



Biosphere

CHAPTER

5

The Earth is a unique planet, in that it has life thriving on it. It is inhabited by countless forms of life from microscopic bacteria to great banyan trees and animals like elephants, tigers, blue whales and, of course, human beings. The fact that the earth has a combination of land, air and water and a moderate temperature due to a moderate distance from the Sun, has made life possible on it. We saw in an earlier chapter that life thrives only in the intersection of the three spheres – lithosphere, atmosphere and hydrosphere. According to many geographers, life itself constitutes a separate sphere called ‘biosphere’.

All forms of life have an integral connection with the land, air, water and sunshine around them. They draw their sustenance from them and, in turn, affect them in significant ways.

Various forms of life are not only related to the three spheres around them, but also to each other. They are part of a complex ‘food chain’ – that is, one kind of life

- Can you tell how are plants dependent upon air and water and how they affect the two in return?
- In what ways are insects like mosquitoes and butterflies dependent upon rocks or soil and water? How do they affect them in return?

becomes food for another kind. Many of the life forms are also symbiotic, that is, they live by exchanging essential substances with each other. Let us consider some examples:

The primary food producers are plants which produce food with the help of sunlight. The plants themselves draw their vital nutrients from the soil,

especially from organic compounds formed due to decay of other plants and animals. They also depend upon nitrogen stored in the soil by bacteria. The food produced by the plants is eaten by plant eating animals, usually called ‘herbivores’, like deer, cattle, goats, elephants etc. Other animals like dogs, cats, fishes, birds, tigers etc. eat the flesh of herbivorous animals and, in this way, are indirectly dependent upon plants. Bacteria and fungi help in decomposition of dead trees and animals and breaking them down into organic compounds which the plants draw upon for their growth. Thus, the cycle of life goes on.

Any disturbance in this cycle can create what is called an ‘ecological crisis’. For example, if a particular species which feeds upon a particular kind of plant is exterminated, it would result in unchecked growth of that plant. It may grow so

much that it may intrude into the area where other plants grow and disturb their growth.

Another example of disturbance is mixing of poisonous substances into air, water or soil. Many industries use chemicals and metals which flow into the streams and rivers. This leads to an increase in the level of such chemicals in the water. These chemicals and metals like mercury are consumed by microorganisms in water, and in turn, become the food of a large number of fishes. When human beings consume these fishes, they too absorb some amount of mercury which is detrimental to their health.

Let us look at another example. Vultures feed upon dead animals like cattle. Vultures eating dead carcass used to be a common sight in villages and towns some twenty years ago. However, people started noticing that vultures have virtually disappeared and are sighted very rarely. Investigations suggest that farmers use a particular chemical called Diclofenac to treat cattle. When the cattle die, their flesh retains this chemical. When their flesh is consumed by vultures, diclofenac leads to kidney failure in them and they die within a week or so. In this way, vultures have come very close to extinction.

Since all living and non-living things on the earth are, in one way or the other, connected to each other, changes affecting one, in due time affect all others too.

Natural Vegetation

Natural vegetation is generally classified into three broad categories: forests in areas with sufficient rainfall and sunshine; grasslands in regions with moderate rains; and shrubs in dry regions. In very cold regions, we have tundra vegetation consisting of small shrubs, moss and lichens. Let us study some of these in greater detail.

As you may remember, there are different kinds of forests, depending upon the climate of the place.

Tropical Evergreen Forests

These forests are also called tropical rainforests. These thick forests are found in the regions near the equator and close to the tropics. These regions are hot and receive heavy rainfall throughout the year. As there is no particular dry season, the trees do not shed their leaves altogether. This is the reason they are called evergreen. The thick canopies of the closely spaced trees do not allow the sunlight to penetrate inside



Fig. 5.1: Tropical Evergreen Forests

Fig. 5.2: Tropical Deciduous Forests



the forest even in the day time. Hard wood trees like rosewood, ebony, mahogany are common here.

Tropical Deciduous Forests

Tropical deciduous are the monsoon forests found in large parts of India, northern Australia and in central America (Fig. 5.2). These regions experience seasonal changes. Trees shed their leaves in the dry season to conserve water. The hard wood

trees found in these forests are sal, teak, neem and shisham. Hard wood trees are extremely useful for making furniture, transport and constructional materials. Tigers, lions, elephants, langurs and monkeys are the animals commonly found in these regions.

