

Students' Learning Outcomes

After Completing this chapter ,the Students will be able to:

- Explain the ecosystem.
- Define the term habitat.
- Compare the different kinds of habitats.
- Investigate the various features that allow animals and plants to live in a particular habitat.
- Identify the factors that cause daily and yearly changes in a habitat.
- Explain how living things adapt to daily and yearly changes in their habitat.
- Explain the ways in which living things respond to changes in daily Environmental conditions such as light intensity, temperature and rainfall.
- Explain why food chains always begin with a producer.
- Illustrate the relationship between producers and consumers.
- Describe two food chains in the environment around them.
- Explain a food web.



Living things are all around us. They are in air, on land and in water.

Environment of an organism consists of all the living and non-living things around that organism. These living and non-living things affect the life of organism in one way or the other. We have learnt in class VI that organisms live where they can have their needs met. All the organisms depend on each other and on non-living things in an environment, we shall discuss it in this chapter.

4.1: Ecosystems

A system formed by the interaction of living organisms and non-living things in an environment is called an **ecosystem**. An ecosystem may be large, like a desert, or small, like a decaying log. Deserts, seashores, rivers, mountains, oceans, grasslands and rain forests are also some of the ecosystems.

4.1.1: Parts of an Ecosystem

All ecosystems are made of two parts:

1. The living or **biotic** part
2. The non-living or **abiotic** part

All the plants, animals, fungi and microorganisms make the living or biotic part of their ecosystem. Organisms of the same kind living and reproducing in a particular area is called **population**. All the populations of different kinds of organisms living together in an area make a **community** (Fig.4.1). Air, water, soil, sunlight and temperature make the non-living or abiotic part of an ecosystem.



Fig: 4.1. The number of wolves in this forest is their population. The wolves and all other animals, plants, microorganisms are included in the community of the forest ecosystem.

4.2: Habitat

The place where an animal or plant lives and reproduces is called its **habitat**. A habitat provides the things an organism needs, i.e. food, water, shelter, etc. Many populations of organisms live in each habitat.

*Animation 4.2 : Habitat
Source and Credit: ttrrobbin*

4.3: Kinds of Habitats

Organisms live in different kinds of habitats. An organism has special features to live in its habitat.

1. The Grassland Habitat

Grassland is a grassy, windy, partly-dry area. These areas receive a medium amount of rain. The soil found here is very fertile. Grasses are the producers in a grassland habitat. Mostly grazing animals like the sheep, goats, cows, antelopes, buffaloes, and deer are a few examples that are found in a grassland. A few flesh-eaters like cheetahs, foxes, wolves and a few birds like owls, eagles, hawks, etc. are also found in this habitat (Fig.4.2). Many kinds of insects are also found in grasslands.



Fig: 4.2. A grassland habitat

2. The Pond Habitat

A pond is an aquatic habitat which is rich in life. Plants like algae, duckweed, water lily, etc. are found in water. The animals like fishes, pond skaters, wolf spiders, snails, frogs and microscopic organisms are also found in the pond habitat (Fig.4.3).



Fig: 4.3. A pond habitat

3. The Desert Habitat

Deserts are the driest land areas. They receive very little rainfall. Rainwater quickly drains away due to the sandy soil. Some plants and animals have adapted to the limited supply of water. Cacti, euphorbia, lizards, snakes, kangaroo rats, camels, etc. are found in a desert habitat (Fig.4.4).



Fig: 4.4. A desert habitat

4. The Rainforest Habitat

Rainforests are always wet. They receive rain the whole year. A large number of plant types (herbs, shrubs and trees) is found here. Several varieties of butterflies, snakes, lizards, frogs, parrots, cockatoos, humming birds, cats and jaguars are also found in this habitat (Fig:4.5).

