

# Investigation Four - Erosion

## Standard III

Students will understand the basic properties of rocks, the processes involved in the formation of soil, and the needs of plants provided by soil.

## Objective 2

Explain how the processes of weathering and erosion change and move materials that become soil.

## Intended Learning Outcomes

1. Use science process and thinking skills

Standard  
III

Objective  
2

## Background Information

When sediments are formed, they are often carried away by the action of water, wind, or people and machinery. Wind erosion is most obvious in dry, desert places. In regions where there is no sheltering vegetation, the wind can strip off dry soils. The abrasive action of wind often wears away softer layers of rock, leaving the harder ones sticking out. Utah's Goblin Valley State Park is a great example of wind-created rock sculptures.

The wind carries only fine particles, but the force of flowing water can move much larger fragments. The faster the water flows, the larger the fragments it can carry. Water from rainfall or melting snow runs downhill, taking particles of rock and soil with it. Rocks carried along by water are gradually reduced in size and become smooth and rounded as they bounce along a riverbed or against each other.

Most of the power of wind, water, and ice that strips away rocks comes from the abrasive effect of the rock fragments they carry. In deserts, windblown sand scours rock surfaces into fantastic honeycomb shapes. Rocks carried by a river current widen the river by knocking out more material along the way. Along shorelines, the tides grind sand and pebbles against rock surfaces.

Natural erosion tends to happen very slowly. Humans speed up the process tremendously by altering the environment. When forests are cut down leaving exposed soil, erosion may be devastating. Overgrazing by animal herds and unsound farming practices also accelerate the process of erosion.

## Pre-Assessment/Invitation to Learn

Invite the students to think of times when it has been so windy that the air has been filled with dust. Where did that dust come from? Where does it go? Ask if they have walked along the Jordan River. Have they noticed what the water does to the bank? Where does the soil go that falls into the water?

# Instructional Procedure

## *Activity 1 - Modeling Erosion*

1. Wind erosion: Fill a clear shoebox about 1/4 full of dry sand or dry soil. Tape a piece of clear wrap over most of the top. Leave a space for your hand to reach in. This will prevent blowing sand from getting out and into eyes. Reach in with a syringe or spray bottle. Use it to blow air over the sand. Direct the syringe so you can carve gullies and valleys with wind. Observe the movement of sand - where it blows and the shapes it forms. Next place some stones around the sand. Again make wind with the syringe. Do the rocks make a difference in how the soil is eroded? Have students draw diagrams and label what happens.
2. Water erosion: Raise one end of the erosion tray. Fill the syringe or spray bottles with water. (You might try it both ways and notice the difference.) Sprinkle water on the sand. Notice the movement of sand. It should be forming gullies. Place several rocks across the surface and sprinkle again. Do the rocks change the way the water eroded the sand? Discuss the direction that eroded material travels (uphill? downhill?) Have the students build a mountain with the sand. Make one side rather steep. Aim water at the base of the cliff. Demonstrate how water can undercut a hillside and cause a landslide. Push the sand to one end to form a beach. Use fingers to cause waves and watch the sand erode away.
3. Does sod make a difference in how much soil is eroded? Place a piece of sod in one erosion tray. Fill another half full of just soil. Tilt both trays. Put an equal amount of water in two spray bottles. Spray each tray. Compare and contrast how much water and soil has collected at the bottom of the tray. Use a syringe to pull out the water and measure.

### Materials

- Clear plastic shoe box (for each group) to make an erosion
- Tray (for a seed tray)
- Syringes
- Spray bottles
- Sand
- Small rocks
- Piece of sod
- Journal or erosion log

## *Activity 2 - Discovering Erosion*

1. Take the students on a walking field trip around the schoolyard. Look for evidence of erosion. Look especially for sand collections (e.g., around the swing set, at the edge of the playground, at the doors to the building).
2. Have them record their observations and explanations in a science log. Journal entry: How do eroded materials become part of soil? What has to happen to the sediments in order to support plant life?

## Curriculum Extensions

### *Math-*

- Measure volume using milliliters, liters, cups, pints, and quarts. (*Standard IV, Objective 2*)

### *Science-*

- Study pictures of eroded land or fields. Students will identify the weathering agent and the force or erosion. Pictures such as these can be found on Surweb for Utah sites. Students could work together in cooperative groups to make posters about erosion. (*ILO 1*)
- Collect toy farm animals, trucks, tractors, etc. Using the erosion shoeboxes, have the students demonstrate ways that people cause erosion. (*ILOs 1, 3, 4*)

## Assessment Suggestion

- View the segment from “*Dirt: Secrets in the Soil*” video that shows the dust bowls in Utah. (Contact USU Extension at <http://www.ext.usu.edu/aic> to order the video and binder of activities.)
- Journal entry: How did the dust bowls in Utah affect the economy? Can that kind of erosion be prevented? Explain.

## Resources

### *Books:*

- *Geology Rocks* by Cindy Blobaum (Williamson Publishing Co.), 1999
- *Dirt: Secrets in the Soil* by Debra Speilmaker (Utah State University)

### *Websites:*

- SURWEB [www.surweb.org/](http://www.surweb.org/) Go to Media Shows. Choose Earth + Physical Science. Choose Geology. Choose “Erosion.”

## Homework & Family Connections

Find examples of erosion around the yard. Make a plan outlining how to stop the erosion (put in plants, arrange rocks, etc.).

Name \_\_\_\_\_

## Erosion?

### Modeling Erosion

#### 1. Wind Erosion

Describe what happens to the soil when you blow air across it. \_\_\_\_\_

\_\_\_\_\_

Place several rocks across the surface of the soil. Blow air across the soil. Do the rocks make a difference in how the soil eroded? Explain and draw a diagram with labels.

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\_\_\_\_\_

#### 2. Water Erosion

Raise one end of the erosion tray. Describe what happens to the soil when you sprinkle water on it. \_\_\_\_\_

\_\_\_\_\_

Can you see gullies forming? \_\_\_\_\_ Describe what they look like and how they are made.

\_\_\_\_\_

\_\_\_\_\_

Place several rocks across the surface of the soil. Sprinkle water on it. Does the presence of rocks change the way the water eroded the soil? Explain.

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\_\_\_\_\_

### 3. Preventing Soil Erosion

Repeat the wind and water experiment. This time place a chunk of sod on top of the soil. First blow air across the grass. Then sprinkle water on the sod. Write a statement that explains the difference in how soil is eroded when it has plants growing in it and when it does not have plants growing in it.

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### 4. Discovering Erosion

Take a walk around your school playground and look for evidence of erosion. Look for where soil and sand could collect, such as around the swing set, at the edge of the playground, at the doors of the building, or around fence posts. Find bare patches in the grass. Find any hills - even small ones - and examine what is happening. Make a list of what you discovered.

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Are there any retaining walls to hold back soil? Where? \_\_\_\_\_

Explain the difference between weathering and erosion.

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# Student Log

EROSION reshapes the Earth

Erosion means \_\_\_\_\_

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Types of Erosion:

Wind	
Rain	
Rivers	
Gravity	
Animals	

List ways to prevent erosion. \_\_\_\_\_

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