Temperate Evergreen Forests

The temperate evergreen forests are located in the mid latitudinal coastal region (Fig. 5.3). They are commonly found along the eastern margin of the continents, for example, in South East USA, South China and in South East Brazil. They comprise of both hard and soft wood trees like oak, pine, eucalyptus etc.



Fig. 5.3: Temperate Evergreen Forests

Temperate Deciduous Forests

As we go towards higher latitudes, there are more temperate deciduous forests (Fig. 5.4). These are found in the North Eastern part of USA, China, New Zealand, Chile as well as in the coastal regions of Western Europe. They shed their leaves in the dry season. The common trees are oak, ash, beech, birch etc. Deer, foxes, wolves are the commonly found animals. Birds like pheasants, monals are also found here.

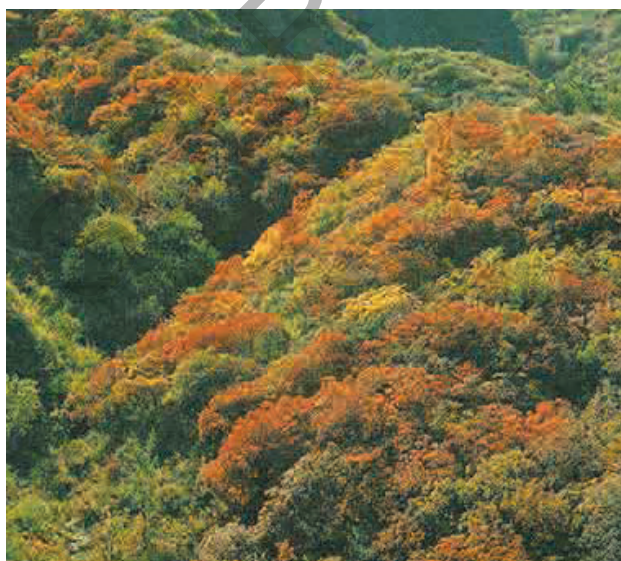


Fig. 5.4: Temperate deciduous forests

Mediterranean Vegetation

You have learnt that most of the east and north east margins of the continents are covered by temperate evergreen and deciduous trees. The west and south west margins of the continents are different. They have Mediterranean vegetation. Mediterranean trees adapt themselves to dry summers with the help of their thick barks and wax coated leaves which help them reduce transpiration. These are mostly found in the areas



Fig. 5.5: Mediterranean vegetation

around the Mediterranean sea in Europe, Africa and Asia, hence the name. This kind of vegetation is also found outside the actual Mediterranean region in California in the USA, south west Africa, south western and South America and South west Australia. These regions are marked by hot dry summers and wet winters. Citrus fruits such as oranges, figs, olives and grapes are commonly cultivated here because people have removed the natural vegetation in order to take up agriculture. There isn't much wildlife here.

Coniferous Forests

In the higher latitudes ($50^{\circ} - 70^{\circ}$) of the Northern hemisphere, the spectacular Coniferous forests are found (Fig.5.6). These are also called as Taiga. These forests are also seen in the higher altitudes. These trees are found in the Himalayas in abundance. They are tall, softwood, evergreen trees. These woods are very useful for making pulp, which is used for manufacturing paper and newsprint. Match boxes and packing boxes are also made from softwood. Chir, pine, cedar are the important trees in these forests. Silver fox, mink, polar bear are the animals commonly found here.



Fig. 5.6: Coniferous forests

- Look around in your surroundings and find out the articles made of hard wood and soft wood.
- Find out and learn the names of a few trees found in your locality.

