The word environment has been derived from the French word *Environir* which means *to surround*. Thus environment refers to the sum total of conditions which surround man at a given point of space and time. It includes both biotic and abiotic substances.

The **biotic** components include all the living organisms in the environment.

On the other hand **abiotic** components are those nonliving physical and chemical factors that affect the ecosystem.

**Dimensions of Environment**

Environment has three dimensions, *viz.* physical, biological and social.

1. **The Physical Environment**

The physical environment consists of abiotic or non-living components such as land, air and water. These are called lithosphere, atmosphere and hydrosphere.

   a) **Lithosphere**:- It is the solid part of the earth which is made of rocks and soils. It occupies about 29% of earth’s surface area and provides habitat for plants and animals.
b) **Atmosphere:**

- It is the blanket which surrounds the earth on all sides.
- The atmosphere plays a crucial role for the sustenance of life on the earth.
- Ozone layer saves us from the harmful effects of ultraviolet rays coming from the Sun.
- At the same time atmosphere permits the penetration of sunlight but doesn’t permits the reflection of light and thus helps stabilizing the heat and temperature on the earth’s surface.

c) **Hydrosphere:**

- It consists of water bodies on the earth’s surface.
- It refers to oceans plus their extensions into other realms like lakes and rivers, water vapour in the atmosphere, water in the soil and in deep layers of water beneath the earth’s surface and the water locked up in its caps and glaciers.
- It includes both fresh water and saline water.
- About 71% of the earth’s surface is covered by water and is known as hydrosphere.
- Of all the water of hydrosphere 97.2% is in oceans, 2% is in icecaps and the rest is in rivers, lakes, inland oceans and below the ground as underground water. Some water is present in the atmosphere as water vapour.

**Biosphere:**

- It is that part of the earth that supports life.
- It lies at the interfaces between the inorganic realms of the earth, i.e., lithosphere, atmosphere and hydrosphere.
- In other words, it is the interaction between these three realms of the earth.
- It is the most important realm for us because it contains all forms of life including human, animal and plant life.
- The average thickness of the biosphere consisting of air, water, soil and rock is about 25 km.
- The upper limit of the biosphere is determined by the availability of oxygen, moisture, temperature and pressure in the atmosphere.

2. **The Biological Environment**

It is also known as the biotic dimension of the environment, this dimension of the environment comprises of all living beings including micro-organisms, plants, animals and above all man. As such it is also known as the biosphere.

**Flora** :- Plants occur in various forms such a woodland, forests, meadows grasslands etc. Various plants growing in a particular area are generally known as vegetation.
Fauna :- Our earth is inhabited by millions of animals. Different areas are occupied by different types of animals depending upon their environment and requirements of life. While plants are primary producers, animals are primary and secondary consumers.

3. Social Environment

It is also known as cultural or man-made environment; it is concerned with the social behaviours of the organisms. All the organisms of the floral and the faunal environment organise themselves into social groups and form what is known as social environment. It involves population interaction and behaviour patterns of animals in response to their environment.

All organisms living in different parts of the world derive matter from the physical environment for their sustenance and do economic activities. This gives rise to what is called economic environment. Economic activities develop civilisation and makes social organisation of human beings rather systematic.
Exercise

1. Fill in the blanks:-
   a) The word environment has been derived from the French word __________.
   b) Lithosphere occupies about ________ % of earth’s surface.
   c) __________ is that part of the earth which supports life.
   d) The average thickness of the biosphere is about __________ km.
   e) _______ are the primary producers, _________ are primary and secondary consumers.

2. Define the following terms:-
   a) Environment
      ___________________________________________________________________________

   b) Atmosphere
      ___________________________________________________________________________

   c) Hydrosphere
      ___________________________________________________________________________

3. Give reasons for the following:-
   a) Atmosphere provides an effective shield to life on earth.
      ___________________________________________________________________________
      ___________________________________________________________________________
      ___________________________________________________________________________

   b) Plants comprise the most important component of biological environment.
      ___________________________________________________________________________
      ___________________________________________________________________________
      ___________________________________________________________________________

4. Write the answers in short:-
   a) Distinguish between biotic and abiotic components of environment.
b) What is economic environment?


c) Why is hydrosphere essential for us?


d) What is the importance of atmosphere?