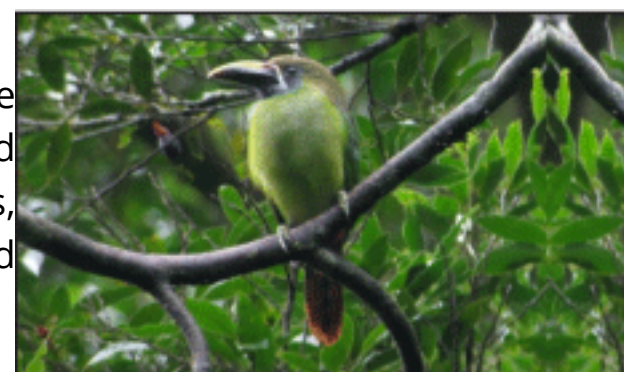


Fig: 4.5. A rainforest habitat

Extend Your Thinking

Explain, why a limited plant and animal life is found in deserts?

Activity 4.1

Observing a Pond Habitat

- Visit a nearby pond under the supervision of your science teacher.
- Observe the pond habitat and fill the table given below.



Producers	Consumers	Abiotic factors

4.3.1: The Factors Causing Changes in a Habitat

We know that light, temperature, air, soil and water are abiotic factors of the environment. Changes in these factors bring changes in the populations of a habitat. Some other natural factors and humans also cause changes in habitats.

Sunlight is the basic source of energy on the Earth. Plants use light energy to make their own food. All forms of life on the Earth depend directly or indirectly on green plants for food. They also need light for their survival (Fig.4.6). Light intensity affects the number of plants in a habitat. Decrease in number of plants may result in the decrease of animals' number in the habitat.

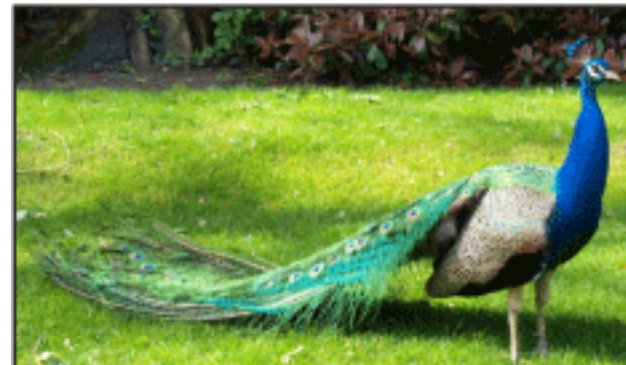


Fig: 4.6: Most plants and animals need light to survive.

Extend Your Thinking

How is the Sun important to the food supply of an ecosystem?

Temperature can also bring change in the population of a habitat. Any extraordinary rise or fall in temperature may disturb the habitat. For example, warm water contains less oxygen. What happens to the aquatic animals in the water as it gets hotter?

Water is essential for life. Where there is more water, more organisms are found there. Availability of water in a habitat can greatly influence its organisms.

Migration is another factor that changes the size of populations of a habitat. When a few individuals come to an area, it increases the size of the population in that area. Organisms migrate in search of better living places.

Animation 4.3: Indicator of a warming world
Source and Credit: myweb

Natural disasters such as droughts, floods, earthquakes, etc. can bring changes in habitats. A **drought** is a period when there is no rain for a long time in an area. The ponds or streams may dry up during a drought (Fig.4.7). Most pond plants and animals die or move to other ponds. Some crops do not grow in the area affected by a drought.



Fig: 4.7: Droughts and floods bring rapid changes in habitats.

When an area gets a lot of rain for a long time, there may be a **flood** in that area (Fig.4.7). Many plants and animals die or move to other drier places during a flood.

Sometimes **lightning** strikes a tree in a forest, causing forest fires. Plants and trees are burned and destroyed (Fig.4.8). Some animals die, others may move to safer places. It takes many years for a forest to grow back.

Earthquakes are sudden shocks of the Earth's surface. Earthquakes can change a habitat very quickly. On October 8, 2005, a massive earthquake damaged a widespread area across Pakistan. Over 70,000 people lost their lives. A large number of animals and plants were also destroyed.



Fig. 4.8: Sometimes lightning destroys the whole habitat.

