

**BEFORE YOU READ**

After you read this section, you should be able to answer these questions:

- Why is soil important?
- How can farmers conserve soil?

**Why Is Soil Important?**

You have probably heard about endangered plants and animals. Did you know that soil can be endangered, too? Soil can take many years to form. It is not easy to replace. Therefore, soil is considered a nonrenewable resource.

Soil is important for many reasons. Soil provides nutrients for plants. If the soil loses its nutrients, plants will not be able to grow. Soil also helps to support plant roots so the plants can grow well.

Animals get their energy from plants. The animals get energy either by eating plants or by eating animals that have eaten plants. If plants are unhealthy because the soil has few nutrients, then animals will be unhealthy, too.

Soil also provides a home, or *habitat*, for many living things. Bacteria, insects, mushrooms, and many other organisms live in soil. If the soil disappears, so does the habitat for these living things. ✓

Soil is also very important for storing water. It holds water that plants can use. Soil also helps to prevent floods. When rain falls, the soil can soak it up. The water is less likely to cause floods.

What does soil provide?	Why is it important?
Nutrients	
Habitat	
Water storage	

If we do not take care of soils, they could become unusable. In order to keep our soils usable, we need to conserve them. **Soil conservation** means protecting soils from erosion and nutrient loss. Soil conservation can help to keep soils fertile and healthy.



**Compare** Create a chart that shows the similarities and differences in the ways that farmers can help conserve soil.



**1. Explain** Why is soil important for animals?

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**TAKE A LOOK**

**2. Identify** In the table, fill in the reasons that nutrients, habitat, and water storage are important.

**SECTION 4** Soil Conservation *continued*

### How Can Soil Be Lost?

Soil loss is a major problem around the world. One cause of soil loss is soil damage. Soil can be damaged if it is overused. Overused soil can lose its nutrients and become infertile. Plants can't grow in infertile soil.

Plants help to hold water in the soil. If plants can't grow somewhere because the soil is infertile, the area can become a desert. This process is known as *desertification*.

### EROSION

Another cause of soil loss is erosion. **Erosion** happens when wind, water, or gravity transports soil and sediment from one place to another. If soil is not protected, it can be exposed to erosion.

Plant roots help to keep soil in place. They prevent water and wind from carrying the soil away. If there are no plants, soil can be carried away through erosion. ✓

**READING CHECK**

**3. Describe** How do plant roots prevent erosion?

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### How Can Farmers Help to Conserve Soil?

Farming can cause soil damage. However, farmers can prevent soil damage if they use certain methods when they plow, plant, and harvest their fields.

### CONTOUR PLOWING

Water that runs straight down a hill can carry away a lot of soil. Farmers can plow their fields in special ways to help slow the water down. When the water moves more slowly down a hill, it carries away less soil. *Contour plowing* means plowing a field in rows that run across the slope of a hill.



Contour plowing helps water to run more slowly down hills. This reduces erosion because \_\_\_\_\_

### TAKE A LOOK

**4. Identify** Fill in the blank line in the figure to explain how contour plowing reduces erosion.

**SECTION 4** Soil Conservation *continued*

**TERRACES**

On very steep hills, farmers can use terraces to prevent soil erosion. *Terraces* change one very steep field into many smaller, flatter fields.



Terraces keep water from running downhill very quickly.

**NO-TILL FARMING**

In *no-till farming*, farmers leave the stalks from old crops lying on the field while the newer crops grow. The old stalks protect the soil from rain and help reduce erosion.



The stalks left behind in no-till farming reduce erosion by protecting the soil from rain.

**COVER CROPS**

*Cover crops* are crops that are planted between harvests of a main crop. Cover crops can help to replace nutrients in the soil. They can also prevent erosion by providing cover from wind and rain.

**CROP ROTATION**

If the same crop is grown year after year in the same field, the soil can lose certain nutrients. To slow this process, a farmer can plant different crops in the field every year. Different crops use different nutrients from the soil. Some crops used in crop rotation can replace soil nutrients.

*Critical Thinking*

**5. Infer** What do you think is the reason farmers use terraces only on very steep hills?

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*Critical Thinking*

**6. Apply Concepts** How can crop rotation affect the number of plants that soil can support?

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# Section 4 Review

## SECTION VOCABULARY

<b>erosion</b> the process by which wind, water, ice, or gravity transports soil and sediment from one location to another	<b>soil conservation</b> a method to maintain the fertility of soil by protecting the soil from erosion and nutrient loss
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1. **Define** Write your own definition for soil conservation.

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2. **Identify** Give three things that soil provides to living things.

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3. **Compare** How is weathering different from erosion?

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4. **Identify** What are two causes of soil loss?

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5. **List** What are five ways that farmers can help to conserve soil?

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6. **Explain** How does no-till farming help to reduce erosion?

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5. Freezing and thawing are dependent on temperature.
6. Water on slopes has more energy to weather rock than water that isn't moving.

**Review**

1. temperature, moisture, elevation, slope
2. Large rocks have less surface area for their volume than small rocks. Therefore, a smaller portion of the rock is exposed to weathering. It takes longer for the rock to wear away. The small rock has more surface area for its volume, so it weathers away faster.
3. The rock on the beach would be affected by waves and a lot of water. The rock on the side of the mountain would be affected by fast-moving water and possibly by high winds. It probably would also be exposed to colder temperatures than the rock on the beach.
4. The longer river probably carries the smallest sediment. The rocks in the longer river travel a longer distance before they drop. Therefore, they have more chance to weather. The particles will tend to be smaller than those in the shorter river.