5. Write the answer in detail:

a) What do you mean by physical environment? Discuss lithosphere as an important component of physical environment.


b) What is biosphere? What is its importance?


c) What is social environment? Explain the role of man in changing the physical environment.


An economic or productive factor required to accomplish an activity, or as means to undertake an enterprise and achieve desired outcome is known as **resource**. Three most basic resources are land, labor, and capital; other resources include energy, entrepreneurship, information, expertise, management and time.

### Classification Of Resources

- **Natural**
  - Renewable
    - Physical
    - Natural
  - Biological
  - Vegetation
- **Human**
  - Non-renewable
    - Recyclable metals
    - Non-recyclable fossil fuels
  - Structure and institutions
    - Quality and Quantity

### Problems from indiscriminate use of resource

- Depletion of resource.
- Accumulation in few hands.
- Problem of sustainable development.

### Measures of resource conservation

- Judicial use of natural resources.
- Stop wastage of resources.
- Discovery of new resources and economical use of existing resources.
Man has been using energy since the dawn of civilisation. In the present day world, we draw energy from different sources. All the energy sources used by the modern men are divided into two broad categories, viz. conventional and nonconventional energy sources.

### Energy Resource

| Energy Resource | Conventional Energy | Nonconventional Energy |

#### CONVENTIONAL SOURCES OF ENERGY

The sources of energy which have accumulated in nature over a very long period, say lakhs of years, are **conventional sources of energy**. Since they are exhausted and cannot be replaced when used once, they are called non-renewable energy sources. Firewood, coal, petroleum and natural gas are outstanding examples of conventional sources of energy. Firewood is obtained from trees whereas coal, petroleum, natural gas etc. are formed as a result of decay and decomposition of vegetable and animal matter and are known as **fossil fuels**.

**Firewood**

Firewood was perhaps the first source of energy used by man for cooking food, keeping him warm in cold climate, and for protection from wild animals. It continued to be the major source of energy till the middle of 19th century. Even today, it is the most important source of energy for millions of people living in rural India.

**Limitations**

- Too much use of firewood leads to deforestation which results in ecological disturbance.
- Wood emits lots of smoke and causes air pollution.

**Coal**

Coal is an inflammable organic substance, composed mainly of hydrocarbons, found in the form of sedimentary rocks and capable of being used as fuel to supply heat or light or both.

Coal was, is and will continue to be the mainstay of power generation in India. It constitutes about 70% of total commercial energy consumed in the country. The power sector and industries account for 94% of total consumption. Manufacturing of iron and steel and a variety of chemicals largely depend upon the availability of coal. Due to it’s high utility as a...
source of energy and as a source of raw material for a large number of industries, it is often called *black gold*.

**Limitations**

- It is a non-renewable source of energy and will not be available to us in future if used indiscriminately.
- Coal mining is a difficult process and requires high class costly technology.
- Transporting coal from producing areas to consuming areas is a difficult and costly affair.
- Coal is not a clean fuel and it is difficult to use it as a source of energy.

**Petroleum**

Petroleum is obtained from rocks; particularly sedimentary rocks. Therefore, it is also called mineral oil. It can be easily transported from the producing areas to consuming areas. It emits very little smoke and leaves no ash. It provides the most lubricating agents and is used as an important raw material for various petro-chemical products. The important oil fields are found in Assam, Gujarat and Mumbai High. The first oil refinery in India is Digboi in Assam. There are 19 oil refineries in the country.

**Limitations**

- It is a non-renewable source of energy and is lost for ever after it is used once.
- It is highly inflammable material and catches fire quickly.
- There is always a danger of oil leakage and oil spill during transportation. This poses serious threat to safety and environment.

