

2 Diversity in the Living World

“

छायामन्यस्य कुर्वन्ति तिष्ठन्ति स्वयमातपे ।
फलान्यपि परार्थाय वृक्षाः सत्पुरुषा इव ॥

(सुभाषित)



0677CH02

Trees stand in the Sun and give shade to others. Their fruits are also for others. Likewise, good people bear all hardships and bring welfare to others. They give to others whatever they have earned.

(Wise saying)

”



It is a pleasant morning after yesterday's refreshing rain. Dr Raghu and Maniram *chacha* (uncle) have been invited to the school by the science teacher, Madam Sulekha, to



facilitate an exciting nature walk. Dr Raghu is a scientist at the nearby Research Laboratory and Maniram *chacha* is an elderly person from a nearby community. Maniram *chacha* is an expert in mimicking bird calls. He is also brilliant at identifying a variety of plants and animals.

To prepare them for the nature walk, Dr Raghu informs the students that the objective of this walk is to experience the beauty and variety of plants and animals in the nature. The students are excited to join them. They are curious to interact and learn from them. The teacher advises the students to carry a notebook, a pen and a water bottle.

As they walk, they begin exploring the plants and animals around them. Dr Raghu advises the students to notice the variety of smells in the park and emphasises respecting all living creatures and observing them without disturbing. Maniram *chacha* tells the students to not only observe different plants and animals but also to carefully listen to different sounds. The students come across a variety of plants, including grasses, bushes, and large trees. They also observe a variety of birds sitting on the branches of trees, butterflies moving from flower to flower and monkeys jumping from one tree to another. They record their observations in their notebooks and discuss them with Dr Raghu and Maniram *chacha*.

The students can hear the chirping of birds. Dr Raghu informs them that each bird has a unique chirp. This is an example of diversity in nature. Dr Raghu requests Maniram *chacha* to mimic calls of some birds. Maniram *chacha* mimics different bird calls. The students enthusiastically start copying him.

Have you ever observed different plants and animals around you? Share and discuss your observations with your friends and teacher.

2.1 Diversity in Plants and Animals Around Us

Activity 2.1: Let us explore and record

- ◆ Plan a nature walk with your teacher to a park or a nearby forest.
- ◆ While on the nature walk, **observe** different plants, insects, birds, and other animals. Also, note the weather conditions, whether it is hot, cold, windy and so on.

- ◆ You can collect different types of fallen leaves or flowers and **create** a scrapbook.
- ◆ Take care of the plants and animals in nature. Ensure that you do not disturb the plants and animals in the park. Do not pluck leaves and flowers.
- ◆ **Record** your observations in Table 2.1 about the features of stems, leaves, flowers and anything interesting in various plants. Some examples have been given for you in Fig. 2.1 and Table 2.1.



(a) Grass



(b) Tulsi (Holy Basil)



(c) Hibiscus (Gudhal)

Fig. 2.1: Examples of different features of some plants

Table 2.1: Observations of different plants around us

S. no.	Local name of plant	Stem	Leaves (shape/arrangement of leaves)	Flowers	Any other observations and features
1.	Common grass	Soft and thin	A single leaf grows alternatively from different points on the stem		Green leaves
2.	Tulsi	Hard and thin	Arrangement of a pair of leaves in the opposite directions	Pinkish purple	
3.	Hibiscus	Hard			
4.	Neem	Hard and thick			Leaves with smooth surface
5.	Any other				

What similarities and differences did you find among the plants that you observed?

You must have observed that plants have a variety of features such as—

- ◆ tall/short, hard/soft stem
- ◆ different shapes of leaves and their arrangement on the stem or branches
- ◆ flowers varying in colour, shape, and scent

Now, create a list of animals you observed during this walk or from your previous experiences. Record the places where they live, the food they eat and the way they move around in Table 2.2. Some examples have been provided for you.

Table 2.2: Observations of different animals around us

Name of the animal (local name)	Place where they live	Food they eat	The way they move around	Any other observations and features
Crow	Tree	Insects	Fly and walk	Carrying a twig in its beak
Ant	Nest in soil and burrow	Leaves, seeds and insects		Have six legs
Cow		Grasses, leaves		
Any other				

What are the similarities and differences among the animals that you have observed and recorded in Table 2.2?

You would have observed that some animals live on land while some others live on trees. Birds live on trees. Fish live in water and some animals like frogs live on land as well as in water. Animals consume a diverse range of foods and exhibit a variety of movements.

Sketch the plants and animals observed by you in your notebook or prepare a scrapbook with leaves, flowers from different plants and feathers from animals. Write all the details you have gathered about them.

While travelling to and from school, observe your surroundings and look out for a variety of plants and animals. Add the name of any plant or animal that you have not listed before in Tables 2.1 and 2.2.

Activity 2.2: Let us appreciate

- ◆ Close your eyes for 30 seconds and think of one plant and one animal that you have closely observed and appreciated very much.
- ◆ Now each one of you can draw the plant and animal that you thought of on the blackboard.
- ◆ What are your observations about the various plants and animals that have been drawn?



- ◆ How many different plants and animals did the entire class draw on the blackboard?
- ◆ Do you think that there may be many more varieties of plants and animals other than those drawn on the board?

The variety of plants and animals found in a particular region contributes to the **biodiversity** of that region.

Each member in the biodiversity of a region has a different role to play. For example, trees provide food and shelter to some birds and other animals, animals help in spreading seeds after eating fruits, and so on. Can you think of more such examples? This shows that plants and animals are dependent on each other.

2.2 How to Group Plants and Animals?

How would you arrange your books and notebooks in groups? Would arranging them in groups help you better organise your school bag?

Now, let us look at the world around us. We are surrounded by a variety of plants and animals with different features about which you have learnt in section 2.1. We can group them based on similarities and differences among them.

Activity 2.3: Let us group

- ◆ Collect pictures of various other plants and animals. Cut their pictures from old magazines, newspapers, charts and other sources. Paste each of these pictures on a different card.
- ◆ Divide your class in groups of 5–6 students each.
- ◆ Pool the cards prepared by the students in your group.
- ◆ Observe various features of plants and animals shown on the cards.
- ◆ Recall the features of plants and animals that you have listed in Tables 2.1 and 2.2.
- ◆ **Group** them on the basis of common features.
- ◆ Share and discuss the basis of grouping you have made with other groups in your class.

You will be surprised to see that the basis used by different groups may vary. What do you think are the reasons behind it? Different students might have chosen different common features for the grouping. For example, some students may have chosen the height of plants as the basis for grouping while others might have chosen presence or absence of flowers as the basis for grouping of plants (See Fig. 2.2).



Fig. 2.2: Some possible criteria of groupings of plants and animals

You may have grouped animals based on varied features, such as what they eat, where they live, what colour they are and how they move.

What is the importance of grouping? Grouping makes it easier to understand and study plants and animals on the basis of their similarities and differences.

You will learn more about the importance of grouping in our daily lives in the chapter, ‘Materials Around Us’.

2.2.1 How to group plants?

You must have noticed that plants show variation in the features related to stems, leaves, flowers, and more. The stems of different plants vary in thickness, height, and hardness, while the leaves vary in shape, colour, size and arrangement. You might have tried grouping the plants in Activity 2.3 using one of these features.

You might have also learnt in earlier classes that plants can be grouped into herbs, shrubs, and trees based on their height and types of stem. Let us study the features of plants in more detail and group them on that basis.

Activity 2.4: Let us group

- ◆ Let us go on a nature walk again for some more interesting observations.
- ◆ Look closely at the height of different plants. Are these plants shorter than you, as tall as you, or taller than you?
- ◆ Is the stem brown or green? Touch and feel the stems and try to bend them gently. Can you bend the stem easily, or is it stiff? Take care that the stems do not break.
- ◆ Also, observe from where the branches of the plants arise—whether they arise close to the ground or higher up on the stem. Fill in your observations in Table 2.3. A few examples are already given.

Table 2.3: Grouping of plants based on height and nature of stem



(a) Tree



(b) Shrub

What differences do you observe among herbs, shrubs, and trees? How can you group plants as herbs, shrubs, and trees based on the data entered in Table 2.3?

Some plants grow really tall and have hard, thick, brown, and woody stems. Their branches typically start higher up on the stem and away from the ground. These plants are called **trees**. For example, a mango tree (Fig. 2.3a).



(c) *Herb*

Some plants are not as tall as trees. These plants often have many brown woody stems that start branching very close to the ground. These stems are hard but not as thick as the stem of a tree. These plants are called **shrubs**. For example, a rose plant is a shrub (Fig. 2.3b).

Some plants are typically small with soft and green stems. These are known as **herbs**. For example, a tomato plant is a herb (Fig. 2.3c).

Some plants with weak stems need support to climb and grow, and are called **climbers**. Some plants creep along the ground and are called **creepers**.

What can be other features on the basis of which you can group plants? Let us perform another activity.

Activity 2.5: Let us compare

- ◆ Look at the leaves of different plants collected by you, during the nature walk.
- ◆ Do you notice any variation in the shape and structure of these leaves?

You may observe thin lines on the leaves of the plants (Fig. 2.4a). These are **veins**. The pattern of veins on the leaf is called **venation**. What differences do you see in the veins of leaves shown in Fig. 2.4a and Fig. 2.4b?



(a) Hibiscus leaf with
reticulate venation



(b) Banana leaf with
parallel venation



(c) Grass leaf with
parallel venation

Fig. 2.4: Leaves showing different types of venation

In some leaves, you can observe a net-like pattern of veins on both sides of a thick middle vein. This pattern is called **reticulate venation**. For example, leaves of hibiscus exhibit reticulate venation (Fig. 2.4a). In some leaves, you may observe that the veins run parallel. This pattern is called **parallel venation**. For example, the leaves of banana plants and grasses exhibit parallel venation (Fig. 2.4b and Fig. 2.4c).

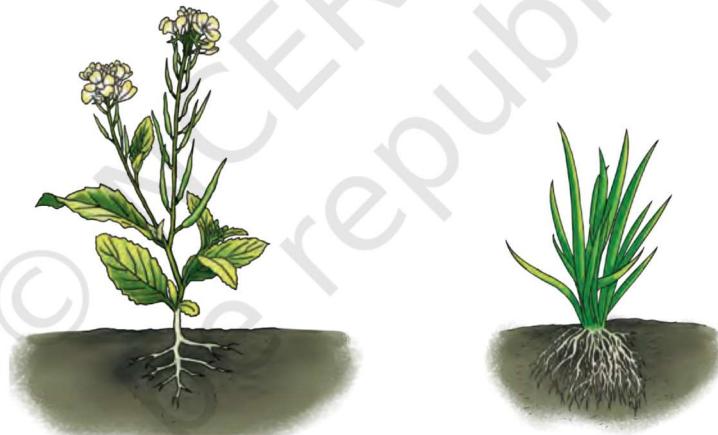
Do you think that plants can be grouped on the basis of venation present in their leaves?

Now, let us try to **explore** roots of the plants. Do all plants have roots? Are these roots similar?

Activity 2.6: Let us find out

- ◆ Visit an open area where wild herbs and grasses are growing. You may use small herbs for this exercise.
- ◆ Using a *khurpi* (trowel), carefully dig out a few different herbs without damaging the roots. To do this, you may wet the soil and loosen it.
- ◆ Wash the roots with water and observe them.
- ◆ After you are done observing, make sure to replant the herbs so that they may continue to thrive and grow.

What are the similarities and differences in the roots of the plants collected by you? What differences do you see in the roots of plants shown in Fig. 2.5a and Fig. 2.5b?



(a) Taproot system in
a mustard plant

(b) Fibrous root system
in common grass

Fig. 2.5: Types of roots

Carefully observe the roots of a mustard plant in Fig. 2.5a. The roots of this plant consist of one main root and small side roots arising from it. The main root is called **taproot**. Another example of a plant having taproots is hibiscus observed by you in Activity 2.1. The plant in Fig. 2.5b is a common grass plant. The roots of this plant appear as a bunch of similar-sized thin roots arising from the base of the stem. Such roots are called **fibrous roots** (Fig. 2.5b). Does your collection include any other grasses? What kind of roots do they have?

Is there any relation between the type of leaf venation and the type of root of the same plant? How do we find this out?

Activity 2.7: Let us relate and analyse

- ◆ Collect saplings of five common plants from your school nursery or any other nurseries to plant in your school garden. Examples of such plants can include lemongrass, marigold, *sadabahar* (periwinkle), and others.
- ◆ Before planting them, observe their roots and the venation in their leaves.
- ◆ Record your observations in Table 2.4.

Table 2.4: Types of leaf venation and roots

S. no.	Name of the plant	Type of leaf venation (reticulate/parallel)	Type of root (fibrous/tap)
1.	Lemongrass	Parallel	Fibrous
2.			
3.			
4.			
5.			

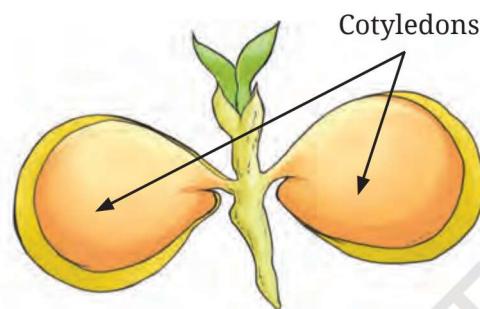
Do you observe any relation between the leaf venation and types of root in these plants? A *sadabahar* plant has a taproot and its leaves have reticulate venation. Do other plants with reticulate venation have taproots too? Lemongrass, on the other hand, has fibrous roots and its leaves have parallel venation. Do other plants with parallel venation have fibrous roots too? Generally, plants with reticulate venation have taproots while those with parallel venation have fibrous roots.

Chickpea (*chana*) is another example of a plant with taproots and reticulate venation in leaves. Wheat is an example of a plant with fibrous roots and parallel venation in its leaves.

Is there any relation among the seed of a plant, types of root and leaf venation? Are all seeds similar?

Activity 2.8: Let us compare

- ◆ Soak some chickpea and maize seeds in water for two or three days.
- ◆ Remove the seed coat of a chickpea. Now, observe the structure of the chickpea and maize seeds. Are they similar or different?



(a) Dicot seed (chickpea)



(b) Monocot seed (maize)

Fig. 2.6: Dicot and monocot seeds

You would notice that chickpea seeds are split into two parts (Fig. 2.6a). Each part is called a **cotyledon**. Plants that have seeds with two cotyledons are called **dicotyledons (dicots)**. Maize has a single thin cotyledon (Fig. 2.6b). Plants with such seeds are called **monocotyledons (monocots)**.

What relation do you observe among leaf venation, root types and the number of cotyledons in seeds of a plant? **Dicot plants** have reticulate venation and a taproot system while **monocot plants** have parallel venation and a fibrous root system.

You have learnt about some features used for grouping plants. Now, let us explore the grouping of animals in more detail.

2.2.2 How to group animals?

Just like plants, animals too are significantly different from one another. How can we group such a wide variety of animals? What features can you think of to group them? In Activity 2.3, you have already set some bases for grouping animals. Let us explore a few of these in more detail.

Activity 2.9: Let us find out

You have recorded the movement of a few animals in Table 2.2. You may have also observed how other animals move from place to place. Let us now think about the types of movement in animals. A number of animals are shown in Fig. 2.7. You can add more animals that you may have observed and create a poster on the variety of animals. Which body parts are used by the animals in the poster you created and those in Fig. 2.7 for movement?

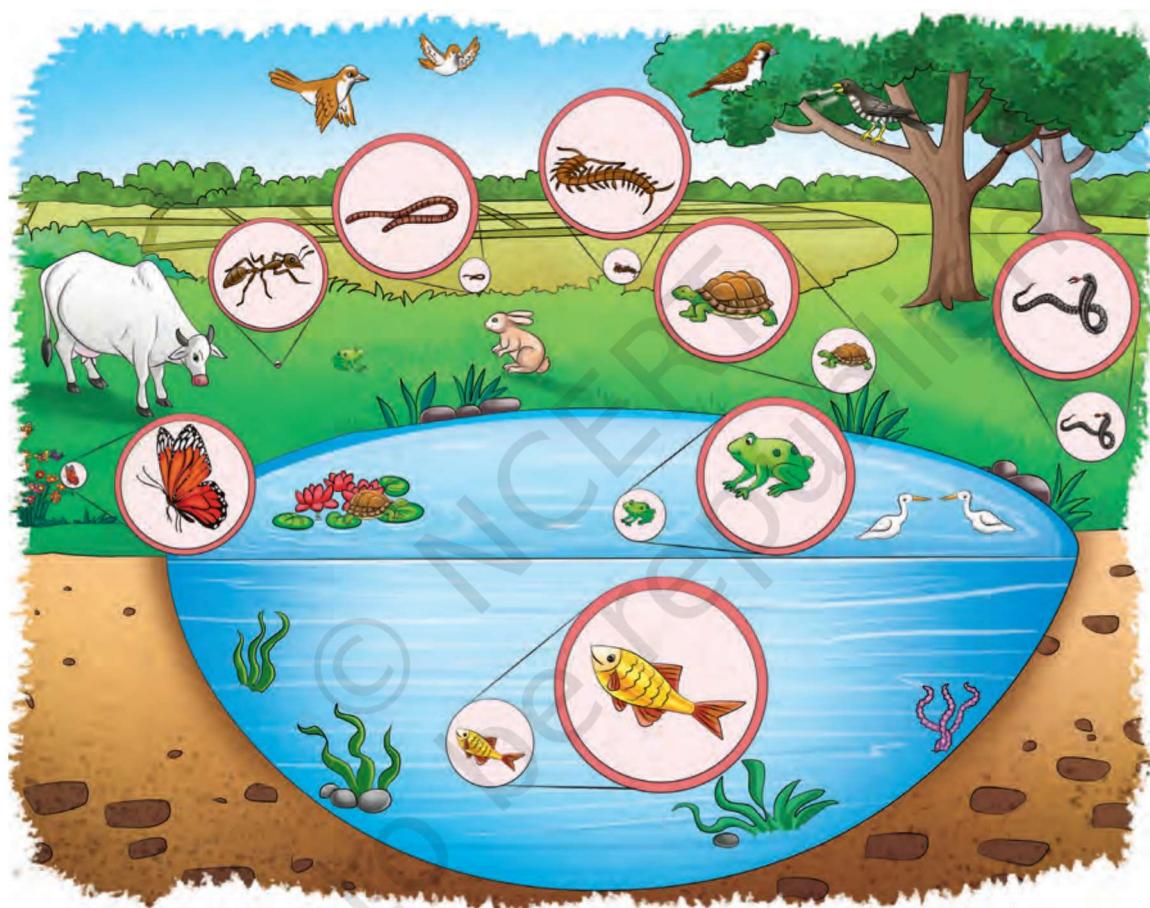


Fig. 2.7: Diversity in animals

- ◆ List these animals in Table 2.5.
- ◆ Note the ways in which these animals move and name the body parts used for movement. Some examples are given in Table 2.5.

Table 2.5: Movements in animals and their body parts involved

S. no.	Name of the animal	Type of movement	Body parts used for movement
1.	Ant		Legs
2.	Goat	Walks and jumps	Legs
3.	Pigeon	Walks and flies	Legs and wings
4.	Housefly	Walks and flies	Legs and wings
5.	Fish		Fins
6.	Any other		
7.			
8.			

What conclusions can you draw from the data given in Table 2.5?

Different animals have different types of movement. Animals can fly, run, crawl, walk, hop or jump, and so on. They use different body parts for moving from one place to another. They may use wings, legs, and other parts that help them to move. Here, we have identified animals based on the types of movement and the body parts used for movement. How can we group animals based on their movements? Additionally, many animals differ from each other in shape, size, structure, colour, and other features. Some of these features can also be used to group animals in various ways. Like plants, grouping of animals is important for understanding their diversity.

