

Home Activity - Erosion

This is an **at-home family independent activity with adult assistance**

Grade Level Second

Timing 30-35 minutes

Overview

Water can change the shape of land. Sometimes this change happens quickly and sometimes it happens over a long period of time. Students will set up a variety of models using dirt or sand and items such as rocks, toothpicks and sticks to explore the impact of water on the land.

Key Concepts

Weathering is the breaking down of rocks into smaller pieces and erosion is the act of water (or wind) moving those pieces somewhere else.

Stewardship Message

Erosion is a natural process that happens over time, but it can cause harm to the environment and to people. Changing the environment, for example, cutting down trees, can make land more prone to erosion.

Materials

- 2-3 cups of dirt or sand
- Rectangular pan or plastic box, with sides at least 2" tall (e.g., roasting pan)
- Spoon
- Bucket or other container for excess water
- A towel, in case of spills
- Small items from around the home (plastic forks, small rocks, sticks/pencils/crayons, Legos, toothpicks)
- 1 rectangular piece of cardboard about the width of your pan and about 2-3 inches tall or a large spatula

- Something to create “rain” such as a paper cup with a pencil-size hole punctured in its bottom or small nail-size holes, a spice jar with holes, a plastic bottle with holes in the cap, etc.



- Measuring cup, pitcher or another cup to pour water into the one with holes
- Supply of water (for use and for clean-up)
- Photos: [Erosion Slides](#) Note: The photos on the slides will be used at the beginning and toward the end of this activity.

Lesson Steps

1. Have your child look at the two oldest photos of Natural Bridges State Beach (1900 and 1950) individually and then view the two photos next to each other for comparison. Describe the difference in the rock formation between 1900 and 1950. Ask what they think caused the change. Jot down the answers. If one answer is not water, ask your child if they think water could have been a part of what caused the changes.
2. Tell your child that today they are going to make a model that demonstrates the impact water has on land, and how it helps change the shape of the land on Earth. Ask if they know what a model is. Scientists use models to test their ideas of how things work. Models are used in different ways. A car designer will make a small model of a car, similar to the kind you play with, and use it to test lots of things before going to all the work of building a big one. We’re going to make our own models to learn more about how rain impacts the surface of the earth.
3. Have your child fill their container with dirt or sand so it’s about half full. Sprinkle a little water on it so it’s damp enough to build a

"mountain." They can use their spoon to mix up the dirt or sand and build their mountain.



4. Now tell your child to put some objects - rocks, sticks, toothpicks, small toys like Legos - in **half** of their mountain.



-
- 5. Ask your child to predict what they think will happen to the two sides of their mountain when it rains.
- 6. Next have your child sprinkle water (rain) over their mountain until the soil is fairly soaked and it begins to erode. We want to see erosion, but hopefully the whole mountain will not collapse.



7. Now ask your child to describe what happened to the two sides of their mountain. Ask if they know the name of this force. If they don't know, tell them that two forces are at work: Weathering loosens the rock and soil. Erosion moves the rock and soil somewhere else, often down a mountain. Water, wind and sometimes gravity cause erosion.
8. Have your child use the cardboard, their spoon or a spatula to "scoop" their dirt or sand back into a mountain and add additional objects - sticks, toothpicks, rocks, small toys - to **both sides** of their mountain. Have them predict what will happen. Then let it rain!
9. Were there any surprises? Was the color of any runoff water different from the first test? Why? Does your child have ideas for how they might improve their model if they were to test it again?
10. Ask how tree and plant roots impact erosion. What happens when we cut all of the trees down on a mountain and then it rains?
11. Ask your child to use their cardboard once more to move their dirt or sand. This time pile it up at one end of their container.



12. Have your child add water to the depth up to their first or second joint in their index finger, depending on the size of their container. Tell them they will use their cardboard to sweep the water toward the dirt or sand over and over as if a wave is hitting a beach. Ask them to

predict what will happen. Can waves erode soil? It's time for some wave action! Have your child do this for 15-30 seconds.



13. Look at the photo of tree roots holding a cliff edge (Slide # 6) and discuss how the roots of trees do a good job of keeping land from eroding away.
14. Slides 7, 8, 9 & 10: Show students the first two photos of Natural Bridges State Beach again (slide 7). Tell them that you are now going to show them more recent photos. Ask them what they think has happened to the arches since 1950. Then show them the 1979 and 2012 photos (slides 8 and 9). The next slide has the 1950 and 1979 photos together (slide 10). Ask what they think caused the rock formation to change so much in the last 112 years (rain, wind, waves). Remind students of their guesses when they first saw the photos at the beginning of the lesson.