**Natural Gas**

Natural gas consists mainly of methane (95%) with small quantities of ethane and propane. It usually accompanies petroleum accumulations. Whenever a well for oil is drilled, it is natural gas which is available before oil is struck.

About three-fourths of the total gas comes from Mumbai High.

**Uses**

- It burns instantly and produces a lot of heat. As such it is used for domestic, industrial and transport purposes.
- It is a source of hydrogen gas which is used in fertilizer industry.
- It is used as a source of carbon for rubber industry.

**Advantages**
• It burns instantly. As a result of which it has gained much popularity as a domestic and industrial fuel as well as an effective fuel for transport.
• It is a clean fuel and causes much less pollution as compared to coal and petroleum.
• It can be easily transported from the producing areas to the consuming areas.

Limitations

• It is a non-renewable source of energy.
• It is highly inflammable material and is associated with fire hazards.
• There is always a fear of gas leakage.

NONCONVENTIONAL SOURCES OF ENERGY

Nonconventional sources of energy are alternatives which are capable of saving us from the energy crisis the world is currently facing with increasing demand for energy and with fast depleting conventional sources of energy. Nonconventional energy is abundant, renewable, pollution free and eco-friendly. It can be more conveniently supplied to urban, rural and even remote areas. It is the energy of the future.

Biomass

It is the waste or residue from plants and animals. It includes dung, wood, sewage, agricultural waste or crop residue etc. These materials are burned to produce heat, or electricity or converted into liquid or gaseous biofuels.

Advantages

• It is a cheap, clean, convenient and eco-friendly source of energy.
• It provides employment opportunities to rural people.
• The left over serves as enriched manure.
• It reduces dependence on fossil fuels and saves environment from pollution.
• It makes rural people self sufficient with respect to energy resource.
• Construction of a biogas plant requires less time and money as compared to large conventional plants.

Limitations

• It is confined to small and local areas.
• It is not advisable to transport the organic matter over long distances because this matter is heavy and cannot bear heavy cost of transportation.

Solar Energy

Sun is the source of all energy on the earth. It radiates energy in all directions in the space. Our earth receives just two billionth part of the energy radiated by Sun. Even one percent of
this energy is sufficient to meet the energy requirement of the entire humanity living on the earth. Most part of the country have bright sunshine throughout the year except a brief monsoon period. So exploitation of solar energy is an extremely important component of renewable energy.

**Advantages**

- It is unlimited and inexhaustible source of energy available freely.
- It is clean, pollution free and environment friendly.
- Most of the solar energy devices are cost efficient.
- It can be used for a large variety of purposes.

**Limitations**

- Installations of solar energy devices require large area which is not readily available.
- There are large diurnal and seasonal variations in amount of solar radiation received on the earth.
- Areal variations in the amount of solar radiation are also pronounced. For example, Rajasthan receives maximum solar radiation while Meghalaya receives very little solar radiation because sky is covered by clouds for most part of the year.
- Solar radiation is available only during day time and that too when the weather is clear. No solar radiation is received at night.
- Solar energy can be stored in solar Photovoltaic Cells. These are very costly and have a life span of about ten years only.

**Wind Energy**

When air moves in a horizontal direction due to pressure difference between two places, it is called wind. When wind blows, it generates energy which is called wind energy. The amount of energy generated by wind depends on its speed. Wind is used to run a windmill, which in turn drives a generator to produce power. A single windmill produces small quantity of power and cannot be used on commercial scale. As such a large number of windmills are erected. This is known as windfarm. The first windfarms in India were installed in 1986 in coastal areas in Tamil Nadu.

**Advantages**

- It is renewable, abundant and inexpensive.
- It does not emit smoke and causes very little harm to environment.
- This energy can be generated and supplied to remote areas where other sources are not easily available.

**Limitations**

- It is irregular and is not dependable.
- It cannot be generated in areas of calm wind.
- Windmills create a lot of noise and cause noise pollution.

**Tidal Energy**

A tide is the periodic rise and fall of ocean water level, caused by the gravitational attraction of moon and sun. The energy possessed by tides is harnessed to produce electricity. The Gulf of Khambat is the best suited area for tidal energy.