Know a scientist

Janaki Ammal (1897–1984) was an Indian botanist dedicated to environmental work and helped to document and preserve India's rich plant biodiversity. She played a key role in the 'Save Silent Valley' movement. As the head of the Botanical Survey of India, she initiated programmes to document the plant diversity of India.



Success Story—Save Silent Valley Movement

This is a real story of a forest in the Palakkad district of Kerala. It is about preserving untouched beauty of a moist evergreen forest and its rich biodiversity. The now-famous Silent Valley was saved by a remarkable movement led by common people who were not even residing in the vicinity of the forest. The battle against the proposal of a hydroelectric dam across the Kunthipuzha river persisted for 10 years. At that time, people used all possible available means, such as widespread awareness programmes, letters to editors, articles in, newspapers, seminars, and petitions and appeals in court. The movement was successful in saving the Silent Valley.



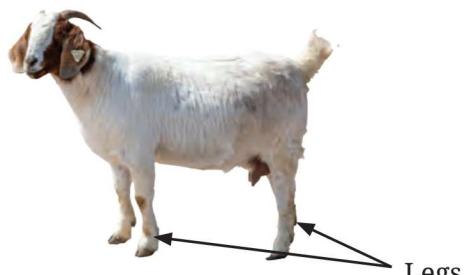
More to know!

2.3 Plants and Animals in Different Surroundings

You might have observed during nature walks that different animals live in different surroundings. You have also recorded movement of animals in Table 2.5. Does the movement of these animals depend upon their surroundings? Let us consider fishes and goat as examples. Fishes live in water. They have streamlined bodies and fins for movement in water (Fig. 2.8a). Goats live in grassy areas and move with the help of legs (Fig. 2.8b). The sizes and shapes of animals also differ from one another.



(a) A fish swims in water with the help of fins



(b) A goat walks on the ground with the help of legs

Fig. 2.8: Body parts used by animals for movement

Activity 2.10: Let us compare and analyse

- ◆ Look at Table 2.6. Recreate a similar table on the blackboard.
- ◆ List the names of plants and animals you or your classmates have observed in the regions given in the table or already know about. A few examples are given. You can add more.

Table 2.6: Animals and plants found in different surroundings

S. no.	In the desert	On mountains	In the ocean	In the forest	Any other region
1.	Camel	Deodar tree	Fish	Lion	
2.	Any other				
3.					



Fig. 2.9: Cactus with thick and fleshy stems in a desert

What are your observations regarding plants and animals found in various regions? Discuss your observations with your classmates.

You might observe from Table 2.6 that the plants and animals found in one kind of region are different from those found in another kind of region.

During a discussion in the classroom, Alex recalls that he observed cactus plants with thick and fleshy stems in the deserts of Rajasthan (Fig. 2.9). Maya shares that she saw deodar trees in the Himalayas of Himachal Pradesh (Fig. 2.10). These trees are conical in shape and have flexible and sloping branches.

Notice that these two types of plants found in different regions are different



Fig. 2.10: A deodar tree in the mountains

from each other. Why is it so? Why does the biodiversity of a region vary from that of another? Let us find out.

There is very little water available in the deserts. A hot desert is typically very hot during the day and very cold at night. Therefore, you will find plants and animals in these areas that can tolerate and survive both the hot conditions during the day and cold conditions at night. The fleshy stems of plants found in the desert can store water and help them tolerate the hot conditions in these places.

The mountains in extremely cold regions experience frequent snowfall. In order to survive in such conditions, some of the trees have the ability to let the snow slide off easily. Conical shape and sloping branches of deodar trees enable them to do so easily.

You must have understood by now that the biodiversity varies from region to region because of diverse conditions.

Look at the images of a camel from the hot desert of Rajasthan (Fig. 2.11) and a camel from the cold desert of Ladakh (Fig. 2.12). What are the differences you observe between them? What advantages do these differences provide to these camels?

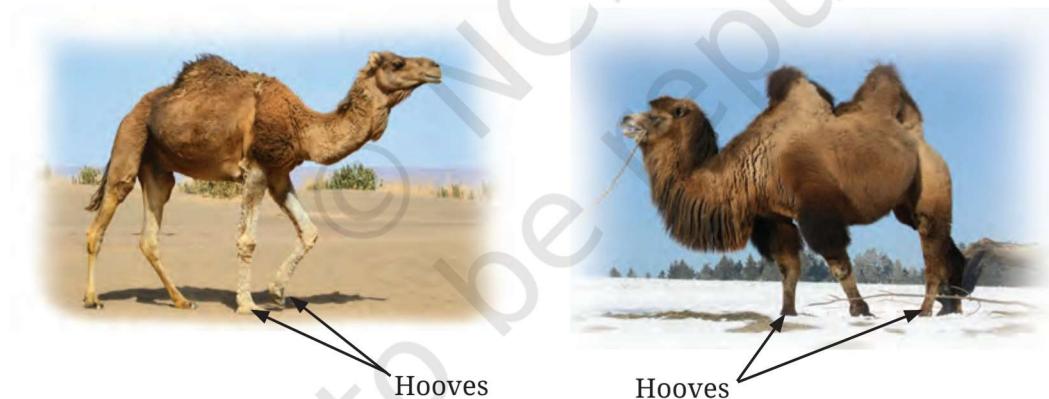


Fig. 2.11: A camel living in the hot desert of Rajasthan

Fig. 2.12: A camel living in the cold desert of Ladakh

The camel of the hot desert has long legs with wide hooves. Alex shares that his grandmother told him that the long legs and wide hooves help these camels to walk on the sandy desert without sinking into the sand. On the other hand, the height and legs of camels of a cold desert are comparatively shorter than those found in a hot desert. These short legs allow them to walk easily in mountainous regions.

In deserts, food is not available easily. Camels store food in their humps. Camels found in the hot desert have one hump each that helps them to survive during the scarcity of food. Camels found in the cold desert have two humps each. These two humps shrink in late winters because there is not much food available in the cold desert and they have to use food stored in their humps during that time. Moreover, they grow long hair from head to neck, which help them survive the cold winters of Ladakh.

What other features can help camels to survive in the desert?

Other students also start sharing their observations. Kashi from Rajasthan says that camels excrete small amounts of urine, their dung is dry, and they do not sweat. As camels do not lose much water from their bodies, they can survive for many days without drinking water.

Maya talks about seeing plants with beautiful bright flowers, **rhododendrons**, in the Shola forests of Nilgiris. Here, rhododendrons are of shorter height and have smaller leaves to survive through the heavy winds on mountain tops. However, Pema, who is from Sikkim, mentions that she has observed rhododendrons in the nearby mountains to be taller (Fig. 2.13). So, even plants such as rhododendrons may exhibit different features in different regions to survive the conditions of those regions.



Fig. 2.13: Different features of rhododendrons

Sagar tells his classmates that he went to the Andaman and Nicobar Islands with his parents for a special event. He saw huge whales and colourful fish in the ocean. His father explained that the streamlined body of fish helps them to swim in water.

We have learnt that the plants and animals living in a particular region have special features that make them fit to survive there. The special features that enable plants and animals to survive in a particular region are called **adaptations**.

The shape of the deodar tree and the height of the rhododendron are adaptations that enable them to survive in the mountainous regions.

The place where plants and animals live is called their **habitat**. For example, the habitat of sea turtles is the sea or the ocean. The habitat of a camel is the hot or the cold desert, and the habitat of a rhododendron is the mountains. The habitat of plants and animals provides them food, water, air, shelter and other needs for their survival. Many types of plants and animals may share the same habitat. Habitat plays an important role in shaping the biodiversity of a region.

Know a scientist

Salim Ali (1896–1987) travelled across India to observe diversity in birds. He prepared a list of birds and documented their travel routes and habitats. He recorded the regions with high diversity of birds and took measures to conserve these regions. Keoladeo National Park in Bharatpur, Rajasthan and Ranganathittu Bird Sanctuary in Mandya, Karnataka are examples of regions he preserved. He wrote a landmark series of 10 books on birds of the Indian Subcontinent. He is referred to as the ‘Birdman of India’. He was awarded Padma Vibhushan in 1976.



What are the different ways in which you can group plants and animals based on their habitats? One way is to group them into those ‘that live on land’ and those ‘that live in water’.

The plants and animals that live on land are said to live in **terrestrial** habitats. Some examples of terrestrial habitats are forests, deserts, grasslands, and mountains.

The plants and animals that live in water are said to live in **aquatic** habitats. Some examples of aquatic habitats are ponds, lakes, rivers, and oceans.

Some animals, such as frogs, can live in water as well as on land. These are called **amphibians**.

What would happen if the habitat of a plant or an animal is damaged? What would happen if a goat does not get grass to eat? Can a fish survive without water?

Check with your parents, grandparents, and neighbours to know about the plants, birds, insects or any other animal they used to see frequently in their childhood but do not see as often now. These changes often happen when habitats are damaged. The damage to habitats of plants and animals results in loss of their homes, food, and other resources. This leads to the loss of biodiversity.

The population of the Bengal Tiger, Cheetah, and Great Indian Bustard has declined in India due to loss of natural habitats caused by human activities. The Government of India has initiated several projects to conserve our biodiversity. ‘Project Tiger’ was initiated in 1973 to protect the declining population of the Bengal Tiger. The ‘Cheetah Reintroduction Project’ was initiated in 2022 to restore the population of the Cheetah. Similarly, habitats of the Great Indian Bustards have been declared as Protected areas in the states of Gujarat, Rajasthan and Maharashtra.



Bengal Tiger



Cheetah



Great Indian Bustard



**Do you
know?**

Traditionally Protected Forests: Sacred Groves

Sacred groves are undisturbed patches of forests. Their sizes may vary from quite small to very large. Sacred groves are found all over India. They are home to different kinds of plants and animals, including numerous medicinal plants. These are protected by the local community and no one is allowed to harm any animals and cut trees in these groves, or disturb the area. This way, sacred groves are a community protected treasure of biodiversity. Find out about the sacred groves in your region.



Sacred grove from the Western Ghats



More to know!

We must protect biodiversity to ensure our planet is full of life, helping plants and animals to survive and thrive.

Keywords

Adaptation

Monocot plants

Analyse

Amphibians

Parallel venation

Compare

Aquatic

Reticulate venation

Create

Biodiversity

Sacred groves

Explore

Cotyledon

Shrubs

Group

Dicot plants

Taproot

Observe

Fibrous root

Terrestrial

Record

Habitat

Tree

Relate

Herbs

Venation

Summary

Key Points

- ◆ We are surrounded by a large variety of plants and animals. Such variety of plants and animals is a part of biodiversity.
- ◆ Plants and animals can be grouped on the basis of similarities and differences among them.
- ◆ Plants have similarities and differences based on features associated with roots, stems, leaves, flowers, and so on.
- ◆ The method of arranging things into groups based on their common features is called grouping.
- ◆ Plants can be grouped into herbs, shrubs, and trees based on their heights, types of stem, and branching patterns.
- ◆ Plants can also be grouped as dicotyledons (dicots) and monocotyledons (monocots) based on the number of cotyledons in their seeds.
- ◆ Monocots generally exhibit parallel venation in their leaves and possess fibrous roots while dicots typically exhibit reticulate venation in their leaves and possess taproots.
- ◆ Animals have different types of movement that can be a basis for their grouping.
- ◆ Biodiversity of different regions varies because of distinct environmental conditions.
- ◆ The special features that enable plants and animals to survive in a particular region are called adaptations.
- ◆ The place where plants and animals live is their habitat.
- ◆ Based on their habitats, animals and plants can be grouped as terrestrial and aquatic.
- ◆ Due to damage of their habitats, plants and animals lose their homes, food and other resources resulting in the loss of biodiversity.
- ◆ We must protect biodiversity to ensure that our planet is full of life, helping plants and animals to survive and thrive.

Let us enhance our learning



1. Here are two types of seeds. What differences do you find among the roots and leaf venation of their plants?

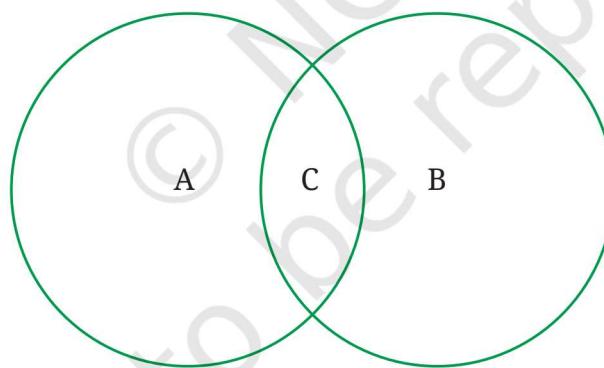


(a) Wheat



(b) Kidney beans

2. Names of some animals are given below. Group them based on their habitats. Write the names of aquatic animals in the area marked 'A' and terrestrial animals in the area marked 'B'. Enter the names of animals living in both habitats in part 'C'.
Horse, Dolphin, Frog, Sheep, Crocodile, Squirrel, Whale, Earthworm, Pigeon, Tortoise



3. Manu's mother maintains a kitchen garden. One day, she was digging out radish from the soil. She told Manu that radish is a kind of root. Examine a radish and write what type of root it is. What type of venation would you observe in the leaves of radish plant?
4. Look at the image of a mountain goat and a goat found in the plains. Point out the similarities and differences between them. What are the reasons for these differences?

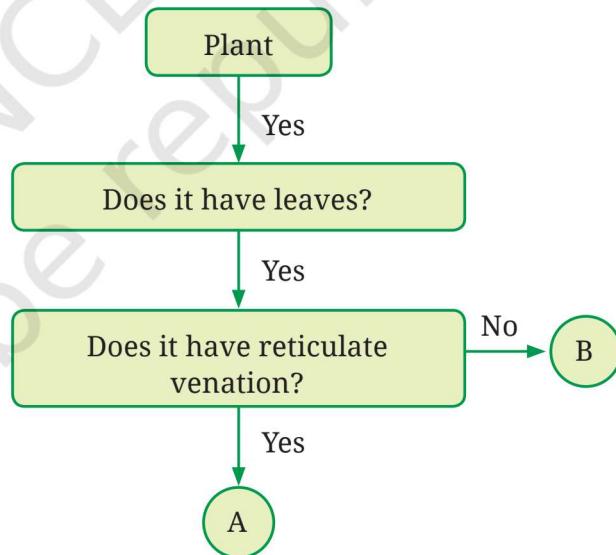


(a) Mountain Goat



(b) Goat found in the plains

5. Group the following animals into two groups based on any feature other than those discussed in the chapter—cow, cockroach, pigeon, bat, tortoise, whale, fish, grasshopper, lizard.
6. As the population grows and people want more comfortable lives, forests are being cut down to meet various needs. How can this affect our surroundings? How do you think we can address this challenge?
7. Analyse the flowchart. What can be examples of 'A' and 'B'?

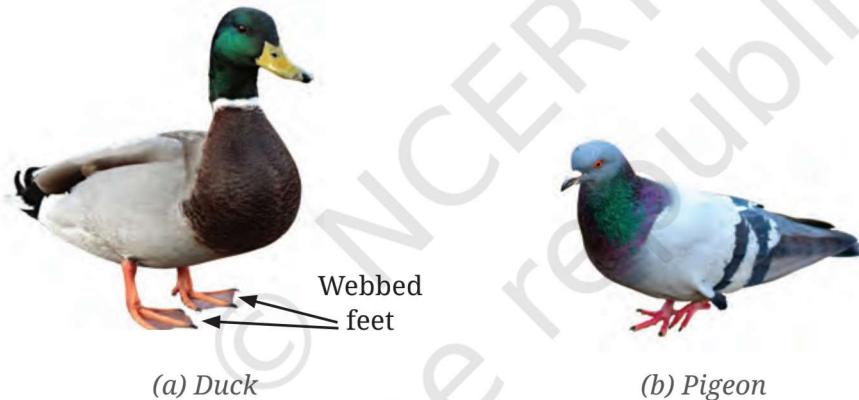


8. Raj argues with his friend Sanjay that “*Gudhal* (hibiscus) plant is a shrub.” What questions can Sanjay ask for clarification?

9. Based on the information in the table, find out examples of these plants for each group.

Group	Type of seed	Type of root	Examples
A	Dicot	Taproot	
B	Monocot	Fibrous roots	

- (a) What other similarities do plants of group A have?
 (b) What other similarities do plants of group B have?
10. Observe the labelled part of a duck in the picture given below. What differences do you observe in the feet of the duck compared to the other birds? Which activity would the duck be able to perform using this part?



Learning further

- ◆ Read about one Indian scientist or a wildlife biologist who is working towards protection of India's biodiversity. Prepare a brief report.
- ◆ Explore the contributions of Divya Mudappa, Usha Lachungpa, Ghazala Shahabuddin, Nandini Velho, Vidya Athreya, Uma Ramakrishnan and Divya Karnad towards biodiversity in India. Prepare a report of the work done by any three of them.

- ◆ Label the plants in your school with their local names with the help of your teacher or the gardener. List them in your notebook.
- ◆ With the help of your teacher, plan a field visit or a nature walk. Record your observations. Prepare a class biodiversity register by consolidating the observations and notes of all the students taken during the field visit or nature walk.
- ◆ Find out about ‘Project Tiger’ and other similar projects initiated in India to protect our biodiversity. Prepare a presentation for your class.
- ◆ Divide your class into groups of six students each. Initiate a discussion in the class on how you can protect biodiversity around you. Prepare a group-wise report that includes suggestions given by members of each group.
- ◆ Interact with elders in your family or neighbourhood to find out various plants and animals that they see now but were not seen earlier and vice-versa. Collect pictures of these plants and animals and paste them in a scrapbook. Find out more about them from your teacher.

3 Mindful Eating: A Path to a Healthy Body

“

कोऽरुक्? कोऽरुक्? कोऽरुक्?
हितभुक् मितभुक् क्रतुभुक्

(सुभाषित)

Who is healthy? Who is healthy? Who is healthy? One who eats food that is wholesome, in moderate quantities, and appropriate for the season, time, and place.

(Wise saying)



0677CH03

”



Medu and Mishti read ‘thought of the day’ on the school noticeboard every day. Today’s thought, ‘*annena jātāni jīvanti*’, makes them curious. Mishti tells Medu that it is a Sanskrit saying which means ‘food gives life to living beings.’

Let us try to understand the significance of this saying.

3.1 What Do We Eat?

Activity 3.1: Let us record

All of us eat food every day. Food is an essential component of our daily life. List the food items you have consumed over the week in Table 3.1.

Table 3.1: Food items consumed over a week

Day	Food items
Monday	
Tuesday	
Wednesday	
Thursday	
Friday	
Saturday	
Sunday	

What observations can you make about your food from the data collected in Table 3.1? Do you eat the same kind of food in every meal or do your choices vary? **Compare** your list with those prepared by your friends. Find similarities and differences in the food consumed by you and your friends. What did you find? Record your findings in your notebook. You may have noticed that there is a variety in the food eaten by you and your friends.

Do you think that such diversity in food exists in all states of our country?

3.1.1 Food in different regions

Activity 3.2: Let us explore

- Find out the types of food traditionally consumed and the crops grown in various states of India. You may refer to books in your library, search the internet, and interact with your friends, family and neighbours to collect information.

- In Table 3.2, add more states and fill the collected data. A few examples are already given.