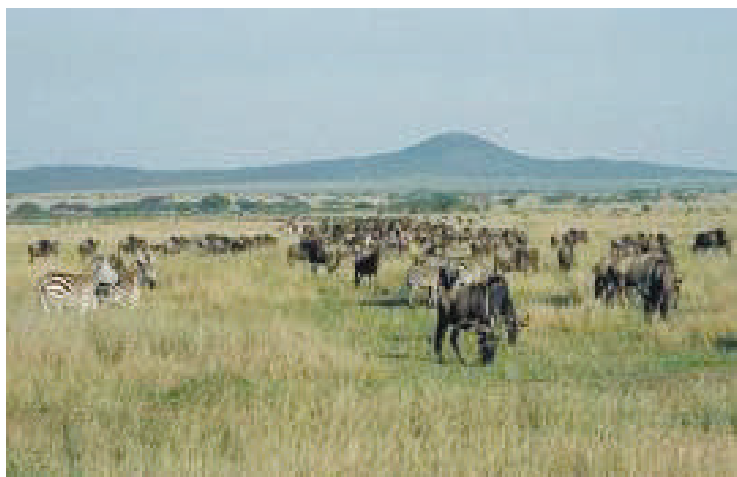


Fig. 5.7: Tropical grasslands

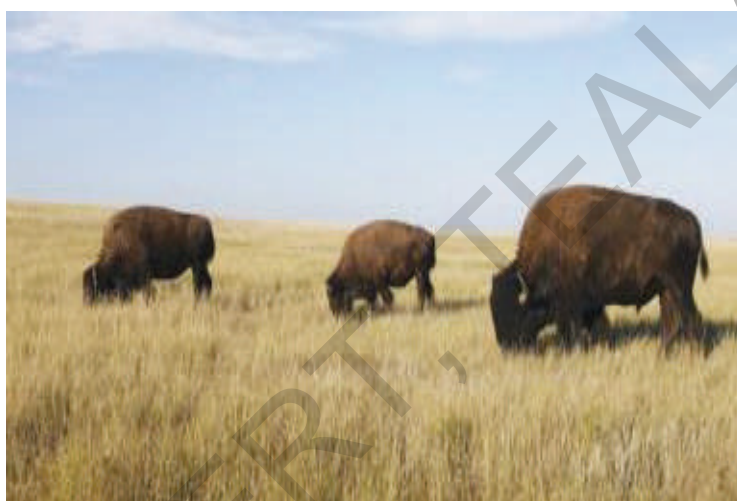


Fig. 5.8: Temperate grasslands

- Identify the desert regions in the world map.

reach the polar region, you will find the place extremely cold. The growth of natural vegetation is very limited here. Only mosses, lichens and very small shrubs are found here. These grow during the very short summer. This is called Tundra type of vegetation. This vegetation is found in the polar areas of Europe, Asia and North America. The animals have a thick fur and thick skin to protect themselves from the cold climatic conditions. Seal, walruses, musk-oxen, Arctic owl, Polar bear and snow foxes are some of the animals found here.

Grasslands

Tropical grasslands: These grass lands grow on either side of the equator and extend to the tropics (Fig. 5.7). This vegetation grows in areas of moderate to low rainfall. The grasses grow very tall, about 3 to 4 metres in height, for example, Savannah grasslands of Africa. Elephants, zebras, giraffes, deer, leopards are common in tropical grasslands.

Temperate grasslands: These are found in the mid-latitudinal zones and in the interior part of the continents (Fig. 5.8). Usually, grass here is short and nutritious. Wild buffaloes, bison, antilopes are common in the temperate region. These are known as Steppes in Eurasia.

Thorny bushes: These are found in the dry desert like regions. Tropical deserts are located on the western margins of the continents. The vegetation cover is scarce here because of scanty rain and scorching heat.

Tundra Vegetation: If you

Human Society and Environment

Down the ages, human societies have been interacting with the environment and in this process, changing it. Hunters and gatherers used stone tools and tools made of wood etc. to hunt animals and gather tubers and fruits. They learnt to use fire – by lighting sticks and grass – the first source of energy to be used. Thus began the tale of human endeavour to alter the environment to satisfy their needs. Human beings also began investigating into the nature of the environment around them in order to be able to change and use them for their purposes. Thus, the building of knowledge of the environment is an essential part of human beings' interaction with the natural world.

When human beings began to practise agriculture and animal husbandry, they began to change their environment even more. The building of cities and the use of metals like bronze and iron further changed human interaction with the environment. Before long, people began building tanks to store water, canals to divert water to fields, and even dams across streams and rivers.

People also built roads to connect distant places and sailed in ships and boats across seas and oceans. In this way, human societies established themselves not only on every continent (except the Antarctic) but over the seas and oceans too.

Gradually, human population grew so much so that human beings became the dominant species on earth. It is estimated that during BCE 10,000 i.e., the time when cultivation started, the total population of human beings worldwide was about 40 lakhs. It reached to 50 crores in 1750; 100 crores in 1800; 250 crores during 1950 and to 700 crores during 2010. It is estimated to reach 1000 crores by 2100. This increase in population creates great pressure on the earth as well as its resources. This means that almost the entire earth would need to be reshaped to suit the needs of humans.

