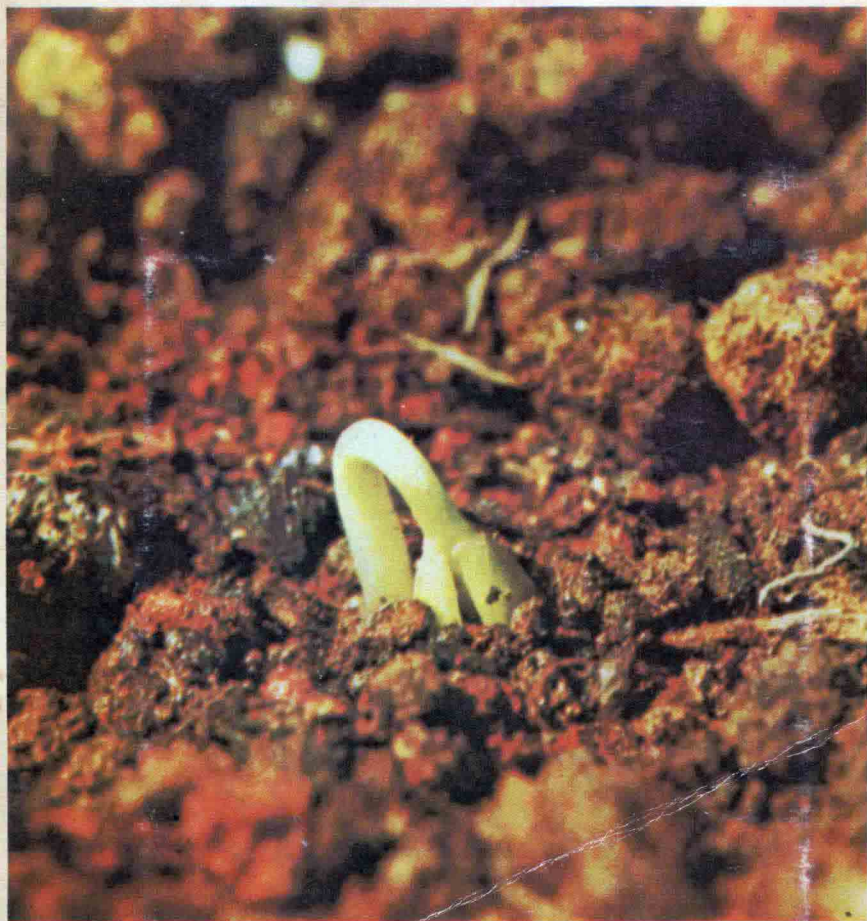


簡易英語科技叢書

地球



中外出版社

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出版說明

《簡易英語科技叢書》是爲初學英語的中國青年學生提供一套閱讀英語科技書籍資料的參考讀物。

本叢書包括十六個科學課題，分爲十六冊出版。每一課題構成一個完整的知識讀物。這十六個課題把目前國外學校教學中的基礎科學內容都包括進去了。

爲提高讀者科學知識和閱讀興趣，每一分冊均附有生動的彩色插圖，英語文字力求淺顯，使一般初學英語的中國青年學生都能接受。

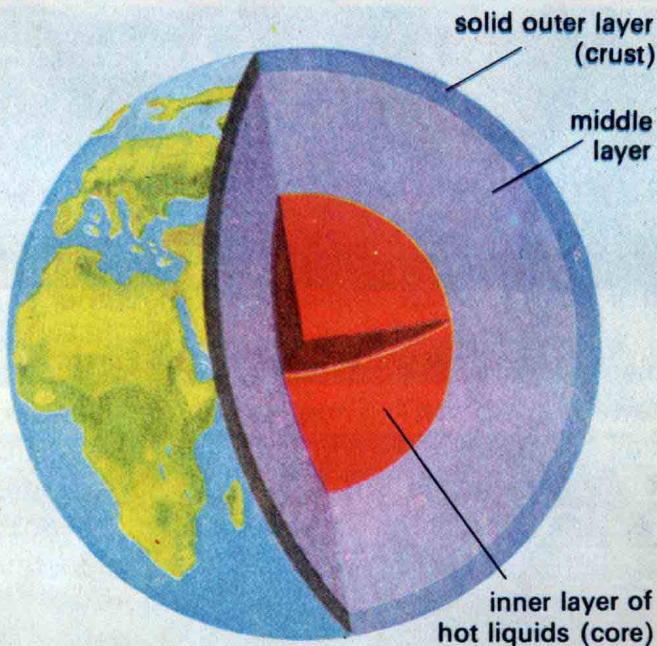
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OUR PLANET EARTH

The Earth which we live on is a beautiful planet. It is made up of land and oceans, mountains and rivers, plants, animals and people. It is actually very, very old and was not always as beautiful as it is now. It is not certain how the Earth began. Probably it began as a huge globe of gas and dust. The globe became smaller and denser, and most of the gas drifted away leaving behind bodies of solid

What our planet Earth is made up of.

