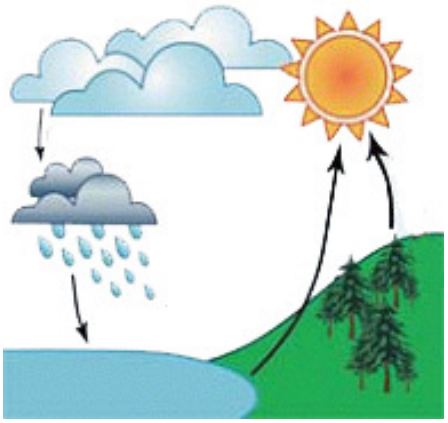
01 The dynamic nature of the environment



By the end of this Chapter, you will be competent to...

- investigate the various interactions among the different components of the environment.
- understand the importance of the inter-relationships among the different organisms for their survival.
- understand how the various interactions take place among components, help to maintain the dynamic nature of the environment.

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1.1 The interactions among organisms

There are living components as well as non-living components in our environment. Since there are various inter-relationships among these components, the environment is subjected to many changes. This is the dynamic nature of the environment. These interactions can be well understood by observing the nature closely.

Fig.1.1- Butterfly sucking nectar from a flower.

Some observations which show the interactions among organisms are ;

- A butterfly sucking nectar from a flower
- A cat killing and eating up a rat
- A creeper winding up the trunk of a tree to climb upwards.

Interactions between organisms could be cartogorized as follows;

1.1.1 Interactions based on food

Interactions among plants and Animals

Green plant		Herbivore		Carnivore
Mango plant	→	Squirrel	→	Cat
Grass	→	Rabbit	→	Fox
Sunflower plant	→	Snail	→	Caucal

Table 1.1 - Some food relationships among plants and animals.

Observe the Table 1.1. Here the interactions between the organisms in the three columns are indicated by arrows. By studying it, you may understand that the herbivore directly and the carnivore indirectly depends on green plants. The reason for this is, only green plants can produce their own food.This process is known as photosynthesis. But there are some autotrophic green plants adapted to catch insects and absorb the nutrients after digesting them. By this way they get extra nutrition needed. These are known as **insectivorous** plants. Pitcher plant Nepenthes, sundew and utricularia are some examples.

Fig. 1.2 -Insectivorous plant (Pitcher plant)

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Interactions among Plants and Plants.

Let us try to identify some relationships between plants and plants based on food.

You may have heard of *Loranthus* and *Cuscuta.* They are two types of plants which grow on other plants. Both these plants send their roots into the host plant and absorb the nutrition they need from the host plant. Such a relationship, where only one of the two organisms involved are getting the benefit is called **parasitism**. The plant which is benefitted is called the **parasite**.

Fig. 1.3 -*Loranthus*

Parasitic plants such as *Loranthus* posses green leaves, hence can prepare its own food. Such plants will only absorb water and minerals from the host plant. These plants are called **semi - parasites**. (Fig.1.3)

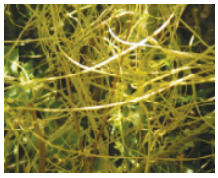

Fig.1.4 - *Cuscuta*

But *Cuscuta* which has no green leaves, absorbs all the essential nutrients from the host plants. Hence *Cuscuta* is a **total parasite**. (Fig.1.4) Total parasitic plants are more harmful to the host than semi-parasitic plants.

Interactions among Animals and Animals

Carnivores depend directly on another animal for their food. When they kill an animal and take it as food, food is known as the **prey,** while the carnivore is known as the **predator.** As an example, when a leopard hunts and eats a deer, the deer is the prey while the leopard is the predator.

There are occasions a number of animals depend on the same prey.(Fig.1.5). Here, there is a competition among the predators and the stronger one will succeed.

Fig. 1.5 -An animal eating a prey

There are occasions that animals depend on each other for the mutual benefit of both. It is called **symbiosis**. Here both animals are benefitted.

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Such a relationship is also seen between ants and aphids. Aphids feed on plant juices. A part of the plant juice which contains sugar is sent out of the body of the aphid. The ants feed on this sugar solution. In turn, the ant takes the aphids to new plants in order to find more food. Hence both are benefited.