Table 3.2: Some traditional food items in various states of India

State	Locally grown crops	Traditional food items eaten	Beverages
Punjab	Maize, wheat, chickpea, pulses	<i>Makki di roti, sarson da saag, chhole bhature, parantha, halwa, kheer</i>	Lassi, <i>chhach</i> (buttermilk), milk, tea
Karnataka	Rice, ragi, <i>urad</i> , coconut	Idli, dosa, sambhar, coconut chutney, ragi <i>mudde</i> , <i>palya</i> , rasam, rice	Buttermilk, coffee, tea
Manipur	Rice, bamboo, soya bean	Rice, <i>eromba</i> (chutney), <i>utti</i> (yellow peas and green onion curry) <i>singju</i> , <i>kangsoi</i>	Black Tea
Any other			

Why do we see diversity in traditional food consumed in various states of our country?

Analyse the data collected by you in Table 3.2. Are there food items that are common across states? Make a list of those food items. You may find that some food items are common in many states while some are eaten only in a particular state.

What relation do you find between the traditional food items and the locally grown crops? You must have observed that the traditional food of any state is usually based on the crops grown in that state. India is an agricultural country with diverse soil and climate types. Various crops are grown in its different regions depending on the soil types and climatic conditions.

In various regions of India, the choice of food may vary according to the **cultivation** of food crops in that particular region, taste preferences, culture, and traditions.

3.1.2 How have cooking practices changed over time?

You have learnt that food habits vary across states. Our food choices as well as practices of food preparation may differ from one another. Have our food habits and cooking practices changed over time?

Activity 3.3: Let us interact and find out

- ◆ Prepare a list of questions for gathering information from elderly people about their food habits and cooking practices. Following are some of the sample questions—
 - What kind of food do you still eat and what is new?
 - What are the changes in cooking practices over time?
 - What has caused these changes?
- ◆ Conduct interviews with some elderly people based on the questions prepared.



(a) Chulha (Traditional stove)



(b) Modern gas stove



(c) Sil-batta (Stone grinder)



(d) Electrical grinder

Fig. 3.1: Change in cooking tools over time

What are your findings from the interviews you conducted? Cooking practices, also called **culinary practices**, have changed over time. There is a significant difference between traditional and modern culinary practices. Earlier, most cooking was done using a *chulha* (Fig. 3.1a). Nowadays, most of us cook using a modern gas stove (Fig. 3.1b). Earlier, most grinding was done manually using a *sil-batta* (Fig. 3.1c). These days, we use an electrical grinder for ease of grinding (Fig. 3.1d). Find out what were the other ways of cooking and grinding. Why have these culinary practices changed over time? These changes may be due to factors such as technological development, improved transportation and better communication.

3.2 What are the Components of Food?

Medu and Mishti visit the ‘Traditional Food Festival’ organised in their school. The theme of the festival is ‘Eat Healthy, Live Healthy’.



The festival features various stalls displaying different kinds of traditional dishes. Dr Poshita, a nutritional expert, explains to students that ‘Health is the Ultimate Wealth’.



Let us understand what Dr Poshita means by this statement.

Have you ever missed a meal? How do you feel when you miss a meal?

We feel tired and less energetic when we do not eat for some time. Why do you think a marathon runner drinks glucose water during and after a race?

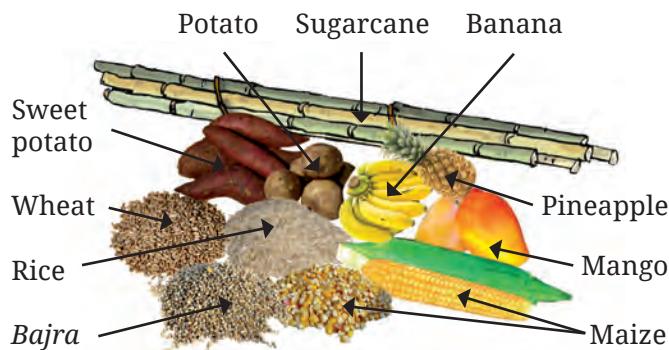


Fig. 3.2: Some sources of carbohydrates

Glucose provides instant energy. Glucose is an example of a carbohydrate. **Carbohydrates** are one of the primary sources of energy in our diet. Cereals like wheat, rice, and maize, vegetables like potato and sweet potato, and fruits like banana, pineapple, and mango are some sources of carbohydrates (Fig. 3.2).

Do you know that common sugar is also a type of carbohydrate?

Why do you think we prefer to have *laddoos* as a part of our traditional diet in winters?

Besan or wheat flour (*aata*) and ghee are among the main ingredients of laddoos along with *goond* (edible gum), nuts, and seeds. Ghee and various kinds of oils are grouped under another kind of food component, which is called **fat**.



Yes, my grandma told me that laddoos rich in ghee and nuts provide energy to keep us warm.

Sources of fats can be from plants or animals (Fig. 3.3). Nuts, such as groundnuts, walnuts, coconuts, and almonds, and seeds, such as pumpkin seeds and sunflower seeds, are some sources of fat. Fat is a source of stored energy.

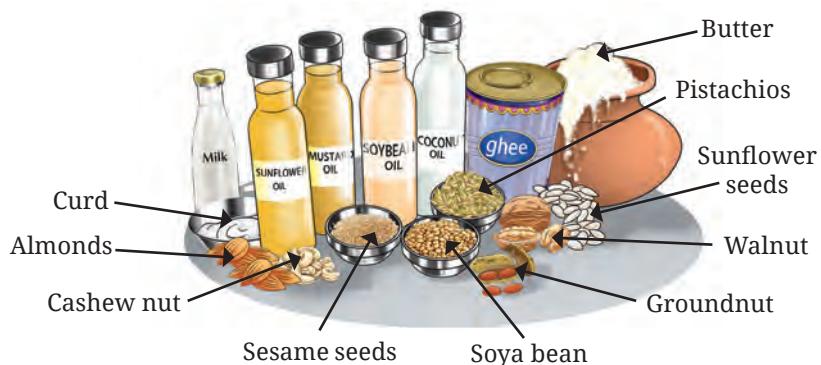


Fig. 3.3: Some sources of fats

Carbohydrates and fats provide us energy for performing various activities. Therefore, they are called **energy-giving foods**. Identify more food items that are rich sources of carbohydrates and fats .



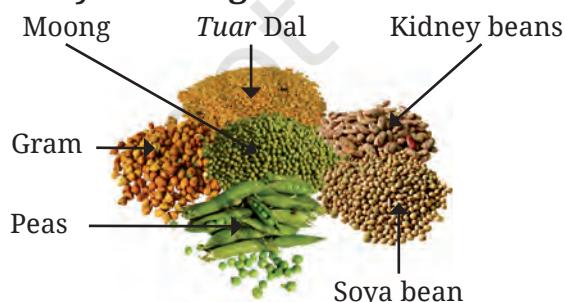
Polar bear

Polar bears accumulate a lot of fat under their skin. This fat serves as an energy source. It supports them during their months-long winter sleep (hibernation), enabling them to survive without eating.

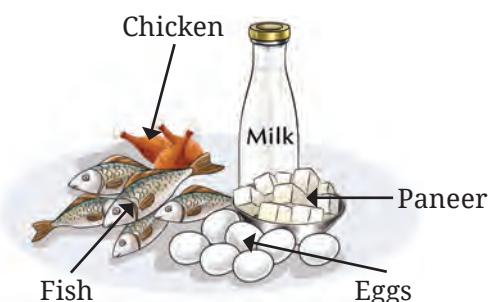


More to know!

Proteins are also an important part of our food. Milk products and pulses are good sources of protein. Sportspersons need proteins in larger quantities to build their muscles. People get proteins from plants as well as animals. Some excellent plant sources of protein are pulses, beans, peas and nuts (Fig. 3.4a). Animal sources of protein are milk, paneer, egg, fish and meat (Fig. 3.4b). Protein-rich foods help in growth and repair of our body. These are, therefore, called **body-building foods**.



(a) Plant sources



(b) Animal sources

Fig. 3.4: Some sources of proteins

The right amount of protein must be included in the diet of growing children for their proper growth and development. Which of these food components are part of your daily diet?



More to know!

Have you ever seen mushrooms? They grow mostly in dark and moist places. Edible mushrooms are good sources of protein.



Mushroom

Why do you think we are advised to include servings of fruits, vegetables and other plant-based foods in our daily diet? Let us understand the importance of some other **food components** by reading the following two cases—

Case 1

In earlier times, during long voyages, sailors often suffered from bleeding and swollen gums. During a voyage in 1746, Scottish physician James Lind observed that sailors who consumed lemons and oranges recovered from these symptoms. Bleeding and swollen gums are symptoms of a disease called **scurvy**.

What do you interpret by reading Case 1? What cures scurvy? Lemons and oranges help in curing scurvy. Scurvy is caused due to deficiency of Vitamin C. **Vitamin C** present in citrus fruits like lemons and oranges helps in curing this disease.

Case 2

In the 1960s, Indian scientists found that among the human population in the Himalayan region and the Northern plains of India, symptoms of swelling at the front of the neck were prevalent. As per norms of the Government of India, an effort was made to supplement common salt with iodine for preparing **iodised salt**. Consumption of iodised salt visibly reduced the above symptoms. These symptoms were due to a deficiency of iodine in the soil of this region resulting in a lack of iodine in the local food and water supply. Swelling at the front of the neck is a symptom of a disease called **goitre**.



What do you infer from Case 2?

You may have learnt about iodised salt through newspapers, advertisements or by reading about it on a salt packet. What does it mean? Iodised salt is simply common salt mixed with required quantities of salts of iodine.



Salt farming is a traditional practice of a tribal community named *Agariyas*. They practice salt farming in the Little Rann of Kutch and other parts of Gujarat. For eight months, they live in the extreme heat of the desert and work very hard to get salt from seawater.



More to know!

How would you find out more about other food components that protect our body from various diseases?

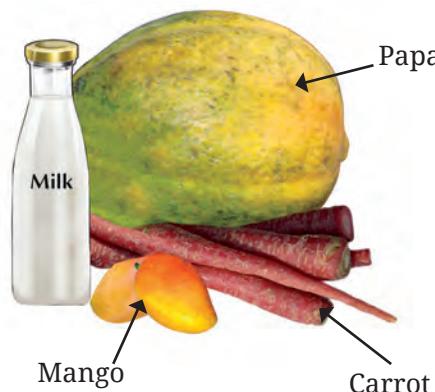
Activity 3.4: Let us conduct a survey

- ◆ Study the chart given in Fig. 3.5 to explore the functions and sources of various food components. Find out more sources of vitamins and minerals. Also, understand the symptoms of the diseases caused by the lack of these food components.
- ◆ Visit your neighbourhood, interact with people and find out if any individual shows the symptoms listed on the chart (an investigatory project of this kind can be taken by the students under the guidance of a teacher).
- ◆ Correlate these symptoms with their diet and identify the deficiency disease(s) or disorder(s).
- ◆ Suggest the possible cause(s) for the symptoms observed and changes required in the diet for improvement.
- ◆ Suggest them to visit a doctor for further advice.

Food component (Vitamin/Mineral)	Functions	Some sources	Deficiency disease/disorder	Symptoms
Vitamin A	Keeps eyes and skin healthy	Papaya, carrot, mango, milk	Loss of vision	Poor vision, loss of vision in darkness (night blindness), sometimes complete loss of vision
Vitamin B ₁	Keeps heart healthy and supports body to perform various functions	Legumes, nuts, whole grains, seeds, milk products	Beriberi	Swelling, tingling or burning sensation in feet and hands, trouble in breathing
Vitamin C	Helps body to fight diseases	Amla, guava, green chilli, orange, lemon	Scurvy	Bleeding gums, slow healing of wounds
Vitamin D	Helps body absorb calcium for bone and teeth health	Exposure to sunlight, milk, butter, fish, eggs	Rickets	Soft and bent bones
Calcium	Keeps bones and teeth healthy	Milk/soya milk, curd, cheese, paneer	Bone and tooth decay	Weak bones, tooth decay
Iodine	Helps to perform physical and mental activities	Seaweed, water chestnut (<i>singhada</i>), iodised salt	Goitre	Swelling at the front of the neck
Iron	Important component of blood	Green leafy vegetables, beetroot, pomegranate	Anaemia	Weakness, shortness of breath

Fig. 3.5: Chart of vitamins and minerals, their functions, some sources, related deficiency disease(s)/disorder(s) and symptoms

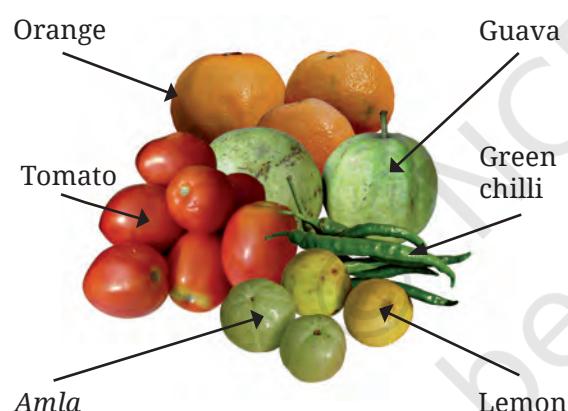
From Fig. 3.5, you have learnt that **vitamins** (A, B₁, C and D) and **minerals** (calcium, iodine, and iron) are two groups of food components that protect our body from various diseases. But, how can we overcome vitamin and mineral **deficiency diseases** or disorders?



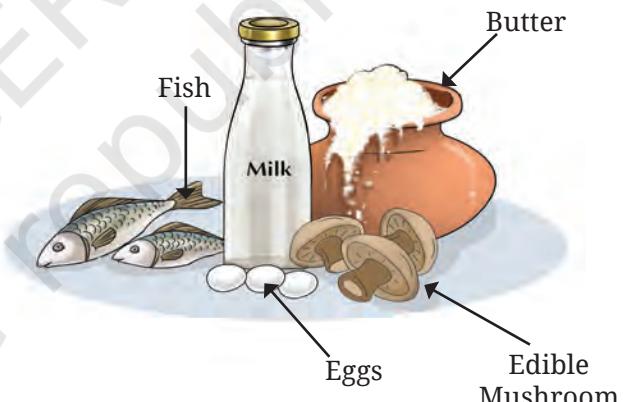
(a) Some sources of Vitamin A



(b) Some sources of Vitamin B₁



(c) Some sources of Vitamin C



(d) Some sources of Vitamin D

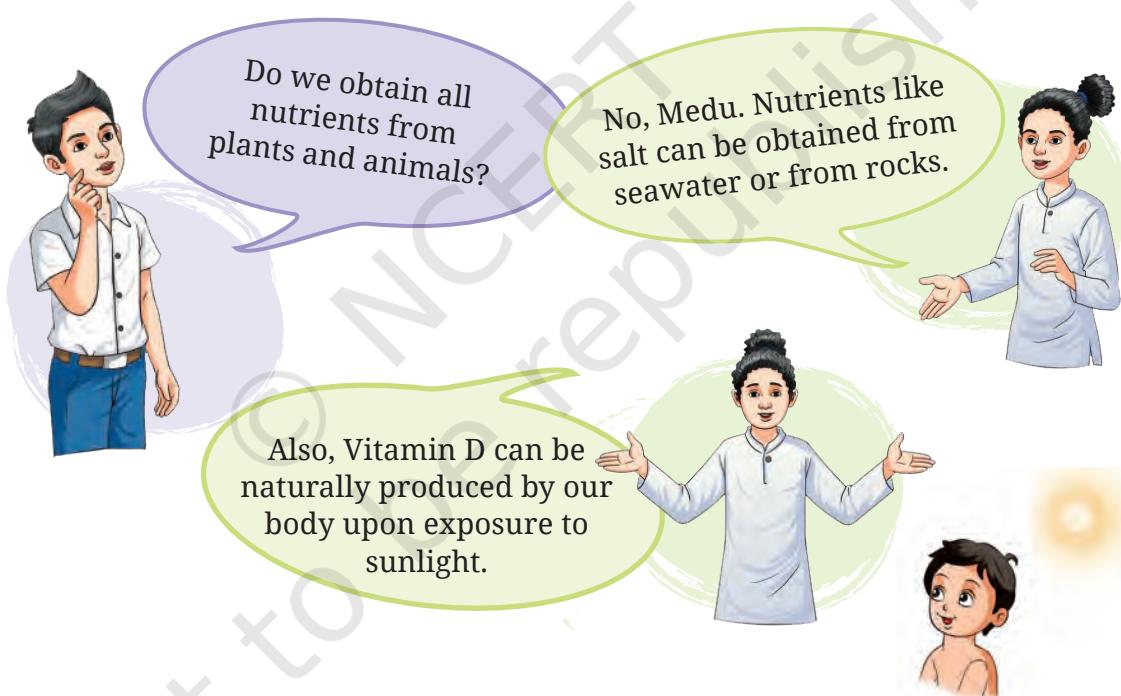
Fig. 3.6: Some sources of different vitamins

Food components that provide energy, support growth, help repair and protect our body from diseases, and maintain various bodily functions are called **nutrients**. The major nutrients in our food include carbohydrates, proteins, fats, vitamins and minerals.

Vitamins and minerals are also called **protective nutrients**. These nutrients protect our body from diseases and keep us healthy. Your parents may have advised you to have

milk, green vegetables, fruits and wholegrains regularly. These food items are some sources of vitamins (Fig. 3.6) and minerals. Although vitamins and minerals are required in small amounts, they are essential to keep our body healthy.

What differences do you **observe** in raw and cooked vegetables? Have you ever noticed that vegetables sometimes lose their bright colour, or become softer and less crisp when cooked? Some nutrients like vitamin C and others are lost during cooking due to high heat. Would it not be wise to include fruits and uncooked vegetables into our diet? Washing cut or peeled vegetables and fruits may also result in the loss of some vitamins. However, it is highly recommended that all fruits and vegetables be thoroughly washed before consumption.



Fruits and vegetables are rich in dietary fibres. Let us see how dietary fibres are beneficial for us.

In addition to the essential nutrients, our body needs dietary fibres and water. Dietary fibres, also known as **roughage**, do not provide any nutrients to our body. However, they are an essential component of our food. They help our body get rid of undigested food and ensure smooth passage of stools. Roughage in our food is provided mainly by suitable plant products.

Green leafy vegetables, fresh fruits, wholegrains, pulses and nuts are good sources of roughage.

Eating food that is locally grown and plant based, to the extent possible, is not only healthy for the body but is also good for our environment and our planet.

My grandma has difficulty in passing stool. Now I understand why the doctor advised her to eat food that is high in fibre.



What are the food sources that provide water to our body? List a few of them.



Water is also an essential part of our diet. It helps the body absorb nutrients from food. It removes waste from the body through sweat and urine. We should drink sufficient water regularly to keep ourselves healthy.

Know a scientist

Coluthur Gopalan (1918–2019) initiated nutrition research in India. He analysed more than 500 Indian foods for their nutritional value and recommended an appropriate diet in the Indian context. He led surveys on the nutritional status of the Indian population, identifying widespread deficiencies in protein, energy, and other food components. This led to the implementation of the Mid Day Meal Programme in 2002, now a ‘PM POSHAN’ initiative, to provide balanced food in the government-run and government-aided schools of our country. This scheme has played a role in improving the health and nutrition of millions of children nationwide.



3.3 How to Test Different Components of Food?

Let us find out which nutrients are present in various food items.

Some nutrients like **starch** (a type of carbohydrate), fat and protein can be detected using fairly simple tests, while others can be detected only in a well-equipped laboratory. Let us explore how we can detect the presence of starch, fat and protein in some food items.

3.3.1 Test for starch

Activity 3.5: Let us investigate

- ◆ Take a small quantity of the food items such as a slice of potato, cucumber, bread, some boiled rice, boiled gram, crushed peanuts, oil, butter and crushed coconut. You can take other food items too for testing.



