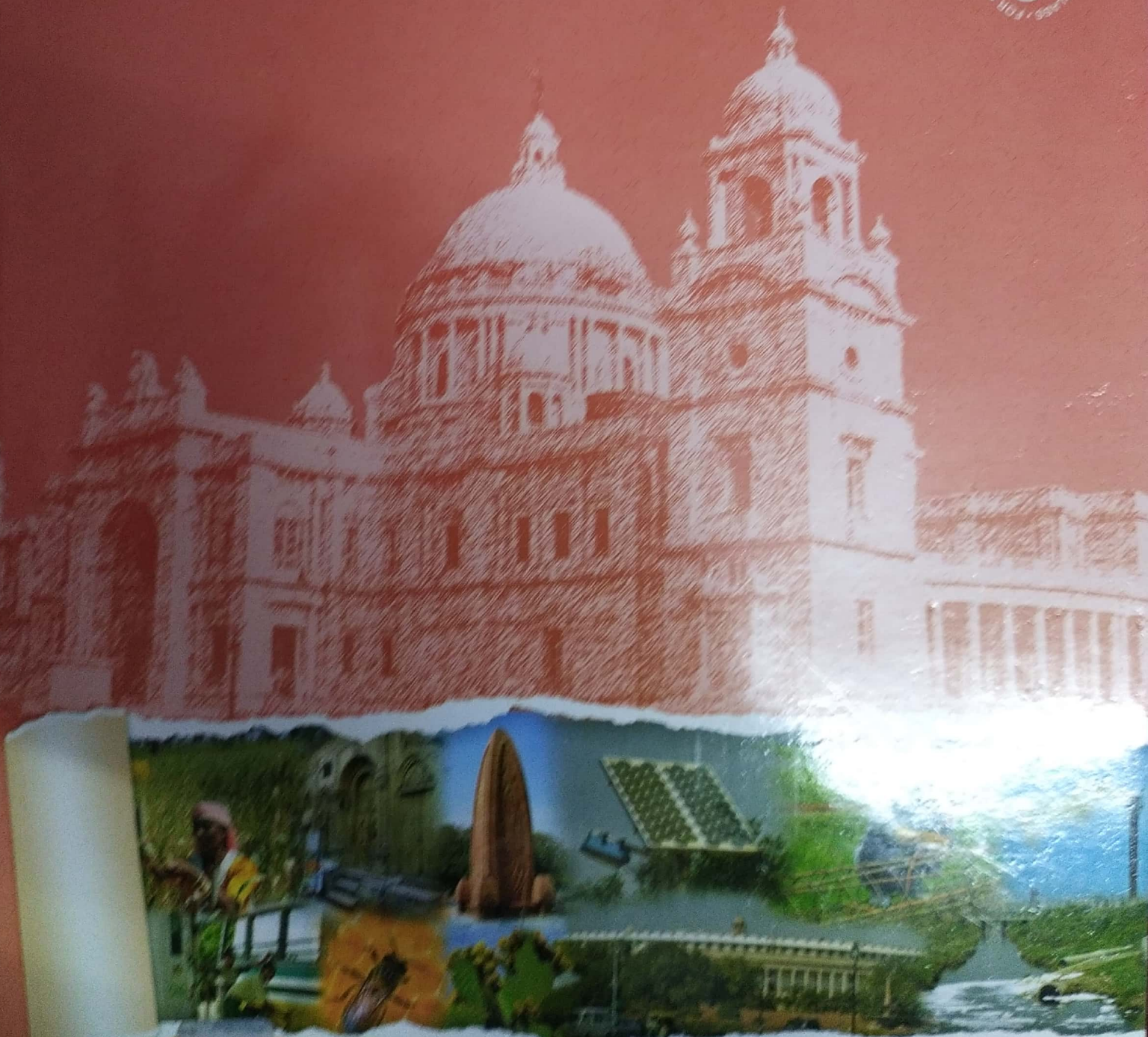




Our World Then and Now

Book 3

FOR CLASS - FOR CLASS - FOR CLASS -
8





Resources

What is a resource? Anything that satisfies human needs is called a *resource*. Gifts of nature, such as air, water, soil, forests and minerals, as well as human creations, such as buildings, roads and so on, are resources because they satisfy various human needs. Human beings, too, are a resource because they have the ability to develop skills that can help them identify new resources and find new uses of existing ones. A thing becomes a resource only when its useful properties are recognised. For example, coal has existed on earth for millions of years. But, it became a resource only when man discovered its fire-producing property. Coal, which is now considered very valuable, had no more value than an ordinary rock until it was recognised as a resource. So, once a thing is recognised as a resource, it acquires some value.

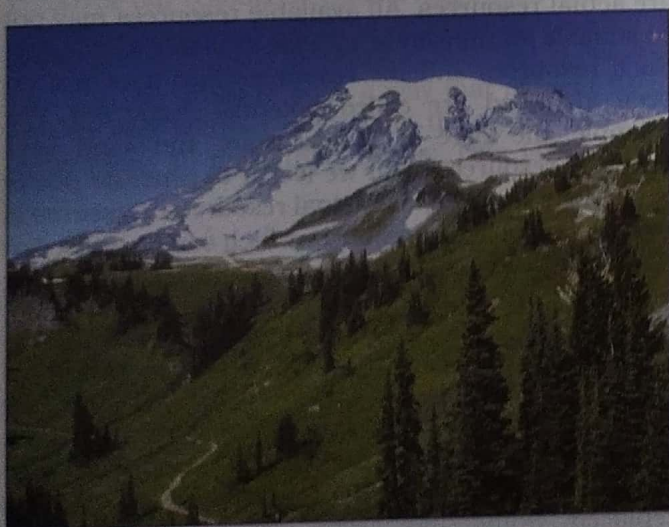


Fig. 1.1 These mountains have aesthetic value and hence are a resource.

Value of a resource Different resources are valued for different reasons. Some resources can be bought and sold or can be used to make things that can be bought and sold. Such resources have *economic value*. Crops and minerals are examples of such resources. The need for pleasure is also a human need. So, things that give us pleasure are also resources. Mountains, deserts, etc., are resources because we enjoy their beauty. Such resources have *aesthetic value*.

Types of Resources

Resources may be classified as *natural*, *human* and *human-made*, or *man-made*, resources. Resources like air, water, sunlight, minerals, forests and wildlife are provided to us by nature. They are called *natural resources*. Human beings and their qualities and abilities are called *human resources*. Knowledge, skill, wisdom, health, etc., are human resources. Improving these qualities is called *human resource development*. Resources created by human beings are *man-made resources*. Man-made resources include houses, roads, schools, hospitals, government bodies, machines, and so on. The application of the latest knowledge and skill in doing or making things is called *technology*. It is also a man-made resource.

Classification of natural resources Natural resources can be classified on the basis of their nature, stock, distribution, and level of development and use.

On the basis of their nature, natural resources may be *biotic* or *abiotic*. The biotic resources are living things such as useful plants and animals. The abiotic resources are nonliving things such as water, air, solar energy, soil and metals.



Fig. 1.2 The buildings erected by human beings are examples of man-made resources.

Depending on their stock, natural resources may be *renewable* or *nonrenewable*. Renewable resources are those which are present in unlimited quantities or are constantly being generated by natural processes or can be generated by us.

Resources like sunlight, wind, air, etc., are *inexhaustible*. They are present in such vast amounts that human consumption for various purposes does not affect their total quantities much. Our activities can, however, make these resources unusable. For example, if air becomes polluted, we cannot breathe it even if it is abundant.

Many natural resources are cycled within the environment by natural processes, and this keeps

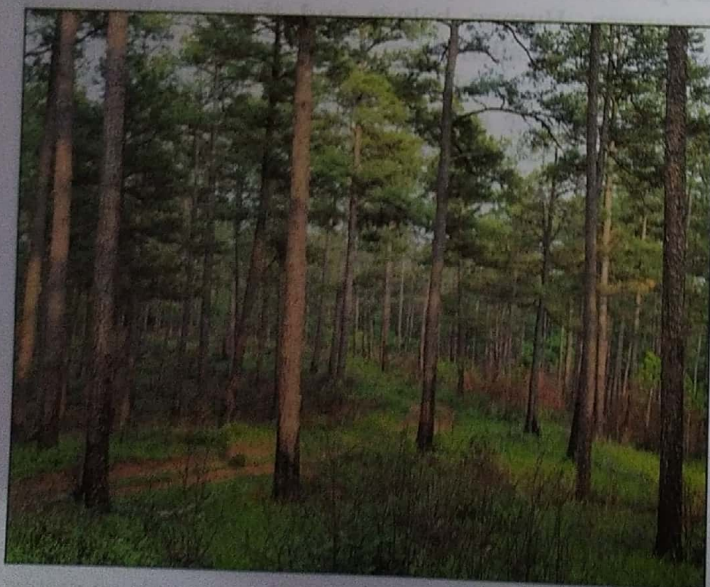


Fig. 1.3 Wood obtained from trees is a renewable resource. By planting trees in a planned way to replace those that are cut down, we can be assured of a continuous supply of wood.

their quantities more or less constant. Such resources when consumed are replenished over time. Some natural cycles, like the water cycle and the oxygen cycle, take place quite rapidly, while some, like the rock cycle, are very slow. Hence, all resources do not get replenished at the same pace.

