



Title: Streams in the Sand

Subject: Science

Grades: K – 2

Concept: Students learn about the process of erosion.

Learning Objectives:

- Observe and record the erosion of soil by water in a local area.
- Describe the effects of erosion.

Teacher Background:

In this lesson, students will explore how erosion can change the land. Erosion is the wearing away of land caused by water, wind, ice, and the pull of gravity. Erosion is a natural process, but it can be sped up by human activities that remove plants and other cover that hold the soil in place. By exposing the soil, humans make it easier for erosion to occur. Erosion can have negative effects on aquatic environments (streams, rivers, lakes, wetlands), because it carries fine soil particles into bodies of water, making the water cloudy, or turbid. Increasing the turbidity of waters can make it difficult for fish and other aquatic life forms to survive. In this lesson, students will explore erosion of sand by water; in this case, the water causes the sand to erode very quickly. You may also wish to give students other examples of forces that cause erosion, like high winds and the washing of soil down a slope.

Materials:

- Image of the Grand Canyon (or other environment that clearly shows erosion by water)
- For demonstration:
 - Prepared sand bank in clear plastic bin
 - Pipette or small cup filled with clear water
- For each student or group:
 - Bottle or small cup filled with clear water
 - Dropper
 - Clipboard

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Vocabulary:

- Canyon
- Erosion

Timing:

- Approximately two twenty-minute class periods
 - Class 1:*
 - Lesson: 10 minutes
 - Activity: 10 minutes
 - Class 2:*
 - Activity: 10 minutes
 - Wrap-up: 10 minutes

Lesson:

1. Show students an image of the Grand Canyon, and ask if anyone knows what is in the picture. Some students may recognize the Grand Canyon, while others will not be familiar with it.
2. Explain to students that this is a picture of a place called the Grand Canyon. Explain to students that a **canyon** is a deep cut in Earth's surface. Usually, a canyon has a river at the bottom of it. The Grand Canyon is one of the biggest canyons on Earth.
3. Ask students: How do you think canyons are formed? Students should share their ideas in pairs, and then share their ideas with the class. Make a list of student ideas on the board so that you can refer to them as the lesson progresses.
4. Define the word **erosion**. Erosion happens when land breaks down into little pieces. After erosion takes place, the land is carried away by wind or water. For example, when water moves over rock or soil, it can cause little pieces of rock or soil to break off. When this happens, we say that the rock or soil has been eroded by the water. After this, the water can carry the little pieces of the rock or soil away with it. Erosion can happen quickly or it can happen slowly.
5. Ask students: Have you ever seen erosion happen? Some students will be familiar with the process of erosion from pictures or videos that they have seen at home. Have students share what they have seen with the class. If students struggle to respond, ask them to think about their experiences when it rains: Did they see water running off of a field or a construction site, or down a ditch or into a stream? Was the water clear? What color was it? (Students likely will remember the water was "dirty.") Ask: How did the water get dirty? Where did the dirt come from?

Activity:

1. Show students the prepared sand bank in the clear plastic bin, as well as the clear water you will use to model erosion. Have students describe the sand bank and the water. Write student descriptions on the board.

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2. Ask students: What do you think will happen if I add the water to the sand? Have students share their predictions with the class, and write a class prediction on the board.
3. Use the pipette or a small cup to create a stream of water down the side of the sandy bank. Ask students: What is happening to the sandy bank? Encourage them to use the word **erosion** in their explanation. Most students will be able to recognize that the erosion of sand has created a miniature “canyon.” Ask students: What is happening to the water? Most students will recognize that the water that flowed over the sand looks dirty, whereas before the experiment the water was clean.
4. Explain to students that they will explore the effects of erosion on the local environment. If possible, distribute droppers and a small cup of water to each member of the class, but if there are not enough materials to do this, divide students into small groups. Have students bring these materials and a piece of paper, pencil, and clipboard outside.
5. While outside, model using the dropper and the water to see how water erodes different areas of the ground. Have students choose a location and draw a picture or describe this location in their notes. Allow students to experiment with their dropper, their water, and their chosen area of land. Students should draw or describe what happens when they pour a small stream of water on the ground outside.

