



ACTIVITY E

SOIL AND WATER CONSERVATION

Time Frame: Two 30-minute lessons

Learning Objectives:

- Explore the effects of erosion
- Identify different types of weathering and erosion
- Learn about scarcity of resources

Materials for activity:

- Sand
- Shallow pan(s)
- Ice cube trays (and access to a freezer)
- Cup
- Soil
- Small bowl
- Hair dryer

For optional extension:

- More soil/sand
- Empty juice/milk carton (cardboard)
- Duct tape
- A medium-sized, shallow bin

Overview:

In this activity, students will learn about causes and consequences of erosion, as well as how water conservation can have an impact. Five different erosion stations will be demonstrated, and students will make connections between the demonstrations and real-life natural events.

Connections:

Urban Gardens | STEM Activities, TogetherCounts

Essential Questions:

- What happens when we don't conserve water and soil?
- How does the process of erosion work?
- What can we do to help?

Preparation:

- Prepare sand ice cubes in advance for Station 3 (see below). Place sand in ice cube trays, add water and freeze.
- You may set up the erosion stations in advance to save time, or together with the students during class time.

Introduction:

Begin with a brief introduction to the concepts of erosion and weathering. Refer to the Vocabulary and Reference section at the end of this lesson. Explain that water, wind, ice and gravity are the main things that cause erosion. Ask if any student has seen the effects of erosion or weathering, maybe at the beach, or at a cliff or canyon?

Instructions:

Set up five separate "erosion stations" as follows. Do not label the stations. Instead, have students make hypotheses about which natural processes correspond with each station. Ask students to record their observations by writing one or two sentences in their notebooks after doing the activity at each station.

Station 1: [Demonstrates beach erosion] – Using a pan, make a sand pile at one end and pour water at the other end. Slide the pan back and forth to create a wave movement. Record your observations.

Station 2: [Demonstrates wind erosion from high winds and storms] – Place sand in a small bowl or pan and then use a hair dryer to move the sand. Note if different speeds are possible. What happens to the sand?

Station 3: [Demonstrates abrasive erosion] – Move the sand ice cubes over different surfaces (sand, water, soil, etc.). What is the effect on different surfaces?

Station 4: [Demonstrates melting events] – Place a pile of ice cubes on a mound of soil. Observe and record.

Station 5: [Demonstrates global ocean warming] – Fill a cup to the rim with warm water. Hold the cup over a pan of soil or sand and place an ice cube in it. What is the effect? (The ice cube will melt in the warm water, causing the cup to overflow onto the sand.)

For each station/demonstration, have the students make hypotheses about which natural processes correspond with each station. Make connections to climate change and water conservation if they do not come up with these on their own. Explain how excess runoff water could contribute to erosion.

Extension #1:

What would happen to an eroded area if a natural disaster struck? Simulate a landslide:

- Cut one side of an empty cardboard juice/milk carton open, and fill it with moist soil or sand. Leave the cap on, or tape the spout up.
- Prop the carton up on the short side of a medium-sized bin, at a steep angle. You may want to tape the carton to the edge.
- Shake the bin from side to side, simulating an earthquake.
- Watch for the soil/sand to slide. Observe how far it moved down the carton, and how much ended up in the bin.

Extension #2:

Demonstrate the effects of different natural disasters on eroded areas. In addition to earthquakes, look at hurricanes, tsunamis, forest fires and more. After research, have students design a model. Or, groups within a classroom could work on models for each one and present them.

Students should examine the eroded areas and natural disaster consequences, but also what caused the erosion and how areas could solve these problems.

To take the lesson even further, students could examine nations and communities around the world who have suffered from these natural disasters, how the consequences were worsened by building, lack of plant life, poverty and more, as well as the possible solutions.

Vocabulary and Reference Material:

Erosion is the movement of rock and mineral grains from one place to another.

Weathering breaks down and wears away rock, creating sediment.

Glaciers, gravity, wind and water are the main agents of erosion. Changes can occur gradually (as with glaciers) or suddenly (from flash floods, landslides, rock slides).

Water is one of the most powerful causes of erosion. Sudden or incremental changes occur due to the movement of water — from rivers, rain or ocean waves.

Plants play an important role in preventing erosion. Soil that has no vegetation (plants) to protect it is the most vulnerable to both wind and water erosion.

Why is erosion such a big deal? More than 20 billion tons of soil is lost (moved) each year. That rate of loss is 10 times faster than soil is being replenished and is clearly not sustainable.

Why is conservation so important? Since 1982, the combined wind and water erosion on agricultural cropland in the United States has been reduced by more than 43%, thanks to best management practices and conservation efforts. Learn more facts here:

Further Reference:

[Erosion and Conservation](#) | Soil Science Society of America

[Build an Erosion Model](#) | Soil Science Society of America

[Reducing Erosion and Runoff](#) | SARE Sustainable Agriculture Research & Education, USDA

[Water Infiltration and Runoff: Understanding Western Soils](#) | University of New Mexico

[The Montessori Work of Water](#)

Next Generation Science Standards:

NS. 5-8.1 Science as Inquiry

As a result of activities in grades 5-8, all students should develop:

- Abilities necessary to do scientific inquiry
- Understandings about scientific inquiry

NS.5-8.2 Physical Science

As a result of their activities in grades 5-8, all students should develop an understanding of:

- Properties and changes of properties in matter
- Motions and forces

NS.5-8.4 Earth and Space Science

As a result of their activities in grades 5-8, all students should develop an understanding of:

- Structure of the earth system