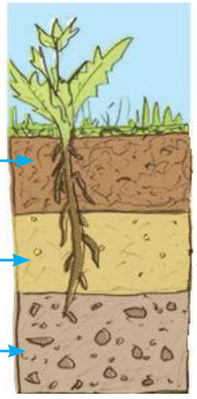
7 Soil

The Earth on which we walk is made of soil and rocks. Without soil, most life on Earth could not survive. Soil provides a place for plants to grow. The farmer grows rice, wheat, *dal*, vegetables, and fruits for us in soil. It holds water in place for their roots. It contains nutrients, or food substances, needed for their growth. Soil also provides a home for many animals.

WHAT IS SOIL?

Soil is a mixture of minerals and organic material or humus. Minerals are bits of rock, and organic material is the remains of living things that have died. Soil is not as solid as rock. It has many small spaces, called pores that hold water and air.

Layers of Soil



Soil layers

Soils is made up of layers. These layers rest on solid rock, called bedrock. A layer of broken rock rests on the bedrock. Some of this rock may have gone into forming the soil above. The soil above the broken rock is called subsoil. Subsoil contains mostly minerals and a small amount of humus. Only the deepest plant roots reach the subsoil.

The top layer is called topsoil. Topsoil contains a lot of humus. It is the layer where plants grow. This topsoil is very precious. It not only allows plants to grow, but also helps absorb rainwater which forms our groundwater.

In some places on Earth, the bedrock is found one or two metres deep. In other places it is more than 100 or 200 metres deep.

HOW SOIL FORMS

The mineral part of soil forms from rocks. Weathering (wind, water, and temperature changes) breaks rocks down into tiny particles. The smallest particles are called clay. Medium-sized particles are called silt. The largest particles are called sand. Different types of soil contain different mixtures of clay, silt, and sand.

The organic part of the soil forms when plants and animals die. Their bodies decay and mix with the rock particles. The organic material, called humus, helps to form the pores in the soil. It keeps the soil soft and loose. Humus also provides the nutrients used by plants.

Soil forms slowly. A layer of soil that is 2.5 centimetres thick may take 500 to 1,000 years to form. For this reason it is important to protect soil from erosion-being blown or washed away.

SOIL EROSION

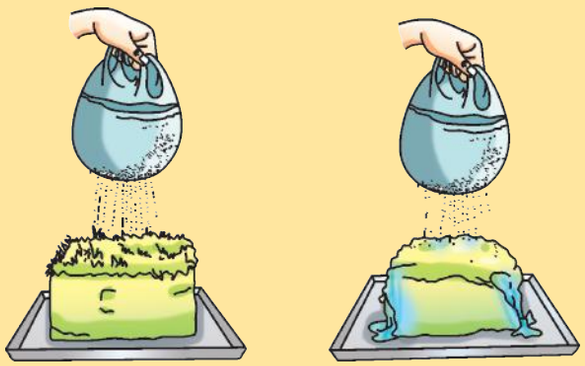
Water, wind, and other natural forces cause soil to wear away. These forces also move bits of rock and soil to new places. This movement changes the shape of the land. These processes are called erosion.

Activity

Things required : Small spade, 2 large trays/ flat plates, newspaper

Method : Find a part of Earth with small green cover (small plants, weeds or grass growing on it). Mark out a 15 cm 10 cm rectangle.

Loosen the soil outside the square, going down at least 6 cms or more. Carefully pick up the clod of Earth and put it on the tray, as shown in picture given here.



(A) (B)

Now find a part of Earth with no green cover. Mark and dig out a similar clod of Earth. Carefully put it into the other tray. Spread a newspaper on your desk. Take a plastic bag. Fill it half with water. Make some tiny pin holes underneath and gently sprinkle water on both clods of Earth. What do you notice?

Water in tray A gets absorbed and then starts running out. But the clod of Earth holds its shape. The roots of plants and green cover on top hold the soil together. When we water the patch of Earth in tray B, we find it absorbs less water and muddy water starts running off. If we keep on pouring water on both patches of Earth, the clod in tray B breaks up much faster than the clod in tray A.

As shown in the above activity, the roots of plants hold the top soil in place and allow little soil erosion. Erosion can be very harmful to farmland. Crops depend on rich soil for healthy growth. But this top layer of soil is thin. Wind and flowing water can sweep it away.

WHAT CAUSES SOIL EROSION ?

There are three major factors which cause soil erosion. These are :

- Running water
- Wind
- Deforestation

Water soil erosion

Running water causes soil erosion : When there is little or no green cover on the Earth and it rains, running water carries away top soil with it. In case of flood, fast flowing water of rivers carries away tons of top soil downstream[1].