Some natural resources can also be generated by us. For example, we can produce forests by planting trees. But, even such resources will ultimately be exhausted if they are consumed faster than they can be regenerated.

Nonrenewable resources are those that were produced in the past by natural processes that occurred by chance and may not occur again. These resources are limited in supply and cannot be generated by us once they have been consumed. Metal ores and fossil fuels, for example, are nonrenewable resources.

Some resources like iron, gold, wood, etc., can be reclaimed from discarded things and used again and again. This is known as *recycling*. All resources cannot be recycled. For example, fossil fuels once consumed cannot be reclaimed.

Resources are not evenly distributed. Resources like sunlight and air which are found everywhere are *ubiquitous* resources. Resources like metal ores and fertile soil which are not found everywhere are *localised* resources.

Based on their level of development and use, resources may be *actual* or *potential*. An actual resource is that whose existence has been proved and whose location, quality and quantity have been determined. All resources that are currently in use are actual resources. All available resources may not be suitable for utilisation with the available technology. Such resources and the resources that have not yet been identified are called potential resources. For example, the force of flowing water and wind were potential resources until we learnt to generate power from them. Now they are actual resources. A *reserve* is that part of an actual resource which can be utilised at a sufficiently low cost with the available technology but is kept for future use.

Sustainable Development

You already know that nonrenewable resources get exhausted as they are consumed. Even renewable resources when consumed take some time to get replaced. Some, like crops, are replaced quickly. Some, like soil nutrients and water, may take several years to get restored, while some, like forests, may take many years. Resources may also become unfit for use due to our activities. If we do not preserve the



Fig. 1.4 Preventing pollution and wastage, preserving biological diversity, using more abundant resources and recycling reusable resources are some ways to promote sustainable development.

quality of our resources and protect our resources from depletion, a time may soon come when usable resources will be completely exhausted. For continuous economic development, we must ensure the future availability of resources. For this, we must *conserve* our resources. Conserving resources means protecting them from getting polluted or depleted so that they can be used in future. Conservation helps us use our resources in such a way that present needs can be met without destroying the ability of future generations to meet their needs. This is known as

sustainable development. Sustainable development involves among other things

- preventing wastage and excess consumption of resources,
- preventing pollution,
- preserving the biological diversity on earth,
- recycling reusable resources, and
- using more abundant alternatives instead of scarce resources.

Things to Remember

- Anything that satisfies human needs is called a resource.
- All resources have some utility and value.
- Resources that are provided by nature are natural resources; human beings and their qualities and abilities are human resources; and resources created by human beings are human-made, or man-made, resources. Thus, sunlight, minerals, forests, etc., are natural resources; education, health, etc., are human resources; and buildings, government bodies, machines, etc., are man-made resources. Technology, i.e., the application of the latest knowledge and skill in doing or making things, is also a man-made resource.
- Natural resources that are present in unlimited quantities or are constantly being generated by natural processes or can be generated by us are called renewable resources. Natural resources that were produced by chance, are limited in supply, and cannot be generated by us are called nonrenewable resources.

- Some resources can be recycled, i.e., reclaimed from discarded things and reused.
- Resources need to be conserved (protected from getting polluted or depleted so that they can be used in future).
- The use of resources in such a way that present needs can be met without destroying the ability of future generations to meet their needs is known as sustainable development.

Exercises

A. Answer the following questions orally.

1. Give two examples of resources that have economic value.
2. What are the three main types of resources?
3. What are natural resources? Give two examples.
4. What are inexhaustible resources?
5. Name a natural resource which can be generated by us.
6. Give two examples of localised resources.

B. Answer the following questions in not more than 20 words.

1. Define resource.
2. Classify natural resources on the basis of their nature. Give two examples of each.
3. What is technology?
4. What is meant by recycling? Name a resource that can be recycled.
5. What is a reserve?

C. Answer the following questions in not more than 40 words.

1. Differentiate between human resource and man-made resource. Give suitable examples.
2. With the help of an example, distinguish between actual and potential resources.
3. What do you understand by conservation of resources?

D. Answer the following questions in not more than 100 words.

1. Distinguish between renewable and nonrenewable resources. Give two examples of each. Discuss whether renewable resources can ever be exhausted.
2. What is sustainable development? Why is it required? Mention any three ways in which resources can be sustained.

E. Think and answer.

1. Why are human beings considered a resource?
2. Why are fossil fuels and metal ores nonrenewable resources?
3. How can a potential resource become a real resource?

F. Fill in the blanks.

1. All have some utility and value.
2. Resources that give us pleasure have value.
3. are a type of biotic resource.
4. resources cannot be generated by us.
5. Resources that have not yet been identified or cannot be used at present are called resources.

G. State whether the following statements are true or false.

1. A thing is not a resource until its useful properties are recognised.
2. Things that can be bought and sold are resources with economic value.
3. Things that only give us pleasure are not resources.
4. Human activities can make resources unfit for use.
5. All renewable resources get replenished at the same pace.
6. Fossil fuels can be recycled.

H. Choose the correct option.

1. Health is
 - (a) a nonrenewable resource
 - (b) a human resource
 - (c) a natural resource
 - (d) not a resource
2. Which of the following is an inexhaustible resource?
 - (a) forests
 - (b) wildlife
 - (c) sunlight
 - (d) fossil fuels
3. Technology is
 - (a) a natural resource
 - (b) a human resource
 - (c) a man-made resource
 - (d) none of these
4. Which of the following resources is nonrenewable but can be recycled?
 - (a) coal
 - (b) water
 - (c) wood
 - (d) iron
5. Sustainable development seeks to prevent
 - (a) wastage of resources
 - (b) pollution
 - (c) loss of biodiversity
 - (d) all of these

Things to Do

Group project

- Make a chart showing a table of the different types of resources that you just learnt about. Leave spaces for examples. Fill in these spaces with the names of resources that are present in your surroundings. Display the chart in your classroom.

Group discussion

- Have a classroom discussion on the role of sustainable development in today's world.

Debate

- Hold a debate on the topic 'The rapid growth of industries is more important than maintaining the balance of nature'.





2

Land, Soil and Water Resources

Land, soil and water are the most important natural resources as they provide the base on which other resources develop.

Land Resources

Land is the most basic resource because we live on it. Land supports forests and pastures, and provides the base for agriculture and various other human activities. You might know that land masses form only about 29 per cent of the earth's surface. All of this land is not equally suitable for human habitation or economic activities. Areas having moderate climate, level land and fertile soil have more people. These areas are ideal for human habitation, as they support a variety of economic activities. It is estimated that about 90 per cent of the world's people inhabit only about 10 per cent of the world's land.

Depending on the characteristics of the land available for human use and the needs of the people, every country develops its own pattern of *land use*. In other words, different proportions of the available land are set aside for different purposes such as crop cultivation, grazing, forestry, housing, industries, transportation, and so on. For instance, in regions with large populations, level land and fertile soil, more land is used for agriculture, as the main thrust is on growing crops to meet the food requirement. However, the pattern of land use changes over time, with changes in the needs of the people. Thus, as the human population is growing, forested lands are being cleared to make room for crop fields, houses, factories, roads, and so on. Again, in very heavily populated areas, where housing is the prime need,

even lands that were earlier used for growing crops are being converted into residential areas.

The pattern of land use may also change as the available technology changes. For example, a mineral-rich area used for agriculture or housing in the absence of mining technology may be converted into a mine when suitable technology becomes available. Soon factories may be built in the area, and

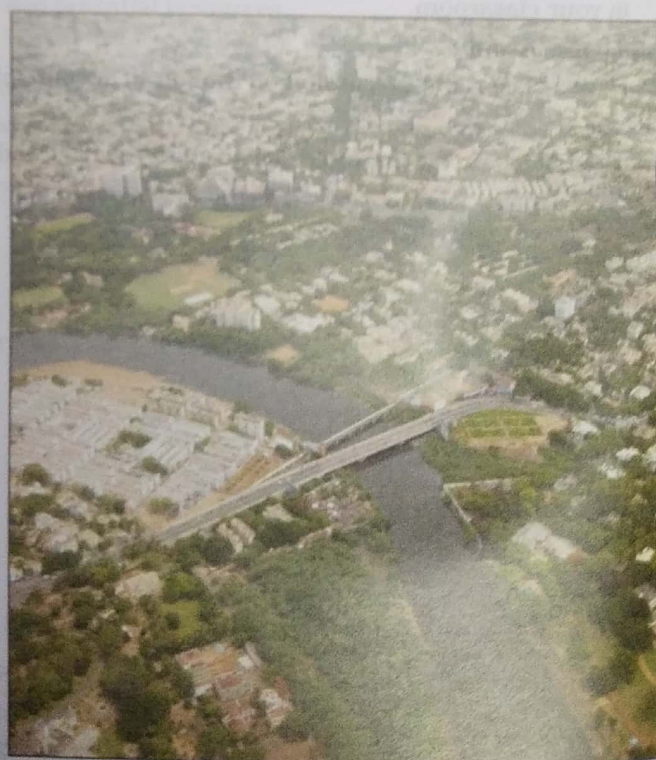


Fig. 2.1 Part of a crowded city seen from the air. Notice how most of the land is occupied by buildings and roads.

