

## Chapter 4

# Environment and Interactions

Earth

Lifeless  
Moon

The Earth is full of life.

### Student Learning Outcomes

After completing this chapter, you will be able to:

- Identify the components of environment.
- Compare the physical factors, which make up the environment of a desert and a rain forest.
- Describe the relationship between biotic and abiotic components of the environment.
- Explain how abiotic factors affect the ability of plants to create their own food.
- Describe that living things depend on one another for food, shelter and protection.
- Explain the different relationships between organisms.
- Give examples of how organisms interact with each other and with nonliving parts of their environment.

## Environment

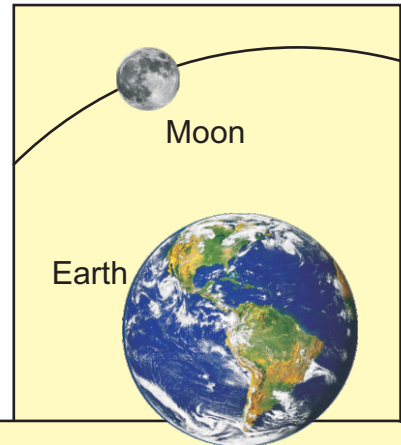
Everything around an organism that affects its life is called its **environment**. Life is not same on every part of the Earth. Conditions are different on different places. That is why, we find a variety of plants and animals on Earth. Living organisms do not live alone. All living things interact with one another all the time. They also interact with the non-living things around them.

### Components of Environment

Environment has two components:

All plants, animals and micro-organisms are called living or **biotic components** of an environment.

Air, water, light, temperature and soil constitute non-living or **abiotic components** of an environment. What are some biotic and abiotic factors in your classroom environment?



### Point to think!

The Moon is the natural satellite of our Earth. Both receive light energy from the Sun, but they present different pictures. Our Earth is full of life, but the Moon is lifeless. Which are the necessary factors absent on the Moon and present on the Earth?

## Biotic Components

Biotic components of an environment consist of plants, animals and micro-organisms.

Most of the interactions among organisms involve food. Plants and animals are often linked together because only green plants can make food.

### Producers

Plants are able to make their own food by photosynthesis and are known as **producers**. They also release oxygen in which all organisms respire.

### Consumers

All the organisms which do not make their own food and feed on plants directly or indirectly are called **consumers**. There are different types of consumers (Fig.4.1). Animals that eat only plants are called **herbivores**. Horses, goats, squirrels and butterflies are herbivores. Can you name a few more





Fig.4.1: A consumer may be a herbivore, a carnivore or an omnivore.

herbivores? Animals that eat flesh of the herbivores or other animals are called **carnivores**. Some carnivores are tigers, lions, cats, dogs, frogs and snakes.

Some animals eat both plants and animals. They are called **omnivores**. Chickens, crows, bears and humans are omnivores.

### Decomposers

When plants and animals die, their bodies are broken down or decomposed by bacteria and fungi. These bacteria and fungi are called **decomposers**.

Decomposers play a very important role in the environment. They break down complex substances into simple ones. Plants and animals reuse these simple substances. This is a natural way of “recycling” of materials.

#### Point to think!

What would happen if there were no decomposers in our environment?

## Dependence of Organisms Upon One Another

All organisms (plants and animals) interact with each other.

Animals depend upon plants:

### 1. For food

All animals depend directly or indirectly on green plants for their food. From where do we get fruit, vegetables and cereals?

### 2. For shelter

Some animals such as owls make their homes in the holes of trees (Fig. 4.2). Some birds



Fig.4.2: An owl in a tree hole

like sparrows, crows, eagles and kites build their nests in trees. A few insects like the ants, grasshoppers, moths and beetles live in trees. Plants provide animals shade and also make the surroundings cool.

### 3. For protection

Some animals take help from plants to protect themselves from enemies. For example, a parrot hides in the green leaves due to its colour (Fig. 4.3), a grasshopper hides in grass due to the same colour.