Fig. 1.6-Aphid and ant

You may have often seen crows picking up the ticks that live on the skin of cattle. The cattle seem to be very tolerant of the crows in such instances. That is because this is mutually beneficial. The crow gets its food while the cattle gets rid of ticks.

Fig. 1.7 - Sea anemone and fish

An interesting relationship exists between sea anemone and a certain species of fish. The sea anemone has poisonous tentacles. The fish who lives among those tentacles gets protection since the sea- anemone attacks any predator which comes to catch the fish.

Another important inter-relationship based on food is **parasitism**. Here the parasite is often smaller than the host and always benefitted from the host. As a result, the host is affected

Fig.1.8 - Feeding the young

The ticks that live on animals such as cattle and dogs as well as the round worms and thread worms that live inside the intestine of man are examples of parasites.

Adult mammals feeding their offspring is another wonderful food relationship between animals and animals. Mammals feeding their young with breast milk is a good example for this. (Fig.1.8)

Food chains and food webs

Green plants store the energy of the sun in food. All other organisms depend on this food for their nutritional needs. To fulfil these needs, organisms build up relationships among them which can be indicated as in Fig. 1.10.

Fig.1.10

This type of relationship based of food, when arranged in a sequence, is called a **food chain**. In a food chain, each organism represents a link. The first link is the primary producer. This is always a green plant. The second link is a herbivore. The links beyond this are **carnivores**, but at times may be omnivores. Two links in the chain are connected by arrows. The arrow head points to the direction of the higher trophic level.

Since many animals may feed on the same food, and also the same animal may feed on many kinds of food, Food chains get interconnected to form a complicated web.

These are known as **food webs.** Figure 1.11 indicates a food web that can be seen in a small thicket.

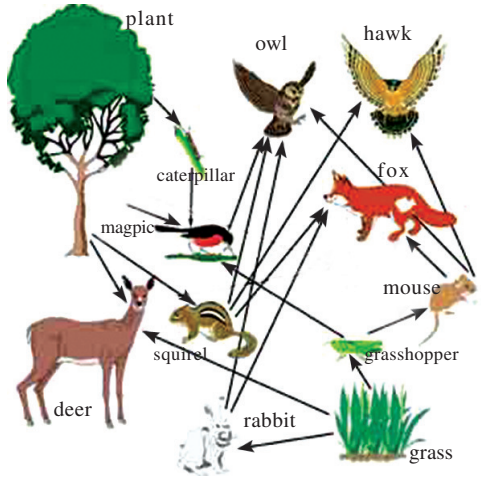

Fig.1.11- Food web

Assignment 1.1

Draw and label two food webs you may come across in your garden and in a fresh water pond.

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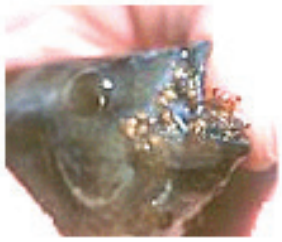
1.1.2 Inter-relationships of organisms based on protection

Food as well as protection is also an important factor for the survival of an organism. Organisms in the higher trophic levels of the food chain are a threat to those at the lower levels. Therefore protection is a major factor which ensures the survival of organisms.

Parental care

Animals adopt various methods to protect their young from enemies.

A



B

C

Fig 1.12 - Parental care

- Kangaroo protects the young inside its brood pouch and feeds it for about nine months. (Fig 1.12 A)
- Thilapia protects its young by taking them into its mouth in the sign of danger. (Fig.1.12B)
- The entire herd of elephants provide protection to the newly born young irrespective of who the mother is.(Fig 1.12C)
- Bees and wasps secrete a poisonous chemical and destroy enemies who try to harm their young.

Do you know?

The honour for being the most committed parent should go to the male penguin.

The eggs laid by the female penguin is kept on the feet of the male, covered over by its feathers and protected without moving, at low temperatures of around -40 ^{0}C even for one month, untill the she-bird comes back.

