internal environment comes back to its original condition.

The pond which the fish inhabits is its **natural environment**. The abiotic factors of the pond, like light, temperature, depth, nutrients, and dissolved gases will provide the life supporting chemical and physical factors for the fish. The other living organisms inhabiting the pond, like bacteria, insects, worms, molluscs, tadpoles, frogs and aquatic vegetation could be food for the fish. Examples of such natural environments on land include forests, grasslands, savannah and deserts. So far we have discussed only the natural environment but there are several components of environment which are created by humans, like crop fields, cities and industrial spaces (Fig. 1.2). These are places made artificially by humans through planned manipulation. For



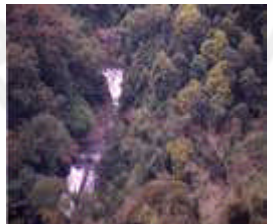






<b>Natural Environment</b> Oceans, lakes/ponds, rivers, forest, grasslands, deserts etc.	  
<b>Human-modified Environment</b> Orchards, plantations, sanctuaries, parks, etc.	  
<b>Human-made Environment</b> Industries, cities, towns, crop fields, artificial lakes, dams, etc.	  

Fig. 1.2: Examples of Different Types of Environment.



example, let us consider a city. The city environment is totally created by human beings. One of the most important components – water is not taken from streams directly but is first filtered, purified and then used for drinking and other municipal purposes. The metabolic waste and garbage are not disposed off locally but are carried for treatment or dumping to a remote place, away from the city. Food for the people in cities often comes from rural areas. An environment made by humans results in the consumption of excessive amounts of materials and energy, necessitating care, supervision and management.

### 1.3.3 Significance of the Environment for Life

Whatever type of environment organisms inhabit, they all need life supporting elements for their survival. These include air that they breathe, food and water they take in, and shelter either as natural (like caves and tree holes) or as artificial dwellings (like houses). Environment is the only source that provides these life supporting elements.

We make use of the land for cultivating crops. Soil provides nutrients needed for the growth of plants. The landform determines the soil types found in any one area and soil itself varies from place to place. Some soils are rich in nutrients and other are lacking in them. The soils lacking nutrients need the addition of fertilizers. Climate and short term weather changes are characterized mainly by wind, temperature, pressure and rainfall and are determined by the properties of the atmosphere. Air in the atmosphere provides living organisms with oxygen, without which survival of the most of the living organisms will be threatened.

### SAQ 1

Answer the below given question within 30 words.

- i) Describe the significance of physical components in an environment.
- ii) Explain in brief the significance of the environment for life.

## 1.4 HUMAN - ENVIRONMENT RELATIONSHIP

As we know from the previous section that all living beings are dependent upon their immediate surroundings for their sustenance and survival. There are two distinct situations observed if we trace the history of human civilization. The first situation is that human being adjusted or adapted to the prevailing environmental conditions. Those who could not adapt or adjust perished. Similar situations can be observed amongst plants and animals also. As human civilization progress, people developed knowledge, skill and technology to subjugate nature. This happened faster after *renaissance* and Industrial revolution. It has improved standard of living as well as made human life comfortable. However, this has leads to irreparable damage of environment and threat to the human society as well as survival of the planet earth. Therefore, it has been realized that there should be a balance between

development and protection of environment. This approach is best expressed as 'sustainable development' which we will discuss in detail in the next section. But now, let us consider the various approaches to human-environment relationship i.e. determinism, possibilism and environmentalism.

**Determinism:** This concept was developed by German Geographer Friedrich Ratzel, which was further expanded by Ellsworth Huntington. This approach is based on the concept of 'nature controls human' or 'earth made human'. This is also known as environmental determinism. According to this approach, human being is largely influenced by nature. In fact, the determinism states that human being is subordinate to natural environment because all aspects of human life such as physical (health and well-being), social, economic, political, ethical and aesthetic not only depend on but are dominantly controlled by the physical environment.

**Possibilism:** This term was coined by the French historian, Lucien Febvre. Possibilism approach in the study of human-environment relationship is an offshoot of the criticism of environmental determinism. The evolution of such human-environment relationship was influenced by the advancement of science and technology. Possibilism indicates that the physical environment is passive and human being is the active agent at liberty to choose between wide ranges of environmental possibilities. According to this approach, the pattern of human activity is the result of the initiative and mobility of human being operating within the natural framework. However, it was agreed upon by the possibilists that humans lack the abilities to fully tame the nature and is not always victorious over it. As a result of the above, some scientists and academics vouched for 'cooperation with nature' or 'mutual interaction' between human being and environment.