Animation 4.4: Deforestation
Source & Credit: Coventryschools

Animation 4.5: Deforestation
Source & Credit: Coventryschools

Extend Your Thinking

Two kinds of birds live in the same tree. Kind A eats ants that live in the tree. Kind B eats ants and caterpillars. Which species is more likely to survive if the ant population decreases? Why?

How People Change Habitats

Human activities also change habitats. When habitats change, some organisms die or leave the habitat.

Farming is very important to human survival. People clear forests to get land for farming. People also cut down trees to get wood or paper. In this way they destroy the natural habitats of several plants and animals.

Pollution is another agent that brings changes in habitats. Pollution harms the land, water or air. Pollution is harmful to people, animals and plants. It destroys many habitats. Land pollution affects the land, destroying life, the environment and its habitats (Fig.4.10).

Air pollution affects the air we breathe in. Factories and motor vehicles add air pollution in the environment (Fig.4.11). Air pollution damages our health and our environment.



Fig. 4.9: Water pollution destroys water habitats.



Fig. 4.10: Litter kills plants and causes animals to get sick or die.



Fig. 4.11: Air pollution causes acid rain that can destroy pond or lake habitats.

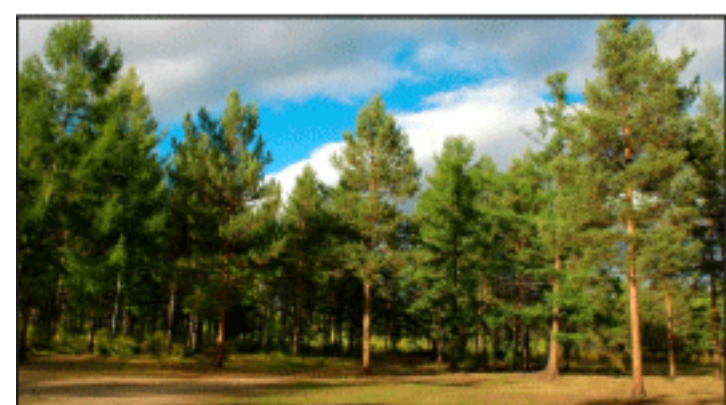


Fig. 4.12: Forests clean the air. We need forests to help keep the air clean.

How to Protect Habitats

Everyone can help protect habitats by saving the resources. Reducing, reusing, and recycling are three ways to save resources and protect ecosystem.

- **Reduce** means to cut down on the use of resources.
- **Reuse** means not to throw away things that can be used again.
- **Recycle** means to make new things from the used material.

Activity 4.2

Effect of Salts on the Growth of Plants

You will need

- 3 plastic cups
- garden soil
- 24 watermelon seeds
- normal water
- salty water
- very salty water

Procedure

1. Make holes in the bottom of plastic cups with a nail.
2. Label the cups A, B and C.
3. Fill the cups two-third with garden soil.
4. Sow 8 watermelon seeds in each cup.
5. Add some normal water to cup A, salt water to cup B and very salty water to cup C.
6. Every day add some more water to each cup.
7. Observe the cups every day for ten days and collect the data.

Number of seeds germinating to plants

	cup A	cup B	cup C
Day 1			
Day 2			

Things to think

1. How did salt in the habitat change the growth of plants?
2. Why did more plants grow in the cup A?

4.3.2: Adaptations of Organisms to Live in a Habitat

Plants and animals live in different habitats. They develop special features that help them to live in their habitats. These special features are called adaptations. An **adaptation** is a change in the organism's body or behaviour that helps it to survive in its habitat. Organisms that are not well adapted to their habitats may not survive.

Aquatic Habitats

Animals and plants living in aquatic habitats have such body parts that help them to live in water.

1. Streamlined body shape is an important adaptation for animals to move easily through water.
2. Webbed feet of ducks, seagulls and frogs work like oars to help move in water (Fig.4.13).
3. Floating plants like water hyacinth, duckweed and water lily have floating leaves and submerged roots. Their bodies contain air spaces. Their leaves have waxy covering to prevent water from collecting on them.



Fig:4.13: Webbed feet of a frog help to move in water.

Extend Your Thinking

All the plants and animals of an aquatic habitat will find difficulties in living in other habitats.
Why?