Fig.1.13

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Camouflage


Leaf insect


Lizard


Frog


Fish

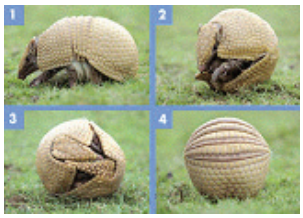
Fig.1.14 - Camouflage among different animals


A species of snake

Observe Fig.1.14 carefully. It may be difficult to identify each of those animals from its surroundings. They possess colour patterns, body shape and other body features blend with their living environment very well. It helps to protect the animal from predators. Such adaptations to suit the environment are called **camouflage**.

Protective behaviours and strategies

Organisms have many behaviours which ensure their protection. Some such behaviours are shown in Fig. 1.15.


Curling patterns of pangolin


snail in its shell


Curling of millipede

Fig. 1.15 - Protective behaviours of certain animals

Lizards, when grabbed by an enemy, will shed its tail and escape. Very soon a new tail is grown. This is called regeneration. Skink also possess this ability. Deers and buffaloes live in groups for protection. Black ants, ants, centipedes, scorpions and snakes paralyse their enemies by introducing poisonous things into their bodies. The bristles of a caterpillar and claws of a cat are also organs helping in protection.

Assignment 1.2

Observe the strategies adopted by animals for protection and prepare a book-let.

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1.2 Interactions between organisms and the abiotic environment

1.2.1 Interactions based on habitats

The place where an organism lives is its habitat. Organisms have various interactions with the habitat for food, water, light, and protection.

Interactions of plants with the habitat

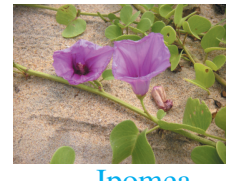
According to the specific environmental features of a habitat, organisms too display particular features to obtain water, air and light from that habitat. These specific features are called **adaptations**. Table below shows certain habitats and the specific features of that habitat.

Habitat	Specific features of the habitat
Xerophytic conditions	Strong sunlight, high temperature, little water in the soil
Mangroves	Soil covered with salt water. Soil lacks air. Strong sunlight.
Sandy beach	Loose sandy soil. Strong wind. Sand is intermittently covered with salt mixed water.
Fresh water pond	Strong sunlight. Covered with water. Little light reaching the lower layers of pond.
Epiphytes	Fixed on to trunks of other plants. No direct contact with soil, low sunlight.
Small thicket	Sufficient water, soil, air and light.

Table.1.2 - Environmental features of some plant habitats.

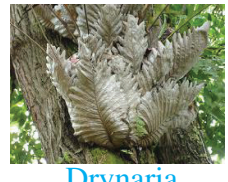
Cactus

Sonneratia - 'kirala'

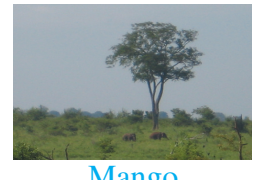


Ipomea

Valisnaria



Drynaria



Mango

Fig. 1.16 - Plants adapted to suit the habitat

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Let us identify how each one of the plants in Fig.1.16 are adapted to get water, air and light in the relevant habitats.

Cactus – Grow under xerophytic conditions. Fixed to the soil by roots. Leaves have turned into thorns, to minimize the transpiration. And as the stem is fleshy and green, it is also adapted to store water.

Sonneratia – A mangrove plant. Plant is fixed to the soil, but some roots grow upwards. These are known as **respiratory roots** (pneumatophores). Since the soil lacks air, respiration is done by these roots.

Ipomea – This is a plant that trails along the seashore. The roots spread quickly over the soil in order to absorb rain water. Leaf surface is shiny to reflect the sunlight.

Valisnaria – Aquatic submerged plant. Fixed to the soil by roots. Leaves are dark green. Leaves are narrow and ribbon shaped to resist the flow of water.

Drynaria – Epiphytic plant, attached to the surface of the host plant by roots. Leaves fold up like a cup to hold back organic matter carried by the wind. Stem is hairy for the same purpose. Divided large leaves absorb sunlight.

Mango – Mango a typical terrestrial plant. It has a well developed root system. Highly branched. Strong trunk.

Assignment 1.3

Give one example which grow in each of the above habitats. Write the special features of those, which they process to suit that particular habitat.

Interactions of animals with the habitat

The specific features of some habitats of animals are indicated below.

