

SECTION 2 **Wind Erosion and Deposition**

**BEFORE YOU READ**

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

- How can wind erosion shape the landscape?
- How can wind deposition shape the landscape?

**National Science Education Standards**  
ES 1c, 2a

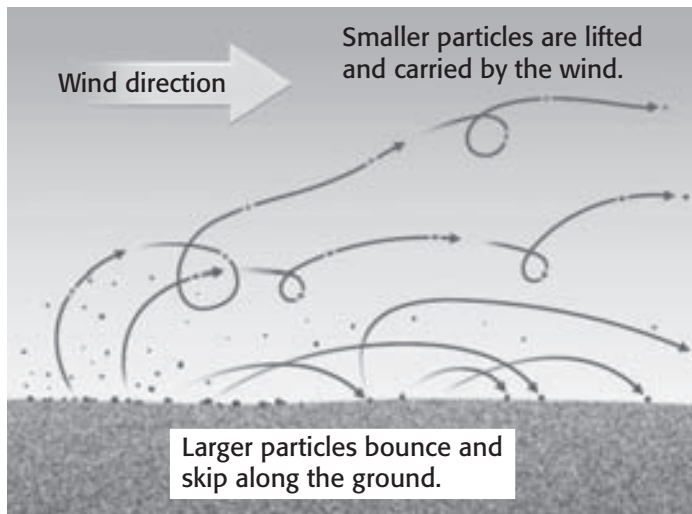
**How Can Wind Erosion Affect Rocks?**

Wind can move soil, sand, and small pieces of rock. Therefore, wind can cause erosion. However, some areas are more likely to have wind erosion than other areas. For example, plant roots help to hold soil and rock in place. Therefore, areas with few plants, such as deserts and coastlines, are more likely to be eroded by wind. These areas also may be made of small, loose rock particles. Wind can move these particles easily. ✓

Wind can shape rock pieces in three ways: saltation, deflation, and abrasion.

**SALTATION**

Wind moves large grains of soil, sand, and rock by saltation. **Saltation** happens when sand-sized particles skip and bounce along in the direction that the wind is moving. When moving sand grains hit one another, some of the grains bounce up into the air. These grains fall back to the ground and bump other grains. These other grains can then move forward.



**STUDY TIP**

**Learn New Words** As you read this section, underline words you don't understand. When you figure out what they mean, write the words and their definitions in your notebook.

**READING CHECK**

**1. Explain** How do plant roots help to prevent wind erosion?

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**TAKE A LOOK**

**2. Apply Concepts** Why can't the wind lift and carry large particles?

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**SECTION 2** Wind Erosion and Deposition *continued*

**DEFLATION**

Wind can blow tiny particles away from larger rock pieces during deflation. **Deflation** happens when wind removes the top layers of fine sediment or soil and leaves behind larger rock pieces. ✓

Deflation can form certain land features. It can produce *desert pavement*, which is a surface made of pebbles and small, broken rocks. In some places, the wind can scoop out small, bowl-shaped areas in sediment on the ground. These areas are called *deflation hollows*.

**ABRASION**

Wind can grind and wear down rocks by abrasion. **Abrasion** happens when rock or sand wears down larger pieces of rock. Abrasion happens in areas where there are strong winds, loose sand, and soft rocks. The wind blows the loose sand against the rocks. The sand acts like sandpaper to erode, smooth, and polish the rocks.

Process	Description
	Large particles bounce and skip along the ground.
Deflation	
Abrasion	

**READING CHECK**

**3. Define** What is deflation?

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**TAKE A LOOK**

**4. Complete** Fill in the blank spaces in the table.

*Critical Thinking*

**5. Infer** What do you think is the reason that fast winds can carry larger particles than slower winds?

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**What Landforms Are Produced by Wind Deposition?**

Wind can carry material over long distances. The wind can carry different amounts and sizes of particles depending on its speed. Fast winds can carry large particles and may move a lot of material. However, all winds eventually slow down and drop their material. The heaviest particles fall first, while light material travels the farthest.