Land Habitats

Animals and plants living in land habitats also have adaptations to adjust well in their surroundings.

1. The arctic fox and polar bear have thick fur on their bodies. This thick fur keeps the body of these animals warm in freezing cold. Snowy owl has a thick coat of feathers.
2. Plants and animals of deserts are adapted to live in scorching heat. Some desert plants have tough, thick surfaces and thin, spiny leaves to reduce water loss. Most animals, such as gecko (lizard) and jackrabbit conserve water by living underground during the day and coming out at night. Camel's feet and large stomach are the adaptations to live in deserts (Fig.4.14).
3. Bird song, the roars of lions, howling of wolves, etc. are the adaptations of behaviour. Animals send and receive messages using sound (Fig.4.14).
4. Plants, too, have many adaptations to help them survive. Trees in rainforests grow very tall to get the sunlight (Fig.4.14).



Fig. 4.14: Some adaptations in animals and plants

Tidbit

The chameleon can change its colour and has a long sticky-tipped tongue. These adaptations help it to catch insects.



4.4: Biotic Components and Their Relation with Food Chains and Food Webs

Every living thing needs energy. Energy in an ecosystem passes from one organism to another. The basic source of energy on Earth is sunlight. Plants use sunlight and make food. Thus, plants are the **producers**.

Animals cannot make their own food. They eat plants or other animals that eat plants. Thus, animals are the **consumers**. A consumer may be a primary consumer (herbivore), a secondary consumer or a tertiary consumer. Organisms eat organisms and are in turn being eaten by others. This feeding relationship among organisms is called a **food chain**. Most food chains start with producers like:

grass → zebra → lion
 leaves → caterpillar → bird → hawk

Green plants are producers so, they are the first in most food chains. Animals that feed on plants are the second in a food chain. They are called primary consumers. Animals that eat primary consumers are called secondary consumers. Secondary consumers may be eaten by tertiary consumers.

EXAMPLES OF FOOD CHAINS

1- In a grassland habitat a grasshopper eats grass. A snake may eat this grasshopper. This snake may become the food of a hawk.



2- Algae are the producers in this sea food chain while others are consumers.

**Extend Your Thinking**

Even though secondary consumers do not eat plants, how are plants important to their food supply?

Activity 4.3**Food Chains**

A plant or an animal in a food chain is called a link.

(a) Construct two food chains with

(i) three links (ii) four links

(b) Write down the producers, primary consumers, secondary consumers and tertiary consumers in food chains constructed in part (a).

Food Web

An organism can be a part of many food chains. Several food chains in an ecosystem overlap to form a network called **food web**.

Example 1: A lion does not feed entirely on deer but it also hunts cows and goats. Similarly owl and hawk may also take different organisms as their food. So, most animals feed on one or more than one kind of animals. Therefore many food chains form a kind of network or a food web.

Example 2: A snake does not feed on frog alone. It also eats birds, rats and even rabbits. Birds eat grains. They also eat insects, spiders and worms. If we arrange food chains in an ecosystem, it takes the form of a web (Fig.4.15).