Floods damage crops and carry away top soil leaving the poor farmer with less fertile soil for the next season of crop. In hilly and mountainous areas, running water carries away top soil, unless there is forest growing over it.

Wind causes soil erosion : Like waves of water, wind constantly carries sand and other small bits of Earth from one place to another. It also blows topsoil off dry farmland. Fine soil and dust blow away, leaving small stones and mud behind, making it more and more difficult for bush or forest cover to grow. Wind also exposes the roots of plants, which could kill plants. Wind changes the shapes of the rocks and sand dunes.

Wind cause soil erosion

Deforestation causes soil erosion

Deforestation causes soil erosion : We use wood in many different ways in our daily lives. Forests are cut the world over to provide industry and our homes with wood. Felling of trees or deforestation is a major cause of soil erosion, because the roots of trees and plants hold the soil together to preserve top soil or conserve it.

SOIL CONSERVATION

We know that soil erosion is very harmful for farmlands . Let us see how we can prevent soil erosion.

Building Bunds and Dams

Land have a gentle or steep slope to it. Water always flows out to the low-lying area. Building small bunds or dam walls at the point from where water flows out, helps collect water down stream.

Embankment or walls are built along river sides, where possible, to hold river water in.

Dam

Crops

Growing Cover Crops

Farmers use several methods to slow down erosion. Between two major crops (after harvesting the first crop and before sowing the next crop), the field lies fallow. At this time wind and water may erode the topsoil. Farmers often grow fodder or other useful crops at that time. These crops are grown to cover the empty fields so they are called cover crops. Cover crop prevents water from carrying topsoil away.

Farmers also plant trees around farmland to block wind.

Terrace Farming

Farmers in hilly mountainous regions cut the slopes of hills into steps or terraces. Water gathers on the terraces rather than rushing down the slope. This prevents soil being carried away. It also makes farming easy.

Terrace farming

Planting

Afforestation

Felling of trees or deforestation is one of the main reasons for soil erosion. Planting more trees or afforestation is important. But it is equally necessary to look after the saplings. Water them in dry season and fence them off so that cattle do not eat the saplings.

Go Green

Gift a sapling to your friends and family members on their birthday or other happy occasions. Plants make a great gift.

Know the Keywords :

Organic	:	Of or produced from animals or plants.
Silt	:	Mud deposited by moving water.
Erosion	:	Wear away.
Harvesting	:	The gathering of crops.

Point to Remember

- Plants grow and survive because soil is made up of minerals (broken rocks) and organic matter (dead and decayed living things).
- Soil erosion is caused by water, wind, and other natural forces.
- Soil can be conserved by building bunds or dams, growing crop cover and soil cover, terrace farming and afforestation.

EXERCISE TIME

A. Multiple Choice Questions (MCQs).

Tick (✓) the correct word :

1. Soil is a mixture of _____.

   a. minerals ◯ b. rocks ◯ c. water ◯

2. Felling of _____ is a major cause of soil erosion

   a. houses ◯ b. trees ◯ c. monuments ◯

3. _____ causes soil erosion.

   a. Soil conservation ◯ b. Deforestation ◯ c. Afforestation ◯

4. _____ is made up of layers.

   a. Land ◯ b. Water ◯ c. Soil ◯

5. Humus also provides the _____ used by plants.

   a. vitamins ◯ b. minerals ◯ c. nutrients ◯

B. Fill in the blanks :

1. Humus is formed with dead and decaying _____, and _____.
2. Soil is made up of three layers : topsoil, _____, and _____.
3. Planting forests is called _____.
4. Terrace farming and growing cover crops prevents _____.
5. Running water and wind causes _____, _____.

C. Write 'T' for true and 'F' for false statements :

1. Soil is as solid as rock.
2. The top layer is called top soil.
3. The organic part of the soil forms when plants and animals die.
4. Running water does not cause soil erosion.
5. Soil erosion is very harmful for farmlands.

D. Match the following :

1. Soils	a. rock
2. Top soil	b. soil erosion
3. The mineral part of soil	c. riversides
4. Deforestation	d. made up layers
5. Embarkment	e. humus

E. Answer the following questions :

1. Why is soil important to us ?
2. Briefly state three ways in which we can conserve soil.
3. How is soil formed ?
4. What is bedrock ?
5. What is soil erosion ?

Creative Work

- Get some young plants from a nursery. Plant them in your garden or in a park near your home. Water these plants regularly and see them grow.

- Collect sand, clay, and soil rich is humus in shallow trays on your science table. Blow on all three. Which blows away the first? Now pour a little water on all three. Can you still blow it away?

  Which soil will be the most difficult to blow on?

  Which soil will grow plants the best? Why ?