**Advantages**

- It is renewable and continuous source of energy.
- Tidal power stations are capable of producing a large amount of energy and have a long life span.

**Limitations**

- Construction of a tidal power station needs huge initial investment and it has long gestation period.
- Tidal plants can pose danger to aquatic life and cause serious disturbance in navigation.
- Pollutants may accumulate as rivers with barrage are flushed to a lesser degree.

**Sea Waves Energy**

Wave is the rhythmic rise and fall of ocean water. The amount of energy produced by the waves depends upon their height and velocity. Wave energy can be converted into electrical or mechanical energy. India’s first wave energy power plant has been installed near Thiruvananthapuram. Another plant is being set up in the Andaman and Nicobar Islands.

**Advantages**

- It is a renewable, continuous and stable source of energy.
- It is useful in coastal areas where other energy sources are not adequately available.
- It is also useful in remote islands.

**Limitations**

- Cost of wave energy generation is very high.
- There are often severe storms in the ocean which may destroy generation plant completely.
- Growth of algae, water hyacinths etc. could obstruct ships.

**Hydroelectricity**

Running water from streams, rivers and melting glaciers has long been utilised by man as motive power. Flowing water possesses a lot of energy and energy generated by using energy of flowing water is called hydroelectricity. The potential energy of water is stored behind a
dam constructed across a river. This energy is harnessed to generate hydroelectricity by making the water fall with great force from a sufficient height on the turbine.

Advantages

- It is a clean, renewable and pollution free source of energy.
- Although initial cost of construction is high, the operating cost is low and this is a cheap source of energy in long run.
- Hydro reservoirs are multipurpose and capital invested is easily recovered.
- Power generation can be controlled and production can be changed according to changes in demand.

Limitations

- Damming of rivers buries vast tracts of fertile agricultural land, forested land, submerges large number of villages and towns and destroys animal habitats.
- Reservoirs behind the dam are subject to siltation, thus disturbing environmental balance.
- Heavy load of water in the reservoir cause imbalance in the earth’s crust and gives birth to earthquakes.
- The natural flow of sediments into the ocean is reduced and sand on the beaches is depleted.
- Construction of dam is costly affair.

Geothermal Energy

It is the energy obtained from the heat of the earth. The earth is very hot from within. Most rocks melt at high temperature and form magma. High pressure inside the earth pushes the magma upwards. When ground water comes in contact with magma, the water turns into steam. This geothermal steam provides geothermal energy which can be used to generate electricity or the steam can be directly used as energy.

Advantages

- No fuel is required to obtain this energy.
- No waste is generated.
- It is a renewable, clean and environment friendly.
- It is a reliable and a stable source of energy as it is not affected by weather conditions.

Limitations

- It is available only at specific locations.
- It involves a huge capital input.
- Most of the geothermal plants are small and produces less energy.
- Often toxic gases are found in geothermal reservoirs.
Nuclear Energy

Nuclear power plants require very little fuel as compared to fossil fuels. India has great potential for generating nuclear energy as the country possesses rich deposits of Uranium and thorium, two basic raw materials for producing nuclear energy. The first nuclear power station was set up at Tarapur near Mumbai in 1969.

Advantages

- It is a clean energy and does not emit harmful gases.
- While fossil fuels like coal and petroleum will be exhausted very soon, this energy will last for much longer period of time.
- Very small quantity of fuel is required to produce huge amount of energy.

Limitations

- Harmful radioactive gas is emitted when uranium is mined. This causes environmental pollution.
- Most modern and sophisticated technology is required to generate nuclear energy which most of the developing countries cannot afford.
- The waste generated remains radioactive for thousands of years. As such it can cause damage to our future generations. Disposal of radioactive waste is the most dangerous problem faced by today’s world.
- There is always a fear of an accident taking place in a nuclear power plant.

One big handicap in developing and utilising non-conventional energy sources is that the requisite technology has not yet been developed to harness these sources. There is need to find alternatives to conventional energy sources that would ensure eco-friendly sustainable development on one hand and energy security on the other. Non-conventional sources offer immense potential which still awaits proper harnessing.