**LOESS**

Wind can deposit extremely fine material. Thick deposits of this windblown, fine-grained sediment are known as **loess**. Loess feels like talcum powder. Because the wind can carry light-weight material so easily, a loess deposit can be found far away from its source. In the United States, loess deposits are found in the Midwest, the Mississippi Valley, and in Oregon and Washington states.

**SECTION 2** Wind Erosion and Deposition *continued*

**DUNES**

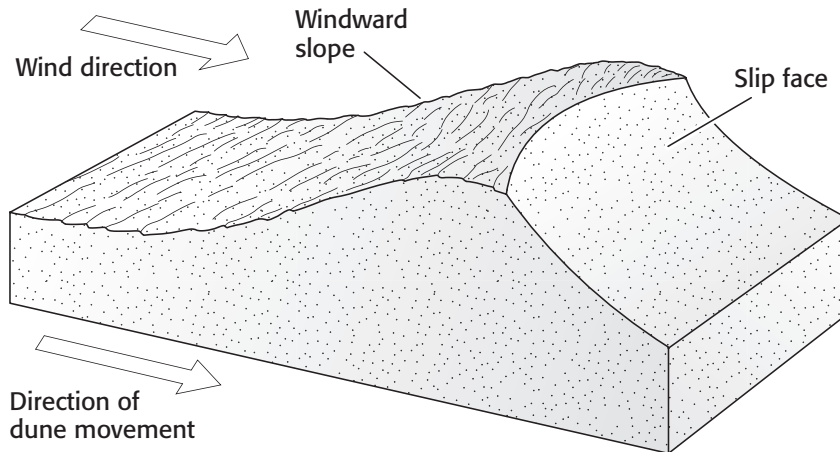
Barriers, such as plants and rocks, can cause wind to slow down. As it slows, the wind deposits particles on top of the barrier. As the dropped material builds up, the barrier gets larger. The barrier causes the wind to slow down even more. More and more material builds up on the barrier until a mound forms.

A mound of wind-deposited sand is called a **dune**. Dunes are common in sandy deserts and along sandy shores of lakes and oceans.

**THE MOVEMENT OF DUNES**

Wind conditions affect a dune’s shape and size. As the wind blows sand through a desert, it is removed from some places and deposited in others. This can cause dunes to seem to move across the desert.

In general, dunes move in the same direction the wind is blowing. A dune has one gently sloped side and one steep side. The gently sloped side faces the wind. It is called the *windward slope*. The wind constantly moves sand up this side. As sand moves over the top of the dune, the sand slides down the steep side. The steep side is called the *slip face*. ✓



The wind blows sand up the windward slope of the dune. The sand moves over the top of the dune and falls down the steep slip face. In this way, dunes move across the land in the direction that the wind blows.

**STANDARDS CHECK**

**ES 1c** Land forms are the result of a combination of constructive and destructive forces. Constructive forces include crustal deformation, volcanic eruption, and deposition of sediment, while destructive forces include weathering and erosion.

**6. Define** What is a dune?

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**READING CHECK**

**7. Identify** In what direction do dunes generally move?

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**TAKE A LOOK**

**8. Compare** How is the windward slope of a dune different from the slip face?

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# Section 2 Review

NSES ES 1c, 2a

## SECTION VOCABULARY

**abrasion** the grinding and wearing away of rock surfaces through the mechanical action of other rock or sand particles

**deflation** a form of wind erosion in which fine, dry soil particles are blown away

**dune** a mound of wind-deposited sand that moves as a result of the action of wind

**loess** fine-grained sediments of quartz, feldspar, hornblende, mica, and clay deposited by the wind

**saltation** the movement of sand or other sediments by short jumps and bounces that is caused by wind or water

1. **Identify** Give two land features that can form because of deflation.

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2. **Describe** What areas are most likely to be affected by wind erosion? Give two examples.

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3. **Identify** The figure shows a drawing of a sand dune. Label the windward slope and the slip face. Draw an arrow to show the direction of the wind.



4. **Explain** How do dunes form?

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5. **Apply Concepts** Wind can transport particles of many different sizes. What sized particles are probably carried the farthest by the wind? Explain your answer.

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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.