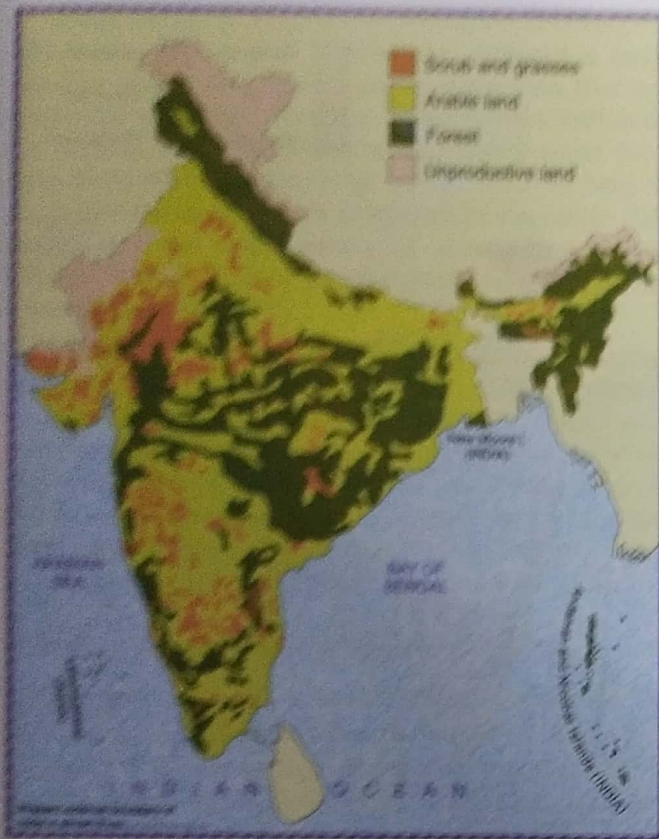


Fig. 2.2 India: Major land resources

gradually more and more land may be put to industrial use.

About one-tenth of the world's land is arable (suitable for growing crops). Less than one-third is under forests. About one-fourth comprises pastures, and the rest is either used for other purposes or is unproductive.

On the basis of ownership, land can be broadly classified as private land and community land. Private land is owned and used by a person or a group. Community land is owned and used by the whole community. Community land is also called common property resource, and includes forests, pastures, parks, roads, etc.

Land use in India More than 50 per cent of India's land is arable. A little more than 20 per cent is forested and pastures cover about 4 per cent. The rest of India's land includes unproductive land and land used for nonagricultural purposes like housing, mining, manufacturing, etc.

Soil Resources

Soil forms the upper layer of the earth's crust. It is made up of loose rock fragments and organic matter. Most food items, like rice, wheat, pulses, fruits and

vegetables, are obtained from plants that grow on soil. Soil also sustains forests, which give us firewood, timber, rubber, fibres and many other valuable products. Besides, soil plays a major role in satisfying our aesthetic sensibilities. Imagine how dreary our world would be without flowers, trees and grass!

Soil is formed when rocks broken up into fine powder by weathering and erosion get mixed with organic matter. Soil formation is a very slow process. A layer of soil only a few centimetres thick may take thousands of years to be formed.

The uppermost layer of soil, or the *topsoil*, is fine. It has a lot of *humus* (organic matter derived from partly decomposed plant and animal remains in soil). Beneath this layer lies the *subsoil*. The subsoil consists of coarse particles of weathered rock and very little humus. Below the subsoil is a layer of large chunks of weathered rock, and below that is the *bedrock* (hard, tightly packed rock through which water cannot seep). The different layers of soil are known as *horizons*. The complete vertical sequence of horizons is known as *soil profile*.

Factors Affecting Soil Formation

Each type of soil has its own characteristics and its own range of soil products. The formation of soil is influenced by various factors.

Parent material The composition and texture of a soil depends on the *parent material* (the material from which the soil is formed). Parent material may be rock broken down on the spot by weathering. It may also be material such as river alluvium, glacial and wind-blown sediment, volcanic ash, etc., transported from elsewhere by the agents of erosion.

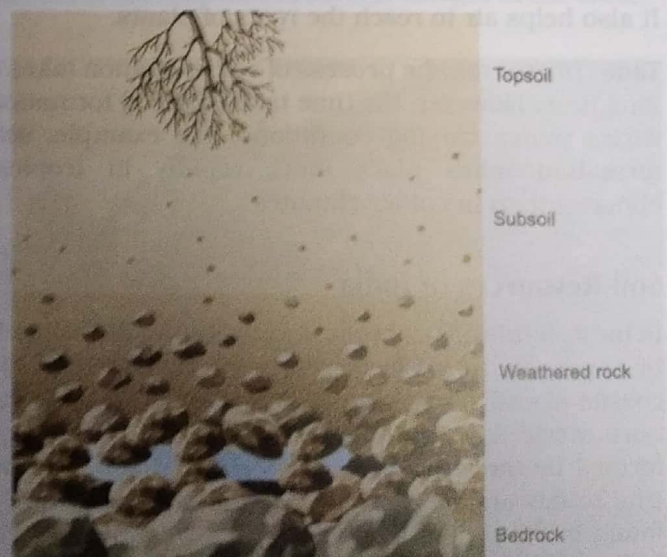


Fig. 2.3 Layers of the soil

Usually, soils formed from dark-coloured rocks are rich in iron compounds, while light-coloured rocks produce soils containing fewer iron compounds. Again, granitic rocks usually produce coarse soils, with large grains. These soils let water seep through easily. Basaltic rocks produce fine soils, with small grains. These soils hold water for a longer time.

Climate Climate influences soil formation mainly through the action of temperature, moisture and wind. Moisture and higher temperatures quicken the chemical reactions involved in soil formation. Therefore, in the warm, wet low latitudes, thick and well-developed soils are quite common. The moisture content of soil is influenced largely by the amounts of precipitation and evaporation. Wind action in some places helps in soil formation by depositing sediments that may become parent material of soil. Again, in areas of sparse vegetation, wind action may also remove soil.

Topography The topography, or physical features, especially the slope of the land, influences the amounts of heat and moisture at a place. It thus affects soil formation. Plains, which usually receive a lot of heat and allow moisture to collect, are ideal locations for the formation of soil. Hillsides, on the contrary, may have relatively thin soil, as water and soil-forming sediments run quickly down the slopes. Soil formation is further hampered if the hillside faces away from the sun and receives little heat.

Organisms The vegetation that grows on soil and the organisms that live in the soil add humus to the soil. Soils rich in humus are very fertile. Burrowing by animals like earthworms, ants and termites exposes soil particles to weathering, which aids soil formation. It also helps air to reach the roots of plants.

Time In general, the process of soil formation takes a long time. However, the time taken for soil formation varies under varying conditions. For example, soil formation takes place more rapidly in tropical climates than in colder climates.

Soil Resources of India

In India, fertile alluvial soils, formed by the deposits left by rivers, are found in the northern plains and in the coastal plains. A black soil called regur is found in the north-western part of the Deccan Plateau. It has been formed by the weathering of basalt. Red soils rich in iron oxides and having low water-holding capacity are found in the southern and eastern parts of peninsular India. Laterite soils are found in the Eastern and Western Ghats and in parts of north-eastern India.

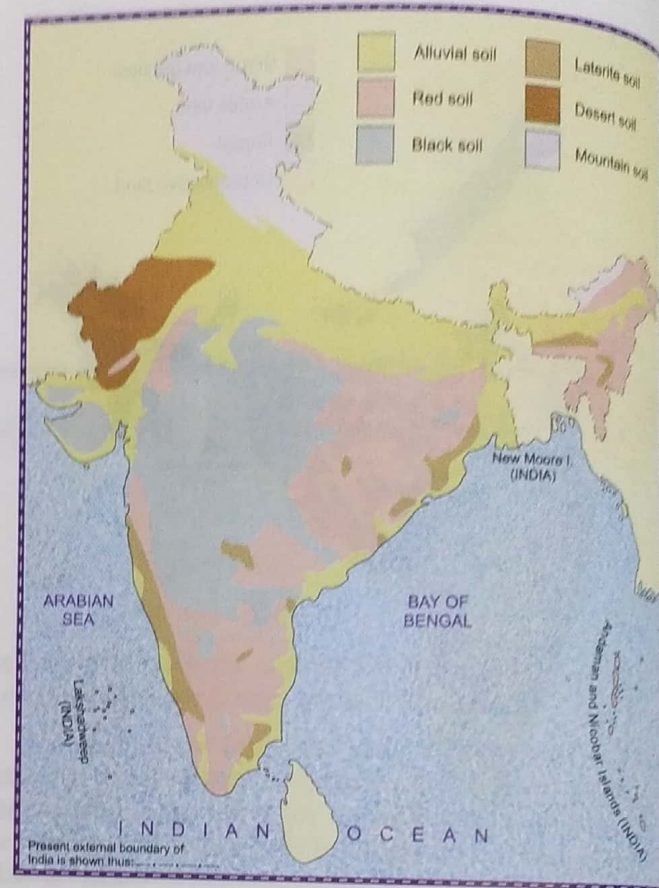


Fig. 2.4 India: Soil resources

These soils are reddish, as they contain iron and aluminium oxides. Mountain soils occur in the mountainous regions, and desert soils are found in the arid regions lying mainly in Rajasthan.