Fig. 3.7: Testing for the presence of starch in various food items

- ◆ Place a small piece of each item on a separate dish.
- ◆ With the help of a dropper, put 2–3 drops of diluted iodine solution on each food item (Fig. 3.7).
- ◆ Observe if there are any changes in the colour of the food items. Have they turned blue-black? Record your observations in Table 3.3.

A blue-black colour indicates the presence of starch.

3.3.2 Test for fats

Activity 3.6: Let us investigate

- ◆ Take a small part of the food items that you tested for the presence of starch in Activity 3.5.
- ◆ Place each food item on a separate piece of paper.
- ◆ Wrap the paper around the food and press it. Be careful not to tear the paper.
- ◆ If a food item contains a little water, allow the paper to dry.

Does the paper develop an oily patch? What do you think is the reason for this patch? If oil or butter is present in the food item, it leaves an oily patch on the paper. Now, hold the paper against light. Can you see the light faintly shining through this patch? An oily patch on the paper shows that the food item contains fat. Which of these items contain fats?

Record your observations in Table 3.3.

3.3.3 Test for proteins

Activity 3.7: Let us investigate

This activity may be demonstrated by the teacher.

- ◆ Take the food items tested in previous activities.
- ◆ Make a paste or powder of the food item using pestle and mortar (Fig. 3.8).
- ◆ Put about half teaspoon of each food item in a separate clean test tube.

Precautions

- These chemicals are harmful and need to be handled with care. Do not touch any of these chemicals unless asked to do so.
- If any chemical gets spilled on your body, immediately wash the affected area with water.
- Do not put any of these chemicals into your mouth, or try to smell them.

- ◆ Add 2–3 teaspoons of water to each test tube and shake them well.
- ◆ Add two drops of copper sulphate solution to each test tube using a dropper.
- ◆ Now, take another dropper and add 10 drops of caustic soda solution to each tube (Fig. 3.8).
- ◆ Shake well and leave the test tubes undisturbed for a few minutes.

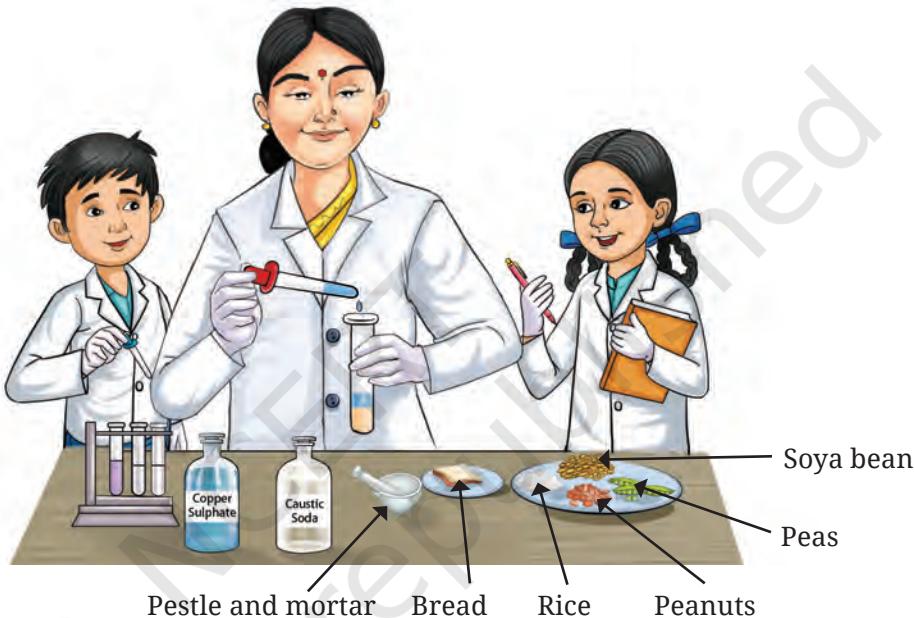


Fig. 3.8: Testing for the presence of protein in various food items

What did you observe? Did the content of some test tubes turn violet? This violet colour indicates the presence of proteins in the food item. Write your observations in Table 3.3.

What conclusions can you draw from Table 3.3? Which food items show the presence of more than one nutrient? Which food items show the presence of both proteins and fats? Peanuts show the presence of both proteins and fats. This indicates that any food which we eat may contain multiple nutrients. Is there a food item that lacks any of these nutrients? Which of these foods do you consume daily? Try to find out other foods that are good sources of starch, fats, and proteins.

Table 3.3: Exploring nutrients present in various food items

Name of the food item	Colour of the food item for starch test		Oily patch for fat test		Colour of the food item for protein test		Starch present (Yes/ No)	Fat present (Yes/ No)	Protein present (Yes/ No)
	Before iodine test	After iodine test	Predic-tion (Yes/No)	Observa-tion (Yes/No)	Before protein test	After protein test			
Potato									
Cucumber									
Boiled rice									
Boiled gram									
Peanuts									
Bread/ Chapati									
Butter									
Coconut									
Any other									

3.4 Balanced Diet

Are nutritional requirements the same for everyone? Do you and your grandparents need the same type or the same amount of nutrients? Requirements of the type and amount of nutrients in a diet may vary according to age, gender, physical activity, health status, lifestyle, and so on.

Activity 3.8: Let us find out

You have listed food consumed by you during the week in Activity 3.1. Check whether your food contains all the nutrients and other essential components necessary for growth and development. If not, check which nutrients or other food components need to be added.

A diet that has all essential nutrients, roughage, and water in the right amount for proper growth and development of the body is known as a **balanced diet**. What changes would you make in your diet to make it a balanced diet?

Activity 3.9: Let us compare

Read the nutritional information given below for a packet of potato wafers and a packet of roasted *chana* shown here.



(a) Potato wafers



(b) Roasted chana

Nutritional Information (per 100 g)		Nutritional Information (per 100 g)	
Energy	536 kcal (kilocalories)	Energy	355 kcal (kilocalories)
Fats	35.0 g	Fats	6.26 g
Carbohydrates	53.0 g	Carbohydrates	58.58 g
Proteins	7.0 g	Proteins	18.64 g
Dietary Fibre	4.8 g	Dietary Fibre	16.8 g

Based on the nutritional information on the food packets given above, which food would you choose? Why?

Some foods have high calories due to high sugar and fat content. Moreover, they contain very low amounts of proteins, minerals, vitamins, and dietary fibres. These foods are called junk foods. These foods include potato wafers, candy bars and carbonated drinks. Consuming these foods frequently is not good as these are not healthy for our body. They make a person obese. Such a person may suffer from several health problems. You should always remember Dr Poshita's statement that 'Health is the Ultimate Wealth.' We should take care of our body to stay healthy. Eating a balanced diet and avoiding junk food contribute towards

a healthy body. Good health is essential for leading a happy life.

Which of the two foods you studied in Activity 3.9 could be labelled as junk food?

Packaged food items must have information about the nutrients on their cover. The information should list the amount of each nutrient. Sometimes, more nutrients are added to the food during processing (fortification) to improve its nutritional quality. Iodised salt and some baby foods are examples of fortified foods. The Food Safety and Standard Authority of India (FSSAI) is a government agency that regulates food quality in India.



More to know!

3.5 Millets: Nutrition-rich Cereals

You may have heard of *jowar*, *bajra*, *ragi*, and *sanwa* (Fig. 3.9). These are native crops of India (Fig. 3.9). These can be easily cultivated in different climatic conditions. These highly nutritious grains are also called **millets**. Have you ever had food items made from these millets?



Fig. 3.9: Sanwa (Barnyard millet)

Millets are small-sized grains and have been an integral part of the Indian diet for centuries. They have regained popularity due to their numerous health benefits. They are good sources of vitamins, minerals like iron and calcium, and dietary fibres as well. That is the reason they are also called nutri-cereals. They contribute significantly to a balanced diet required for the normal functioning of our body.

3.6 Food Miles: From Farm to Our Plate

How does food reach from a farm to our plate? What are the steps involved in this process? Who are the people involved in this process? Do you know how much time and effort is required to get the wheat flour once seed grains germinate in the farm? Let us look at Fig. 3.10 to understand the entire process of making the chapati that we eat.

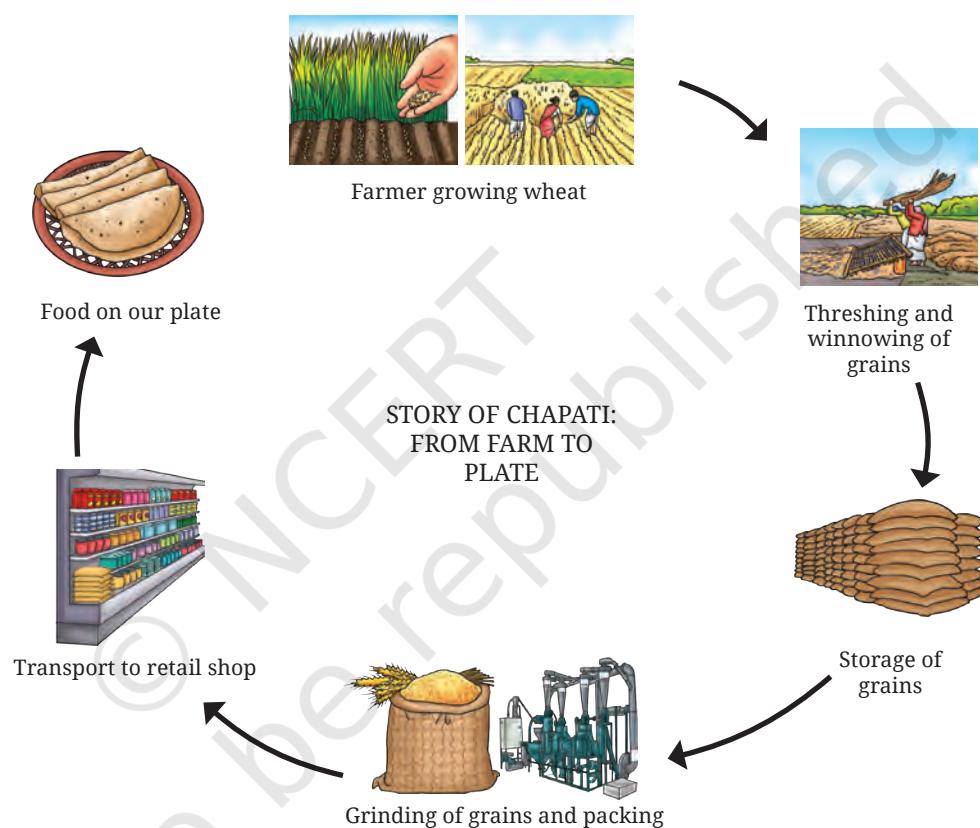


Fig. 3.10: From farm to plate

The entire distance travelled by a bag of wheat or any other food item, from the producer to the consumer, is known as its **food miles**. Reducing food miles is important because it helps to cut down the cost and pollution during its transport; it helps support local farmers; and it also keeps our food fresh and healthy.

Many people waste food, leaving it unconsumed on their plates. One must remember the time and effort put by our farmers and other community members in getting the food from the farm to our plate. We must take only as much food as we can consume. It would reduce food wastage. Try to find the timeline for the various processes involved in getting the food from farm to plate (Fig. 3.10).

How would eating local food help reduce food miles?



Eat healthy, share, and respect food. Support local producers!

Keywords

Carbohydrate	Millets	Analyse
Culinary practices	Minerals	Compare
Deficiency diseases	Nutrients	Infer
Fats	Proteins	Interpret
Food components	Rickets	Investigate
Food miles	Roughage	Observe
Iodized salt	Scurvy	Prediction
	Vitamins	Survey

Summary

Key Points

- ◆ People across India eat diverse types of food, containing various food components.
- ◆ Choice of food may vary according to the cultivation of food crops in a region, taste preferences, culture and traditions, and so on.

- ◆ Culinary practices have changed over time. There is a significant difference between traditional and modern methods of cooking food.
- ◆ Food provides us energy, supports growth, repairs our bodies and protects us from diseases.
- ◆ The major nutrients in our food are carbohydrates, fats, proteins, vitamins, and minerals. In addition, food also contains dietary fibres and water.
- ◆ Carbohydrates and fats are primary energy sources, while proteins are body-building nutrients.
- ◆ Vitamins and minerals strengthen our body, protect us from infections, and keep us healthy.
- ◆ A balanced diet provides all the essential nutrients in the right quantities, along with adequate roughage and water.
- ◆ Deficiency of one or more nutrients in our diet for a long time can lead to deficiency diseases and disorders.
- ◆ Junk foods are unhealthy as they contain high levels of sugar and fats but little protein, minerals, vitamins, and dietary fibres.
- ◆ Millets are known as nutri-cereals as they provide most of the nutrients required for the normal functioning of our bodies. They can be easily cultivated in different climatic conditions.
- ◆ Eating food that is locally grown and plant-based, to the extent possible, is not only healthy for our bodies but is also good for our environment and our planet.
- ◆ The distance travelled by a food item, from the place of its production to the consumer, is called food miles. We must aim to minimise food miles.
- ◆ We should never waste food and only take as much as we can consume.

Let us enhance our learning



1. Pick the odd one out and give reasons:
 - (i) *Jowar, Bajra, Ragi, Chana*
 - (ii) Kidney beans, Green gram, Soya bean, Rice

2. Discuss traditional versus modern culinary practices in India.
3. A teacher says that good food may act as medicine. Ravi is curious about this statement and has some questions for his teacher. List at least two questions that he can ask.
4. Not all delicious foods are necessarily healthy, while not all nutritious foods are always enjoyable. Share your thoughts along with a few examples.
5. Medu does not eat vegetables but enjoys biscuits, noodles and white bread. He often has stomach ache and constipation. What changes should he make in his diet to get rid of these problems? Explain your answer.
6. Reshma had trouble seeing things in dim light. The doctor tested her eyesight and prescribed a particular vitamin supplement. He also advised her to include a few food items in her diet.
 - (i) Which deficiency disease is she suffering from?
 - (ii) Which food component may be lacking in her diet?
 - (iii) Suggest some food items that she should include in her diet to overcome this problem (any four).
7. You are provided the following:
 - (i) Canned fruit juice
 - (ii) Fresh fruit juice
 - (iii) Fresh fruitWhich one would you prefer and why?
8. Gourav got a fracture in his leg. His doctor aligned the bones and put on a plaster. The doctor also gave him calcium tablets. On the second visit, the doctor gave him Vitamin D syrup along with calcium tablets. Refer to Fig. 3.5 and answer the following questions:
 - (i) Why did the doctor give calcium tablets to Gourav?
 - (ii) On the second visit, why did the doctor give Vitamin D syrup along with calcium tablets?
 - (iii) What question arises in your mind about the choices made by the doctor in giving the medicines?

9. Sugar is an example of carbohydrates. Sugar is tested with iodine solution but it does not change to blue-black colour. What can be a possible reason?
10. What do you think of Raman's statement, "All starches are carbohydrates but not all carbohydrates are starches." Describe the design of an activity to test your answer.
11. While using iodine in the laboratory, a few drops of iodine fell on Mishti's socks and a few fell on her teacher's saree. The drops of iodine on the saree turned blue-black while the colour on the socks did not change. What can be a possible reason?
12. Why are millets considered a healthy choice of food? Can eating just millets suffice for the nutritional requirements of the body? Discuss.
13. You are given a sample of a solution. How would you check the possibility of it being an iodine solution?

Learning further

- ◆ Help your mother in unpacking the packets of various food items after shopping for grocery next time. Read the nutritional information of at least three fortified food items and analyse those.
- ◆ The Apatani tribe of Arunachal Pradesh produces a salt called *tapyo* to fulfil their dietary requirements. Collect more information from the internet about their salt making process and the need to make their own salt. Collect pictures and paste them on a chart paper. Also, write a paragraph about the process of making this salt and its usefulness.
- ◆ Vegetables or fruits that grow naturally in the forest or nearby fields without being cultivated by farmers are considered wild varieties. Traditionally, many tribal groups in India depend on these wild varieties, which form a part of their food. Read about *ranbhajis* from Maharashtra and edible mushrooms from Himachal Pradesh. Are you aware of any such wild varieties of food from your region? Discuss in class.

- ◆ List junk foods you eat frequently. Ask your friends also to make such lists. On the basis of these lists, write a letter to your principal requesting to ban certain junk foods inside the school campus. Suggest some healthy options.
- ◆ Find out the variation in nutritional requirements of different individuals based on age, physical activity and health conditions. Record your observations. Discuss and analyse.
- ◆ Prepare a diet chart to provide a balanced diet to a twelve-year-old child. The diet chart should include food items that are not expensive and are commonly available in your area.

Notes

10 Living Creatures: Exploring their Characteristics



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Avadhi and Aayush go for a morning walk with their parents. Avadhi notices some shells and tries to pick them up. Her mother advises her not to do so and explains that the shell could be home to a living snail and is actually a part of its body. Avadhi and Aayush wonder how the shell that is not even moving could have a living being inside! Later that day in school, Avadhi and Aayush share this incident with their friends. They approach the teacher to understand how a shell which is not even moving could be a body part of a living snail. The teacher initiates a discussion in the class on living and non-living.

Activity 10.1: Let us record

We are surrounded by numerous things. Just look around in your classroom and you may find many examples—the pencil that you are holding, the book that you are reading or the pigeon near the window.

- ◆ List them in Table 10.1 and **identify** each of them as living or non-living on the basis of your understanding in column II.
- ◆ Write a reason for grouping them as living or non living in column III.

Table 10.1: Living beings and non-living things in our surroundings

(I) Name	(II) My guess (Living/ Non- living)	(III) Reason/ Remarks	(IV) Correct answer	(V) Reason/ Remarks for the correct answer
Pencil	Non-living			
Book				
Pigeon	Living			
Car				
Plant				
Any other				

10.1 What Sets the Living Apart from the Non-living?

Look at Table 10.1. Why do you think a pencil is non-living but a pigeon is living? What do you think are the differences between living beings and non-living things according to you? What similarities do the identified living beings share with each other?

You may have identified movement as one of the similarities among living beings. You have also seen cars moving on a road. Does it mean that a car is living? List the

tasks that you can do but a car cannot. You are a wonderful example of a living being. Whenever you attempt to group things around you as living or non-living, you can compare them with yourself. Which characteristics help you in differentiating yourself from a car? For instance, a car does not grow. Does it mean it is non-living? Now, which characteristics have you used to classify a car as non-living? Continue your discussion in a similar way to identify the essential characteristics of living beings.

What are some common characteristics that make living beings very different from the non-living things? Let us learn about them.

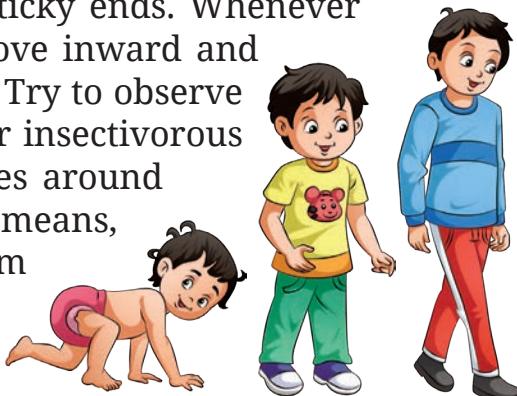
Can we consider **movement** as one of the characteristics to differentiate between the living and the non-living? List five things around you that can move on their own. Do you think that all five things that you have listed can be considered as living just because they can move on their own? However, unlike animals, plants do not move from one place to another. Do you consider them as living?