**Environmentalism or Ecological Approach:** This approach is based upon the basic principle of ecology, which is the study of mutual interaction between organisms and physical environment on the one hand, and the interaction among the organisms on the other in a given ecosystem. This approach describes human being as an integral part of nature or environment. Human being as the most skilled and intelligent has a unique role to play in maintaining a natural environment as healthy and productive as it should be. This approach emphasizes on wise and restrained use of natural resources and application of appropriate environmental management programmes, policies and strategies keeping in view certain basic principles of ecology so that already depleted natural resources are replenished, and health and productivity of the nature is restored.

The ecological approach is best reflected in the concept of sustainable development which we will discuss in the following section.

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## SAQ 2

Fill in the blanks with suitable words:

- i) The approach of determinism is based on the concept of .....  
..... or .....

- ii) Possibilism indicates that the physical environment is .....  
and human being is the ..... agent at liberty to choose  
between wide ranges of environmental possibilities.
- iii) Environmentalism emphasizes on ..... and .....  
..... use of natural resources.
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## 1.5 CONCEPT OF SUSTAINABILITY AND SUSTAINABLE DEVELOPMENT

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The concept of Sustainable Development was formally defined in the report titled “Our Common Future”. This report was an outcome of deliberation of a group constituted by World Commission on Environment and Development (WCED) and chaired by the then Norwegian Prime Minister Gro Harlem Brundtlandt. Brundtlandt Commission defined sustainable development as the development that involves “...**meeting the need of present generation without compromising the ability of future generations to meet their own needs.**” This definition of sustainable development initiated a lot of debate. The scientists were of the opinion that the term ‘need’ and ‘development’ has not been defined properly in the report. Need can not be generalized universally. It varies from place to place and person to person. Similarly, development was also not properly defined. The report explains development as something people do to improve their lives. Therefore, it becomes amenable to varied interpretations. A more precise definition with clearly spelt-out goals remains elusive.

Herman Daly, an ecological economist, referred to sustainable development as an “**oxymoron**”. Do you know what an Oxymoron is? Oxymoron is a figure of speech that combines two usually contradictory terms into a compressed paradox (e.g. bitter sweet, pretty ugly). The definition of ‘**development**’ is not precise enough to make it more in favour of nature conservation than on building roads, factories, infrastructure etc. The Oxford dictionary meaning of development is “**a stage or advancement**”.

On the other hand, “**sustainability**” is the capacity to endure. The word “sustainability” is derived from the latin “sustinere” (tenere = to hold; sus= up). Dictionaries provide more than ten meanings for sustain, the main ones being to “maintain”, “support”, or “endure”. Further more, as has been pointed out by Michael Redclift the sustainability discussion has gradually, over the years, moved almost imperceptibly away from “human needs” to “**human rights**”. Therefore, **Sustainability** refers to a process which can be continued indefinitely without depleting the resource base on which it depends. Therefore, it is the practical goal towards which our interaction with the natural world should be directed. The guiding principles of sustainability cut across ecological, economic, social and cultural dimensions.

The concept of sustainable development is now well accepted at international, national and local levels. This has been emerging as a strong alternative model of development after a long debate and discussion since Rio Summit in

1992. Sustainable development means different things to different people. There are three important disciplines traditionally concerned with the processes involved in conceptualizing sustainable development. The discipline of economics is mainly concerned with growth, efficiency and the optimum use of resources. On the other hand, sociologists mainly focus on human needs and on concepts like equity, empowerment and social cohesion. Ecologists show their greatest concern for preserving natural systems, for living within the carrying capacity of the environment, and for dealing efficiently with pollution. Today this sectarian approach to development adopted by the above mentioned disciplines have been rejected. Now, it has been argued that sustainable development will be achieved where the concerns of these three groups are addressed in a holistic manner, as shown in Fig. 1.3.



Fig. 1.3: Three Pillars of Sustainable Development.

It has been said that sustainable development is an ideal which no societies today have achieved anything resembling it. Nevertheless, as with justice, equality, and freedom, it is important to uphold sustainable development as an ideal - a goal toward which all human societies need to be moving. For example, policies and actions that reduce infant mortality, increase the availability of family planning, improve the air quality, provide more abundant and pure water, preserve and protect natural ecosystems, reduce soil erosion and reduce the release of toxic chemicals to the environment, all move a society in the right direction – toward a sustainable future.

To achieve this desired goal, societies have to make certain transitions which are very much essential. There is a broad consensus on the following transition to make future societies:

- **A demographic transition:** from a continually growing population to one that is stable.
- **A resource transition** to an economy that is not solely obsessed with growth, rather relies more on nature's income and protects ecosystem capital from depletion.



