

EROSION

Science - 4th Grade

Standard 3 Objective 2: Explain how the processes of weathering and erosion change and move materials that become soil.

Materials:

- Clear plastic box (for each group) to make an erosion tray
- Syringes
- Spray bottles
- Sand
- Small rocks
- Piece of sod
- [Student Log: Erosion](#) (pdf)
- Worksheet: [What is Erosion?](#) (pdf)

Additional Resources:

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

Background For Teachers: 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.

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 strip 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.

Intended Learning Outcomes:

1. Use a Science Process and Thinking Skills

Instructional Procedures:

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 Hudson River. Have they noticed what the water does to the bank? Where does the soil go that falls into the water?

Instructional Procedures

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.

Activity 2 - Discovering erosion

1. Take the students on a walking field trip around the schoolyard. Look for evidence of erosion. Look especially where sand collects (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?

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 of erosion. 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*)

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.).

Assessment Plan:

View the segment from "Dirt: Secrets in the Soil" video that shows the dust bowls in Utah. (Contact [USU Extension](#) 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.

Author:

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