

Soil and Erosion

Lesson Description

In this lesson students learn about erosion. They learn about the four different kinds of erosion and do experiments that demonstrate each kind. They learn how erosion plays a part in farming, gardening and land formation.

- Time required: 60 minutes
- Location of lesson: Classroom and garden

Learning Objectives

- Describe four kinds of erosion: wind, water, chemical, glacier.
- Understand how erosion relates to farming, gardening and land formation.

Materials and Preparation

Wind erosion experiment:

- Shoebox or aluminum tin pan with hole-punches in the end
- Sand and small rocks/pebbles to fill the shoebox/tin
- Straws – 1 per student

Water erosion experiment:

- Non-oily molding clay
- Pebbles, coins or plastic chips to put in the clay
- 1 aluminum tin pan to hold the clay
- Spray bottle filled with water

Chemical erosion experiment:

- Glass jar filled with vinegar – 1 per experiment
- Glass jar filled with water – 1 per experiment
- Gobstopper candy (jawbreakers) – 2 per experiment

Alternate chemical erosion experiment:

- Chalk – 1 piece per experiment
- Dropper filled with vinegar

Glacier erosion experiment:

- Ice cube – 1 per student
- Modeling clay – 1 piece per student
- Sand – 1 pinch per student

Sod vs. soil experiment

- Small piece of sod
- Soil to put in tin pan
- 2 aluminum tin pans
- Cup of water

- Practice each activity prior to teaching this lesson to be sure it works for you. Prior to class, prepare each experiment station as instructed.
-  **Erosion**
-  **Erosion Examples** – print this and bring to class
- Prepared vegetable snack of the week – 1 for each student
- Water to drink during the Class Warm-up – water dispenser in the classroom and 1 cup or a water bottle for each student

Class Warm-up: Champion Cheer and Veggie Taste Test (5-10 minutes)

- Give each student a cup of water or ensure that they have a filled water bottle in front of them.
- Give each student the prepared veggie snack of the day.
- Lead the students in enthusiastically reciting the  **Champion Cheer**.
- At the end of the cheer, drink water and eat the veggie snack together.
- Have students complete their  **Taste Test Observations** about the vegetable snack of the week.

Review of Last Lesson (2-3 minutes)

- Review the evaluation questions from last week's lesson. Evaluation questions from all lessons are listed at the end of the workbook .

Class Discussion (5 minutes)

Who has heard of the word 'erosion'? What does 'erosion' mean? (Answer: erosion is the process of breaking things down; specifically, it is the wearing down and removal of rock materials from one area of the Earth's surface)

We are going to imagine something in order to understand erosion. Please stand up, close your eyes and get ready to imagine: You are standing on top of a mountain. You pick up a big rock and throw it down the mountain. When the rock hits the ground it breaks and makes tiny pieces of rock, which become sand. Now imagine that as you are standing on top of the mountain it starts to rain. The tiny pieces of rock from the big rock you just threw down the mountain are being washed away down a stream at the bottom of the mountain. Now open your eyes. This was an example of erosion.

We are going to learn about four different kinds of erosion today. Does anyone know what these different types of erosion are? (Answer: wind erosion; water erosion; chemical erosion; glacier erosion)

Write the names of the four different types of erosion on the board. Pass around the pictures of erosion from the  **Erosion Examples** teacher resource.

Wind erosion: *Wind picks up particles of soil or sand and blows them to another location. This can be stopped by planting things in empty areas.*

Water erosion: Water moves material from one place to another.

Chemical erosion: Chemical reactions break down the bonds holding the rocks together.

Glacier erosion: Ice slowly breaks away from the glacier due to warmer weather or natural processes.

We are going to do some experiments to demonstrate different kinds of erosion.

Activities – Erosion Experiments (40 minutes)

Either divide the class into groups to rotate through the first four stations, or do each experiment in front of the whole class. The experiments can be done either in the classroom or the garden.

Refer students to the workbook pages  **Erosion**. Prior to doing any of the stations, have students answer question # 1 in the workbook. (What is erosion?)

-  **Station 1 – Wind Erosion**

1. Prior to class, prepare a shoebox or aluminum foil tin that has hole-punches on one end of the box/tin. The holes should be big enough for a straw to fit through. Put some loose sand and rocks in the box/tin.
2. Have students gather around the box/tin.
3. *What is wind erosion?* (Answer: wind picks up particles of soil or sand and blows them to another location. This can be stopped by planting things in empty areas.)
4. *Let's create wind erosion in this box.*
5. Ask for a volunteer. Give the student a straw and have the student blow through the hole. Watch as the sand moves. This is an example of wind erosion.
6. Ask students to answer questions # 2, # 3 and # 4 in their workbooks. (What are your observations on the experiment about wind erosion? What are some examples of wind erosion? Have you seen wind erosion and where?)