Even though plants do not move from one place to another, they do show certain types of movements. Opening of flowers is one of the examples of movement in plants. Another example of movement in plants is seen in insectivorous plants. Insectivorous plants are dependent on insects for their nutrition. *Drosera* is one of the examples of an insectivorous plant. *Drosera* is featured with saucer-shaped leaves having many hair-like projections of unequal length with sticky ends. Whenever an insect enters the saucer, hairs move inward and trap the insect with their sticky ends. Try to observe the mechanism of movement in other insectivorous plants. Climbers also wind themselves around any object placed close to them. That means, even though plants do not move from one place to another, they do show some movements.

Compare yourself with the picture of your childhood. Can you



Drosera



Growth of a child



Water droplets on grass

wear the dress that you used to wear four years ago? No, because you have become larger in size. This is due to **growth** in your body. Plants and other living beings also grow. Can we consider growth as a characteristic of living beings?

Living beings need food (**nutrition**) for their growth and development. List five living beings that require food to grow.

Now, think of a process without which we cannot live. Count the number of breaths you take per minute after a normal walk, after a run, and after a few dance steps. Record the data and observe. Do you notice any difference in the number of breaths after each situation? Do you notice the process of breathing in other animals like dogs, cats, cows and buffaloes? Notice the movement of their abdomen while they are taking rest.

In the process of breathing, when we inhale, the air moves from outside to inside our body. When we breathe out, the air moves from inside our body to outside. Breathing is part of a process called **respiration**. Do plants also respire? There are tiny pores called stomata on the surface of leaves. These pores help plants in taking air in and out. Interact with senior class students in your school and request if they can demonstrate stomata using a microscope in your class. All living beings respire.

Have you noticed white patches forming on shirts around the armpits during summers? These patches are formed due to sweat. The sweat consists of water and salts removed by the body as waste products. Removal of waste products from the body is called **excretion**. Urine is also formed as a product of excretion in animals. Do you know that plants also excrete? You may notice plants excrete excess water and minerals in the form of small droplets on leaves. For example, grasses and roses. All living beings excrete.

Let us look at another characteristic. What is your reaction if you unexpectedly step on a sharp object, such as a thorn,

while walking without shoes, or you accidentally touch a hot cup of tea? Stepping on a thorn and touching a hot object are stimuli. Any thing or any event that prompts living beings to respond is called a **stimulus**. List three stimuli (plural of stimulus) and your body's instant **response** to them.

Do plants also respond to stimuli? Yes, plants also respond to stimuli. For example, touch-me-not (*mimosa*, *chhui-mui*, *lajjalu*) plants fold their leaves when we touch them. Have you also observed that certain plants fold their leaves after sunset? Specifically, the leaves of certain plants facing each other tend to come together. This can be observed in the sleeping leaves of *amla* (Indian gooseberry) tree. All living beings **respond to stimuli**. Find a few more plants in your neighbourhood which fold their leaves after sunset.

Why do the leaves of *chhui-mui* and *amla* plants respond in this way? Which stimulus could be responsible for their behaviour?

Have you seen young ones of cats, dogs or other animals? List young ones of five different animals. Have you seen young ones of any non-living things such as a pencil, a chair or an electric bulb?

All living beings reproduce. **Reproduction** is the process of producing new ones of one's own kind. Why is reproduction necessary? It is necessary for the continuity of life.

When a living being is not able to exhibit all of the above mentioned characteristics, despite the availability of all resources (like food, air and water) needed for being alive, it is said to be **dead**.

From the above discussion, we can understand that all **living** beings share some common characteristics. For example, all living beings show movement, they need



Touch-me-not (*chhui-mui*) plant

food, and they grow. They also respire, reproduce, excrete, respond to stimuli, and eventually, die. Absence of any of these features indicates that they are **non-living** things.

Now that you know how to identify a living being, fill up the remaining two columns (IV and V) of Table 10.1 and complete the activity.

In which category would you place a seed—living or non-living? Why?

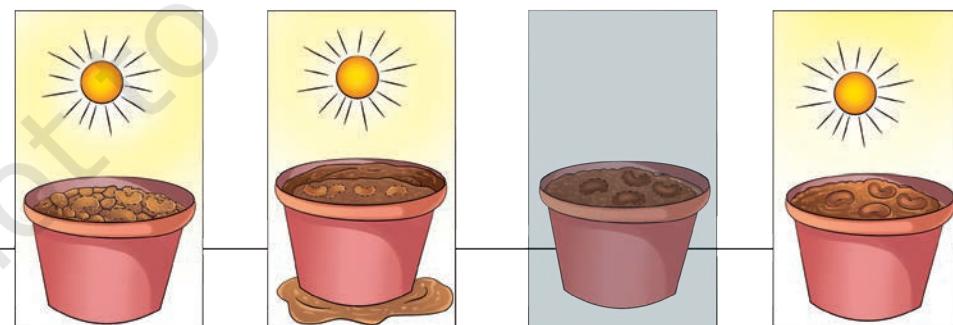
Let us **explore** how a seed germinates to observe some of these essential characteristics in plants.

10.2 Essential Conditions for Germination of a Seed

Have you observed a seed germinating? You might have wondered what conditions are required for **germination** of a seed. What conditions do you think are required for seed germination? How will you investigate whether these conditions have an effect on the germination of a seed? Let us find out by performing Activity 10.2.

Activity 10.2: Let us experiment

- ◆ Take four identical pots filled with garden soil. Sow four bean seeds in each pot. Now, keep these pots in the following conditions for 15 days.
 - Pot A: Do not water the soil. Place this pot in direct sunlight.



(a) Pot A kept in direct sunlight, no water

(b) Pot B kept in direct sunlight, excess water

(c) Pot C with moist soil, kept in the dark (d) Pot D with moist soil, kept in direct sunlight

Fig 10.1: Bean seeds exposed to different conditions

- Pot B: Add excess water to the soil such that water is always present above the soil. Keep adding water on a regular basis if water reduces. Place this pot in direct sunlight.
- Pot C: Keep the soil in this pot slightly moist by adding a moderate amount of water on a regular basis. Place this pot in a dark location.
- Pot D: Maintain the soil in this pot slightly moist by adding a moderate amount of water on a regular basis. Place this pot in direct sunlight.
- ◆ Indicate the availability of air, sunlight and water for the seeds in each of these cases in Table 10.2.
- ◆ When a seed turns into a sprout, it is said to have germinated. Predict whether the seeds in each pot will germinate. Record your **predictions** for each pot kept under different conditions in Table 10.2.

Table 10.2: Effect of certain conditions on seed germination

Pot with bean seeds	Availability of			Seed germination		Possible reason for the observation
	Air	Sunlight	Water	Prediction	Observation	
A: In direct sunlight and without water			No			
B: In direct sunlight and excess water						
C: In complete dark and moist soil						
D: In direct sunlight and moist soil						

- ◆ Regularly observe the pots for 7–10 days to check the status of germination of the seeds. Record your **observations** in Table 10.2.
- ◆ Compare your predictions with your observations.

Do you think sunlight is necessary for germination of seeds? Do the seeds in all the pots receive air, water and sunlight? Is there any pot in which air is not available to the seeds? If so, why is it not available? What happens to the seeds in the pot where water is provided in excess? Which seeds receive both air and water? Identify the pots where you can notice the germination of seeds.

Do your observations match with your predictions? Write possible reasons in favour of your observations in Table 10.2. Based on your observations, state the conditions which favour seed germination.

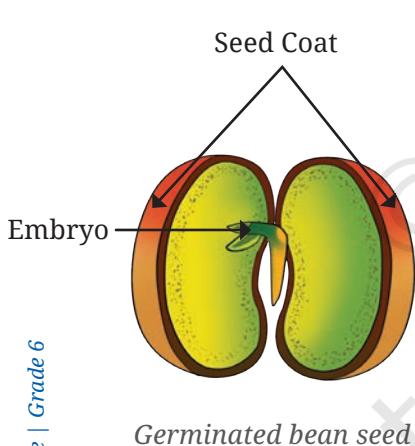
Which of the following are essential for seed germination—air, water and sunlight? Compare the available conditions in each pot. Germination of bean seeds requires the right amount of water and air. Why do seeds require these conditions for germination? Do you think that the absence of one or more of these conditions will affect seed germination?

Let us understand how these conditions help in seed germination. The effects of the following conditions have been seen in Activity 10.2.

Water: Seeds require water for germination. Water enables the seeds to carry out the processes necessary for their growth. The outer covering of the seed is called seed coat. Water softens the seed coat and helps the tiny embryo inside it to develop into a plant.

Air and Soil: Seeds need air for germination. They use the air available in the spaces between soil particles. Moreover, spaces between the soil particles allow roots to grow easily.

Light and/or dark conditions: We have learnt that for the bean seeds, presence of light is not essential for their germination. In general, most seeds do not require light for germination. But after germination, sunlight is required for further growth of the seedling.





Do you know?

Some seeds of flowering plants, like Coleus and Petunia, require light to germinate. Covering these seeds with soil inhibits their sprouting. Seeds of flowering plants, like Calendula and Zinnia, need darkness to germinate. These seeds should be covered with sufficient soil.

In the Chapter 'Mindful Eating: A Path to a Healthy Body', you have learnt that human beings need a balanced diet for good health and proper growth. Similarly, plants too need favourable conditions and nutrients for their proper growth and development. What other conditions do you think would affect seed germination?

In Activity 10.1, what are the characteristics of living beings which made you place plants in living beings? Do plants show growth in Activity 10.2? Are there any other characteristics of living beings that these plants show?

Let us study another characteristic that can be seen clearly in plants—growth and movement.

How would you now categorise a seed, as living or non-living?



10.3 Growth and Movement in Plants

How do plants respond to sunlight? Does sunlight affect the direction of growth of different parts of plants? In which direction would the root and shoot of a plant grow and move if the plant is placed inverted? How would you **design** an activity to find answers to these questions?

Activity 10.3: Let us design

- ◆ Take some bean or gram seeds and allow them to germinate on a moist cloth or a moist tissue paper.
- ◆ Let them germinate until each of them develop into a seedling having a small root and a small shoot.
- ◆ Now, take three glass beakers or tumblers, and label them as A, B and C.

- ◆ Take three glass plates and attach a thick blotting paper to one side of each plate using a thick soft cotton thread.
- ◆ Fix one seedling on each plate using a thick soft cotton thread, as shown in Fig. 10.2, ensuring that the plant is not damaged.
- ◆ Now, place one glass plate upright with a seedling attached into each of the beaker A and beaker C, as shown in Fig. 10.2a and Fig. 10.2c.
- ◆ In beaker B, arrange the plate such that the shoot of a seedling is directed downwards and the root is directed upwards, as shown in Fig. 10.2b.

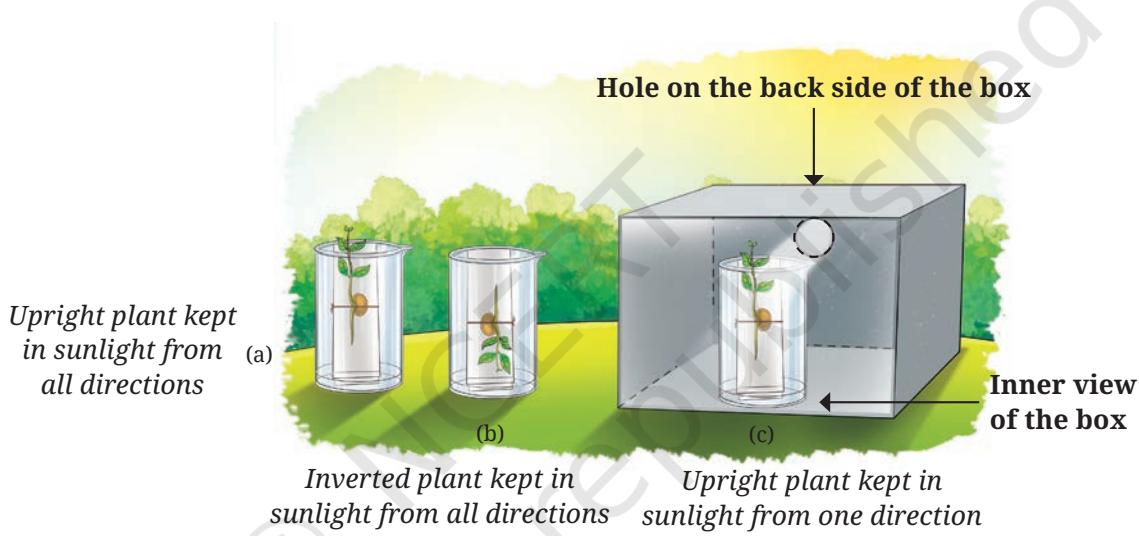


Fig. 10.2: Set-up showing plants kept in different conditions

Table 10.3: Growth of root and shoot under different conditions

Beakers	Direction of sunlight	Direction of plant	Direction of growth of root and shoot		
			Shoot/Root	Predictions	Observations
A	All directions	Upright	Shoot		
			Root		
B	All directions	Inverted	Shoot		
			Root		
C	Only from one direction	Upright	Shoot		
			Root		

What is the direction of growth of root and shoot in beakers A, B and C based on your observations? Do your predictions match your observations? What do you **conclude** from this activity?

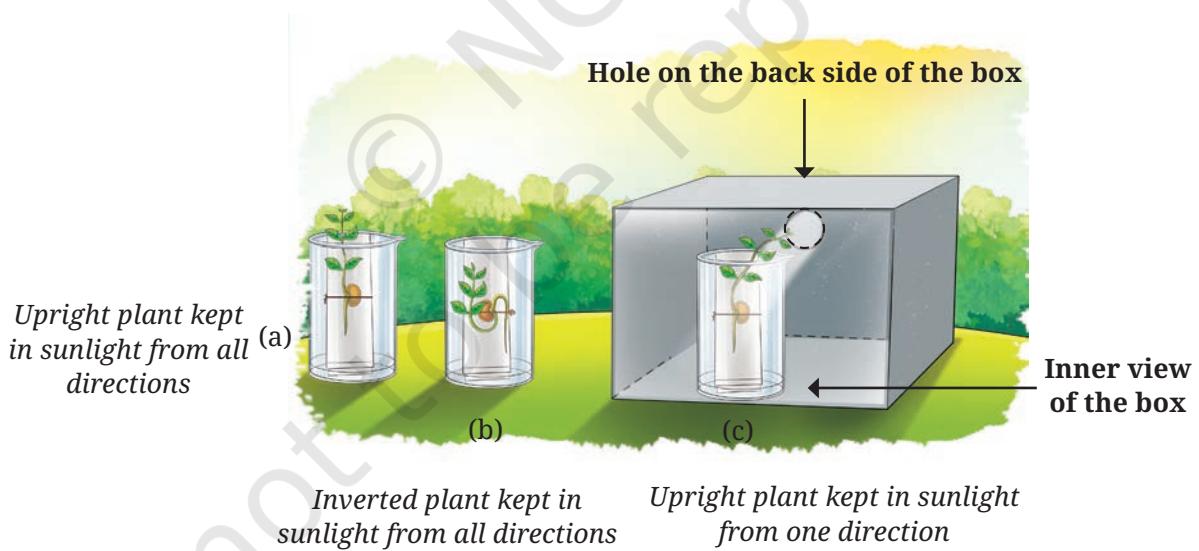


Fig. 10.3: Direction of growth of root and shoot under different conditions

From the results of this **experiment** (Table 10.3 and Fig. 10.3), we note that—

- When the plant is kept upright, the root grows downwards and the shoot grows upwards.

- When the plant is kept inverted, the root bends and grows downwards. Also, the shoot bends and grows upwards.
- When the plant gets sunlight only from one direction, the shoot grows in the direction of light while the root continues to grow downwards.

After conducting Activity 10.3, we can conclude that shoots of plants grow upward and exhibit movement towards sunlight but roots of plants grow downwards.

Know a scientist

Jagadish Chandra Bose (1858–1937) was an Indian scientist who did some fascinating experiments with plants. He built a machine called a crescograph to record how plants respond to stimuli like light, heat, electricity and gravity. With this machine, he could measure how fast plants grow. He also showed that plants can sense and respond to stimuli.



10.4 Life Cycle of a Plant

We have learnt about conditions required for germination and how plants grow and exhibit movement. Let us now explore the changes a plant undergoes in its whole life.

Activity 10.4: Let us explore

- ◆ Plant a bean seed and provide suitable conditions for its growth. Observe regularly for three months.
- ◆ Record your observations in Table 10.4 as and when changes become visible.
- ◆ Note the date when any change is observed. Record answers for the following questions—
 - How long does it take for any change to occur? Make sketches of various changes that you observe in Table 10.4.
 - After how many days does the first flower appear?

- After some parts of the flower have dried, can you see any further growth?
- Which structure do the remaining parts of flower develop into?
- Can you notice a pod or a fruit with seeds develop from a flower?
- What happens to the plant after the fruits containing seeds are formed?

Table 10.4: Changes observed during the growth of the plant

Date	Observations	Sketches
	Seeds are sown	

Go through the observations you recorded regarding the growth of the bean plant in Table 10.4. What changes do you observe after the fruits are formed? Does the plant become yellow and dry even when you continue watering it? Sow the seeds obtained from your bean plant. Watch how the seeds give rise to a new generation of bean plants. Compare the sketches that you have drawn in Table 10.4 with Fig. 10.4.

A seed grows into a young plant and matures to produce flowers and fruit. The fruit, in this case a pod, contains seeds which give rise to a new generation of bean plants. The entire process from a seed to a plant, and then, to the next generation of seeds is called the **life cycle** of a plant (Fig. 10.4). When a plant stops growing and all activities of life gradually come to an end, even after the availability of all the necessary conditions, the plant is considered dead.

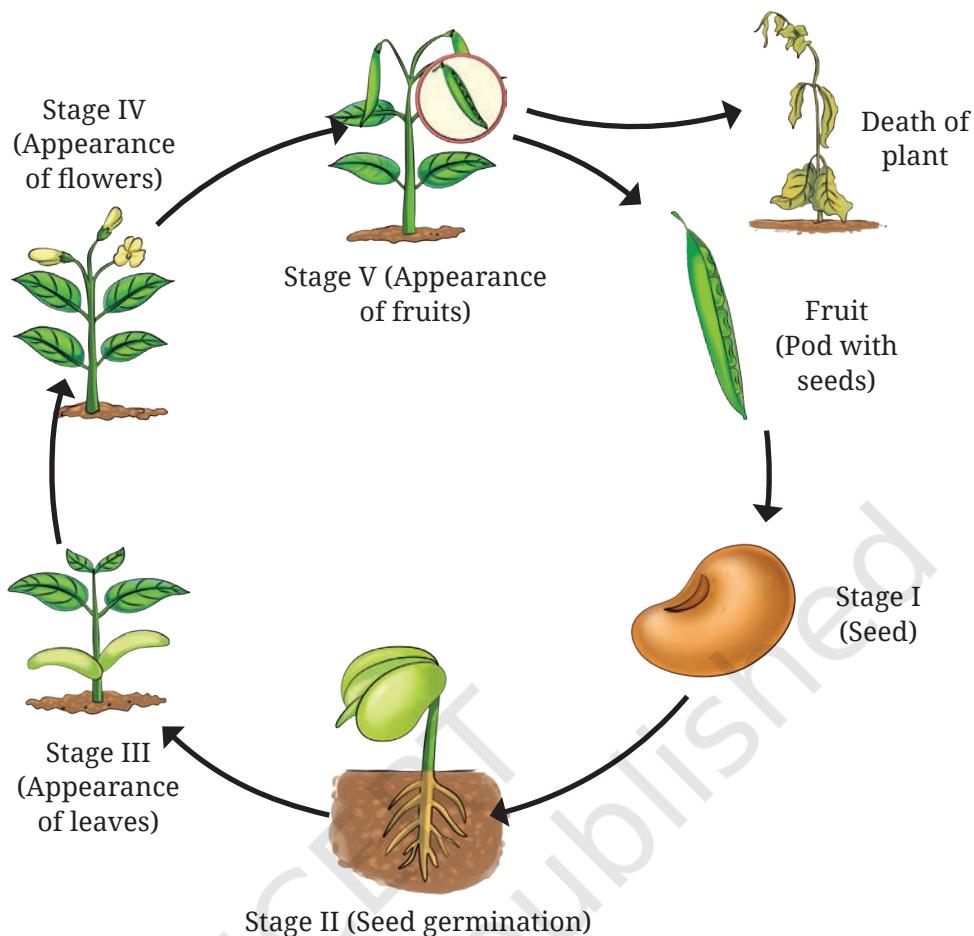


Fig. 10.4: Life cycle of a bean plant

10.5 Life Cycle of Animals

We have learnt about the life cycle of a plant. We have seen that a plant goes through many changes in its life cycle. Have you ever observed how animals grow over time? Draw sketches of their young ones and name them.