Plants also depend upon animals:

### 1. For carbon dioxide

Plants cannot make their food without carbon dioxide gas. All animals release carbon dioxide during respiration. Plants absorb this gas from air.

### 2. For pollination

Animals also help some plants in their pollination (Fig. 4.4).



Fig.4.3: A parrot does not easily seen in green leaves.



Fig.4.4: The bird helps the plant in pollination.

## Do you know?

All living organisms need food to live. Green plants make food and animals consume this food. There is a food link among organisms and is called **food chain**.



Visit a nearby pond under the supervision of your teacher.

— Do you see any animal or plant floating on the surface of pond water?

— Do some animals and plants live under water?

How do these animals and plants depend upon each other?

## Abiotic Components

Abiotic components means non-living components. Light, temperature, soil, air and water are abiotic components in an environment.

### Light

Light is a very important abiotic factor of the environment. The ultimate

### Interesting Fact

Some animals like earthworms, woodlice and cockroaches avoid sunlight and live in dark places.

source of light energy is the Sun. Plants need sunlight for photosynthesis. All animals use the food prepared by plants. Most animals including human beings need sunlight for most of their activities.

## Temperature

The heat of the Sun greatly influences the temperature of a place. Some places on the Earth like deserts are too hot and others like glaciers are too cold for animals and plants to survive. There is a great difference of temperature between day and night of a desert. Days are hot and nights are cold. Most organisms are active at temperatures between 0°C and 45°C. Temperature affects the activities of plants and animals.



Fig.4.5: The camel, known as the ship of the desert, can tolerate high temperature.

## Air

Air is an important abiotic factor. Air is a mixture of gases. Air contains gases which are very important for the lives of animals and plants. Animals and plants respire in the oxygen of air. Respiration is a necessary process to live. Plants in addition to oxygen, also need carbon dioxide from air to make their food.

## Soil

Soil is very important for plant growth. It is an important factor of environment. Without soil, most of the plants would not exist. Plants get water and necessary minerals from soil. Bacteria present in soil provide important compounds to the plants. Man provides fertilizers to crops through soil.

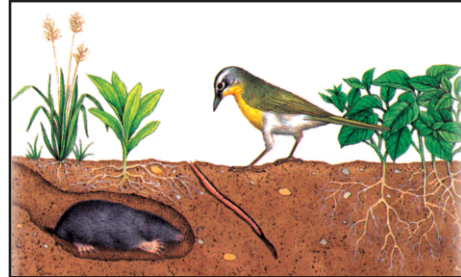


Fig.4.6: Soil provides necessary minerals and water to the organisms.

Arrange a soil study program under the supervision of your science teacher. Select a shady patch of land in the school lawn or nearby park. Observe the soil.

\_\_ Do you see some small animals and plants on the ground?

Dig the soil to some depth.

\_\_ Do you see some animals in the soil? Can you name these animals?

Uproot a small plant from the soil. Place it for some time and then observe it.

\_\_ Will the plant remain alive after being uprooted?

Based on this study, discuss the importance of soil for living things.

## Water

Water is essential for life. It is present in the environment of every plant and animal. The amount of rainfall throughout the year determines the amount of water available at any place.

A large number of plants and animals is found in tropical rainforests because of heavy rainfall. Very few plants and animals are found in deserts because of less rainfall. Many plants, such as water lily and hydrilla are found in water. Can you name a few animals that are found in water?

Organisms living in deserts have developed special features to store water in their bodies. The cactus is a desert plant. Its fleshy body and spines help it to store water in its body. Have you ever heard that camels can go without water for weeks?



Fig.4.7: Tropical rainforests cover 10% of the land, but more than 50% of the total kinds of plants and animals are found here.

**Warning:** Living animals are involved in your activity. Carefully handle them, and when you finish, put them back outside.