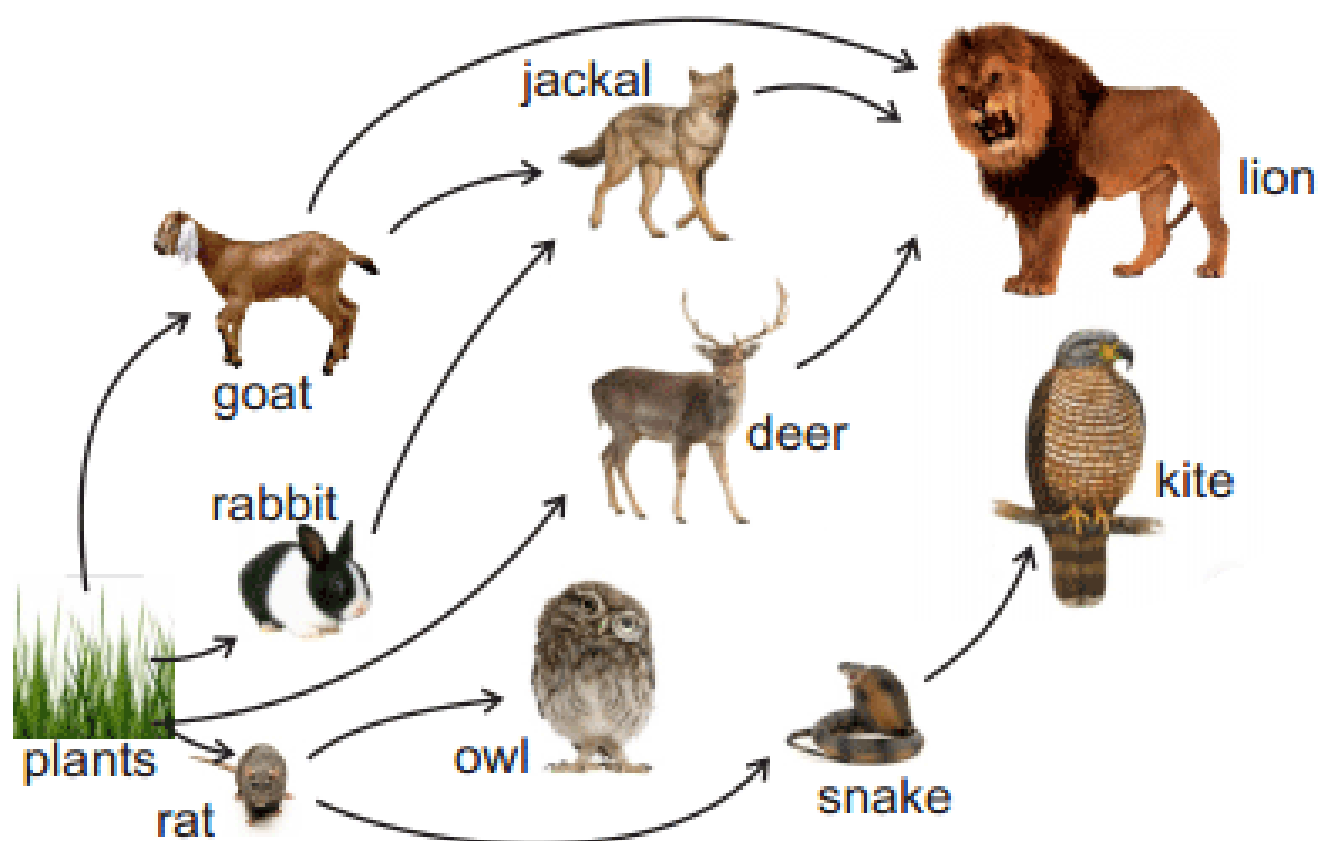


Fig. 4.15: Several food chains are present in a food web.

Science, Technology and Society

Bacteria and fungi are decomposers. They break down the dead bodies of plants and animals into simpler substances. These substances mix with soil and again are available to green plants to make their food. Without decomposers recycling of nutrients is impossible. How can we use decomposers to reduce the use of expensive chemical fertilizers in our country.

Extend Your Thinking

What will happen to all animals of a food web, if green plants are removed?

Key Points

- Ecosystem is the system formed by the interaction of living organisms and non-living things in an environment.
- A habitat is the natural home of an organism where it lives and reproduces.
- Grassland is a grassy, windy, partly-dry area. A pond habitat is rich in life. Desert are the driest land areas with a few number of plants and animals. A large number of plants and animals is found in a rainforest.
- Plants and animals adapt to live in a particular habitat.
- Light intensity, temperature, water, droughts, floods, earthquakes, etc. are the factors that can bring changes in a habitat.
- People can also bring changes in habitats by adding pollution.
- Animals and plants adapt to their environment for their survival.
- Green plants make food, so they are producers. Animals eat plants so they are consumers.
- A food chain and a food web are feeding relationships among organisms.
- The feeding relationship among organisms is called a food chain.
- Several food chains in an ecosystem overlap to form a network called food web.