Water Resources

Water is one of the most important natural resources. It is essential for life. Water on earth exists mainly in three forms—water vapour in the atmosphere, water in the oceans, rivers and lakes, and ice in the mountains and polar regions. Oceans account for about 97 per cent of the total water on earth. Ocean water, being saline, cannot be used for domestic, agricultural and industrial purposes. Only about 3 per cent of the earth's water is fresh water. Almost 70 per cent of it is ice. About 30 per cent is groundwater, most of which is too deep to reach, and the rivers and lakes hold about 0.25 per cent. Atmospheric water vapour and clouds account for about 0.04 per cent, and the rest is present in swamps and in the bodies of plants and animals. So, less than 1 per cent of the total fresh water is available for domestic and industrial use, irrigation, power generation, and so on.

Large bodies of water serve as avenues of transport and trade. Most water bodies also support a large number of fish and other marine organisms that are useful for mankind. Besides, water bodies influence the climate. As water absorbs and stores more heat than most other liquids, large bodies of water help to moderate the extremes of temperature on earth. The oceans are the main source of atmospheric water vapour, which causes precipitation and keeps the water cycle going.

Rivers are one of our major sources of water. Projects undertaken to utilise river water efficiently usually involve the construction of dams and reservoirs for storing water and canals for diverting water to the crop fields. Most of these projects simultaneously serve several purposes like irrigation, flood control and production of hydroelectricity. They are known as *multi-purpose river valley projects*.

Distribution of Water Resources

Water resources are unevenly distributed over the earth. You might know that the amount of surface water at a location depends mainly on gains from precipitation and losses through evaporation, transpiration and run-off. Where losses exceed gains there is a shortage of water, and where gains exceed losses there is a surplus.

A growing population puts pressure on the available water resources. Water scarcity is already a major problem in many densely populated areas of the world, and many more are likely to face this problem in the near future. Among the areas that already face water shortages are northern and southern Africa, western and central Asia, north-eastern China, western USA, parts of Mexico and South America, and most of Australia. According to one estimate, by 2025, about four billion people will have an insufficient supply of water.

India's water resources India has sufficient water resources in the form of perennial rivers, high annual rainfall, underground water, etc. However, as these resources are unevenly distributed, many Indians do not have access to sufficient water. India has undertaken many river valley projects for proper utilisation of its water resources.

Degradation and Conservation of Land, Soil and Water Resources

Land, soil and water are precious gifts of nature. Careless use has, however, depleted and polluted these resources considerably. It has thus become essential to conserve them.

Land

Degradation The total quantity of land on earth is limited, and cannot be increased to meet the needs of our growing population. Moreover, usable land may become unfit for use due to pollution caused by the unscientific disposal of wastes, and bad farming practices that cause soil erosion and loss of soil fertility.

Landslides Landslides are a major threat to land resources, especially on hillsides and in valleys and coastal areas. A landslide occurs when rocks loosened by weathering move down a slope due to gravity. Moving debris can travel at great speed, especially down steep slopes and through channels, giving people little time to get out of the way. The debris carry with them huge boulders and uprooted trees. They can destroy buildings, and bury roads and railways in their path. They can also block streams. This can cause floods upstream, as water collects behind the barrier of debris. It can also cause floods downstream, when the collected water breaks through the barrier and rushes downslope. When the debris get mixed with a lot of water they form *mudflows*.

Landslides may be triggered by earthquakes, volcanic eruptions and violent explosions. Mudflows are usually started by heavy rains or by rapid snowmelt. Human activities such as deforestation, unscientific farming and excessive construction on slopes increase the risk of landslides. For example, blasting for road building on a part of the Hindustan-Tibet Road (National Highway 22) caused severe landslides in the Pangl valley in Himachal Pradesh. The slides caused great damage to a large stretch of the road and to several villages in the area.



Fig. 2.5 A small landslide. Larger ones can be very destructive.

Preventing deforestation can reduce the risk of landslides. Sometimes, walls are built to check the movement of rocks and soil down slopes. The excessive seeping of water into sloping ground can also lead to landslides. So, drainage systems should be built to allow water to drain away. Building houses, roads, etc., at landslide-prone places should be avoided. Such places can be identified by *hazard mapping*. Hazard mapping includes processes by which geoscientists find out where and to what extent various natural phenomena can cause damage.

Conservation The conservation of land involves planned and judicious use of the available land, soil conservation, taking steps to bring cultivable wastelands into use, etc.

Soil

Degradation Soil can be degraded by erosion, by pollution or by the loss of fertility.

Erosion The carrying away of topsoil by natural agents such as wind and flowing water is called soil erosion. It happens when there is nothing binding the soil. Some common causes of soil erosion are deforestation, overgrazing and leaving cropland bare after ploughing or harvest. Mining and building activities also expose soil to erosion.

A simple activity can show you how vegetation protects the soil. Dig up some loose soil and pack it into a tray. Place the tray at a slant over a tub. Water the soil. You will see that some of the soil is washed out into the tub. Now dig up some soil from a field without uprooting the grass growing on it. Place it in another tray. Place the tray over a tub as before and water it. Less soil is washed out, as most of the soil is held back by the roots of the grass.

Pollution Soil is polluted mainly due to the dumping of wastes and the excessive use of pesticides. The garbage we produce is commonly dumped on the soil or buried in it. Rainwater seeping into the soil through such garbage carries pollutants into the soil. Waste from hospitals is especially dangerous, as it can

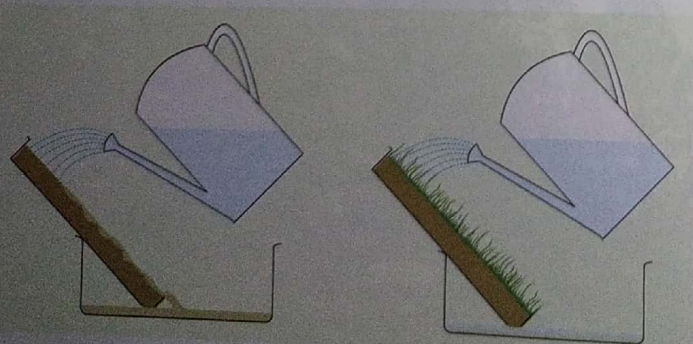


Fig. 2.6 Loose soil is easily washed away by water, but soil protected by vegetation is not so easily washed away.

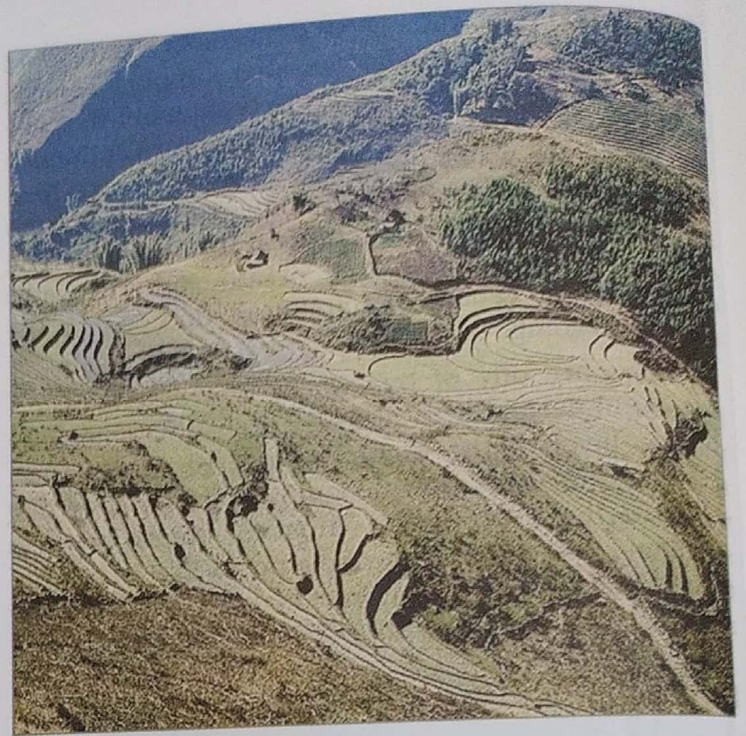


Fig. 2.7 Terrace farming on hill slopes protects the soil.

spread diseases. Some waste materials are poisonous. And some, like plastics, chemical pesticides used in agriculture and some chemicals discarded by industries, are *nonbiodegradable* (cannot be broken down by natural agents). Nonbiodegradable materials accumulate in the soil and in crops grown on the soil. They cause health problems for organisms that eat such crops.

Loss of fertility Soil loses its fertility mainly due to bad farming practices. For example, if too many crops are grown on the same piece of land the nutrients in the soil are all used up. This makes the soil infertile. Adding large amounts of chemical fertilisers to the soil is not the best way to solve this problem. The fertilisers left unused by the crops can change the composition of the soil and make it more prone to erosion.

Conservation Afforestation (the planting of large areas with trees) is very effective in checking soil erosion. In steeply sloping terrain, *terracing* (the system of cutting steps into slopes) helps control soil erosion. On gentler slopes, *contour ploughing* (ploughing along contours, or lines joining points of equal elevation) checks erosion. Embankments of soil and rocks may be built along the contours to check the flow of rainwater down slopes. To hold the barriers in place, grass or other vegetation may be planted on them. Sometimes, trenches are dug behind the barriers to allow water to collect and seep into the soil.