**You will need:** ] about 10 ants in a small transparent bottle with a lid  
] a plastic container (may be ice-cream container)

### Procedure

1. Observe the way the ants move about at normal room temperature.
2. Now fill the plastic container with cold water and place the jar of ants into it. After 10 minutes, again observe the way the ants move about at low temperature. Compare the movements of ants with their movements at normal temperature.
3. Replace cold water with 'hand hot' warm water.
4. Place the jar of ants in the warm water.
5. Observe the movements of ants at higher temperature. Compare the three movements.

Now try to answer this simple question.

**Why are more insects found buzzing around light bulbs on a summer evening than in winter?**



## Relationships Among Organisms

Organisms in an environment interact with other organisms in order to obtain food, shelter, etc. There are many different types of relationships among organisms. Some of these are described below:

### Predator-Prey Relationship

An animal that kills and eats another animal is called a **predator**. The **prey** is the animal the predator kills and eats. The relationship between predator and prey is called **predation**.

For example a lion hunts and eats deer (Fig.4.8). The lion is a predator. The deer is its prey. Predation is a temporary relationship. It only lasts as long as the time a predator takes to kill and feed its prey.



Fig.4.8: Identify the predator and prey.

### Parasitism

**Parasitism** is a relationship between two living organisms in which one is harmed and other helped. A **parasite** is a living organism that feeds on another living organism. The living organism on which the parasite feeds is called the **host**.

Many plants and animals are parasites. A mosquito is a parasite. The mosquito uses our blood or the blood of another animal for food. We are the host and mosquito is a parasite.

Cuscuta is a parasitic plant. Its weak and yellowish stem twines around the stem of the host plant. It sucks water and food from the stem. Leech, ascaris (malap), etc. are also parasites.

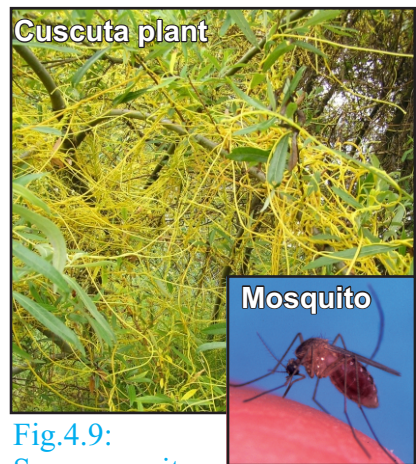


Fig.4.9:  
Some parasites

### Do you know?

Some types of wasps have parasitic larvae. The adult wasp lays its eggs inside the body of a caterpillar. After hatching of the larvae, they eat up all the body of caterpillar from inside and adult wasps come out.



## Mutualism

**Mutualism** is a relationship in which two living organisms live together and depend on each other. It is a friendly relationship. Mutualism occurs among some plants and animals.

Algae and fungi form lichen (Fig. 4.10). The lichen shows mutualism between the two. Green alga makes food for itself and for the fungus. Fungus protects the alga from drying up. The fungus also gives carbon dioxide to alga to make food.

A dead log contains termites. Termites eat wood (Fig. 4.10). However, they are not able to digest the wood. There is a kind of a unicellular organism that lives inside the termites. This unicellular organism is able to digest the wood. After the unicellular organisms digest the wood, the termites can use it.



Fig.4.10: Some examples of mutualism

### Point to think!

Explain how a frog can be both predator and prey.



1. Life is not uniformly distributed on Earth.
2. An environment has two components, i.e. biotic and abiotic.
3. Animals, plants and micro-organisms are included in biotic components of an environment.
4. Living things depend upon one another in an environment.
5. Abiotic or physical environment means non-living environment.
6. Light, water, air and soil are included in abiotic components of an environment.
7. There is a system of give and take between biotic and abiotic components of environment.