10.5.1 Life cycle of a mosquito

Mosquitoes buzzing around is a common experience for all of us. Female mosquitoes are bloodsucking insects that transmit several diseases like malaria, dengue and chikungunya. You might have learnt from newspapers, school noticeboards or awareness campaigns that mosquito breeding should be prevented. We are advised not to allow water to stagnate anywhere in our surroundings. Why is it so? Does stagnant water have any relation with mosquitoes laying eggs?

Conduct a safety audit in your school, or at your home and surroundings to check for stagnant water (if available, carry a hand lens to observe any small creatures). Some common places where stagnant water is likely to gather are desert coolers, planted pots and any open container. You may find two different types of worm-like creatures (Fig. 10.5). They are **larva** and **pupa**, two distinct life stages during the development of mosquito. In case you observe larvae and pupae, report to your teacher. Discuss with the teacher and classmates about the necessary measures one can take to prevent breeding of mosquitoes. What differences do you observe in the shape of larvae and pupae?

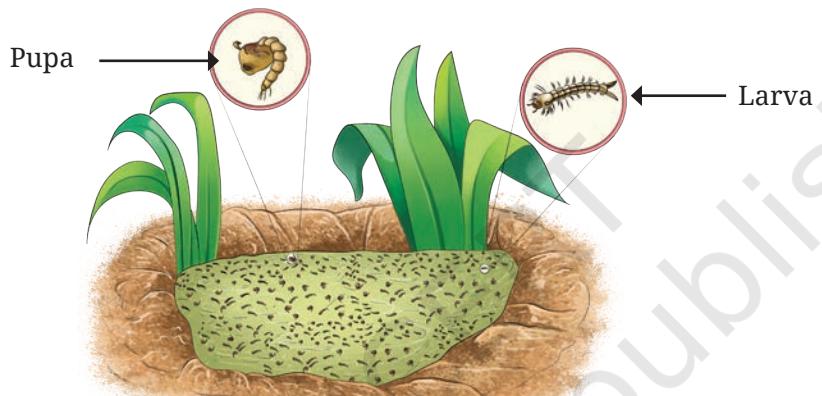


Fig. 10.5: Larvae and pupae of mosquitoes in a stagnant water body

Mosquito larvae and pupae observed in water bodies repeatedly come to the water surface. What can be the reason for this? Mosquito larvae and pupae live in water and require air to respire. They move to the surface of the water for air.

How can the life cycle of a mosquito be disrupted?

I have seen my mother spraying kerosene oil on stagnant water. Why does she do so?



Kerosene oil forms a thin layer over the water surface. This layer separates water from air, and does not allow larvae and pupae to inhale air. As a result, they die.



Activity 10.5: Let us analyse

Let us solve an interesting puzzle.

How will you decide which stage (larva or pupa) comes immediately after the egg stage?

Suppose you are given a container with water from a puddle containing larvae and pupae. Design an activity to find out the correct sequence of these stages.

You can take help of the following activity designed by Avadhi to **create** your own activity—



- Step 1: I have a water container with mosquito larvae and pupae.
- Step 2: I will separate 4–5 larvae and pupae into two separate containers with the same water.
- Step 3: I will observe them every day until I see them changing to the next stage.
- Step 4: If the larvae change into pupae, it would mean that the larval stage comes before the pupal stage or vice-versa.
- Step 5: I will keep watching both the containers to see in which one a mosquito appears first.

These observations will help us to learn the correct sequence of growth.

Now, suppose you are given a container filled with water from a puddle which contains larvae and pupae. Without separating them from the container, how would you design an activity to decide which stage, out of the two, gives way to the next?

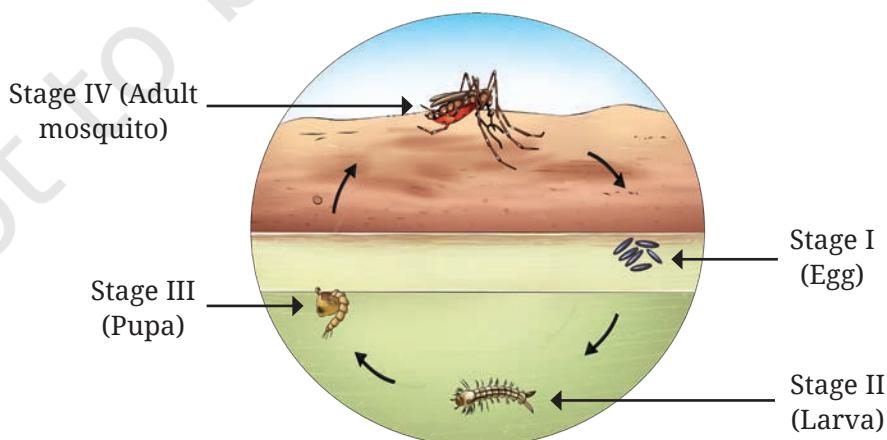


Fig. 10.6: Life cycle of a mosquito

Let us learn more about these stages in the life cycle of a mosquito.

Mosquitoes pass through four stages in their life cycle—egg, larva, pupa and adult (Fig. 10.6).

The adult mosquito that emerges from the pupa rests briefly on the surface of water and then flies away. The adult mosquito may survive for 10 to 15 days.

We have seen that a mosquito begins its life as an egg (stage I), the egg develops into a larva (stage II), the larva grows into pupa (stage III), and the pupa transforms into an adult mosquito (stage IV). The adult female mosquito lays eggs directly on or near water, and the cycle continues.

Significant changes occur in the appearance, body shape and structure during the various stages in the life cycle of a mosquito. The shape of the egg is quite different from the larva; the larva appears very different from the pupa. The pupa appears very distinct from the adult mosquito. Is it easy to imagine that a mosquito emerges from a pupa?

The silk moth also passes through four life stages—egg, larva, pupa and adult. Eggs hatch into larvae, which then grow in size. Larvae secrete thread-like material which they wrap around themselves, before changing to pupae. These are the fibres that are used to make silk fabric. In India, the Khadi and Village Industries Commission (KVIC) has set up several centres for silk production.



Do you know?

10.5.2 Life cycle of a frog

Activity 10.6: Let us analyse

Avadhi and Aayush are dressed up in full sleeves shirts and full pants today. It has been raining intermittently for a week. They are going out with their classmates for an activity. After a brief walk led by their science teacher, they reach a shallow pond. It is surrounded by trees and tall grasses. The teacher cautions them to watch everything from a distance

without causing any disturbance. You may also go to a small water body during the rainy season with a facilitator and explore it by taking due safety precautions.

You may notice a white jelly-like substance on the surface of water towards the edge of the pond (Fig. 10.7). This may also be attached to plants growing in or around the water. This jelly-like substance is actually a cluster of eggs of a frog and is known as **spawn**.

Observe the features of all the stages of a frog shown in Fig. 10.7. How will you decide the sequence of the given stages (A, B, C, D, E, F)? Some of the stages show distinct changes in their initial and final shapes. Record these changes in Table 10.5.

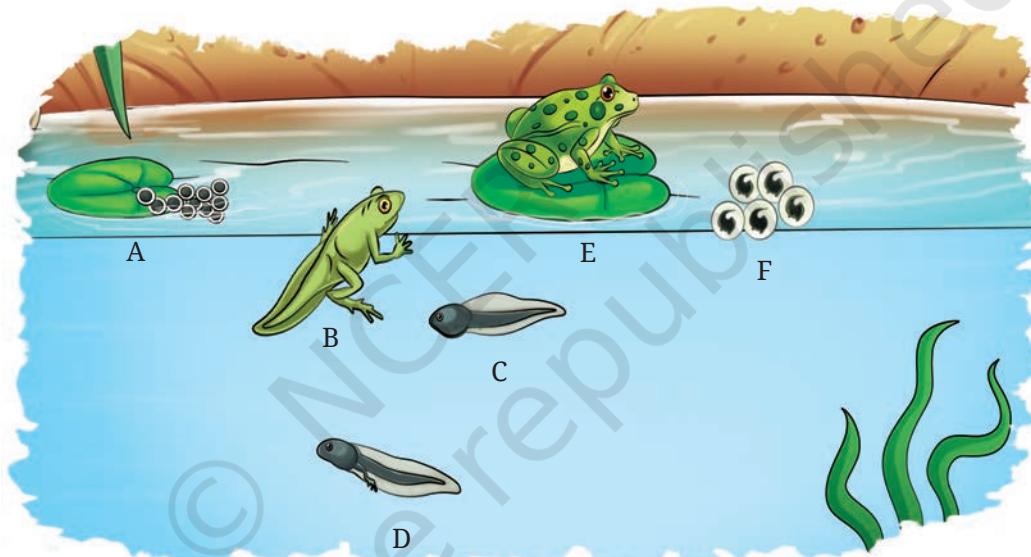


Fig 10.7: Different stages of a frog in a pond

Based on the observations listed in Table 10.5, draw the life cycle of a frog. Compare the figure drawn by you with Fig. 10.8.

Table 10.5: Changes in different life stages of a frog

A	B	C	D	E	F
			It is similar to 'C' but it has two legs.		

Some of the stages have been clubbed together, for example, stages A and F in Fig. 10.7 have been kept under stage I. You will find four stages in the life cycle of a frog—the egg stage, which progresses to the embryo stage; the **tadpole** stage, consisting of an early stage with a tail and no legs, and a late stage with hind legs; the **froglet** stage, and the adult frog stage (Fig. 10.8).

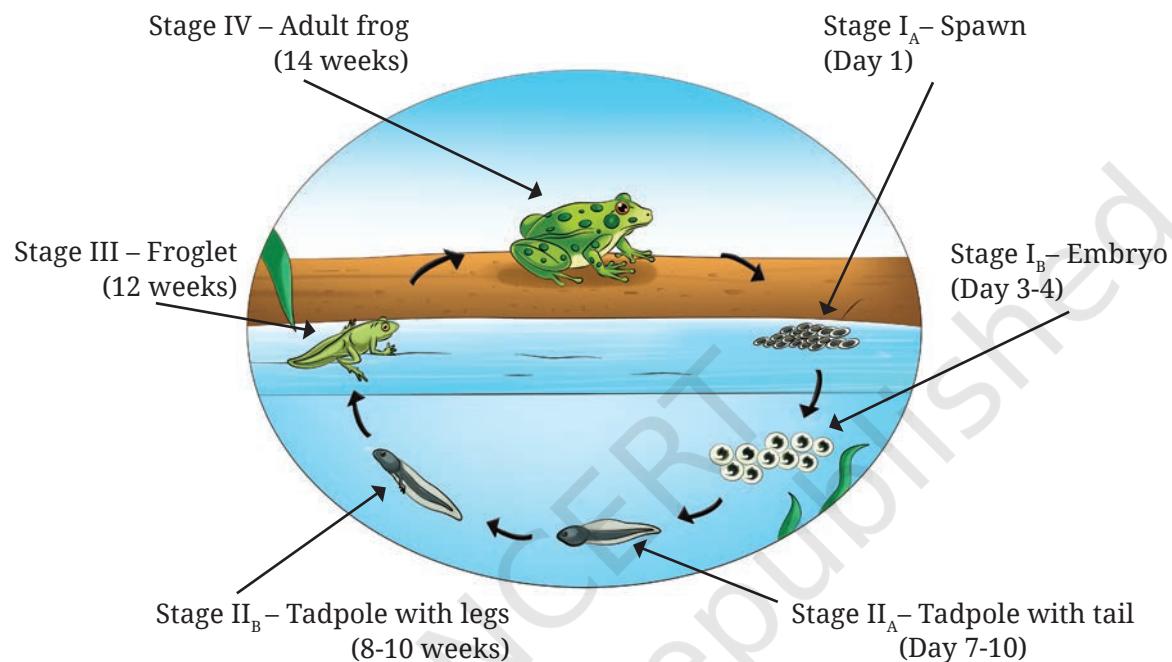
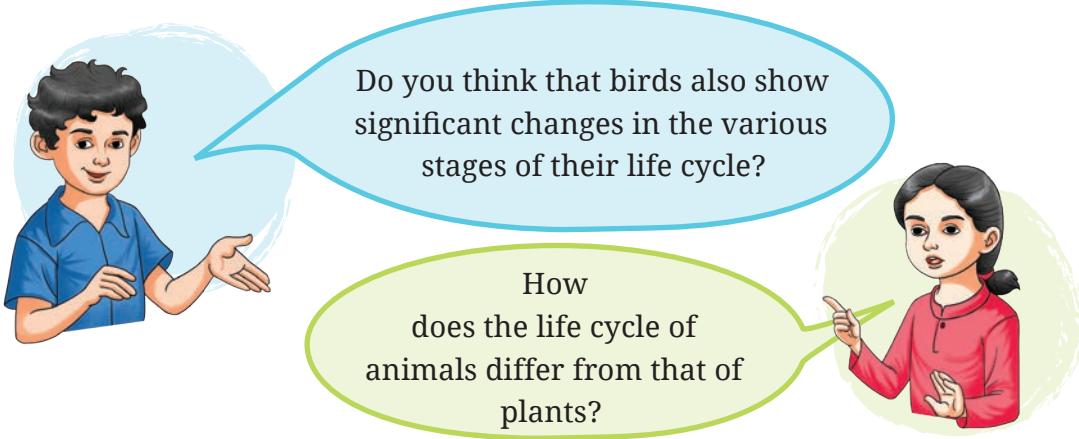


Fig. 10.8: Life cycle of a frog

Discuss in the class along the following points:

- ◆ How are these eggs of a frog different from the other eggs that you may have seen?
- ◆ Which stage has the shortest duration?
- ◆ Is there a change in the habitat during the various stages in the life cycle of a frog?
- ◆ How do the special features support that stage?

Observe Fig. 10.8. You will see that tadpoles develop legs but still have tails. Tails help them swim in water. Tadpoles grow gradually and start looking like little frogs called froglets. They still live in water but begin to spend some time on land. They continue to grow and lose their tails completely. Their legs become strong to help them jump and land. They become fully developed adult frogs who live both in water and on land.



Plants and animals are a part of the living world. They go through various changes during the course of their lives. We have learnt that a tiny plant grows and develops into a big tree. We have also learnt how animals grow and change from young ones to adults. This journey varies for each animal, making it unique and special. We have seen pupae change into insects, and tadpoles change into frogs. Such changes are important for plants and animals to survive and to maintain continuity of their kind. We should also take care of them and their homes. By nurturing and preserving their homes, we contribute to this flourishing living world.

Keywords

Breathing	Movement	Conclude
Death	Non-living	Create
Excretion	Nutrition	Design
Froglet	Pupa	Experiment
Germination	Reproduction	Explore
Growth	Respiration	Identify
Larva	Response	Observation
Life cycle	Stimulus	Prediction
Living	Tadpole	

Summary

Key Points

- ◆ The objects around us can be categorised into two types living and non-living.
- ◆ The essential features of living beings are that they move, eat, grow, breathe, excrete, respond to stimuli, reproduce and die. Absence of any of these features indicates that they are not living beings.
- ◆ Each living being goes through several stages during its life.
- ◆ Germination of seeds depends upon the availability of water, air and suitable light and/or dark conditions.
- ◆ During germination of seeds, roots generally grow downwards, while shoots grow upwards.
- ◆ A plant's life cycle starts with seed germination, followed by several stages of its growth and development. These include flowering and seed production. Seeds produced during their life cycle would germinate into new plants and the cycle continues.
- ◆ The life cycle of an animal as a result of reproduction, begin with a newborn that undergoes various stages of growth and development followed by an adult stage and finally death. The process of reproduction maintains the continuity of its kind.
- ◆ Mosquitoes pass through the stages of egg, larva, pupa and adult. The life stages of a frog include eggs, tadpoles, froglets and adults.
- ◆ In some living beings, such as mosquitoes and frogs, significant changes occur during the various stages of their life cycles. These changes can be seen in body shape, structure and sometimes even in the habitat.

Let us enhance our learning



1. List the similarities and differences in life cycles of plants and animals.
2. The table on the next page shows some data. Study the data and try to find out examples appropriate for the conditions given in the second and third columns. If you think that

an example for any of the conditions given below is not possible, explain why.

S. no.	Does it grow?	Does it respire?	Example	Remarks
1.	No	No		
2.	No	Yes		
3.	Yes	No		
4.	Yes	Yes		

- You have learnt that different conditions are required for seed germination. How can we use this knowledge for proper storage of grains and pulses?
- You have learnt that a tail is present in a tadpole but it disappears as it grows into a frog. What is the advantage of having a tail in the tadpole stage?
- Charan says that a wooden log is non-living as it cannot move. Charu counters it by saying that it is living because it is made of wood obtained from trees. Give your arguments in favour or against the two statements given by Charan and Charu.
- What are the similarities and distinguishing features in the life cycles of a mosquito and a frog?
- A plant is provided with all the conditions suitable for its growth (Fig. 10.9). Draw what you expect to see in the shoot and the root of the plant after one week. Write down the reasons.
- Tara and Vijay set up the experiment shown in the picture (Fig. 10.10). What do you think they want to find out? How will they know if they are correct?

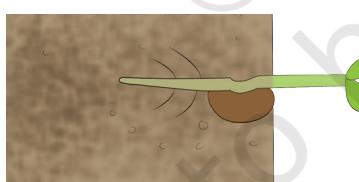


Fig. 10.9: Pot kept along the ground

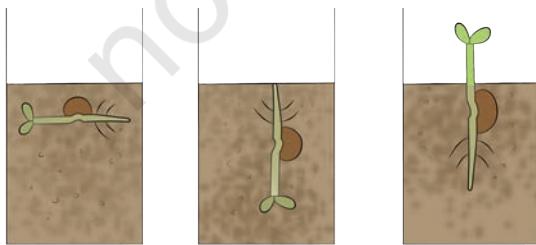


Fig. 10.10: Experimental set-up

- Design an experiment to check if temperature has an effect on seed germination.

Learning further



- ◆ Make a field trip to a local garden. Interact with a gardener to learn about various conditions and the time required for the growth of various plants.
- ◆ Can we grow plants without germinating their seeds? Explore and cite some examples.
- ◆ Observe the life cycle of five plants grown at home, school, or in a nearby garden. Create a picture book containing pictures of various stages of their growth. Write the name of each plant and the duration of each of its stage.
- ◆ Try to observe some of the stages in the life cycle of a butterfly or a moth. Are these stages similar to the stages in the life cycle of a mosquito?
- ◆ In your opinion, would the environment affect the life cycles of insects? Explore and list the factors that affect the life cycles of insects.

Let us create



Add more lines to the incomplete poem given below. Include information on the different stages in development of a frog. You may also draw and paint each stage as it appears in your poem.