Habitat	Specific features of the habitat
Land	The substratum is soil. Sorrounded by air.
Trees	Branches of trees. Sorrounded by air.
Water	Sorrounded by water.
Soil	Sorrounded by soil.

Table 1.3 Some animal habitats

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Fig. 1.17 - Animals adapted for different habitats

The Fig. 1.17 shows some animals which live in several habitats. The method of movement of animals not only help them to obtain water and food, but also for their protection. Legs in terrestrial environment, wings and feathers in aerial environment, elongated body and fins in aquatic environment, elongated body to move through the soil are several adaptations of animals in locomotion.

Assignment 1.4

Write down how each of the animals shown in Fig. 1.17 shows methods of movement suited to the environmental conditions of that particular habitat.

1.2.2 Interactions based on matter and energy needs

Every organism needs air and water to maintain the life. In addition, plants need soil and light, while animals need food. In order to get each of these factors organisms interact with their surroundings. Let us find out what these interactions are.

Soil

You may notice that most plants in our surroundings are attached to the soil. The soil helps them to stay erect. The plant is fixed to the soil by roots. The root system divides into branches and penetrates in the soil while absorbing water and minerals needed to the plant.

Soil is affected by the plants. Because of the roots penetrating the soil, the soil gets loosen and makes it porous. This increases the amount of air and water that is retained in the soil. Roots prevent the erosion of soil. Also the dead animals and plants undergo decay and add fertility to the soil. Plants grow well in a fertile soil. As a habitat, soil is important to animals as well. Their dead bodies and waste materials help to make the soil fertile. The earth worm that lives inside the soil makes the soil porous and fertile, by decaying the organic matter.

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Water :- The most abundant chemical in the bodies of organisms is water. Many biological activities of organisms, take place in a medium of water. Further, water helps certain organisms to maintain the body shape and rigidity. Stems of most herbs stay erect due to water. When water is not available, they wilt. Plants have various adaptations to preserve water.

Green plants use water as one of the raw materials in preparing food. A part of the water absorbed by the roots is used in the preparation of food while another part evaporates from the leaf surface as water vapour. This loss of water vapour from the leaf surface is called **transpiration**. Transpiration causes the water in the soil to be released to the atmosphere. This is particularly important in the water cycle. (Fig 1.17). Transpiration causes a continuous stream of water to be drawn into the plants from the roots. Along with this water, minerals too enter the plant and moves to all parts of the plant. Water is also useful to maintain the body temperature in animals.

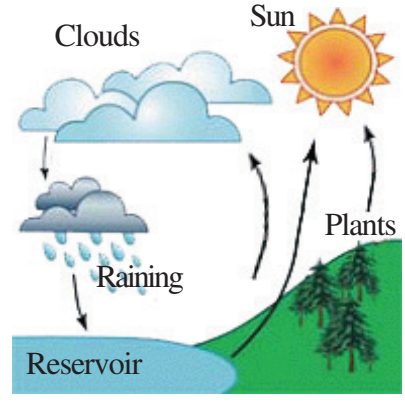

Fig. 1.18 - Water cycle

Air :- Air is a mixture of gases. The oxygen in it, is used for respiration. Land animals get their oxygen from air while most animals that live in water get the oxygen from water. They show various adaptations for this. Land animals, including man has lungs for this purpose. Fish living in water have gills.

Green plants use the carbondioxide of the air to prepare food. Carbon-dioxide gets back into the environment during respiration of organisms. Since this carbondioxide is absorbed by plants for food production, the composition of the atmospheric air remains fairly constant. Plant leaves have very tiny holes in their surface called **stomata**. (Fig 1.19).

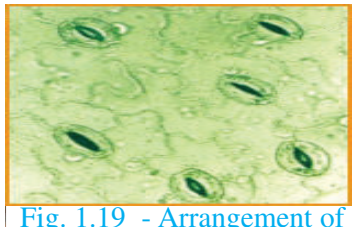
Fig. 1.19 - Arrangement of stomata on the lower surface of a leaf.

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Fig. 1.20 - Effect of wind on plants

Air enters the plant through these stomata. Oxygen needed for respiration and carbondioxide needed for photosynthesis is obtained from this air. The oxygen needed for the roots is taken from the soil air. Moving air is called wind. The wind effects on plants indirectly.