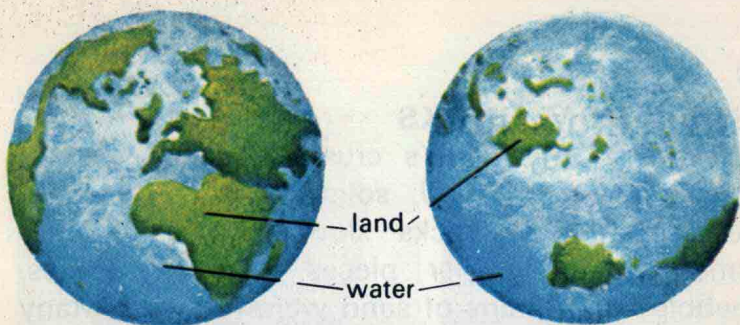


matter. These bodies eventually collected together to form solid Earth. Then the inside of the solid Earth became hot and molten causing certain materials to rise to the surface. This probably resulted in the formation of the Earth's layers. To-day the outer layer or crust is cool and hard, while the core is probably hot and molten.



See how water filled up the Earth.





**Much of the Earth's surface
is covered with water.**

Some of the materials which were pushed up to the crust from the molten core of the Earth formed water. Others formed the gases of the atmosphere. The water evaporated to form clouds. These rose into the sky to form rain. Soon rain fell down on the Earth's crust and filled all the valleys, cracks and hollows. In this way, rivers, lakes, oceans and seas were formed. Throughout the ages, Earth has received a lot of rainfall and now most of the Earth's crust is covered with water. About $\frac{7}{10}$ th of the Earth's surface is covered with water while $\frac{3}{10}$ th of it is covered with land.

For a long time the Earth's atmosphere did not contain much oxygen. The oxygen was combined with the other materials in rocks. This oxygen was slowly freed and escaped into the atmosphere. After a very long time, as the amount of oxygen in the atmosphere increased, the Earth became a more suitable place for plants to develop. Plants produced more oxygen which was freed into the atmosphere. Later on animals developed.

SOIL FROM ROCKS

At first, the Earth's crust was made up of huge blocks of hard, solid rocks. The outer layers of these rocks slowly broke up into smaller and smaller pieces. Finally stones, pebbles and grains of sand were formed. Many sorts of plants and animals lived and died on the surface of the Earth. Their remains mixed up with the stones, pebbles and sand of the Earth's crust to form **soil**. The outermost layer of the Earth's crust is soil.

There are many ways in which large pieces of rock break into smaller pieces. Wind, water, heat and cold help to break up rocks. When winds blow sand particles against a large rock for a long time, the softer layers of the rock are slowly worn away. These leave holes and cracks in the rock. The holes and cracks become bigger until finally the rock breaks up into smaller pieces.

The moving water of streams and rivers also helps to break large rocks into smaller pieces. As the water moves along, it carries with it small pieces of rock. These rub against the large rocks. As this happens, the larger rocks are worn down to smaller pieces. These smaller pieces are carried away and they in turn wear down other larger rocks.

The heat of the sun helps to break up rocks too. When the sun shines, the rocks become very hot. If these rocks are suddenly cooled



Two types of rocks

they may crack. Therefore, a sharp change in temperature can cause rocks to break into smaller pieces.

Ice also helps to break up rocks. When it rains, water collects in the cracks of a rock. If the weather becomes very cold, this water will turn to ice. When water becomes ice, its volume becomes bigger. Therefore, the crack becomes wider. Soon the crack becomes so wide that the rock breaks into smaller pieces.

Things to Do

- (i) Let's find rocks. We can find rocks if we go into the open fields, or near the sea-shore. Collect as many rocks as you can. Take a bag or box along to put your rocks into. Write down where you found each rock and what you found near it.

- (ii) Now look at your rock collection. Wash each rock with water and examine it. Is it large or small? Touch each rock to find out whether it is smooth or rough. Look at its edges. Are they rounded or jagged? Scratch each rock with a blade or pen-knife. Is it hard or soft? Describe the colour of the rock.
- (iii) Let's look inside our rocks. Try to break each rock up with your hands. If the rock is too hard, use a hammer. What do you see inside the rock? Is the colour inside the rock the same as the colour outside? Do small pieces of sand fall out?
- (iv) Use a hammer to pound each rock up into small pieces. Pound the pieces until they become very small. Now pour water on them and mix them with the water. Do you get sticky mud? What colour is the mud? Now you have made mud from rocks.