Soil erosion often carves out deep channels called gullies, which cannot be smoothed out by ploughing. This makes land unfit for cultivation. Hence, gullies need to be plugged. For this, rock dams made by piling up rocks may be built across gullies.

Farmers can reduce soil erosion from their fields by covering ploughed soil or soil left bare after a harvest. This is known as *mulching*. Dried vegetation, straw and discarded parts of the harvested crop are some of the things commonly used as *mulch* (substance used to cover bare soil).

Some farmers grow different crops in alternate rows. This type of intercropping is known as *strip cropping*. Usually, the crops chosen are sown at different times or take different times to mature. This ensures that the whole field is never bare. Sometimes, a close-growing crop and a crop that leaves quite a lot of ground exposed are grown together in alternate strips. The close-growing crop holds back the soil eroded from the exposed ground. *Shelter belts*, or rows of trees, also reduce erosion by breaking the force of raindrops and checking the speed of winds.

Growing the same crop on a particular plot year after year drains the soil of the nutrients used by that crop. However, all crops do not use the same nutrients. Hence, crops requiring different nutrients are grown in succession to give the soil some time to regain the nutrients lost in earlier seasons. This is called *crop rotation*. It preserves soil fertility. Often, crops such as legumes, which restore nitrogen to the soil through the action of bacteria living in their roots, are grown in rotation with other crops. Leaving land fallow between two cropping seasons also allows the land to regain its nutrients.

Soil pollution by chemicals can be reduced by using natural enemies of pests instead of pesticides, and natural manures instead of chemical fertilisers.

Irrigated farming in regions of poor drainage often causes *salinisation* (accumulation of salts in the surface soil). The irrigation water that is not drained away from the fields evaporates, and the salts present in the water are left on the surface of the soil. Although irrigation water contains little salt, the accumulation over time can make the soil unfit for cultivation. This problem, which now affects much of India's irrigated land, can be reduced mainly by improving drainage.

Water

Degradation Humans now use about 45 times as much water as they did three centuries ago. Both surface water and groundwater are getting depleted because we are using up water faster than nature can replace it.



Fig. 2.8 Water polluted by the discharge of wastes

Pollution of water is harmful for man and other organisms. Domestic wastes, untreated sewage and industrial wastes, including harmful compounds of metals such as lead, pollute water. In cropped areas, surface run-off and water seeping through soil often carry polluting chemical fertilisers and pesticides into water sources. Mineral oils from spills, and dissolved salts also pollute water.

Conservation The problem of water depletion can be partly solved by checking the wastage of water, reusing waste water if possible, storing water for the dry season, diverting surplus water from wet regions to dry regions and *rainwater harvesting* (collecting rainwater for future use). Rainwater is usually collected by digging pits or tanks or by building embankments around a low-lying area. The collected water can be used directly and a part of it also seeps into the soil, replenishing groundwater reserves. The rainwater falling on roofs can also be led by pipes to collection tanks on the ground. The use of sprinklers and dripping pipes to irrigate fields saves water.



Fig. 2.9 Irrigating fields with sprinklers saves water.

Increasing the vegetation cover helps increase groundwater, as plants reduce surface run-off and allow more water to seep into the ground.

Water pollution can be controlled by treating industrial and domestic wastes suitably before dumping them into water bodies. Natural pesticides and fertilisers should be used because many chemicals present in the synthetic ones are nonbiodegradable. They are washed into drinking water sources by surface run-off. They accumulate in the bodies of organisms, causing various health problems. They can be removed from water only by distillation, which involves boiling the water and condensing the steam. This process is very expensive.

Drinking contaminated water may cause diseases such as cholera and typhoid. Boiling kills most disease-causing organisms in water. Treatment with chlorine also disinfects water. At home, this can be done with a small amount of bleaching powder, which when added to water releases chlorine.

Water hyacinth and some other plants filter out toxic substances like lead compounds from industrial wastes. We should grow these. Water containing salts of calcium, magnesium and iron is unfit for industrial use, as it damages machinery. It is also unfit for cooking and washing. Such water should be suitably treated before use.

Things to Remember

Land resources

- Land is the most basic resource, as we live on it. The pattern of land use depends on the characteristics of the land. Land use patterns change over time, with changes in the needs of the people.

	Arable land	Forested land	Pasture	Others (including unproductive land)
World	One-tenth	Less than one-third	One-fourth	Remainder
India	More than 50%	A little more than 20%	4%	Remainder

Soil resources

- Soil forms the upper layer of the earth's crust. Soil formation is influenced by parent material, climate, topography, organisms and time.
- The most important varieties of soils found in India are alluvial soils, black soil (regur), red soils, laterite soils, desert soils and mountain soils.

Water resources

- Water is essential for life. Oceans account for about 97 per cent of the world's total water resources. The remaining 3 per cent is fresh water, but less than 1 per cent of it is available for agricultural, industrial and domestic use and for hydel power generation.
- River water can be efficiently utilised through multi-purpose river valley projects.
- India has sufficient water resources in the form of perennial rivers, high annual rainfall, underground water, etc. It also has several multi-purpose river valley projects for irrigation, flood control, power generation, etc.

Conservation

- Land can be conserved through planned and judicious use, soil conservation and measures for bringing wastelands into use.
- Soil erosion can be checked by afforestation, terracing, contour ploughing, building embankments, plugging gullies, mulching, strip cropping and planting shelter belts.
- Soil fertility can be maintained by crop rotation, fallowing, preventing salinisation, and using natural alternatives of chemical fertilisers and pesticides.
- Water can be conserved by preventing wastage. Water pollution by untreated wastes, harmful metal compounds, chemical fertilisers and pesticides, mineral oils and dissolved salts should be controlled.

Exercises

A. Answer the following questions orally.

1. What percentage of the earth's surface is made up of land masses?
2. What is soil?
3. What is humus?
4. List three factors that affect soil formation.
5. Mention two things that may trigger mudflows.
6. What are the two ways in which soil gets polluted.
7. Mention two ways of harvesting rainwater.
8. Name two diseases that spread through contaminated drinking water.

B. Answer the following questions in not more than 20 words.

1. What is arable land? How much of India's land is arable?
2. What is soil profile?
3. Name any two regions that suffer from water scarcity.
4. What is a landslide?
5. Mention three ways of saving water.

C. Answer the following questions in not more than 40 words.

1. Why are well-developed soils found mostly in the low latitudes?
2. Write briefly about regur soil.
3. What are multi-purpose river valley projects?

D. Answer the following questions in not more than 100 words.

1. What do you understand by pattern of land use? Explain with an example why the pattern changes. Draw a table to show how India's land is used.
2. Briefly describe any three methods of soil conservation.
3. How can we deal with water pollution?

E. Think and answer.

1. Explain how ecofriendly methods can control soil pollution.
2. Why are legumes often grown in rotation with other crops?
3. Why is irrigation harmful in areas of poor drainage?

F. Fill in the blanks.

1. The black soil of the Deccan Plateau is locally called
2. give red soils their colour.
3. is the system of cutting steps into slopes.
4. Covering ploughed soil or bare soil is called
5. are rows of trees that break the force of raindrops and check the speed of winds.
6. The accumulation of salts in the surface soil is called
7. is a plant that filters out certain toxic substances from industrial wastes.

G. State whether the following statements are true or false.

1. The pattern of land use changes with the needs of people.
2. Most of the world's land is arable.
3. Soil formation is a very slow process.
4. Usually light-coloured rocks produce soils rich in iron compounds.
5. Fine soils have low water-holding capacity.
6. Afforestation is not effective in checking soil erosion.
7. Synthetic fertilisers often contain nonbiodegradable chemicals.

H. Choose the correct options. More than one option may be correct.

- Granitic rocks usually produce
 - coarse soils
 - fine soils
 - black soils
 - none of these
- Soil formation usually takes place more rapidly in
 - cold climates
 - tropical climates
 - moderate climates
 - all climates
- Of the earth's total water resources, the fresh water available for our use is
 - more than 90%
 - 50%
 - 1%
 - less than 1%
- Which of the following is not a method of checking soil erosion?
 - afforestation
 - terracing
 - salinisation
 - contour ploughing
- Which of the following help preserve soil fertility?
 - mulching
 - crop rotation
 - plugging gullies
 - fallowing

Things to Do

Presentation

- Make a presentation on how the land resources around your city or town are being utilised. Suggest measures for the conservation and improvement of these resources.

Assignment

- Make a comparative assessment of the soil and water resources of India and the USA.

Report

- Search the Internet and find information on the methods of soil and water conservation being adopted in advanced countries such as the USA, the UK, France and Germany. Write a brief report on your findings.



Life on e
comprises
lithosphere
beings ne
get food f
produced
is passed
materials
Such a lif
The plant
the enviro

Plant
medicina
that satis
soil and
milk, me
animals



Natural Vegetation and Wildlife

Life on earth exists only in the biosphere, which comprises the life-supporting zones within the lithosphere, hydrosphere and atmosphere. All living beings need energy in the form of food. Living beings get food from the environment. In a given area, food produced from materials found in the environment is passed on from one organism to another and materials are released for use over and over again. Such a life-supporting system is called an ecosystem. The plants and animals of every ecosystem depend on the environment and on each other for survival.