Sunlight and heat energy

Green plants need sunlight to prepare food. For this reason plants grow in search of sunlight. They also get heat energy from the sun. As the temperature of the environment goes up, the air around the plant loses water vapour which in turn increases transpiration. Therefore, plants living in areas with a scarcity of water have adaptations to reduce transpiration.

Fig 1.21 Colouration of leaves to absorb sunlight

Some such adaptations are having;

- a shiny leaf surface, a layer of wax on the leaf surface,
- stomata sunk in pits
- leaves turns into thorns

Plants grow in dry climatic conditions (xerophytic) have very significant adaptations to reduce transpiration. Cacti plant is an example for this.

Animals can see the surroundings because of light. Therefore in addition to food and water, animals need sunlight too, to ensure their existence. Eyes of bats are not sensitive to light, hence they fly about in the night to seek food.

Temperature is a result of heat. All activities in plants take place within a certain temperature range. Certain animals maintain their body temperature constant whatever the surrounding temperature is. They are called **warm blooded animals**. Various adaptations are seen in them to maintain their body temperature at a constant level. Some examples are having a covering of fur and production of sweat. Mammals and birds are warm blooded animals. Reptiles and amphibians are **cold blooded animals**. Their body temperature changes with the environment. Hence during strong sunlight , they often hide at dark places.

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1.2.3 Interactions based on changes in environmental factors

Three factors which are highly changeable in the environment are water, light intensity and temperature. The adaptations that organisms show towards the changes of these factors are very interesting.

Perennation

Perennation is one of the adaptations shown by organisms to ensure their survival during unfavourable environmental conditions. Some of the reasons for perennation are lack of water, increase of temperature and extreme cold.

You may have seen how the grass on a playground dies off during dry season, but with the rains, they sprout up again and become green. The reason for this, is the underground stems (Fig 1.22). During dry season, these underground stems remain below the soil. With the rains, they produce new plants from the buds. The lotus plant too, remains under the mud during the dry season and will sprout up again from the buds.

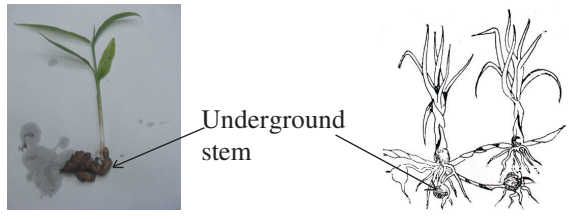

Fig. 1.22 - Ginger plant and grass

Fig. 1.23 - Tree during leaf fall

In the winter, most plants respond to the extreme cold by slowing down or completely stopping their rate of growth. For this, certain plants shed their leaves. Some plants shed their leaves during very hot weather (Fig 1.23). Example: Rubber

Seeds often have a dormant period before germinating. This dormant period is useful to overcome unfavourable conditions. The hard covering of the seeds too is a useful strategy for overcoming difficult conditions. All these are considerd as methods of perennation.

Among animals too, there are strategies to overcome difficult environmental conditions. Examples are certain kinds of fish (Kaawaiya, Magura) and the frogs that hide under the mud when the pond dries up.

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They hibernate under the mud till favourable conditions return.In temperate countries, animals such as rabbits and squirrels stay inactive inside holes in the ground or in hollows in trees. This is called **hibernation**.

Migration

Animals migrate from one area to another for certain reasons such as food shortage, unfavourable environmental conditions or for reproductive purposes. In migration animals often take the same path to return.

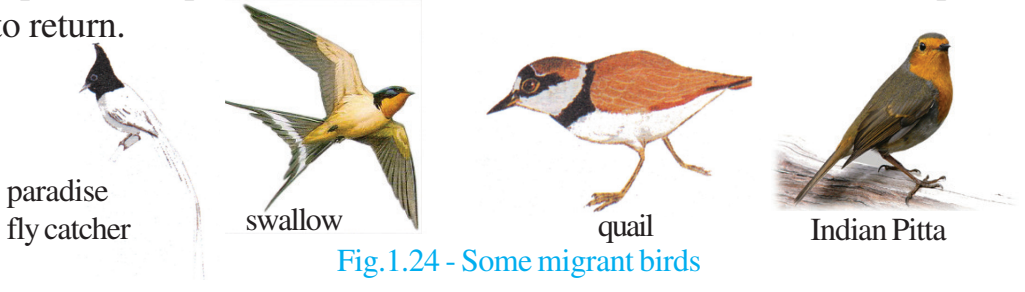

Fig.1.24 - Some migrant birds

Migration is common among birds. With the approach of the cold season in countries in the Northpole, certain kinds of birds fly over thousands of miles of oceans to get the warmth in tropical countries.