*In shaded and grassy bogs,
There lived a group of frogs.
They happily sang from dusk to dawn,
In double bass going on and on.
One day sitting beside a reed,
Female frogs think it's time to breed*

.....

Notes

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School vacations are always fun for Bhoomi and Surya. This vacation, they visit their *Ajji* (grandmother). *Ajji* lives in a village on the edge of a forest in the Western Ghats. The air in the village is fresh and cooler than in the city. They can see beautiful hills, streams, and many interesting plants, animals and birds around them.

One afternoon, Bhoomi and Surya ask *Ajji* to tell them more about the place. *Ajji* says, "Children, do you know that this place has several treasures of nature that enrich our lives? The pure air is refreshing and the soil is so fertile that it supports a variety of living beings. Moreover, this place gets plenty of sunlight which is useful in many ways. Different varieties of trees provide food and shelter to animals including various birds and insects. Can you think of more such treasures of nature?"



0677CH11



A village

Bhoomi replies, “*Ajji*, we use water for drinking and growing vegetables.” *Ajji* says, “Yes. We need these treasures for our survival and for making our lives more comfortable. Without these treasures of nature, any form of life on Earth is not possible.” We all are a part of nature.

Ajji explains the importance of air around us and how it is essential for our survival. Let us find out more about air.

11.1 Air

One morning, Bhoomi and Surya see *Ajji* performing some breathing exercises. *Ajji* asks them to join her. She says, “I am taking deep breaths in, and letting them out. This helps in getting more fresh air in the lungs to stay healthy.” Bhoomi and Surya sit with *Ajji* and start taking deep breaths.

Let us also perform a breathing exercise.

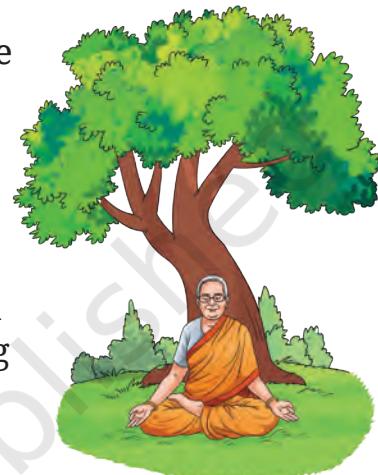
Activity 11.1: Let us experience

- ◆ Take a deep breath in, and then breathe out slowly.
- ◆ Take a deeper breath in again.
- ◆ Hold your breath for as long as you can and then breathe out slowly.
- ◆ How long can you hold your breath?
- ◆ How do you feel when you hold your breath?



Caution

Do not hold your breath for so long that you start feeling uncomfortable.



Breathing exercise

From this activity, we find that it is difficult to hold our breath for a long time. The air which we breathe in has oxygen. Our body needs oxygen to perform its functions. When we hold our breath for a long time, the body does not get enough oxygen to perform its functions. Thus, we need oxygen for our survival. Similarly, most of the living beings also need oxygen for their survival.

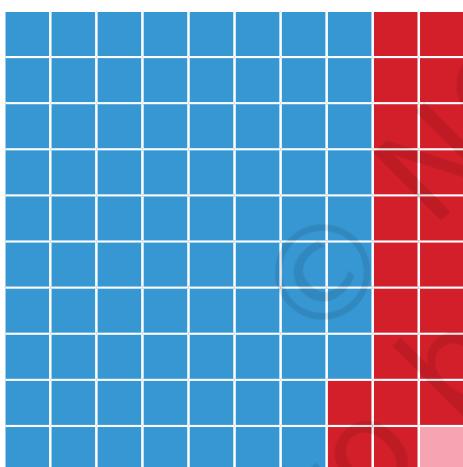
We can survive without food or water for a few days, but we cannot survive without oxygen for even a few minutes.

Do you know?

The air which surrounds the Earth is a mixture of gases. Can you name some gases which are present in the air? Air contains nitrogen, oxygen, argon, carbon dioxide and other gases in small quantities. Fig. 11.1 gives the composition of air in percentage. Notice that in Fig. 11.1 there are 100 squares. Out of 100 squares, 78 are occupied by nitrogen, 21 are occupied by oxygen, and 1 by argon, carbon dioxide and other gases.

Percentage is the number of parts in 100. It is denoted by the symbol ‘%’.

More to know!



Composition of air

Nitrogen (78%)
Oxygen (21%)
Argon, carbon dioxide and other gases (1%)

Fig. 11.1: Composition of air

You notice the presence of air when the leaves of a tree rustle, the clothes hanging on a clothes line sway, or the pages of an open book begin to flutter once a fan is switched on.

Moving air is called wind. Sometimes it blows fast, for example, during a storm, and sometimes it blows gently as a breeze. You must have played with a *firki* (paper pinwheel) many times. Let us make a *firki* by performing Activity 11.2.

Activity 11.2: Let us make and decorate

- ◆ Take a square paper of size 15 cm x 15 cm, a pair of scissors, an all-pin and a soft stick.
- ◆ Follow the instructions shown in Fig. 11.2 to make a *firki*.

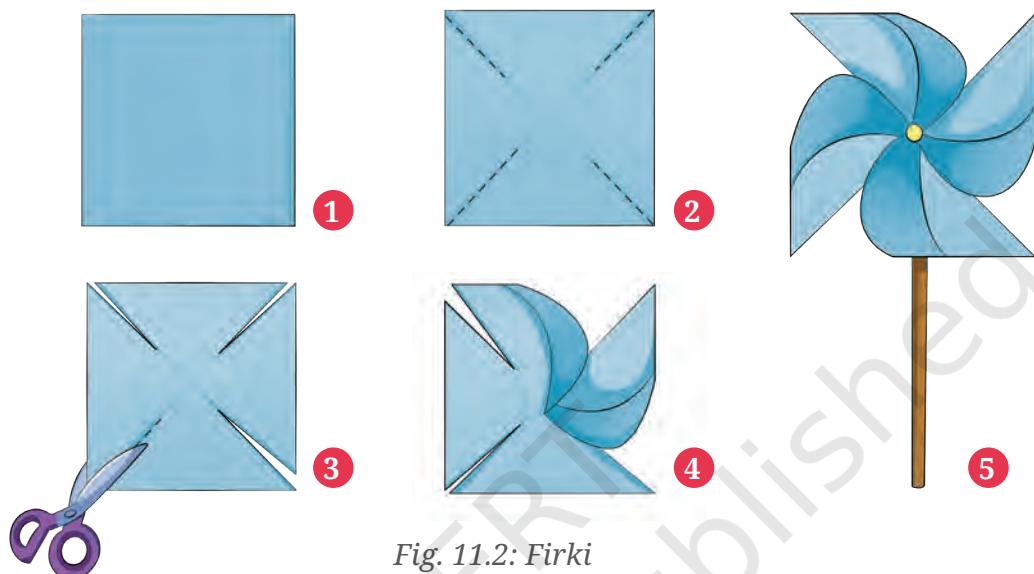


Fig. 11.2: Firki

Now, you can hold the *firki* in your hand and run. You can also blow air on it. What do you observe? Does the *firki* rotate? When you move it a little back and forth, the *firki* rotates. What makes a *firki* rotate? It is the wind that makes a *firki* rotate.

The working of a windmill is similar to that of a *firki*. Wind rotates the wings of a windmill. Windmills can be used to run flour mills, to pull up water from a well, or to generate electricity. In India, there are many windmill farms. A windmill farm is an area that has a large number of windmills which use the energy of the wind to generate electricity (Fig. 11.3).

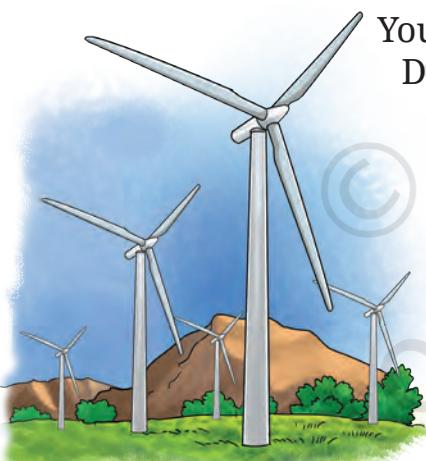


Fig 11.3: A windmill farm

Muppandal Wind Farm in Tamil Nadu, Jaisalmer Wind Park in Rajasthan and Brahmanvel Wind Farm in Maharashtra are some of the leading windmill farms in our country. Find out more other windmill farms in our country.

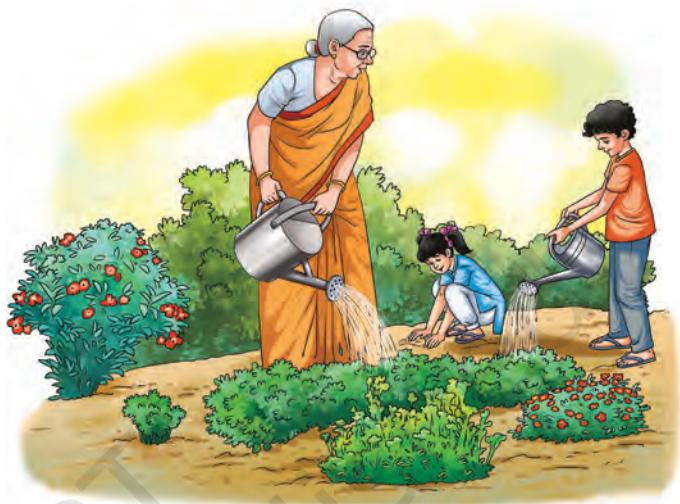
!
More to know!

We have learnt that air is very important for us. Water too is essential and precious for us. How do you feel when you cannot get water to drink, especially when you are thirsty? Let us find out more about water.

11.2 Water

Bhoomi and Surya help *Ajji* in filling the troughs of water for the cows. They also help her in watering plants such as vegetables and medicinal herbs in the garden. *Ajji* teaches them how to water the plants so that every drop is used and none of it goes waste.

Can you think of some more uses of water in your daily life? Write down your responses in the blank bubble.



Watering the plants



We need water for many daily activities, such as drinking, cooking, bathing, washing and cleaning. It is also used for growing crops and for industrial purposes. Where do we get water from? Make a list of the different sources of water.

Water covers about two-thirds of the Earth's surface. Most of the water is found in oceans and seas. However, this water is saline or salty. This saline water is not fit for domestic, agricultural and industrial use. For all these activities, we need freshwater, which is present in the form of ice sheets or snow, rivers or lakes on the surface of the Earth, and underground. Freshwater present in ice sheets

and snow, or underground water is difficult to access. A very small fraction of the freshwater present in ponds, rivers, lakes and wells is easily accessible. Water is precious, that is why *Ajji* guides them to use it with care.

Do you feel that water is being used efficiently in our daily activities? Have you observed water being wasted in your daily activities? Let us find out activities where water is wasted and how this wastage can be reduced.

Activity 11.3: Let us find out

Fill the Column II and Column III in Table 11.1.

Table 11.1: Wastage of water in your daily activities

Column I	Column II	Column III
Activity	How is water wasted?	Suggest ways to reduce wastage of water.
1. Hand washing		
2. Washing clothes		
3. Washing utensils		
4. Taking shower		
5. Cooking		
6. Gardening		
7. Brushing teeth		

What conclusion can you draw from the information you gathered in the table? What can you and your family do to reduce this wastage of water? There are many ways to reduce wastage of water. For example, turning off taps when not in use and fixing water leakages. Recycling water and water harvesting also help in saving water.

Our country is blessed with numerous rivers, streams and lakes. Have you ever noticed plastic bags and wrappers floating on the surface of water? We pollute freshwater

sources by throwing trash (waste materials) in them. Waste from homes and industries pollute our water sources when it is dumped into them. Identify other human activities that lead to water pollution. Discuss with your friends in the class what you can do to reduce water pollution. Polluted water is not fit for consumption by living beings.

As freshwater sources are limited, there is a shortage of water in many parts of India. At some places, people have to walk long distances to fetch drinking water. Everyone does not have the same kind of access to water. It is important for us to conserve water and use it judiciously. We must also prevent it from being polluted so that water remains fit for consumption by all living beings. In what ways can you conserve water?

Water harvesting is one of the methods for conserving water. In many buildings, rainwater is collected and stored in large quantities for later use. This is called **rainwater harvesting** (Fig. 11.4a). Do you know that rainwater is also harvested in many homes, residential societies or schools? It is an age-old practice in India.

For example, stepwells (Fig. 11.4b), commonly known as *Bawadi* in Rajasthan and *Vav* in Gujarat are built for water harvesting as a response to the scarcity of water in these regions. These stepwells have a unique system of water harvesting. They store not only rainwater but also water seeping from nearby lakes, ponds and rivers. The walls of the trenches (long deep holes dug in the ground) are lined with blocks of stones that allow seepage of water. Find traditional water harvesting practices in your locality. Discuss with your teachers and parents to learn more about it.



Fig. 11.4 (a): Rainwater harvesting

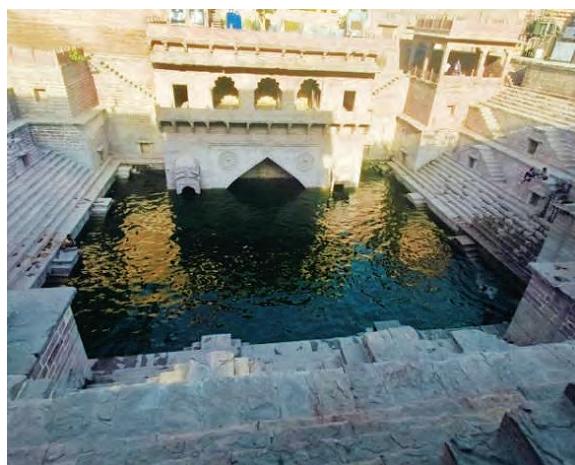


Fig. 11.4 (b): Bawadi (Toorji ka Jhalra, Jodhpur in Rajasthan)



Do you know?

World Water Day is observed on 22nd March every year. Find out its importance.

In the chapter ‘A Journey through States of Water’, we have learnt about the water cycle, where the Sun plays an important role in the evaporation of water. Have you ever observed your mother or grandmother cut raw mangoes and expose them to the hot sun for several days to dry? Let us explore more about energy from the Sun.

11.3 Energy from the Sun

On a sunny day, Bhoomi and Surya are helping *Ajji* dry chillies in the Sun. *Ajji* says, “We use the heat from the Sun to dry it. We can use dried chillies when fresh ones are not available. I will give you some to take home. Do you know that the Sun is the main source of energy on Earth? All plants and animals are dependent on it.”

We use heat and light from the Sun for various purposes. What are some of the activities for which we need heat and light? Bhoomi draws some pictures to show the uses of heat and light from the Sun. Help her by adding more examples. Draw the pictures and write their descriptions in the space provided.



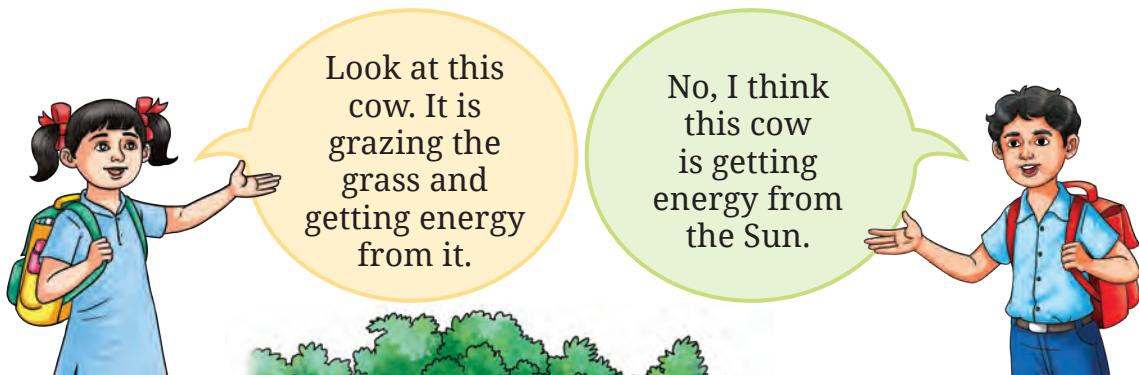
Plants make food



Drying of clothes



One afternoon, Bhoomi and Surya pass by the field near *Ajji*'s house, where they see a cow grazing the grass. They talk about the Sun being the main source of energy. Read the conversation carefully and answer.



The cow is standing in the Sun. But it does not mean that it is getting energy from the Sun.

The cow is eating grass. Grass leaves need sunlight to grow. So, the main source of energy is the Sun. This way the cow gets energy from the Sun.



According to you, whose statement is correct and why?

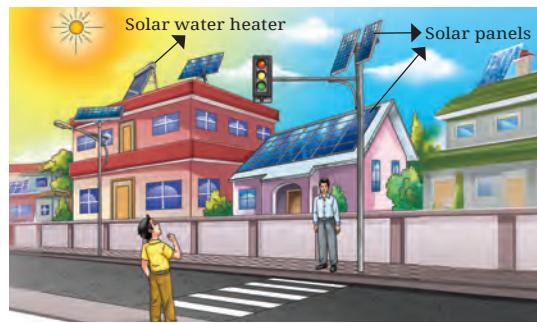


Sunlight helps plants prepare food. The Sun also provides all the living beings on Earth with heat and light. It is their main source of energy.

In many households in India, water is offered to the Sun early in the morning as an expression of gratitude to the Sun.

Do you know?

Have you seen solar panels on rooftops, on top of street lights or on traffic signals? The solar panels capture the Sun's energy and produce electricity. Energy from the Sun can also be directly used for cooking in a solar cooker or for heating water in a solar water heater.



Uses of solar energy

What will happen if the Sun is not visible for a few days?

1. We may have to depend on artificial lighting during day time also.
2. _____
3. _____



One cannot imagine life on Earth without the Sun. The Sun is the main source of energy on the Earth. Plants get energy from the Sun and produce food. Animals eat plants and grow. We get food from both plants and animals. This cycle on Earth is possible due to the Sun. So, we all are dependent on the Sun as the main source of energy. Where do we find a large variety of plants or animals? Let us explore.

11.4 Forests

One morning, *Ajji* takes Bhoomi and Surya for a walk in the forest. They find a variety of herbs, shrubs and trees in the forest. *Ajji* explains, “Forests are large areas with dense growth of various types of plants.” On the way, they collect some *nellikai* (Kannada term for Indian gooseberries) that have fallen on the ground. *Ajji* tells them, “We have a tradition in the village not to pluck fruits from the trees; they are left for animals and birds to eat.”



Discuss with your friends and make a list of at least five products that we get from forests.

Forests are a natural home for many wild animals, including birds and insects. Forests provide food and shelter to them. In nature, every animal depends on other life forms for survival. The diversity of life forms ensures food for every living being. However, over the years, the forest cover has been decreasing, mainly due to human activities like large scale cutting of trees. It takes many years to grow a new forest or restore lost forests. Therefore, we must preserve and use forests responsibly so that they get enough time to regenerate.

Van Mahotsav is a week-long event celebrated across the country during the month of July. It is a forest festival during which new plants and trees are planted, and awareness about respecting forests is raised. The aim of the event is to increase the green cover. You too can plan a *Van Mahotsav* in your community.

What are the consequences of cutting a large forest area? Make a presentation or do a role play, or write a story or a poem that shows what could happen if we continue to cut down trees in our forests.



From ancient times, India had a tradition of respecting, protecting and preserving forests. You have already learnt about sacred groves in the chapter 'Diversity in the Living World'. Many efforts have been made by common people to prevent the cutting of trees, and

thus, saving forests. One such effort is the famous Chipko movement. It started in the early 1970s in Uttarakhand (previously part of Uttar Pradesh). Local women actively participated in this movement. They encircled and hugged the trees to protect them from being felled.