Steps to conserve the Energy Resources

- Arrange for car pool if public transport is not easily available.
- Use public transport as far as possible.
- Keep your vehicle well tuned by timely service and proper maintenance.
- Switch off lights, fans and other electrical appliances when not required.
- Use tubes in place of bulbs.
- Minimise the use of electrical gadgets.
- Maximise the use of natural light during day time.
Exercise

1. Fill in the blanks:-

a) The oldest oil fields of India are found in ________.

b) Natural gas mainly consists of ________________.

c) ___________ is the source of all energy on the earth.

d) When air moves in horizontal direction due to pressure difference between two places, it is called __________.

e) The first wind farm in India was installed in coastal areas ____________.

f) The first nuclear power station was set up at __________ near ____________.

2. Give one word answer:-

a) Waste or residue from plants and animals which include dung, wood, sewage etc.

b) Energy obtained from the heat of the earth.

c) Oil obtained from rocks, particularly sedimentary rocks.

d) Fuels which have been formed as a result of decay and decomposition of vegetables and animal matter.

e) Black gold

3. Define the following:-

a) Conventional energy

b) Biomass

c) Geothermal energy
4. Give reason:-

a) Non-conventional sources of energy are called energy of the future.

___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________

b) Coal is often called as black gold.

___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________

c) India has vast potential for harnessing solar energy.

___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________

5. Write answer in brief:-

a) Differentiate between conventional and non-conventional sources of energy.

___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________

b) What are fossil fuels?

___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________

c) What are advantages of natural gas?

___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________

d) Mention the advantages of biomass.

___________________________________________________________________________
___________________________________________________________________________
___________________________________________________________________________

e) Distinguish between tidal energy and wave energy.
6. Write answer in detail:-

a) What are the advantages and limitations of wind energy?

b) Explain how hydroelectricity is better than thermal electricity.

c) What are the limitations of fossil fuels as a source of energy?

d) Mention the significance of wood as a source of energy in India.
India is a vast country. It has a great diversity of physical and climatic conditions which provide a highly suitable ground for a great diversity in wildlife. Wildlife refers to all those animals that have not been tamed or domesticated by humans. There are about 81000 species of animals and about 1200 species of birds in India. All the different types of animals and birds like to live in different habitats.

- The elephant, one of the largest animal on Earth, is found in the forests of Kerala, Tamil Nadu, Karnataka, West Bengal, Madhya Pradesh and the North-East States.
- Camels and wild asses are found in hot and dry areas. Camels are found in the Thar Desert of Rajasthan while wild asses are found in marshy Rann of Kutchch of Gujarat.
- One-horned rhinoceroses are found in restricted locations of Assam and West Bengal. They are protected in the Kaziranga and Manas National Parks and Jaldapara Wildlife Sanctuary.
- Tigers are mainly found in the forests of West Bengal, Madhya Pradesh and the Himalayan region. Royal Bengal Tiger is the native of Sunderbans. At present there are 27 tiger reserves in India, like Ranthambor National Park of Rajasthan and Kanha National Park of Madhya Pradesh.
- Lions are found in the Gir National Park of Gujarat, the only remaining habitat of this proud and majestic species.
- Brown and black bears are found in the Himalayan ranges, while the sloth bear is found in all over peninsular India.

Indian Bison, wild buffaloes, antelope, deer, monkeys, langur, wolves etc. are the other animals found in Indian forests. India also boasts of a rich variety of birds. Ducks, pigeons, parrots, geese, mynahs, pheasants etc. are among the wide variety of birds in India.
Extinct and Endangered Species

Extinction is the end of an organism or of a group of organisms, normally a species, for ex. Dodo bird, Quaga, etc.

The species whose population is declining rapidly and which need protection and preservation is called endangered species, for ex. Tiger, lion, black buck, Indian bustard and rhinoceros etc.