Whales too migrate from the north seas to the tropical seas. When the cold season is over, they migrate back to the North. Salmon fish migrates only once during its life-time. They are born in the river, later migrate to the Atlantic ocean where they grow to maturity. They come back to the river to breed, and eventually die, never returning to the ocean.

Fig. 1.27 Path of migratory birds to Sri Lanka

Migration does not occur cyclically all the time. Elephants and cattle migrate in herds when there is a shortage of food or water in their environment and they go to other places for food or water.

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1. 3 Interactions between the living and the non-living environment with time

Recall an old house which has been abandoned for a long time. There may be some small weeds growing on its walls, or there may even be small herbs growing while their roots penetrating into the wall and causing cracks in the walls.

Fig. 1.26 - An abandoned house

With further decay, the entire house may come down and more plants will grow. So that the place will change beyond recognition.

It will now be clear to you, that even when environmental conditions do not change, the living and the non-living environment changes from a simple to a more complex state. This process is called a **succession.**

A succession may start on the surface of an exposed rock or on an open water body such as a pond. At the end, a permanent forest may be formed. This is called a **climax community.** Since this process undergoes a series of recognizable steps, it will take a long time to happen.

1.3.1 Establishment of organisms in a barren environment

The surface of an exposed rock is unfertile. No plant can grow on it. Yet you may have noticed whitish patches on certain places, spread over it (Fig.1.27A). These patches represent **lichens**. Lichens are autotrophic, and consist of fungal and algal varieties.

They can grow on very unfertile surfaces. As the lichens grow, certain chemicals are secreted by them which cause the rock to a process of chemical weathering. Further, dead parts of lichens gather on the rock surface. Then action of decomposers will begin and the process of soil formation is started.

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The soil so formed eventually supplies a suitable substratum for the seeds which get blown around. Plants such as moss, ferns, grasses and small dicotyledons will get established on this soil (Fig.1.26 B). These add more organic matter to the soil.

Gradually the soil improves in quality and quantity and, it paves the way for more long-term plants (Fig.1.27C).

A B C D

Fig. 1.26 -Stages of a succession starting on an open rock

Succession is a fine example of a situation where organisms build up the environment for themselves as well as provide opportunity for other organisms too.With time, as plants grow herbivores and next the carnivores and finally the decomposers will settle down, eventually a **climax community** will be established. (Fig. 1.27D)

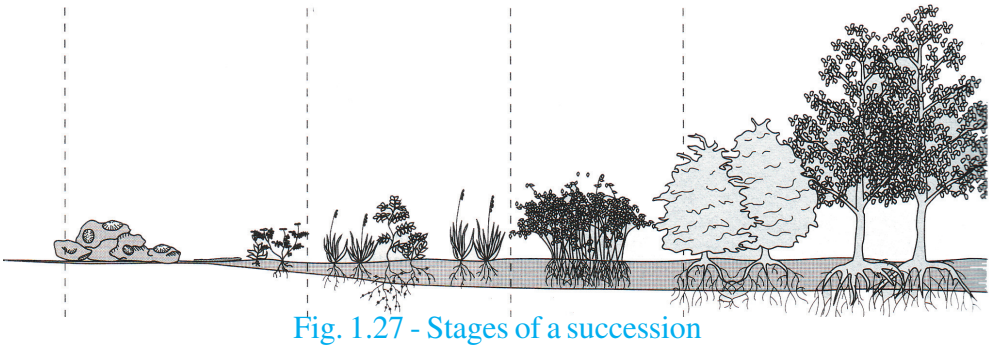

Fig. 1.27 - Stages of a succession

1.3.2 Establishment of organisms in a water body

Let us consider a pond as an example for an open water body.The organic material in a pond is very little. We can see some plants floating on the surface or emerged in the water. These are the pioneers in this habitat. On death of these organisms, decomposers will act on them and cause decay. The soil so formed will gather at the bottom and finally raising the level of the pond and reducing the depth of the pond.