Do you know?



During their walk in the forests, Bhoomi and Surya notice that there are a lot of leaves on the ground and the soil feels damp. *Ajji* explains, “The roots of plants hold on to the soil and prevent it from being washed away. The leaves that fall from the trees decay and enrich the soil with nutrients. This soil is used by new plants and trees to grow. This is an example of recycling in nature.” Let us investigate the soil in more detail.

11.5 Soil, Rocks and Minerals



Fig. 11.5: Soil preparation for planting vegetables

Bhoomi, Surya and *Ajji* come back home from the forest. Bhoomi and Surya help *Ajji* in preparing the soil in the garden for planting some vegetables (Fig. 11.5). *Ajji* asks them to dig the soil gently and loosen the lumps. You have already learnt in the chapter ‘Living Creatures: Exploring their Characteristics’ that for plants to grow, the space between the soil particles not only provides sufficient air but also space for the

roots to grow easily. Bhoomi and Surya could see small pebbles, the roots of plants and a few earthworms too in the soil. Do you realise that earthworms are natural agents that help in turning and loosening the soil?

While Bhoomi and Surya help *Ajji*, let us do our own experiment by performing Activity 11.4.

Activity 11.4: Let us investigate



Caution

Remember to wash your hands thoroughly after touching the soil collected from different places. Sometimes soil that has garbage carries germs that may be harmful to us.

- ◆ Collect samples of soils from different areas around your home and school.
- ◆ Guess what could be there in different soils.
- ◆ Observe carefully each soil sample and note its colour.
- ◆ Touch each soil sample and feel its texture.

- ◆ Observe the soil samples with your naked eye. If you have a magnifying lens, look at the soil through it.
- ◆ Record your observations in Table 11.2.

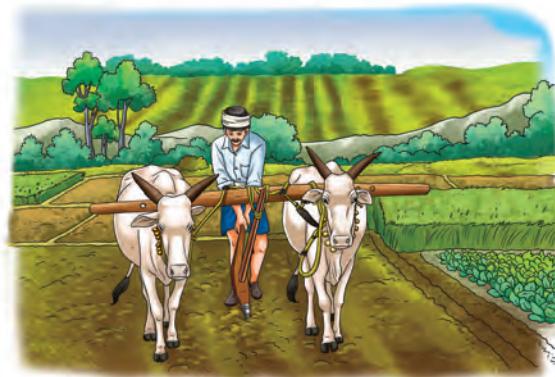
Table 11.2: Soil samples

Location from which soil sample was collected	What I guessed about the soil?	Observation of soil with naked eye including its colour and texture	Observation of soil with magnifying lens
Soil from a farm after ploughing			

- ◆ Is there any difference between your guess and what you can actually observe when you look closely?
- ◆ Do you see any differences in the soil samples taken from different places?
- ◆ Do you see differences in what you are able to observe with your naked eye and what you can observe with a magnifying lens?

There are many things in the soil, such as sand, insects and worms. There may be many small organisms that we cannot see with our naked eyes. Plants and animals also become part of the soil as they decompose and decay. The soil samples collected from different places may be of different colours because they may contain different materials.

Have you ever wondered how soil is formed? Soil is formed by the disintegration (breaking apart) of rocks by actions of the Sun, water and living organisms over a long time (thousands of years). There are different types of soils. Some are good for growing certain types of



Ploughing

plants while some are good for making bricks for buildings. Forests have a variety of soils. Soil is a precious treasure that supports biodiversity.

You may have seen rocks in your surroundings. Rocks are used in the construction of houses, buildings, temples, roads, dams and table tops. Some rocks, like slate, are used for roofing (Fig. 11.6) and laterite can be used as a building material, like bricks (Fig. 11.7). Some of the important rocks are granite, sandstone and marble. Human beings have been using rocks to make tools such as hand axes (Fig. 11.8a) and arrowheads (Fig. 11.8b) since thousands of years.



Fig. 11.6: Rocks used for roofing



Fig. 11.7: Laterite rocks used as bricks



Fig. 11.8 (a): Hand axes

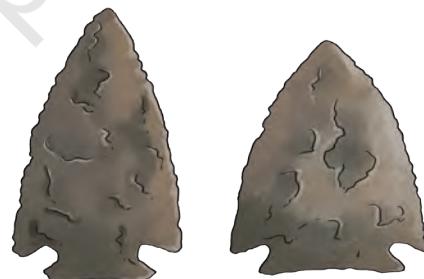


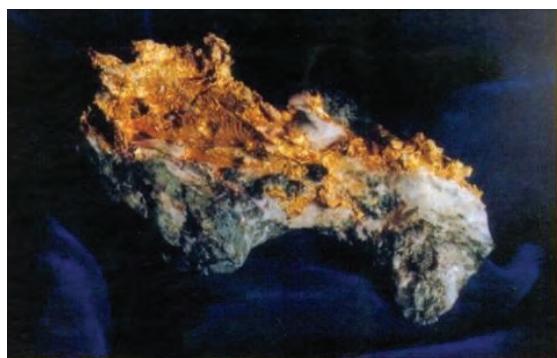
Fig. 11.8 (b): Arrowheads made from stone



Mining of marble

What are rocks made up of? They are made up of minerals. Important metals, such as aluminium, gold, copper and iron are extracted from minerals. Minerals are used in the manufacturing of airplanes, cars, jewellery, cosmetics, and

electrical and electronic equipment. For example, the basic mobile phones that we use contain about a dozen minerals like gold, silver, copper, cobalt, etc.



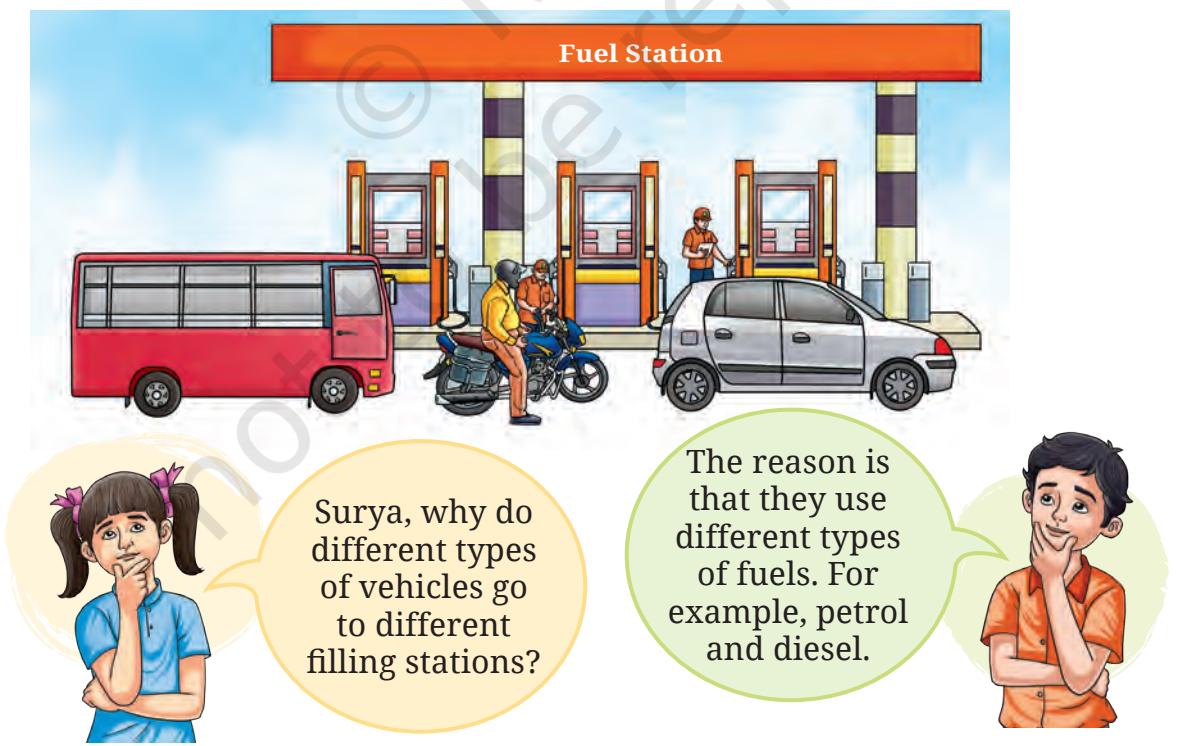
Naturally occurring gold



Some minerals found in nature

Rocks play a vital role in our lives. It takes thousands to millions of years to form rocks. Therefore, it is important to conserve and use them responsibly. Do you know how rocks and minerals are transported from one location to another? Most vehicles that we use for transportation use fossil fuels. Let us explore more about fossil fuels.

11.6 Fossil Fuels



Let us explore more about it by performing Activity 11.5.

Activity 11.5: Let us conduct a survey

- ◆ Conduct a survey of vehicles in your neighbourhood.
- ◆ Which types of vehicles are there? What types of fuels do they use?
- ◆ Record the information that you collect in Table 11.3.

Table 11.3: Types of vehicles and fuels used

Type of vehicle	Type of fuel used

What are the most common types of fuels used? Petrol and diesel are the two most widely used fuels for vehicles. Petrol, diesel and kerosene are obtained from petroleum. Petroleum along with natural gas and coal are commonly called **fossil fuels**. They are formed essentially from the remains of microorganisms and plants that got buried deep inside the earth, and were converted to petroleum, natural gas and coal. It takes millions of years for these fuels to form.

Natural gas is used for cooking and generating electricity. Nowadays, it is also used in the form of Compressed Natural Gas (CNG) as a fuel for vehicles. It is a cleaner fuel than petrol or diesel. Coal is mainly used for the production of electricity. It is found in several parts of India. Find out the major coal-producing states and mark them in a map of India.



Do you know?

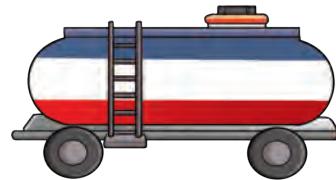
Earlier, coal, wood and dung cakes were used as fuels for cooking. Nowadays, less polluting natural gas and Liquefied Petroleum Gas (LPG) have gradually replaced these domestic fuels.



Coal



Petrol



Natural gas

Fossil fuels are found in limited quantities. Hence, we will soon run out of fossil fuels if we continue to use them in the manner that we currently do. To avoid such a situation, we need to explore alternate sources of energy. When fossil fuels are burnt, smoke and carbon dioxide gas are produced which pollutes the air. Over-dependence on fossil fuels for transportation and as domestic fuels has resulted in large scale air pollution.

Let us do our bit to conserve the fossil fuels by—

- ◆ Walking or cycling to nearby places.
- ◆ Using public transport.

Suggest some more ways.

11.7 Natural Resources: Renewable and Non-renewable

Nature's treasures fulfill our needs. They are essential resources to sustain all life forms on the Earth. For example, we get heat and light from the Sun, water from rivers, and food from plants and animals. These resources which we get from nature are called **natural resources**. We also use natural resources to make many useful things for our convenience. For example, electric bulbs, furniture, solar panels, bicycles, etc., make our lives comfortable. All such resources created by human beings are called **human-made resources**.

You have learnt about various natural resources, such as air, water, energy from the Sun, forests, soil, rocks, minerals and fossil fuels. Some of these natural resources

get replenished through natural processes over a period of time. If you remember, *Ajji* told Bhoomi and Surya that they could collect only those *nellikai* that had fallen on the ground. This makes sure that there would be enough fruits for other animals and birds. The seeds from the droppings of animals and birds would enable new trees to grow, though it would take some years before we get fruits from these new trees. Thus, resources which get renewed, replenished or restored within a reasonable period of time are called **renewable resources**. Air, water and forest are some of the examples of renewable natural resources. Nature renews them. We should use our natural resources judiciously.

On the other hand, fossil fuels take millions of years to form. They are found in limited quantities and once used, they get exhausted. They are not produced or replenished within a reasonable period of time. These resources are called **non-renewable resources**. Examples of non-renewable natural resources are minerals, soil, rocks, coal, petroleum and natural gas.

11.8 Resources We Use

It is time for Bhoomi and Surya to go back home after a wonderful holiday at their *Ajji*'s home. Their *Amma* (mother) comes to pick them up. Bhoomi and Surya show her the vegetable plants that have started to grow in the garden and the dried chillies given by *Ajji* to take home.

They notice changes in the colour of the skyline and the smell of the air once they reach the city. There are very few trees. The air does not smell as good as the air at *Ajji*'s place. They can smell smoke from the vehicles. The air is polluted. *Amma* says, "Yes. When we use fossil fuels in our vehicles, smoke is generated. Now, there are vehicles which cause less pollution. For example, there are electric vehicles that do not release any smoke. So, people are making an effort to create alternatives."

Can you list some alternatives for reducing air pollution?

We use many natural resources in our everyday life. Let us identify some resources that we use by performing Activity 11.6.

Activity 11.6: Let us make a list of natural resources used

Make a list of activities you do in your daily life and write down the natural resources used directly or indirectly for each activity. In Table 11.4, some items are already filled in. Using them as a guide, fill the remaining blank rows.

Table 11.4: Natural resources used

Activity	Natural resource
Washing clothes	Water
Making clay toys	
Collecting firewood	
Making kites	
Having breakfast	

How many natural resources did you list? Compare your list with that of your friend.

You and your friends have listed many natural resources that we use everyday. These resources are air, water, soil, and food from plants and animals. We get these resources from nature and also make things using them for our consumption. Therefore, we must conserve our natural resources and use them responsibly without wasting them. This way, we can continue to fulfill our present needs while also saving for the future, without harming the environment.

“Earth provides enough to satisfy every man’s need but not for every man’s greed.”

– M. K. Gandhi

Keywords

Air	Petroleum	Classify
Coal	Rainwater harvesting	Experience
Forests	Renewable resources	Explore
Fossil fuels	Resources	Investigate
Human-made resources	Rocks	Observe
Natural gas	Soil	Survey
Natural resources	Sun	
Non-renewable resources	Water	

Summary

Key Points

- ◆ Resources required for our survival are provided by nature.
- ◆ Resources provided by nature are called natural resources.
- ◆ Some important natural resources are air, water, energy from the Sun, forests, soil, rocks, minerals and fossil fuels.
- ◆ Resources created by human beings to meet their needs are called human-made resources.
- ◆ Natural resources can be classified as renewable resources and non-renewable resources.
- ◆ Resources that get renewed, replenished or restored by natural processes within a reasonable period are called renewable resources.
- ◆ Resources that are in limited quantities and do not get replenished within a reasonable period are called non-renewable resources.
- ◆ All living beings, including humans, depend on natural resources for their survival so we should use them judiciously.

Let us enhance our learning



- Fig. 11.9 shows items related to natural resources. Match them with their jumbled up names. Make another table and write the names of these resources. Classify these resources as renewable or non-renewable.

Item	Jumbled up name
	ocrk
	refost
	ndiw
	atwre

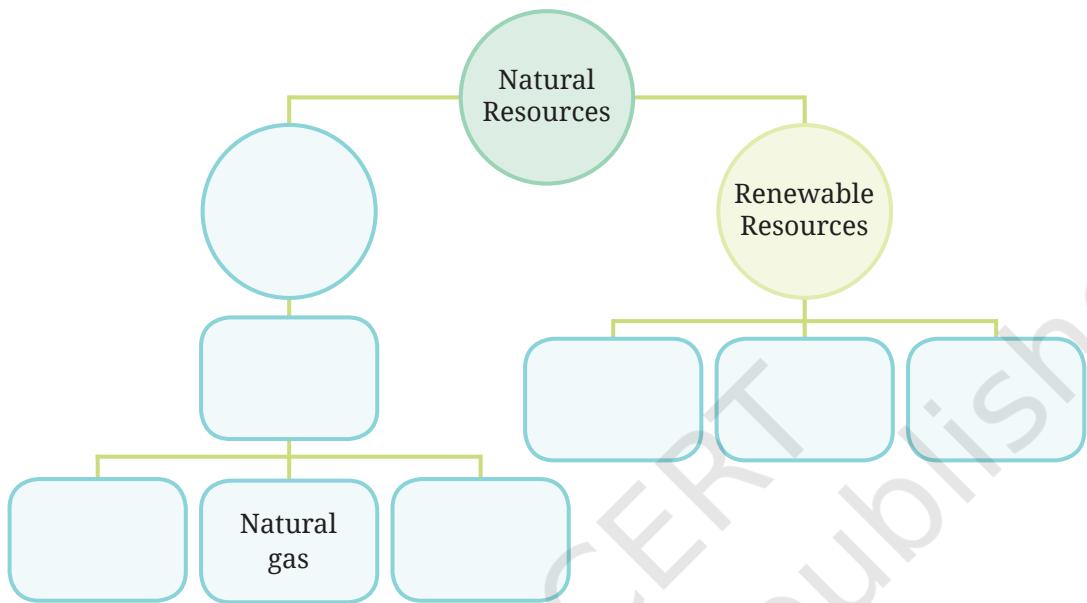
Fig. 11.9: Natural resources

- State whether the following statements are True [T] or False [F]. If False, correct them.
 - Nature has all the resources to meet human needs. []
 - Machines are a resource found in nature. []
 - Natural gas is a non-renewable resource. []
 - Air is a renewable resource. []

3. Fill in the blanks using the most appropriate option—
 - (i) A fuel that is commonly used in two wheelers like scooters or bikes is.....
 - (a) Kerosene
 - (b) Petrol
 - (c) Diesel
 - (d) LPG
 - (ii) An example of a renewable resource is
 - (a) Coal
 - (b) Water
 - (c) Natural gas
 - (d) Petrol
4. Classify the following as renewable or non-renewable resources—coal, natural gas, forests and minerals.
5. Why do we say that petroleum is a non-renewable resource?
6. It is difficult to regrow forests. Justify this statement.
7. Make a list of five daily activities in which you use natural resources. Suggest ways by which you can reduce their use.
8. List four activities that are possible due to the presence of air.
9. How can you contribute towards enhancing the green cover of your locality? Make a list of actions to be taken.
10. In the given illustration, we see that food is being cooked.
Answer the following questions—
 - (i) What type of energy is being used for cooking?
 - (ii) Name one benefit and one drawback of using this type of energy for cooking.
11. Cutting down trees on a large scale impacts the quality of the soil. Why do you think it is so?
12. Explain two ways in which human activities pollute the air. Propose one action which can help in reducing air pollution.



13. A family uses solar panels to generate electricity, a gas stove to cook food and a windmill for pumping water from a well. What would happen if there were no sunlight for a week?
14. Fill up the blanks using the following terms—
(fossil fuels, forest, air, petroleum, coal, water and non-renewable resource)



15. There is an increasing demand of trees to meet the requirements of industries and for housing. Therefore, trees are being felled. Is it justified? Discuss and prepare a brief report.
16. Propose a plan to use less water in your school. What steps would you take to make this plan happen and how would it help the environment?

Learning further

- ◆ Rainwater harvesting is an age-old practice in India. Find out some of the traditional rainwater harvesting techniques being used in your state or in other parts of the country.

- ◆ Investigate the effect of air pollution on human health by interacting with your elders or community members and identify the main sources of air pollution in your local area. Based on your findings, suggest two practical steps that your school or community could take to help reduce air pollution.
- ◆ Prepare a list of the names and uses of important minerals and rocks that are used in your village/town/city for various purposes.
- ◆ You are an eco-club monitor. Organise a tree plantation drive in your school with the help of your teacher. List the steps required for organising this activity. Prepare a one-page report listing the names of the trees planted along with their importance.