-  **Station 2 – Water Erosion**

1. Prior to class, form a mound of non-oily clay into a level mass about 5-10 inches across. Place it into an aluminum foil pan. Press pebbles, coins, or plastic chips onto the surface of the clay.
2. Have students gather around the pan.
3. *What is water erosion?* (Answer: water moves material from one place to another)
4. *Let's create water erosion in this pan.*
5. Ask for a volunteer. Have the student spray the clay from above with a water spray bottle. You might have to tilt the pan. The harder surfaces

should remain intact while some of the softer clay will run off. This is an example of water erosion.

6. Ask students to answer questions # 5, # 6 and # 7 in their workbooks. (What are your observations on the experiment about water erosion? What are some examples of water erosion? Have you seen water erosion and where?)
7. *What are some canyons near where we live? Canyons were formed by water erosion.*

-  **Station 3 – Chemical Erosion**

1. Prior to class, prepare one glass jar with vinegar and one glass jar with water.
2. Have students gather around the two jars.
3. *What is chemical erosion?* (Answer: chemical reactions break down the bonds holding the rocks together)
4. *What kinds of chemicals do you think break down rocks over time? The main way rocks break down over time is by acid rain. Acid rain occurs when carbon dioxide from the air mixes with rain water. This changes the rain into acid rain. The carbon dioxide is from pollution in the air, such as from cars or factories.*
 - a. Note: it might not be appropriate to discuss this in some Native communities as rain is considered sacred. Emphasize that pollution is the reason why chemical erosion exists, not the rain itself.
5. *We will be using vinegar for this experiment – a key ingredient in vinegar is acetic acid, which is sort of like acid rain.*
6. Ask for a volunteer. Give the student two Gobstoppers (colored jawbreakers). Ask them to put one Gobstopper in each jar. This is an example of chemical erosion.
7. Ask students to answer questions # 8, # 9 and # 10 in their workbooks. (What are your observations on the experiment about chemical erosion? What are some examples of chemical erosion? Have you seen chemical erosion and where?)
8. Note: it may be hard to see the difference between the water jar and the vinegar jar; if so you may decide to just use the jar with vinegar. An alternate experiment is to drop droplets of vinegar on a piece of chalk. This should create the same reaction.

-  **Station 4 – Glacier Erosion**

1. *What is glacier erosion?* (Answer: Ice slowly breaks away from the glacier due to warmer weather or natural processes)
2. Give each student a piece of modeling clay, an ice cube and a pinch of sand.

3. Instruct each student to move the ice cube back and forth on the clay several times. *What do you observe?*
4. Instruct each student to place the pinch of sand on their clay and then put the ice cube on top of the clay for one minute. *What do you observe on the surface of the cube that was touching the sand?*
5. On the same side of the ice cube that was touching the sand, place the ice cube back on the sand and move it back and forth several times. Remove the ice cube and wipe away the sand from the surface of the clay. *What do you observe on the surface of the clay?*
6. *These are all examples of glacier erosion.*
7. Ask students to answer questions # 11, # 12 and # 13 in their workbooks. (What are your observations on the experiment about glacier erosion? What are some examples of glacier erosion? Have you seen glacier erosion and where?)

- **Sod vs. Soil**

1. Prior to class, prepare one tin pan with soil in it and one tin pan with a piece of sod in it.
2. Have student gather around the pans.
3. Blow on both or pour water over both pans (at a slight angle) to show how the grass keeps the soil in place.
 - a. *By blowing on the trays we are showing wind erosion. The soil blows around but the grass in the sod stays put.*
 - b. *By pouring water on the trays we are showing water erosion. The soil is carried away by the water but the sod stays put.*
 - c. *By planting things in the ground we can slow down some types of erosion, especially wind erosion.*

Evaluation Questions (5 minutes)

1. *What does erosion mean?* (Answer: the wearing down and removal of rock materials from one area of the Earth's surface)
2. *What are the four types of erosion?* (Answer: wind, water, chemical, glacier)
3. *What can we do to prevent wind erosion?* (Answer: plant things to keep the dirt in place and block some of the wind)
4. *What is an example of water erosion?* (Answer: Grand Canyon)
5. *How much water should you drink every day?* (Answer: at least 6 cups of water a day)
6. *How many fruits and vegetables should you eat every day?* (Answer: at least 5 fruits and vegetables a day)
7. *Does gardening connect you to your culture and help you learn new words in your language?* (Answer: yes)

Preparation for Future Lessons – Reminder for the Instructor

- Review the materials and preparation needed for the next lesson.
- Remember that an Elder guest instructor is needed for these Spring lessons: lesson 1 (Eating a Rainbow), lesson 4 (Conserving Water: A Renewable Resource), and lesson 9 (Plant Parts: Flowers and Pollination).

Notes