- **A technological transition** from pollution-intensive economic production to environment friendly processes.
- **A political/sociological transition**
- **A community transition**

#### Priority Areas for Achieving Sustainable Development

1. **Slow Down Population Growth:** This is essential for addressing all the other priority areas.
2. **Reduce Poverty, Inequality and Third World Debt:** Improving health, longevity and literacy, increasing employment etc. This is important for curbing the loss of species, the extent of land degradation and water pollution.
3. **Make Agriculture Sustainable:** This includes reducing soil erosion and decreasing the use of harmful agricultural practices. This is important for curbing the loss of biodiversity, land degradation and pollution.
4. **Protect Forests and other Habitats:** This includes reforestation and afforestation of wastelands, protection of other living resources, control greenhouse gases and ozone layer depletion. This is important for reducing air pollution, land degradation, depletion of energy and minerals
5. **Make Water and Energy Use Sustainable:** This includes improved energy efficiency, conserving energy and developing renewable energy resources. This is important for reducing air pollution, land degradation, depletion of energy and minerals.
6. **Make Water Use Sustainable:** This includes improving the efficiency of water use and protecting water quality. This is important for curbing water pollution and depletion and land degradation.
7. **Reduce Waste Generation:** This includes improving production processes, waste treatment and recycling processes. This is important for reducing air and water pollution and energy, mineral and water depletion.

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### SAQ 3

- i) Define the term "Sustainability".
  - ii) Why is it important to uphold sustainable development as an ideal?
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## 1.6 MULTIDISCIPLINARY NATURE OF THE ENVIRONMENTAL STUDIES

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Till now, you must have realised that the environment affects us in several ways, for example, the water we consume, the air we breathe, the climatic conditions in which we live, and surrounding where we live all have effects on us. In natural conditions usually living organisms keep a balance with their environment. Humans in many ways have personalized the environment

according to their need with the help of skill and science, but in doing so we have disrupted the fragile intricately woven web of life and life supporting systems. All these interactions with environment as a whole are subjects of environmental studies. Therefore, environmental studies contribute a branch of study of inherent or induced changes in the environment, and their effect on living beings.

Environmental studies cover a large domain of knowledge which deals with every concern that affects an organism. From human angle, this means it is an applied science which seeks all possible answers to make human civilization sustainable on the earth with all its limited resources. It includes not only the study of physical and biological characters of the environment but also economic, social, cultural and even political and legal aspects of the environment. Various issues such as clean and safe drinking water, clean and fresh air, clean living conditions, productive land, good quality foodstuff and sustainable development are dealt with in environmental studies.

The importance of environmental studies cannot be disputed. The need for sustainable development is a key to the future of humankind. Continuing problems of pollution, loss of forest and bio-diversity, solid waste disposal, degradation of environment, issues like global warming and climate change, the depletion of ozone layer and loss of biodiversity have made everyone aware of environmental issues. The United Nations Conference on Environment and Development held in Rio de Janeiro in 1992 and World Summit on Sustainable Development at Johannesburg in 2002 have drawn the attention of people around the globe to the deteriorating condition of our environment. This has been again reaffirmed by United Nations by adopting seventeen Sustainable Development Goals in the year 2015. It has been decided that these seventeen goals would be achieved in the next fifteen years i.e. 2016-2030.

#### Box 1.1: Sustainable Development Goals

1. No Poverty
2. Zero Hunger
3. Good Health and Wellbeing
4. Quality Education
5. Gender Equality
6. Clean Water and Sanitation
7. Affordable and Clean Energy
8. Decent Work and Economic Growth
9. Industry, Innovation and Infrastructure
10. Reduced Inequalities
11. Sustainable Cities and Communities
12. Responsible Consumption and Production
13. Climate Action
14. Life Below Water
15. Life on Land
16. Peace, Justice and Strong Institution
17. Partnership for the Goals.

India is rich in biodiversity which provides various resources for people. Only about 1.7 million living organisms have been described and named globally. Still many more remain to be identified and described. Attempts are made to conserve them in *ex-situ* (outside their natural habitat) and *in-situ* (in their natural habitat situations). You will learn about *in-situ* and *ex-situ* conservation in Unit 8. Destruction of habitats, over-use of energy resources and environmental pollution has been found to be responsible for the loss of a large number of life-forms. It is feared that a large proportion of life on earth may get wiped out in the near future.

These issues are extensively addressed in the next thirteen units of this course both at global as well as national level.