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Fig. 1.28 -Some stages of a succession in a pond

Around this time, certain kinds of reeds and bamboo will grow close to the pond. With the death and decay of these plants, more soil will be formed around the pond. The pond edge will get broader and more plants will grow which eventually will grow into the pond.

As this process continues, more and more living and non-living matter gets collected in the pond eventually filling up the pond with soil. The soil is now suitable for the land plants to grow. Gradually the pond will be converted to a forest.

1.3.3 Establishment of organisms in a cleared area

There are occasions where man destroys forests for chena cultivation or for other activities.Forests get destroyed by bush fires or other natural reasons too. In such cleared areas, small plants will grow in a very short period of time. Because there are some leftover seeds and roots in the soil. If such an area is left undisturbed, it will become a jungle again. In this way, destroyed environments get rehabilitated, but it needs a long time to happen.

Fig.1.29-Reestablishment of plants in a bare land

Fig 1.31- a scrubland

The nature and type of the climax community is determined by the environmental conditions found there. The organisms which are most suitably adapted to the environmental conditions of that area, will get established successfully in that particular community.

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1.4 Interactions take place in the non-living environment

Organisms living on the earth live in different habitats.The soil on the earth crust is directly important for the growth of organisms. Let us consider, how the rocks are important for the growth of organisms?

Do you know?

4600 years back, the earth was a huge ball of air. It's temperature was around $4000^0C - 8000^0C$. When this started cooling gradually only the outer layer cooled to form a solid mineral crust. These minerals gradually underwent weathering to form the soil.

Weathering of rock

Weathering of rock occurs in two ways.

1. Physical weathering - Breaking up of rock into small pieces.
2. Chemical weathering – Separation of the chemicals making up the rock.

1. Physical weathering

Physical weathering is the breaking up of the rock due to the pressures and pulls acting on the rock. Temperature is one of the factors causing weathering. Rock that is exposed to strong heat of the sun during the day time, when subjected to sudden fall of rain or the cooling during the night, it contracts and cracks up.

Do you know?

If cool water is poured into a heated glass, it will crackup instantly due to the sudden contraction of the surface.

The volume of ice formed out of a certain volume of water is greater. If a glass bottle filled with water, sealed and left to freeze will crack up due to the pressure of the ice formed inside, as the volume of ice will be greater than the volume of water.

The breaking up of large pieces of rock into smaller pieces, due to various factors is called physical weathering. Let us observe how physical weathering can occur due to pressure.

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Activity 1.1

Put some pieces of stone into a bottle , add some water and shake it vigourously.
After shaking for about 15 minutes, note how the sharp edges of the pieces have got rounded.
Note the fine powder of rock gathered at the bottom of the bottle.

From the above activity, you would have understood how weathering takes place when rock gets carried down by fast flowing water.

- Rocks on the ocean beaches are subjected to weathering by being constantly hit by sand carried by the waves.
- Plants growing on the surface of large rocks send their roots into the crevices of the rock. As the roots spread out and go deep, resulting pressures will cause the cracks to widen and the rock to break up into smaller pieces.
- Animals walking on the rock too cause the weathering of rocks.

Assignment 1.4

Prepare a report on the following. Identify the factors that cause weathering, and discuss how they bring about weathering.

2. Chemical weathering

In physical weathering, due to the breaking up of the rock into small peices, the surface area of the rock increases. Now it can react better with environmental factors such as water and air. Therefore chemical reactions can take place faster. In this way, the speed of chemical weathering gets accelerated after physical weathering.

Instances where chemical weathering occurs

- Carbondioxide of the air dissolves in rain water and then the rain water becomes slightly acidic. The limestone, granite or iron ore in rock will get dissolved off in such acidic water.