Wrap Up

- With your child, summarize what they learned today about how water changes the shape of the land. Ask what would happen if all of the trees on a mountain were cut to build houses and then there was a big rain storm. What about if there was a fire in the forest that burned down most of the trees? How could erosion impact that land?
- Slide 11: When erosion occurs naturally, it shapes the land, but people can sometimes cause erosion that harms the land because it can wash the soil or sand away very quickly. We can work to repair damage and help the soil or sand erode naturally by planting trees and bushes.

Other Erosion Activities

- Challenge students to find examples of erosion when they go outside. After a rainstorm do they see tiny rivers of water flowing through the soil? Do they see soil washed away due to rain? At the beach do they see the waves washing away the sand?
- Encourage students to create their own examples of erosion outside using a bucket of water and a funnel or cup. Can they create tiny rivers and watch them erode the banks as they pour water down the rivers?
- Suggest that students go to a park that has sand and bring a bucket and cup. They can build mountains, make it rain and design their own versions of erosion.

Background Information

From "One Geology Kids"

<http://www.onegeology.org/extra/kids/earthprocesses/weathering.html>

Weathering is the process where rock is dissolved, worn away or broken down into smaller and smaller pieces. There are mechanical, chemical and organic weathering processes.

1. Organic weathering happens when plants break up rocks with their growing roots or plant acids help dissolve rock. Once the rock has been weakened and broken up by weathering it is ready for erosion. Erosion happens when rocks and sediments are picked up and moved to another place by ice, water, wind or gravity.
2. Mechanical weathering physically breaks up rock. One example is called frost action or frost shattering. Water gets into cracks and joints in bedrock. When the water freezes it expands and the cracks are opened a little wider. Over time pieces of rock can split off a rock face and big boulders are broken into smaller rocks and gravel. This process can also break up bricks on buildings.
3. Chemical weathering decomposes or decays rocks and minerals. An example of chemical weathering is dissolving limestone. When ice melts or wind and water slow down they can't carry as much sediment. The sediment is dropped, or deposited, in landforms.

From National Geographic "Erosion and Weathering"

(<http://science.nationalgeographic.com/science/earth/the-dynamic-earth/weathering-erosion-article/>)

Weathering and erosion slowly chisel, polish, and buff Earth's rock into ever evolving works of art—and then wash the remains into the sea. The processes are definitively independent, but not exclusive. Weathering is the mechanical and chemical hammer that breaks down and sculpts the rocks. Erosion transports the fragments away.

Working together they create and reveal marvels of nature from tumbling boulders high in the mountains to sandstone arches in the parched desert to polished cliffs braced against violent seas.

Water is nature's most versatile tool. For example, take rain on a frigid day. The water pools in cracks and crevices. Then, at night, the temperature drops and the water expands as it turns to ice, splitting the rock like a sledgehammer to a wedge. The next day, under the beating sun, the ice melts and trickles the cracked fragments away.

Repeated swings in temperature can also weaken and eventually fragment rock, which expands when hot and shrinks when cold. Such pulsing slowly turns stones in the arid desert to sand. Likewise, constant cycles from wet to dry will crumble clay. Bits of sand are picked up and carried off by the wind, which can then blast the sides of nearby rocks, buffing and polishing them smooth. On the seashore, the action of waves chips away at cliffs and rakes the fragments back and forth into fine sand.

Plants and animals also take a heavy toll on Earth's hardened minerals. Lichens and mosses can squeeze into cracks and crevices, where they take root. As they grow, so do the cracks, eventually splitting into bits and pieces. Critters big and small trample, crush, and plow rocks as they scurry across the surface and burrow underground. Plants and animals also produce acids that mix with rainwater, a combination that eats away at rocks.

Rainwater also mixes with chemicals as it falls from the sky, forming an acidic concoction that dissolves rock. For example, acid rain dissolves

limestone to form karst, a type of terrain filled with fissures, underground streams, and caves like the cenotes of Mexico's Yucatán Peninsula.

Back up on the mountains, snow and ice build up into glaciers that weigh on the rocks beneath and slowly push them downhill under the force of gravity. Together with advancing ice, the rocks carve out a path as the glacier slumps down the mountain. When the glacier begins to melt, it deposits its cargo of soil and rock, transporting the rocky debris toward the sea. Every year, rivers deposit millions of tons of sediment into the oceans.

Without the erosive forces of water, wind, and ice, rock debris would simply pile up where it forms and obscure from view nature's weathered sculptures. Although erosion is a natural process, abusive land-use practices such as deforestation and overgrazing can expedite erosion and strip the land of soils needed for food to grow.

If you enjoyed this activity, please consider supporting Environmental Volunteers with a donation.

<https://www.evols.org/donate/>

Environmental Volunteers was founded in 1972 and our mission is to promote the understanding of and responsibility for the environment through hands-on science education.