Plants provide us with food, timber, firewood, medicinal substances, pulp and other useful things that satisfy various human needs. They also bind the soil and check soil erosion. Animals provide us with milk, meat, hides, wool, tusks, horns, etc. Some animals are used in farm operations and as means

of transport. Besides, both plants and animals help maintain the balance of different materials in the environment. Hence, plants and animals are valuable resources.

Environmental conditions such as the availability of food, the range of temperature and the amount of rainfall influence the life patterns of plants and animals. Plants and animals, therefore, respond to changes in these conditions. For example, when the weather turns very cold, some plants, birds and animals go into a dormant, or inactive, state. Migratory birds and animals spend winters in warmer places. Deciduous trees reduce transpiration in the dry season by shedding their leaves. All surviving plants and animals have developed means to deal with seasonal or mild variations in environmental conditions. However, all of them may not be able to adapt to severe and lasting changes in

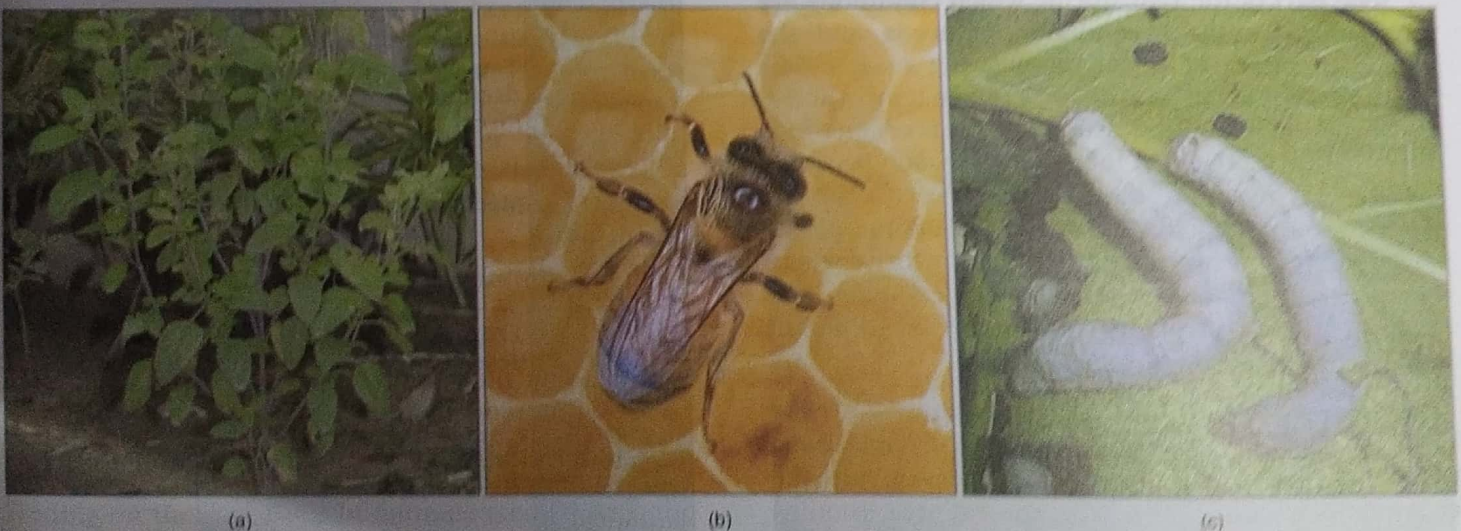


Fig. 3.1 The tulsi (a) is a medicinal plant, the honeybee (b) gives us honey and silkworms (c) give us silk.

Natural Vegetation and Wildlife

Life on earth exists only in the biosphere, which comprises the life-supporting zones within the lithosphere, hydrosphere and atmosphere. All living beings need energy in the form of food. Living beings get food from the environment. In a given area, food produced from materials found in the environment is passed on from one organism to another and materials are released for use over and over again. Such a life-supporting system is called an ecosystem. The plants and animals of every ecosystem depend on the environment and on each other for survival.

Plants provide us with food, timber, firewood, medicinal substances, pulp and other useful things that satisfy various human needs. They also bind the soil and check soil erosion. Animals provide us with milk, meat, hides, wool, tusks, horns, etc. Some animals are used in farm operations and as means

of transport. Besides, both plants and animals help maintain the balance of different materials in the environment. Hence, plants and animals are valuable resources.

Environmental conditions such as the availability of food, the range of temperature and the amount of rainfall influence the life patterns of plants and animals. Plants and animals, therefore, respond to changes in these conditions. For example, when the weather turns very cold, some plants, birds and animals go into a dormant, or inactive, state. Migratory birds and animals spend winters in warmer places. Deciduous trees reduce transpiration in the dry season by shedding their leaves. All surviving plants and animals have developed means to deal with seasonal or mild variations in environmental conditions. However, all of them may not be able to adapt to severe and lasting changes in

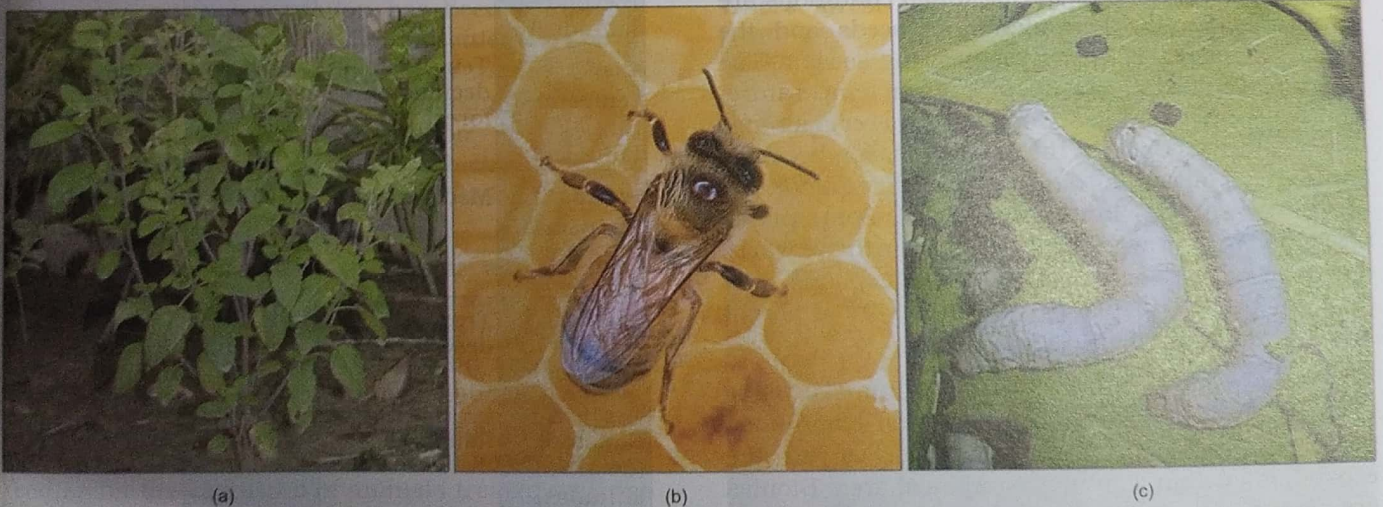


Fig. 3.1 The tulsí (a) is a medicinal plant, the honeybee (b) gives us honey and silkworms (c) give us silk.

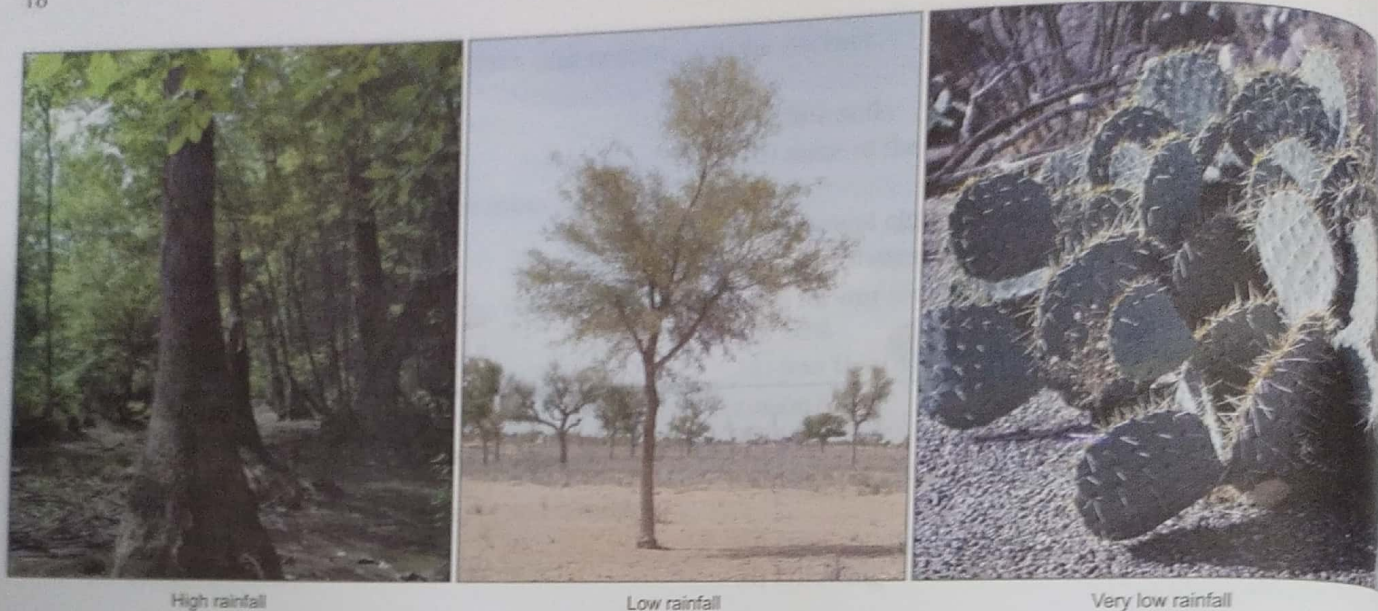


Fig. 3.2 The effect of rainfall on the heights of trees and plants

the environment. This may even cause some species to become extinct.