Wrap-up:

1. When you return to the classroom, gather the class back into a large group.
2. Have students discuss, in their own words, the process they followed in this investigation. Students should explain how they chose the area of land, they should describe how they poured water on the land, and they should describe how they recorded their observations. Be sure that all students correctly poured a small stream of water onto an area of soil and drew pictures (or made verbal descriptions) of their observations.
3. Ask students to recall what happened when you poured the water over the sand in the bin. Then, ask students to compare and contrast their observations of the water on the sand and their observations of the water on the ground outside. Encourage them to use the word **erosion** in their descriptions. Many students will say that the sand eroded more easily than the ground outside did. Encourage students to think carefully about why water might affect the sand and the ground differently. If there is grass or other plants on the ground outside, encourage students to think about why those plants might keep erosion from occurring.
4. Ask students: How might erosion be related to how the Grand Canyon was made? Many students will recognize that the water in the river at the bottom of the Grand Canyon caused erosion. Explain to students that, as the water ran over Earth’s surface, it wore away pieces of land and carried these pieces of the ground away. Gradually, this process formed the

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- Grand Canyon. Remind students that this erosion happened very slowly, and the Grand Canyon was formed over millions of years. Compare this explanation with the student predictions from the beginning of class.
5. Ask students: What happens to all of the small pieces of soil that the water carries away after they have been eroded? Many students will be able to explain that the soil pieces make the water dirty. Some students may say that the water carries the soil away and leaves it somewhere else. Prompt students to think about what happens when a lot of soil piles up in a new place. Encourage students to share their ideas with the class.
 6. Ask students: What kinds of animals and plants live in water? Most students will be able to identify fish, frogs, and turtles as organisms that live in water environments.
 7. Ask students: What kind of water would fish and other animals prefer: the clean water from the beginning of the demonstration or the cloudy water at the end of the demonstration? Most students will be able to explain that animals prefer fresh, clean water. Discuss with students how erosion might affect plants and animals that live in water environments. Make sure that students understand that erosion causes land to be worn away, and this makes it easy for other forces to carry that land to other places. This can make it difficult for animals and plants that live near water to find places to build their homes. Make sure that students understand that erosion can also cause water environments to become cloudy, making it difficult for some plants and animals that live in water environments to survive.
 8. Finally, ask students: Of all the animals affected by erosion, which animals can act to prevent erosion from happening? If students struggle to identify humans, ask them to consider how *their* actions might cause or prevent erosion. Remind them of their observations from outside. Make sure that students understand that trees and other plants can help prevent erosion, and that when humans cut down trees and plants, they make erosion more likely to happen.

Extensions:

- **Science:** Students observe the processes of erosion at work by identifying a stream bank and observing changes to that stream bank over time (even over several months). Students should focus on changes caused by wind or water.
- **Social Science:** Have students observe areas around school where human activities could contribute to erosion. They can then draw a map of the schoolyard and highlight areas prone to erosion.

Standards:

Earth and Space Science

- **Changes in the Earth and Sky:** The surface of the earth changes. Some changes are due to slow processes, such as erosion and weathering, and

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some changes are due to rapid processes, such as landslides, volcanic eruptions, and earthquakes.

- Properties of Earth Materials: Earth materials are solid rocks and soils, water, and the gases of the atmosphere. The varied materials have different physical and chemical properties, which make them useful in different ways, for example, as building materials, as sources of fuel, or for growing the plants we use as food. Earth materials provide many of the resources that humans use.

Science in Personal and Social Perspective:

- Changes in Environments: Some environmental changes occur slowly, and others occur rapidly. Students should understand the different consequences of changing environments in small increments over long periods as compared with changing environments in large increments over short periods.

Association of Fish and Wildlife Agencies (AFWA)

- The health and well-being of fish, wildlife, and humans depend on the quality of their environment.
- All living things depend on habitat that includes adequate and suitably arranged food, water, shelter, and space.
- Unlike other organisms, only humans have the capacity and responsibility to consider the effects of their actions on the environment.