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- Lichens and moss growing on rocks retain moisture.This film of moisture is acidic.Further the juices of fruits that fall on are also slightly rocks acidic. This acidic solutions bring about chemical weathering of the rock.
- Carbondioxide from the roots of plants dissolve in soil water and form an acidic solution. This brings about chemical weathering.
- Dead bodies of organisms and the faeces are acted upon by microorganisms. The solutions so formed are acidic and cause weathering.
- Human activities too speed up chemical weathering. eg. Burning of fuel by motor cars and factories emit sulphurdioxide and nitrogendioxide dissolve. These gases dissolve in water and makes it acidic. The acidic water falling on rock causes chemical weathering.

Decomposition of organic matter

Living bodies are made up of organic matter.When they die, activity of microorganisms convert the organic matter into simpler compounds which are added to the environment.This process is called organic decomposition.

Let us identify how the decomposition of dead organic matter occur.

Activity 1.2

Identify the follwing instances in our environment and name the organisms which cause decomposition in each case.

A- Mushrooms growing on a cut down tree

B - A decaying log with termites and worms.

C – Fallen leaves decaying under a tree

D – Leaf covered with fungal growth

E – Carrot with mildew

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The pictures above show that decay of dead organic matter is brought about by micro organisms such as bacteria, fungus as well as macro organisms such as termites and worms.

These organisms are called **decomposers**.They decompose not only dead organic matter but also sewage.

Bodies of the organisms are made up of materials which were borrowed temporarily from the environment. The function of returning these materials to the environment is done by the decomposers.

Therefore decomposers play a major role in recycling of materials (Fig.1.32).

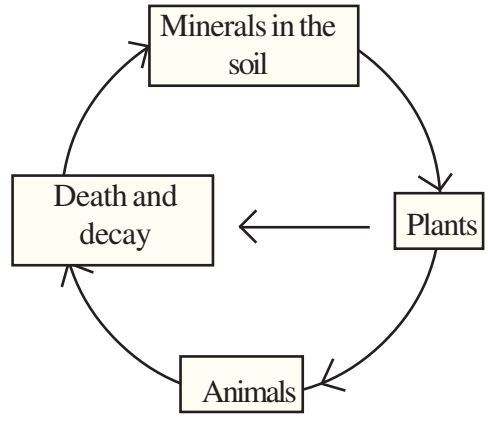

Fig.1.32
Cycling of organic matter

Soil erosion

You have seen that water flowing down on a rainy day is sometimes brown in colour. Collect a sample of such water, keep it aside for about a day and observe. You may see that the colour of the water is clear and clay gets collected at the bottom of the vessel. The reason for the brown colour of flowing water is due to clay particles which get washed away with flowing water.

After the school vacation, you can see your classroom is covered with dust. Dust is small particles of soil.These were brought there by wind. The process of transporting soil from one place to another and depositing it there is called **soil erosion**.

Erosion is caused by two major factors.

1. Water
2. Wind

Let us consider the factors affecting soil erosion caused by water.

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Activity 1.3

Take a tin with holes at the bottom. Pour equal amounts of water from an equal height at each instance and compare the colour of the water flowing out.

(a) Uncovered hard soil
(b) Uncovered loose soil
(c) Uncovered soil at an incline
(d) Soil on a flat land covered with grass
(e) Loose soil covered with decaying leaves.

From the results of your activity, try to identify the instances when erosion takes place most and when it takes place least.

You would have noticed that the brown colour of the water flowing down on the loose soil in the uncovered areas was more than that of the land covered with grass or decaying leaves. This shows that soil erosion is reduced by having a cover of living or non- living organic matter over the soil.

Fig. 1.33 - Cover crops

The erosion takes place by wind is affected by the speed of the wind and the nature of the soil. Now you know growing trees as wind breaks and covering the soil with organic matter reduces soil erosion.

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Now, it will be clear to you that the living and non-living components of the environment interact with each other and thus contribute to a great extent to maintain the dynamic equilibrium of the environment. Further, the interactions among living and non-living things will contribute to build a complex environment.

Exercises

1. With the help of a food-web related to a pond, show the interactions of plants and animals based on food.

2. Explain how a mango tree is adapted to obtain the basic needs for its growth.

3. Explain how far hibernation and migration help in the survival of organisms.

4. Explain how decomposition of organic matter helps in maintaining the environmental balance.

5. Indicate the various stages of a succession, with a diagram and explain it briefly.

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