The plants and trees growing naturally in an area, without human interference, comprise the natural vegetation of that area. Natural vegetation is determined mainly by temperature and rainfall.

The type of vegetation depends mainly on the amount of rainfall. For instance, trees grow best in regions of high rainfall. Hence, forests are found in wet regions. As rainfall decreases, the trees become shorter in height and fewer in number. Thus, the trees found in grasslands, which receive moderate to low rainfall, are widely spaced and stunted in height. Deserts are too dry for the growth of trees. While hot deserts can support thorn bushes and shrubs, cold deserts support only plants like mosses and lichens.

The part of the year during which conditions are favourable for the germination of seeds and the growth of plants is called the growing season. The length of the growing season depends on temperature, as plant growth takes place only within a certain range of temperature. Usually, the growing season becomes shorter with increasing distance from the equator and with increasing height above sea level. Some plants prefer a long growing season, while some thrive where the growing season is short. This explains why different types of plants are found at different latitudes and altitudes.

Different types of plants and animals living together under similar environmental conditions make up a *biome*. A biome comprises all the ecosystems within a given geographical area. Biomes are found on land (terrestrial) as well as in water (aquatic).

Distribution of Natural Vegetation

The natural vegetation zones of the world coincide with the terrestrial biomes. These biomes coincide roughly with the broad climatic regions of the world. Biomes do not have sharply defined boundaries because they merge with each other. Figure 3.3 shows the general distribution of terrestrial biomes in continents.

Distribution of Wildlife

Wildlife comprises animals, birds, fishes, insects etc., that are not domesticated. Every biome has its

	Western margin	Interior	Eastern margin
Subpolar (beyond 65° latitudes)	Tundra	Tundra	Tundra
Cool temperate (45°–65° latitudes)	Temperate deciduous forest	Evergreen coniferous forest (taiga)	Temperate evergreen forest
Warm temperate (30°–45° latitudes)	Mediterranean	Temperate grassland and desert	Temperate deciduous forest
Tropical (10°–30° latitudes)	Tropical desert	Tropical grassland	Tropical deciduous (monsoon) forest
Equatorial (0°–10° latitudes)	Rainforest	Rainforest	Rainforest

Fig. 3.3 Table showing the distribution of terrestrial biomes

characteristic wildlife, although the species may vary from region to region.

The animals of the tundra are adapted to extreme cold. The larger ones, like polar bears, have thick coats of fur. Some, like seals, have a thick layer of fat below the skin. Many small mammals, like lemmings, burrow into the insulating snow to conserve body heat. Most animals of the taiga also have furry coats.

Temperate and tropical forests are home to a wide variety of wildlife, including birds, monkeys, apes, large cats, reptiles and insects. The species vary from place to place. For instance, jaguars, leopards and tigers are all large cats. But, while the jaguar is found in America, the leopard is found in Africa and Asia, and the tiger is found in Asia.

Grasslands are inhabited mostly by grazing animals and their predators. Small burrowing animals like rabbits, marmots and field mice are also common. As in the case of forests, the species vary widely from place to place. Thus, while lions, cheetahs, leopards, etc., hunt animals like antelope, giraffes and zebras in the African savanna, coyotes hunt prey like rabbits in the North American prairies.

Tropical and temperate deserts are home to various species of rodents, reptiles and insects. Many animals, especially in the tropical deserts, survive the daytime heat by hiding away in burrows or under rocks. Camels have adapted themselves very well to the Sahara Desert and the deserts of Asia.

Conservation of Vegetation and Wildlife

The Need to Conserve

Man's economic activities have caused an alarming depletion of the earth's natural vegetation. In many areas, the original vegetation has been completely removed to make room for human settlements, crop fields, and so on. Deforestation destroys the natural habitat of many wild creatures, making it difficult for them to survive. Deforestation also causes serious environmental problems, which may, in the long run, threaten the survival of all living creatures including man.

Over the years, loss of habitat and reckless hunting have caused a decline in the number of wild animals. Many species have become extinct and many are facing extinction. Even those wild animals that have adapted to life near human habitation are at risk. For example, vultures in India and other South Asian countries have been dying of kidney failure after feeding on the carcasses of animals treated with the drug diclofenac. Once common, vultures are now so endangered in the wild that they are being bred in

captivity to save them from total extinction. Due to the disappearance of these natural scavengers, carcasses now lie rotting in dumps in many areas, causing environmental problems. Although treating animals with diclofenac is gradually being stopped, some farmers still do it.

Forest fires—a threat Forest fires (wildland fires that go out of control) are among the greatest threats to vegetation and wildlife. Forest fires usually happen in hot, dry weather, when the vegetation is dry and catches fire easily. They may result from natural causes such as lightning or volcanic eruptions, but most are caused accidentally or purposely by people. There are various ways in which a man-made forest fire could start. The snapping of power lines, the dropping of a lighted match or cigarette, the careless use of machinery or leaving a campfire unattended, for example, could cause the surrounding vegetation to catch fire. Some forest fires are started purposely by farmers to clear land for farming.

Forest fires kill plants and animals and can also spread to human settlements, causing damage to human life and property. They also pollute the air by releasing huge amounts of carbon dioxide and smoke.

A series of devastating forest fires broke out in southern California in October 2007. Fanned by strong winds, the fires spread quickly. They destroyed over 1,500 homes, scorched over 2,000 square kilometres of land, killed several people and injured many others.

It is not possible to prevent natural forest fires, but early detection helps reduce damages. This is possible through regular monitoring by lookouts keeping watch from observation towers and crews patrolling the ground. Satellites, aircraft, smoke scanners, etc., are also often used for monitoring. Where forest fires are frequent, there should be



Fig. 3.4 Forest fire

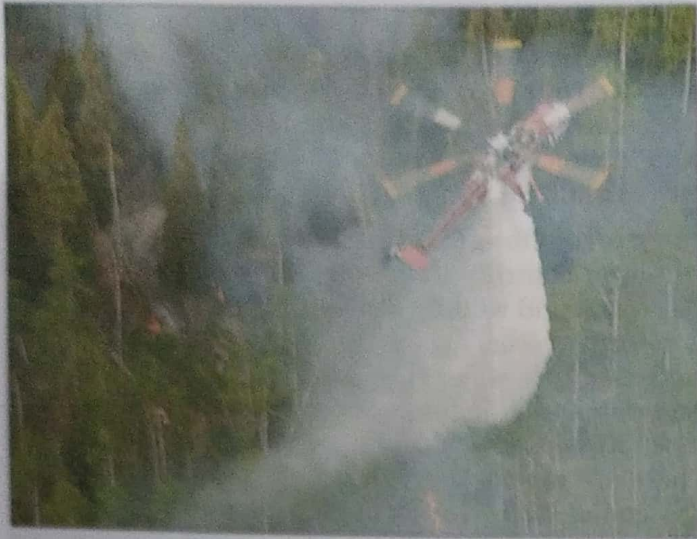


Fig. 3.5 Fighting a forest fire

specialised firefighting crews. They should have the suitable equipment, and preferably, aircraft that can spray water and fire retardants from the air. The spread of fires can be stopped or slowed down by firebreaks. A firebreak is a stretch devoid of vegetation and other things that can burn. If natural firebreaks such as rivers are absent, constructing man-made ones such as wide roads or trenches may help. The number of man-made forest fires can be reduced by making people aware of the ill effects of such fires.

Ways to Conserve

Over the last century, the rate of extinction has increased so much that several species are becoming extinct every day. We have now realised the need to protect and conserve natural vegetation and wildlife. Some ways of doing this are

- preventing loss of vegetation due to deforestation, overgrazing, forest fires, and so on;
- selective felling of trees for commercial purposes;
- undertaking *social forestry*, which involves afforestation and the conservation of forests for the benefit of the environment and for meeting human needs at the same time;
- setting up national parks and sanctuaries to enable wild animals to live in safety in conditions similar to their natural surroundings;
- trying to increase the numbers of rare species by breeding them in zoos;
- preventing the hunting and smuggling of rare birds and animals;
- preventing trade in things made of horn, ivory and animal skin; and
- raising awareness about the need to conserve vegetation and wildlife.