SOIL EROSION AND CONSERVATION

Look at the slopes of a hill on a rainy day. You will see many streams of muddy water running down the slopes. The water is muddy because it washes away soil from the hill slopes. Sometimes soil is blown away by strong winds. When the soil is carried away by water or wind we say that the land is **eroded**. This is known as **soil erosion**.



This is the result of soil erosion.

Soil erosion takes place most easily on hill slopes. Rain water runs down slopes quickly and carries plenty of soil with it. Erosion can also take place on flat, open land. Heavy rain can quickly wash away the rich top soil on flat, open land.

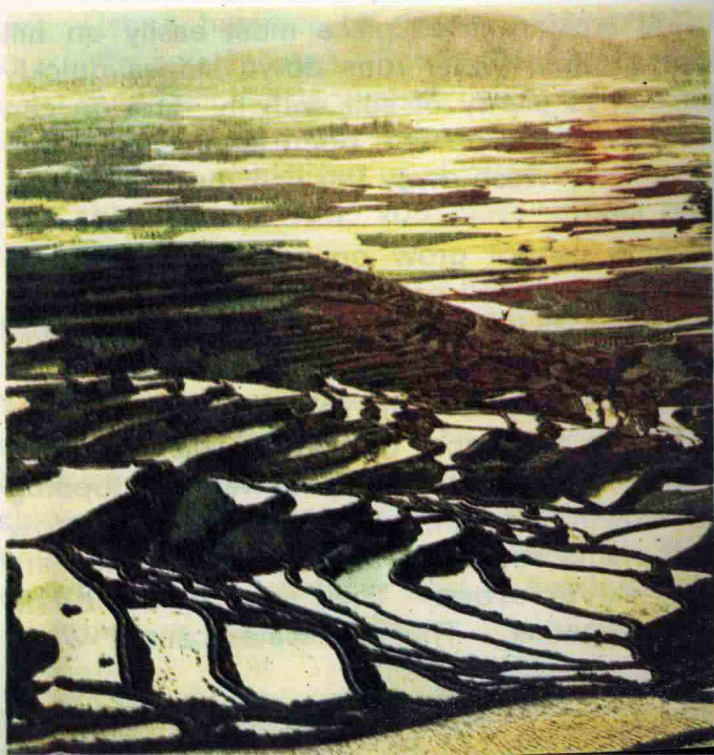
Plants cannot grow on eroded land. There is not enough soil on eroded land to give them the things they need. Plants need water and salts from the soil.

We must try to stop soil erosion. We can do this in a number of ways. This is known as **soil conservation**. One way of stopping soil erosion on flat, open ground is to grow small plants such as grasses. These plants are called **cover crops**. Their roots hold the soil tightly together. The rain water cannot wash

away the soil. When trees and tall bushes are planted at the edges of an open field, soil erosion by strong winds cannot take place. The trees and bushes protect the open land from the winds. They act as a very big wall.

Soil erosion on slopes can be stopped in a number of ways. One way is to cut a slope into "steps" called **terraces**. Water carrying soil cannot run straight down the slope now. It has to run down the terraces. This slows down the flow of the water. Most of the soil in the water is left behind on the terraces.

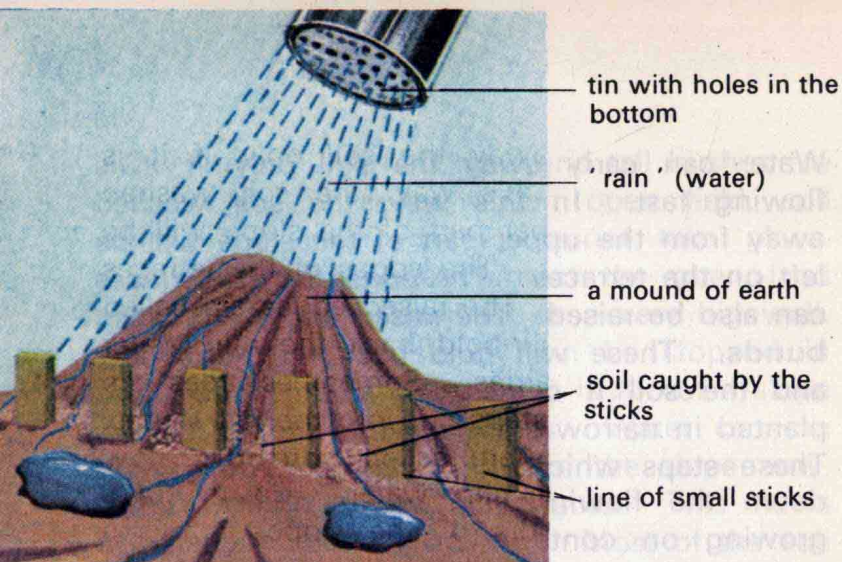
Terracing stops soil erosion.