**SECTION 3 FROM BEDROCK TO SOIL**

1. The rocks from which they form have different compositions.
2. (from left to right) residual soil, transported soil
3. the amounts of different-sized particles in a soil
4. about 25 times
5. organic material that comes from decayed organisms
6. O, A, and B
7. lemon juice
8. parent rock, acid precipitation, and fertilizers
9. Rainwater leaches nutrients from the soil.
10. Groundwater doesn't evaporate as fast in cold climates.

11.

Type of climate	Description of climate	Features of the soil in this climate
Tropical climates	warm temperatures, a lot of rain, many living things	has a lot of <u>humus, but may be poor in nutrients</u>
Deserts and arctic climates	very little rain, <u>few living things</u>	has little humus, poor in nutrients
<u>Temperate forests and grasslands</u>	medium amount of rain, temperature changes often	has a lot of <u>humus, rich in nutrients</u>

**Review**

1. structure, texture, fertility
2. Neither arctic climates nor desert climates get a lot of rain.
3. Flowing water can leach nutrients out of soils. This makes the soils less fertile.
4. Most plants grow best in soil that is slightly acidic or neutral. If the pH is too low or too high, plants cannot grow.
5. the relative amounts of sand, silt, and clay in the soil
6. mineral fragments, organic material, water, air

**SECTION 4 SOIL CONSERVATION**

1. Animals get energy from plants, which need soil to grow. Some animals live in soil.

2.

What does soil provide?	Why is it important?
Nutrients	<u>Nutrients help to keep plants healthy. Animals get energy from plants.</u>
Habitat	<u>Animals and other organisms need places to live.</u>
Water storage	<u>Soil provides water to plants and helps prevent flooding.</u>

3. Plant roots hold soil in place. They help to keep wind and water from carrying the soil away.
4. Slow-moving water carries away less soil.
5. Terraces can be difficult and expensive to build. They are only economical on very steep slopes where other methods don't work.
6. Crop rotation helps to keep soil nutrient levels high. When there are many nutrients in the soil, it can support more plants.

**Review**

1. Possible answer: doing things to preserve soil
2. water, habitat, nutrients

3. Weathering happens when rocks are broken down into smaller pieces. Erosion happens when soil and sediment are moved from one place to another.
4. soil damage and erosion
5. contour plowing, terraces, no-till farming, cover crops, and crop rotation
6. In no-till farming, stalks from older crops are left lying on the ground. The stalks help to protect the soil from wind and rain. This helps to reduce soil erosion.

3. The sand can have different colors, which come from the kind of rock it is made from. Black sand can form from the weathering of dark-colored lava. Light-colored sand may be made of light-colored minerals, such as quartz.
4. Waves carry sand up the shore parallel to their direction of travel. The waves wash back into the ocean perpendicular to the shoreline. This causes sand to move in a zig-zag pattern parallel to the shoreline.
5. sea arches, sea stacks, headlands, wave-cut terraces, sea caves

## Chapter 3 Agents of Erosion and Deposition

### SECTION 1 SHORELINE EROSION AND DEPOSITION

1. Waves remove sand from shorelines during erosion and add sand during deposition.
2. 12 s
3. Crashing waves can break solid rock apart. Water can enter cracks in the rock and break pieces off.
4. If the storm does not include strong winds, large waves will probably not be produced.
5. Sea arches are connected to the mainland, but sea stacks are not.
6. a body of rock that sticks out into the sea
7. A beach is an area along a shoreline that is covered by materials that were carried there by waves.
8. quartz
9. Sand particles are washed away during storms.
10. Waves wash onto the beach in the same direction that they wash off the beach, so there is no sideways movement of water.
11. a ridge of deposited material in open water
12. a sandbar that is connected to the shoreline
13. Barrier spits are connected to the shore, but barrier islands are not.

#### Review

1. A shoreline is the boundary between land and water. A beach is part of a shoreline that is made of deposited sediment.
2. Answers include: wind (produces waves, which erode and add to the shore), waves

### SECTION 2 WIND EROSION AND DEPOSITION

1. They hold the soil and rock in place.
2. Large particles are too heavy, and the wind doesn't have enough energy to carry them.
3. the process in which small sediment particles are removed by the wind, leaving behind larger particles

Process	Description
Saltation	Large particles bounce and skip along the ground.
Deflation	Small particles are removed by wind.
Abrasion	Rock pieces are worn away by wind-carried sand.

5. Fast winds have more energy, so they can lift larger particles.
6. a mound of wind-deposited sand
7. the same direction the wind is blowing
8. The windward slope has a gentler angle than the slip face.

#### Review

1. desert pavement, deflation hollows
2. areas with little plant cover and/or with fine, loose soil or sand, such as coastlines and deserts
3. Student should label the gently sloping side "windward slope" and the steeply dipping side "slip face"; the arrow should point to the right.
4. When wind hits a barrier, such as a plant, a rock, or a building, it slows down. The sediment that it has been carrying is deposited onto the barrier, making the barrier larger. Eventually, the barrier is completely covered by sediment, forming a dune.
5. The wind can carry small particles the farthest because they weigh the least.