

Section 4

Soil Conservation

Key Concept Soil is a nonrenewable resource that can be endangered if it is used unwisely.

What You Will Learn

- Soil is important for plants and animals and for the storage of water.
- Farmers use a variety of methods to prevent soil damage and loss.

Why It Matters

Soil must be conserved because soil is a major factor in the growth of plants. Humans and other organisms depend on plants as a source of food.

Believe it or not, soil can be endangered, just as plants and animals can. Because soil may take hundreds or thousands of years to form, it is not easy to replace. Therefore, soil can be considered a nonrenewable resource. If we do not take care of soils, we can ruin or even lose them. [Soil conservation](#) is a method to maintain the fertility of the soil by protecting the soil from erosion and nutrient loss.

Standards Check Why is soil a nonrenewable resource?



The Importance of Soil

Soil provides minerals and other nutrients for plants. If the soil loses these nutrients, plants will not be able to grow. In **Figure 1**, the plants on the left are healthy because the soil in which they live is rich in nutrients. The plants on the right are unhealthy because they are not getting enough nutrients. The soil is poor in nutrients and does not provide the plants with the food that they need.



Figure 1 Both of these photos show the same crop, but the soil in the photo on the right is poor in nutrients.

Most land animals get their energy from plants. The animals get their energy either by eating plants or by eating animals that have eaten plants. So, if plants can't get nutrients from the soil, animals can't get nutrients from plants.

Housing

Soil also provides a place for animals to live. Habitat is the term used to describe the region where an animal or plant lives. Earthworms, spiders, ants, moles, and other animals live in soil. If the soil disappears, so does the habitat for these animals.

Water Storage

Soil is also very important for water storage. Without soil to hold water, plants would not get the moisture or the nutrients that they need. In addition, soil keeps water from running off, flowing elsewhere, and causing flooding.

Soil Damage and Loss

Soil loss is a major problem around the world. One cause of soil loss is soil damage. Soil can be damaged from overuse by poor farming techniques or by overgrazing. Overused soil can lose its nutrients and become infertile. Plants can't grow in soil that is infertile. Without plants to hold and help cycle water, an area can become a desert. This process is known as *desertification*. Without plants and moisture, the soil can be blown or washed away.

Soil Erosion

When soil is not protected, it can be exposed to erosion. **Erosion** is the process by which wind, water, or gravity transports soil and sediment from one location to another. **Figure 2** shows Providence Canyon in Georgia. The canyon formed when soil eroded because trees were cut down to clear land for farming. Because roots from plants, including trees, anchor the soil, plants keep topsoil from being eroded. Plants also protect the soil by preventing water and wind from flowing freely over the soil and carrying the soil away. By taking care of the vegetation, you also take care of the soil.



Figure 2 Providence Canyon has suffered soil erosion from the cutting of forests for farmland.



Soil Conservation on Farmland

If farmers plowed rows that ran up and down hills, what might happen during a heavy rain? The rows would act as river valleys and would channel the rainwater down the hill to erode the soil. To prevent this kind of erosion, a farmer could plow across the slope of the hills. This process is called *contour plowing*. In contour plowing, the rows act as a series of dams instead of a series of rivers. **Figure 3** shows contour plowing and three other methods of soil conservation. If the hills are very steep, farmers can use *terracing*. Terracing changes one steep field into a series of small, flat fields. *No-till farming*, the practice of leaving old stalks, provides cover from rain. The cover reduces water runoff and slows soil erosion.

Figure 3 Soil Conservation Techniques



Contour plowing reduces erosion by slowing the downhill flow of water.



Terracing creates a series of steps to prevent the rapid runoff of water.



No-till farming reduces erosion by providing a natural cover that reduces water runoff.



Cover crops, such as soybeans, help protect the soil and reduce soil exposure.



Cover Crops and Crop Rotation

During the early 1900s, the soil in the southern United States had become nutrient poor by the farming of only one crop: cotton. George Washington Carver, the scientist shown in **Figure 4**, urged farmers to plant soybeans and peanuts instead of cotton. Soybeans, peanuts, and some other plants help return important nutrients to the soil. These plants are called *cover crops*. Cover crops are crops that are planted between harvests to replace certain nutrients and to prevent erosion. They prevent erosion by providing cover from wind and rain.



Figure 4 George Washington Carver taught soil conservation techniques to farmers.

Another way to slow nutrient depletion is through *crop rotation*. If the same crop is grown year after year in the same field, certain nutrients become depleted. To slow this process, a farmer can plant different crops. A different crop will use up fewer nutrients or different nutrients from the soil. Some crops used in crop rotation can even replace soil nutrients.

Standards Check How can crop rotation affect the number of plants that soil can support?



Section Summary

- Soil forms slowly over hundreds or thousands of years.

Therefore, soil is considered a nonrenewable resource.

- Soil is important because plants grow in soil, animals live in soil, and water is stored in soil.
- Soil can be eroded by water running downhill or by wind.
- Soil erosion and soil damage can be prevented by no-till farming, contour plowing, terracing, using cover crops, and practicing crop rotation.

Chapter Summary

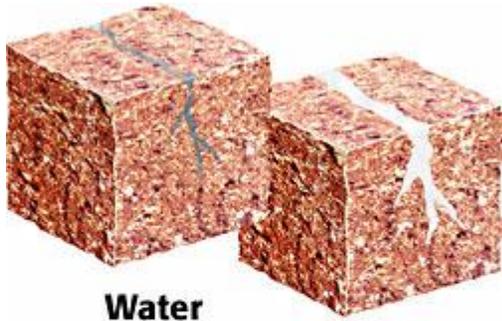
The Big Idea

Weathering is a continuous process that results in the formation of soil and the construction and destruction of landforms.

Section 1 Weathering

Key Concept Rock is broken down into smaller pieces by mechanical and chemical weathering.

- Ice, water, wind, gravity, plants, and animals can cause mechanical weathering by breaking rock into pieces.
- Water, acids, and air can cause chemical weathering of rocks.



Water

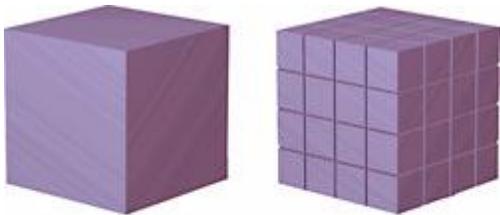
Ice

Ice wedging is a kind of mechanical weathering.

Section 2 Rates of Weathering

Key Concept The rate at which rock weathers depends on climate, elevation, and the size and makeup of the rock.

- Differential weathering is the process by which softer rocks weather more rapidly than harder rocks do.
- Surface area, climate, and elevation are factors that affect the rate at which rock weathers.



Greater surface area speeds the rate of weathering.

Section 3 From Bedrock to Soil

Key Concept Weathering may lead to the formation of soil, which is an important natural

resource.

- Soil is a mixture of weathered rock, organic material, water, and air.
- Soil composition, texture, fertility, and pH affect plant growth.
- Climate affects the types of soil that are found in different places.



Soils contain particles
of different sizes.

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Terracing can reduce erosion on steep slopes.