This process of altering the surface of the earth received a great push with the industrial revolution and the process of colonisation. Industrial production needs raw materials on an unprecedented scale and industrial countries began to search for diverse kinds of raw material and sources of energy all over the globe. They 'explored' the world and made inventories of all the possible resources. They dug deep

- Can you imagine how human beings would have impacted the land, water, plants and animals around them when they began agriculture and animal herding?
- What sources of energy would they have used and how would they have obtained them?
- Can you think of the kinds of changes would building of cities have on the land and water around them?
- In what way do you think would this have affected the landscape and water cycle?

wells and tried to find out what lay underneath and also explored the space high above in the atmosphere. Soon, systematic mining, cutting of forests, building of factories and fields and roads took place all over the earth. Nations began to wage wars with each other to gain control over these resources.

Such intense human industrial activity has profound impact on the air, water and the land around us. Let us try to think of some of these.

Industries – Pollutants and Effluents

Modern industries and transport systems use immense amount of energy which is derived basically from coal and petroleum (which are called fossil fuels as they are the remains of forests buried underground lakhs of years ago). The burning of fossil fuels releases large quantities of carbon dioxide and other chemical gases like nitrogen oxides, sulphur dioxide, volatile organic compounds and heavy metals. They also release sulphuric, carbonic, and nitric acids, which cause what are called ‘acid rains’. Acid rains are caused by the mingling of acidic particles of the atmosphere with the rain by increasing the acid content of rain water.

KYOTO PROTOCOL

A conference was held by United Nations Organization in the city of Kyoto in Japan in December 1997 to protect mother earth from global warming. The countries that attended realised the effect of Green House Gases and signed a declaration called Kyoto Protocol. The main aim of this declaration is to bring down the release of Green House Gases to less than 5.2%. According to this declaration, this aim should have been achieved between 2008-2012.

In addition to burning of fossil fuels, modern industries release enormous amounts of waste materials in the form of solid, liquid and gaseous waste contaminating air, water (both surface water like rivers and underground water of wells) and soil.

The cumulative impact of such pollution is gradual poisoning of our environment. One important impact is the change in worldwide climate also known as ‘global warming’. We will read about this in detail in Class IX biological science book in Chapter X.

Depletion of Resources

Industrialisation, rapid growth of population and urbanisation have all led to unprecedented exploitation of natural resources like minerals, forests, soil, water, air etc. as well as the sources of energy (coal, petroleum etc.) stored in the earth for billions of years. This has resulted in rapid deforestation and decline of reserves of minerals, oil and groundwater. Many scientists have argued that the present way of life is not ‘sustainable’ for life. If we use such large quantities of natural resources, nothing will be left for our children and grand children.

All the living beings on the earth depend on the environment and have to live according to the environment. But, for their enjoyment and development, human beings are destroying nature. The commercial activities carried on by human beings

are affecting every life and every matter on the earth. If there continue like this, it is dangerous not only to animals but also to human beings themselves.

Keywords

1. Food chain
2. Hard wood trees
3. Acid rains
4. Ecological crisis
5. Tundra

Do You Know?

1. Approximately 13-15 tonnes of effluents and sewage water reach Kolleru lake daily from its nearby towns and villages.
2. One study found that the radiation released by cell phone towers affects the life of honey bees. This leads not only to scarcity of honey but also affects pollination, bio diversity and agricultural products.

Improve your learning

1. Life itself constitutes a separate sphere called 'Biosphere'. Explain.
2. Why is ecological crisis occurred in modern times? What are its effects?
3. Write about the different kinds of forests and climatic conditions of their existence?
4. How can we protect natural resources?
5. Read the chapter and fill up the table



S. No.	Type of forest	Spread across the countries	Trees grown	Animals

6. Locate the following countries in the world map.
a) New Zealand b) Brazil c) Australia d) North America e) China f) India
7. Read the paragraph under the title 'In addition to and soil' on page 57 and comment on it.

Discussion: Collect information with regard to the animals/birds extinction. Fill up this table and discuss in classroom.

Sl. No.	Name of the animal/bird	Extinct	Being Extinct	Reasons For Extinction	Result	Preventive measures/our responsibility

Project

Visit any nearby industrial establishment and observe the different kinds of smoke, liquid and solid wastes come out of the compound. Find out from the residents of that locality about their impact on plants and animals. Based on the information collected, prepare a report and present it in the class.