Questions

1. Complete each of the following sentences by writing the correct term.

- The basic source of energy for every ecosystem _____
- Any living thing in the environment _____
- All the populations living in an area make a _____
- Several food chains overlap in a _____
- Breakdown the bodies of dead animals and plants _____

3. Give short answers.

- What kinds of organisms are there at the start of most food chains?
- Name biotic factors of an ecosystem.
- How are producers, consumers and decomposers related to each other?
- Define an ecosystem.
- What do you mean by community in an ecosystem?
- Name the ways by which we can save our natural resources.

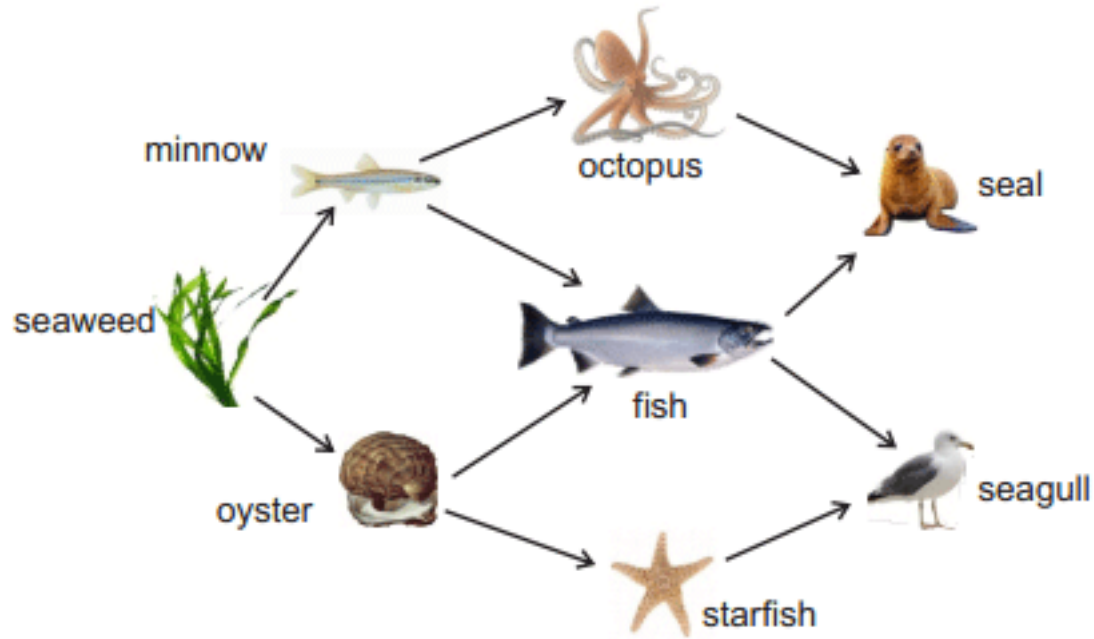
4. What is a habitat? Describe its few kinds.

5. Describe factors that can bring daily and yearly changes in the habitat.

6. Describe adaptations of some aquatic animals to live in their habitat.

7. Explain a food chain and a food web with examples.

Q8. Look at the following food web and answer the questions given below.



i. Name the producer in the food web.

ii. From where does the producer get energy?

iii. Name three consumers in the food web.

iv. Write down two food chains in this food web.

**Computer
Links**

For more information visit:

- http://www.bbc.co.uk/schools/ks3bitesize/science/organisms_behaviour_health/food_chains/revise2.shtml
- <http://www.geography.learnontheinternet.co.uk/topics/ecosystem.html>

CHAPTER

5

Water

*Animation 5.1 :Water Molecule
Source and credit: eLearn.punjab*

Students' Learning Outcomes

After completing this chapter, the students will be able to:

- Describe the ways in which clean water is vital for meeting the needs of humans and other living things.
- Identify the sources of water.
- Recognize the substances present in water that make the water impure.
- Suggest different ways to clean the impure water.
- Describe various uses of water in our country.
- Investigate the consumption of water in our daily life and suggest ways to reduce wastage of water.



All is born of water. (Al-Quran)