**1. Write proper term/word against each statement.**

- i. Plants, animals and micro-organisms in an environment \_\_\_\_\_
- ii. The animals that can eat both plants and animals \_\_\_\_\_
- iii. Bacteria and fungi are examples of \_\_\_\_\_
- iv. A living thing that lives on or in another living thing and harms it \_\_\_\_\_
- v. A relationship between two kinds of organisms in which both benefits \_\_\_\_\_
- vi. An animal that is killed by a predator \_\_\_\_\_

**2. Circle the letter of the best answer.**

- i. An abiotic component of the environment is:  
(a) a plant (b) an animal  
(c) water (d) a micro-organism
- ii. A pine tree is a:  
(a) predator (b) producer  
(c) consumer (d) parasite
- iii. Organisms that feed on plants directly or indirectly are called:  
(a) producers (b) predators  
(c) prey (d) consumers
- iv. What kind of organisms help clean a place of waste and dead remains?  
(a) decomposers (b) carnivores  
(c) herbivores (d) omnivores
- v. Which is an example of parasitism?  
(a) two species of insects that feed on the same rare plant  
(b) a lake near a forest in northern areas  
(c) an African lioness feeding her cubs (d) a tick living on a dog

**3. Answer the following questions in detail.**

- i. How do plants depend upon animals for their needs?
- ii. Explain the abiotic factors of the environment.
- iii. Explain the following with examples:  
(i) Parasitism (ii) Mutualism (iii) Types of consumers

**4. Extend your thinking.**

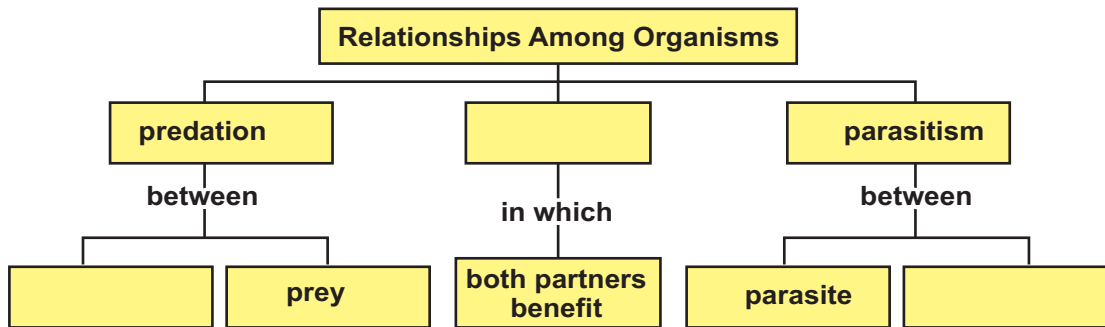
- i. What would be the effect of destroying most or all of the plants on the other biotic factors in an environment?
- ii. There were many deer in a forest. Hunters killed the mountain lions, wolves,

and other enemies of the deer. What changes do you think took place because of what the hunters did?

- iii. Think of three things you like to eat. What type of consumer are you?
- iv. Why are animals said to be consumers instead of producers?
- v. Why is it better for a parasite to leave its host alive?
- vi. Where does the main source of energy come from in an environment?
- vii. What are two ways a mosquito may harm its host?

## 5. Concept Map

Complete the concept map.



- 1 Find out which plants and animals provide our most important foods. Then make a report to your class. Collect pictures of those plants and animals and prepare a chart to illustrate your report.
- 2 Find out which lichens are and what type of relationship they show.

Water, soil, air and light are abiotic components of an environment. Water is needed by all living things in the environment. Without water, plants would not be able to make food. Soil in an environment not only holds plants but it also provides many nutrients to plants. Air is also needed in the environment. Plants use carbon dioxide in photosynthesis. All living things use oxygen during respiration. Rapid development in science and technology has created a great problem of pollution. Investigate how water pollution, air pollution and land pollution affect living organisms in an environment.

### Computer Links

- <http://www.slideshare.net/schumaiers/13-interactions-among-living-things>
- <http://dnr.wi.gov/org/caer/ce/eek/earth/index.htm>