Water can carry away the soil only if it is flowing fast. In this way, the soil washed away from the upper part of the slope will be left on the terraces. The edges of the terraces can also be raised. The raised edges are called **bunds**. These will hold back the rain water and the soil it carries. Sometimes trees are planted in narrow steps cut into the hill slopes. These steps which are called **contours** slow down the flowing rain water. Cover crops growing on contours or the slopes between terraces also help to stop soil erosion.

Things to Do

- (i) We can make our own rain and see what happens when it falls on different types of land. Take a big tin and make a number of holes in the bottom. Prepare a mound of loose earth. Next, find a mound of earth covered with grass or other plants. Finally find a mound of hard, dry earth. Put up a line of small sticks in the form of a fence at the bottom of each mound of earth. Now hold your tin over the mound of loose earth and with a smaller tin, pour some water into it. The water will pass through the holes at the bottom of the tin like rain. Watch it falling on the loose earth. You will see that some soil is washed away. The water flowing down the mound is not



To find out what happens when 'rain' falls on different types of land

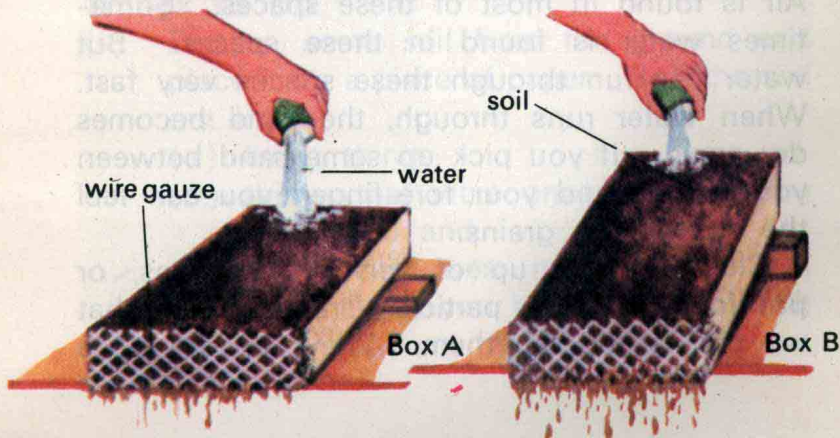
clean but brownish. This is because it is carrying away some soil. As it flows past the fence it slows down and some soil is caught by each stick. The water is eroding the mound while the fence is helping to conserve the soil. Now do the same thing with the mound covered with plants and the other made up of hard ground. See what happens and explain. Do soil erosion and soil conservation occur like before?

- (ii) You can find out more about soil erosion on slopes in this way. Make two long narrow wooden boxes, both open at one end. At each open end nail a piece of wire gauze. Fill both boxes with equal amounts of the same type of soil. Tilt

both boxes, making sure that you tilt Box B much more than Box A. Now pour exactly one tin of water over the upper end of Box A and collect the muddy water from the other end. Do the same thing with Box B. Compare the amounts of soil washed away from Box A and Box B. You will find that more soil is washed away from Box B. This shows that more soil will be washed away when the slope is steeper.

This time tilt both Box A and Box B in the same way. Pour two tins of water into Box A and one tin into Box B. Collect the muddy water from both boxes, and compare the amounts of soil washed away. You will find that more soil is washed away from Box A. This shows that if there is more water, more soil will be washed away.

To find out how soil is washed away by water



Next, find a slope which is made of bare, hard soil, another of bare, loose soil and a third of soil covered with plants. Pour water on each slope and look at what happens. Is soil washed away from all the three slopes? Do the plants on the third slope help to prevent soil erosion? Now build little terraces across each slope and pour water on the slopes. Talk about what happens.

WHAT SOIL IS MADE UP OF

Soil is made up of **stones, sand, clay** and **loam**. It also contains **air** and **water**. Stones are small pieces of rock. They are larger than the other parts of soil. The stones in the soil are of all shapes and sizes.

When stones break up, they form grains of sand. The soil on the beach is mainly made up of sand. Since the grains of sand are quite big, there are many large spaces between them. Air is found in most of these spaces. Sometimes water is found in these spaces. But water can run through these spaces very fast. When water runs through, the sand becomes dry again. If you pick up some sand between your thumb and your fore-finger, you can feel the size of the grains.

Clay is made up of very small grains, or **particles**. These particles are so small that we can hardly see them. They lie very close