## 1.7 IMPORTANCE OF ENVIRONMENTAL STUDIES

The environment studies enlighten us, about the importance of protection and conservation of environment. At present, due to our aggressive consumerist lifestyle and carbon intensive industrial development we have created a large number of environment issues both in terms of magnitude, intensity and complexity at local, regional and global level. We shall study about these issues and suggestive measures for mitigation in the Environment Studies. Let us discuss major environmental issues in the following paragraphs:

1. **Environmental issues are of international importance:** It has now been well recognised that environment issues like global warming, climate change, ozone layer depletion, acid rain, marine pollution and loss of biodiversity are not merely national issues but are global issues and hence must be tackled with international efforts and cooperation.
2. **Emergence of problems in the wake of modernisation and development:** Development in the modern period has given birth to industrialisation, urbanization, modern transportation systems, Agriculture, Housing etc. 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. The developing world now faces the challenge of developing without environmental degradation.
3. **Explosive increase in population:** World census reflects that one in every seven persons in this planet lives in India. 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. This emphasizes on the need for efficient management of natural resources for the benefits of all.
4. **Need for an alternative solution:** It is essential, especially for developing countries to find alternative paths to developmental goal. Such a goal would need to be distinct from the developed world in the manner that would conserve natural resources and avoid wasteful consumption.
5. **Need for wise planning of development:** Resources withdrawal, processing and use of the products have all to be synchronised with the

ecological cycles in any plan of development. Our actions should be planned for the sustenance of the environment and development.

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## SAQ 4

- i) Differentiate between *in-situ* and *ex-situ* conservation.
  - ii) What should be kept in mind while planning for alternative solution in developing countries for the sustenance of environment and development?
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## 1.8 SUMMARY

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- Environment is defined as “the sum total of living and non-living components; influences and events surrounding an organism”. Broadly the environment comprises of abiotic (non-living) and biotic (living) components.
- Brundtland Commission define sustainable development as the development that provides for “...*meeting the need of present generation without compromising the ability of future generation to meet their own needs.*”
- It has been said that sustainable development is an ideal which no societies have been able to achieve. Nevertheless, as with justice, equality, and freedom, it is important to uphold sustainable development as an ideal- a goal toward which all human societies need to be moving.
- Sustainability refers to a process which can be continued indefinitely without depleting the resource base on which it depends. Therefore, it is the practical goal towards which our interaction with the natural world should be working. The guiding principles of sustainability cut across ecological, economic, social and cultural dimensions and there are obvious trade-offs.
- The environment studies enlighten us about the importance of protection and conservation of environment. At present, due to our aggressive consumerist lifestyle and carbon intensive industrial development, we have created a large number of environment issues both in terms of magnitude, intensity and complexity at local, regional and global level. As a result, the quality of life and even survival of humankind on earth are threatened. We study about these issues and suggestive measures for mitigation in the Environment Studies.

## 1.9 TERMINAL QUESTIONS

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1. What is environment? Explain various components of environment with suitable examples.



2. Analyse human-environment relationship over time and space.
3. Describe in detail priority areas required for achieving sustainable development.
4. Explain in detail the importance of environmental studies.

## 1.10 ANSWERS

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### Self-Assessment Questions

1.
  - i) The physical components set the condition for the survival of the biotic components.
  - ii) Environment provides all life supporting elements which include air to breathe, food we eat and water we drink, and shelter either as natural like caves and tree holes or material for the construction of as artificial dwellings.
2.
  - i) nature controls human, earth made human
  - ii) Passive, active
  - iii) wise, restrained
3.
  - i) Sustainability refers to a process which can be continued indefinitely without depleting the resource base on which it depends.
  - ii) A goal toward which all human societies need to be moving.
4.
  - i) *In-situ* refers to conservation in their natural habitat situations. whereas *ex-situ* refers to conservation outside their natural habitat.
  - ii) While planning for alternative solution in developing countries for the sustenance of environment and development need to be distinct from the developed world in the manner that would conserve natural resources and avoid wasteful consumption.

### Terminal Questions

1. Environment is defined as the sum total of living and non-living components; influences and events surrounding an organism. It has two components i.e. biotic and abiotic. Biotic components include all living organisms whereas abiotic component includes non-living things. Examples of abiotic components are topography, light, precipitation, humidity & water, temperature, atmospheric gases, seasonal changes whereas biotic components include plant, animals including humans, parasites and micro-organisms and decomposers.
2. Human-environment relationship can be grouped under three categories i.e. determinism, possibilism and environmentalism. Determinism states that human being is subordinate to natural environment because all aspects of human life are dominantly controlled by the physical

environment. Possibilism indicates that the physical environment is passive and human being is the active agent at liberty to choose between wide ranges of environmental possibilities. Ecological his approach emphasizes on wise and restrained use of natural resources and application of appropriate environmental management programmes, policies and strategies keeping in view certain basic principles of ecology so that already depleted natural resources are replenished, and health and productivity of the nature is restored.

3. Priority areas required for achieving sustainable development are slow down population growth; reduce poverty, inequality and Third World debt; make agriculture sustainable; protect forest and other habitats; make water and energy use sustainable; reduce waste generation.
4. Importance of environmental studies are as follows: (i) Environment issues are of international importance; (ii) Emergence of problems in the wake of modernisation and development; (iii) explosive increase in population; (iv) need for an alternative solution; and (v) need for wise planning of development Any four)

## 1.11 FURTHER READING

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