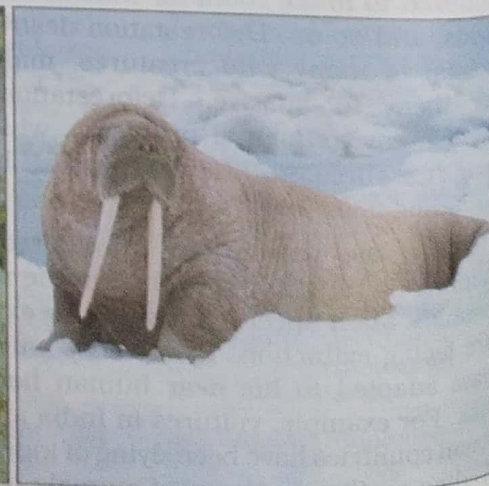
In many countries across the world, there are laws for the protection of natural vegetation and wildlife. Some areas which are outstanding in the diversity of their vegetation and wildlife have been recognised as *biosphere reserves*. Within these reserves, combinations of different types of ecosystems are protected while allowing the local people to continue using them in sustainable ways. There is an international agreement—the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)—to try to ensure that trade in wild animals and plants does not threaten their survival. CITES protects thousands of species of animals and plants. Among the protected animals are tigers, elephants, bears, rhinoceroses, ostriches, whales, dolphins and some types of coral. Among the protected plants are some types of cacti, orchids and aloes.



(a)



(b)



(c)

Fig. 3.6 The black buck (a), giant panda (b) and walrus (c) are among the animals protected by CITES.

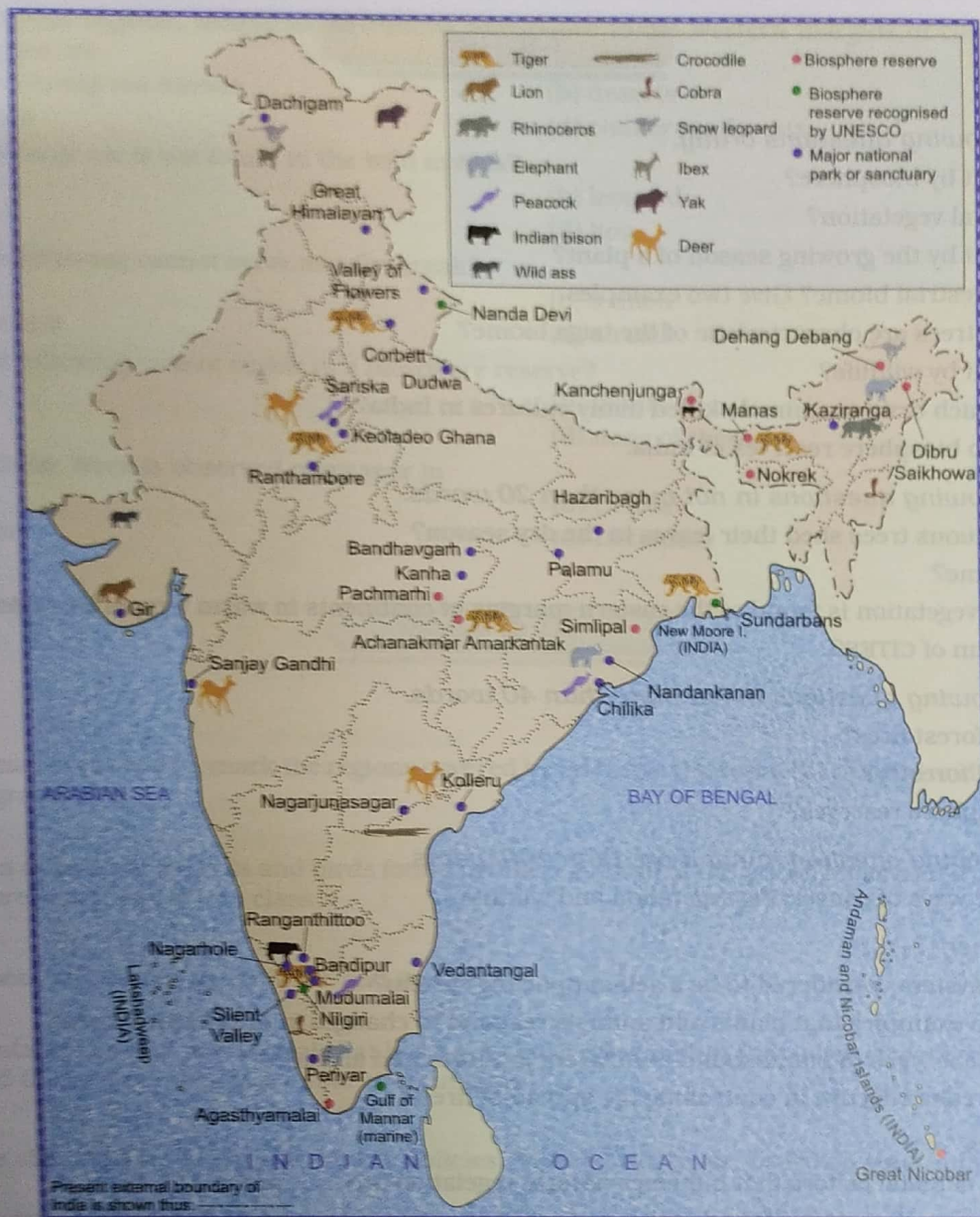


Fig. 3.7 Some national parks, sanctuaries and biosphere reserves of India

India has a long-term plan called the National Forestry Action Programme for increasing forest cover and arresting deforestation. It aims to bring one-third of the country's area under tree or forest cover. India also has a plan called the National Wildlife Action Plan to govern wildlife conservation and the protection of

endangered species. Besides, India follows various international laws and agreements on conservation, including CITES. The people of India celebrate Van Mahotsav every year to encourage the planting of trees. And, they observe the first week of October as Wildlife Week every year to raise awareness about wildlife.

Things to Remember

- Different types of plants and animals living together under similar environmental conditions make up a biome. Biomes need to be conserved.
- Some ways of conserving plants and animals are preventing loss of vegetation; selective felling of trees; social forestry; setting up sanctuaries; breeding rare species in zoos; preventing hunting and smuggling of rare birds and animals; preventing trade in animal products; and increasing awareness.

Exercises

A. Answer the following questions orally.

1. What is meant by biosphere?
2. What is natural vegetation?
3. What is meant by the growing season of a plant?
4. What is a terrestrial biome? Give two examples.
5. What kind of trees are characteristic of the taiga biome?
6. What is meant by wildlife?
7. The use of which drug on animals killed many vultures in India?
8. Name any two biosphere reserves of India.

B. Answer the following questions in not more than 20 words.

1. Why do deciduous trees shed their leaves in the dry season?
2. What is a biome?
3. What kind of vegetation is found at the eastern margins of continents in warm temperate regions?
4. What is the aim of CITES?

C. Answer the following questions in not more than 40 words.

1. What causes forest fires?
2. What is social forestry?
3. What are biosphere reserves?

D. Answer the following question in not more than 100 words.

1. Mention some ways of conserving vegetation and wildlife.

E. Think and answer.

1. Why is an ecosystem considered to be a self-supporting system?
2. Prove with two examples that plants and animals respond to changes in their environment.
3. Why are different types of plants found at different latitudes and altitudes?
4. Why are firebreaks effective in controlling the spread of fires?

F. Fill in the blanks.

1. The two main climatic factors that influence natural vegetation are and
2. In tropical regions, deserts are found at the margins of continents, while deciduous forests are found at margins.
3. Lions and zebras are to the African savanna what and are to the North American prairies.
4. The is a natural scavenger which is now endangered in India.
5. The full form of CITES is
6. In India, is celebrated to encourage the planting of trees.

G. State whether the following statements are true or false.

1. Plants and animals are natural resources.
2. Severe and lasting changes in the environment may cause some plants and animals to become extinct.
3. Across regions, trees increase in height as the rainfall decreases.
4. The length of the growing season of a plant depends on the amount of rainfall.
5. A biome may consist of several ecosystems, both terrestrial and aquatic.
6. Some animals are bred in captivity to save them from extinction.

H. Choose the correct option.

1. With increasing distance from the equator, the growing season of plants generally
 - (a) becomes longer
 - (b) becomes shorter
 - (c) remains the same
 - (d) changes with seasons

2. In cool temperate regions, temperate deciduous forests are to the western margins of continents what to the eastern margins are
 - (a) temperate evergreen forests
 - (b) deserts
 - (c) grasslands
 - (d) coniferous forests
3. What kind of large cat is not found in the wild in Asia?
 - (a) tiger
 - (b) leopard
 - (c) jaguar
 - (d) lion
4. Which of the following cannot serve as a firebreak?
 - (a) a river
 - (b) a ditch
 - (c) a shelter belt
 - (d) a road
5. Which of the following cannot reside in a biosphere reserve?
 - (a) animals
 - (b) plants
 - (c) people
 - (d) none of these
6. In India, Wildlife Week is observed every year in
 - (a) June
 - (b) October
 - (c) November
 - (d) December

Things to Do

Mapwork

- On an outline map of the world, mark the regions covered by (a) tropical forests, (b) tropical and temperate deserts, (c) temperate grasslands.

Group project

- Collect pictures of unusual animals and birds found in different parts of the world. Make a chart with the best of the collected pictures and display it in class.

Group discussion

- Have a classroom discussion on the WWF and its work.

Presentation

- Make a presentation on any one animal that has been declared extinct in India. You may take the help of books, magazines and the Internet to prepare your presentation.

Report

- Find out more about India's forest and wildlife policies. Write a brief report based on your findings.