Need for conservation of wildlife and forests

- The continuous exploitation of forests has damaged the eco-systems. Trees take time to grow and mature and so a quick regeneration of forest is not possible. Forests play an important role in maintaining the ecological balance.
- With the depletion of forest cover our wildlife gets affected. Forests are the homes of wildlife and exploitation of it disturbs their habitat.
- Hunting of animals brought certain species on the verge of extinction.
- Wildlife is an important asset for the country. Tourists are greatly attracted by the rich wildlife.
- Animals and birds are our national heritage and must be protected.

Loss of forests and wildlife is a matter of great concern. Together, forests and wildlife need conservation. Thus, a number of national parks, wildlife and bird sanctuaries have been set up in different parts of the country.

Do you know?

We observe Wildlife week in our country in the first week of October every year.

Projects To Conserve Wildlife

- Project Tiger was launched in 1973-74
- Project Elephant was launched in February, 1992
- Project Rhino
- Asiatic Lion Reintroduction Project
- Cheetah Reintroduction Project
FEW INTERNATIONAL ORGANISATIONS WORKING FOR CONSERVATION OF WILDLIFE ARE:

➢ World Wildlife Fund (WWF)

The WWF works with multilateral and bilateral agencies to promote sustainable development in the world’s poorest countries. Its aims are threefold—to protect natural areas and wildlife populations, to minimize pollution, and to promote efficient, sustainable use of natural resources.

➢ Natural Resources Defence Council (NRDC)

The NRDC is an environmental action organization that consists of 350 lawyers, scientists, and other professionals and commands a membership of about 1.3 million people. The NRDC uses the law, science, and their wide network of members and activists to protect wildlife and habitats around the globe.

➢ The Sierra Club

The Sierra Club was founded by naturalist John Muir in 1892. The Sierra Club is a grassroots organization that works to protect ecological communities, encourage smart energy solutions, and to create an enduring legacy for America’s wildernesses.
- **International Crane Foundation (ICF)**

The International Crane Foundation was established by founders George Archibald and Ron Sauery in 1973 on a horse farm in Baraboo, Wisconsin. The ICF works around the world to protect cranes and the habitats on which they depend.

- **Friends of Haleakala National Park**

The Friends of Haleakala National Park strive to preserve the ecosystems of Haleakala National Park, to protect the Native Hawaiian cultural, and to preserve the area’s scenic character.

- **Royal Society for the protection of birds**

The Royal Society for the Protection of Birds (RSPB) began in 1889 as an organization that opposed the inhumane use of exotic feathers in the fashion industry, particularly the use of exotic plumes to adorn the women’s hats that were so much in vogue at the time.

- **Wildlife Conservation Society (WCS)**

The WCS supports zoos and aquariums while promoting environmental education and conservation of wild populations and their habitats.
Exercise

1. Fill in the blanks:-

   a) Wildlife week is observed in India in the month of ___________.
   
   b) The _____________ is protected in Kaziranga National Park.
   
   c) Kanha Tiger Reserve is in ___________.
   
   d) The first biosphere reserve set up in ___________.
   
   e) The oldest National Park of India is___________.
   
   f) There are ____________ Tiger reserves in India.

2. Name the states in which the following National Parks/ Bird/ Wildlife Sanctuaries are located.

   a) Chilika
   b) Gir
   c) Guindy
   d) Kaziranga
   e) Corbett
   f) Dachigam
   
   g) Periyar
   h) Ranthambore
   i) Panna
   j) Bandipur
   k) Simlipal

3. Write the full form of the following:

   a) WWF
   
   b) NRDC
   
   c) ICF
   
   d) RSPB

4. Define with examples:

   a) Endangered Species
   
   b) Extinct species
5. Write the answers in brief:-

a) Differentiate between National Parks and Wildlife Sanctuaries.

b) What are the differences between extinct and endangered species?

c) Name some International Organisations working towards conservation of wildlife.

6. Write the answers in detail:-

a) Describe Project Tiger.

b) What is the need for conservation of wildlife?

c) What are the steps taken by the Government for the conservation of wildlife?