

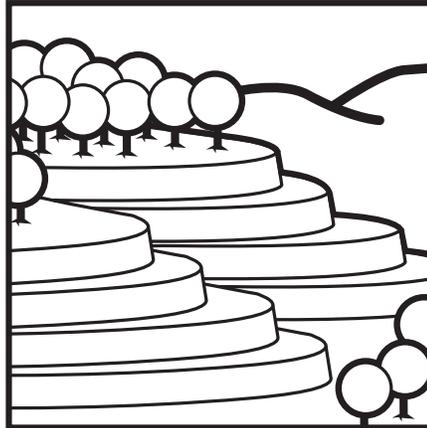
Erosion and Terracing

LESSON 6

Objectives

The students will:

- Identify the main idea of a non-fiction text, and make predictions and draw inferences based on that text.
- Apply geography knowledge, acquired by reading and interpreting non-fiction text, to solving social and environmental problems and planning for the future.
- Explain the negative impact of soil erosion on people and the environment.
- Demonstrate the impact of terracing on soil erosion, one way in which humans can modify the physical environment.



Materials

- ACS article on soil erosion
- Reading Comprehension sheet for ACS article
- Photo examples of terracing (photos can be found using Google Image search)
- Soil
- Organic and inorganic materials (leaves, sticks, moss, rocks, etc)
- Water
- One bucket, large cup, or watering can per group
- Outdoor space or large plastic bins for mountain building
- Erosion Mountain Worksheet
- *Winter in Songming*

Procedure

1. **As a class, have students read the article on soil erosion.** In groups of 2 or 3, students should complete the accompanying reading comprehension sheet.
2. **Explain to students that in communities like Zadou's in *Winter in Songming*, where people who live in mountainous areas rely on their land to feed them, soil erosion can be a real problem.** Terracing is one solution to this problem. Terraces are flat areas formed out of a sloped surface with barriers, like grass or seedlings, at the edges. A series of terraces look like steps cut out of a hillside. Ask students why terracing would help with the problem of soil erosion (the ledges and barriers keep the soil from flowing downhill when it rains).
3. **Show students images of terracing.** You may also choose to allow them to search for images on the Internet. Additionally

National Standards Addressed



Reading

RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers.

RI.3.2 Determine the main idea of a text; recount the key details and explain how they support the main idea.

RI.3.4 Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a *grade 3 topic or subject area*.

Speaking and Listening

SL.3.1 Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grade 3/4 topics and texts*, building on others' ideas and expressing their own clearly.



Procedure (continued)

students can examine the illustration on page 4 of *Winter in Songming* for examples of what terraces look like.

- 4. Divide students into groups of 2 or 3 students and give them the Erosion Mountain Worksheet.** Ask each group to make a “mountain” of soil or sand about 15” high. On one side, they can build terraces by cutting “steps” into the mountainside and place organic materials along the edges to act as barriers to erosion. The other side of the mountain will represent farming without terraces; on this side, students can place twigs, grass, or other organic materials to represent crops.
- 5. Ask students to fill out the “hypothesis” section on the Erosion Mountain Worksheet.**
- 6. Allow students to slowly pour water on both sides and observe soil erosion happening.**
- 7. Have students complete the Erosion Mountain Worksheet to analyze and interpret their results.** Then, ask each group to share their results and conclusions.

Links To Heifer International

Terracing

Terracing is only one method Heifer partners use to protect the soil, as part of Heifer’s Cornerstone “Improving the Environment.” Learn more ways Heifer partners care for the earth by visiting www.heifer.org/environment



Standards

(continued)

SL.3.2 Determine the main ideas and supporting details of a text read aloud or information presented in diverse media and formats, including visually, quantitatively, and orally.

Writing

W.3.7 Conduct short research projects that build knowledge about a topic.

W.3.8 Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories



NEXT GENERATION SCIENCE STANDARDS

ESS2.A Earth materials and systems

Four major Earth systems interact. Rainfall helps to shape the land and affects the types of living things found in a region. Water, ice, wind, organisms, and gravity break rocks, soils, and sediments into smaller pieces and move them around.

ESS2.E Biogeology

Living things can affect the physical characteristics of their environment.

ESS3.C Human impacts on Earth systems

Societal activities have had major effects on the land, ocean, atmosphere, and even outer space. Students describe things society does to protect Earth’s resources and environments.



C3 SOCIAL STUDIES

D2.Eco.2.3-5. Identify positive and negative incentives that influence the decisions people make.

D2.Eco.3.3-5. Identify examples of the variety of resources (human capital, physical capital, and natural resources) that are used to produce goods and services.

D2.Geo.4.3-5. Explain how culture influences the way people modify and adapt to their environments.

D2.Geo.5.3-5. Explain how the cultural and environmental characteristics of places change over time.

D4.6.3-5. Draw on disciplinary concepts to explain the challenges people have faced and opportunities they have created, in addressing local, regional, and global problems at various times and places.

Name: _____ Date: _____

Erosion- Soil on the Move

When the Earth's surface is worn away by wind or rain, we call the process erosion. Erosion changes the face of the Earth dramatically. Sometimes the change is quick, like a flash flood or landslide, or it can take a long time, for example, as long as it took the Colorado River to carve the Grand Canyon. Water from heavy rains, or melting snow and ice, and wind are the main sources of erosion. Soil erosion cannot be stopped, but it can be controlled and it is important to take steps to keep soil in place.

Why is it important to prevent soil erosion? It takes at least one hundred years to make two and a half centimeters (one inch) of soil. Although soil is constantly being made at the surface of the Earth, sometimes soil erosion occurs faster than soil can be made. In general, soil erosion is slow and hard to detect. We know that it is worse if we don't protect the soil. Without protection, several centimeters of soil may be washed or blown away in a single day!

Soil is an important natural resource. We use it to grow plants for food like vegetables and fruit trees. We plant food crops, grasses, and forests in soil because soil has nutrients plants need. It can become hard to grow plants where soil has eroded. Eroded soils can increase the cost of growing crops like grains, vegetables, and fruit. This can cause the price of food and clothing to go up. On poor or eroded soil, we cannot grow as many crops as we can on good, nutrient-rich soil.

All it takes is one little raindrop to start soil erosion. If the raindrop falls on bare soil it may soak into the soil, or it may combine with many falling drops to make a trickle of water which may flow over the ground. And if a lot of rain falls quickly, the water will not have time to soak in, but it will flow downhill. The top layer of soil is quickly washed away by the water when there are no plants growing to help keep it in place.

To prevent erosion, farmers and soil conservationists plant crops to cover and protect the soil. Plants and trees grow roots which hold the soil in place. Leaves and grass may trap soil so it is not blown around by the wind. Plant roots take in water and air. The large pores, or air-filled spaces in soils, let excess water drain away and then air reenters these pores.

Soil stores water for plants and provides a home for bacteria and small animals (e.g. moles, worms, and other living creatures). They help chemically break down minerals and dead plants and animals into nutrients to be absorbed by plant roots. The soil supports trees and plants, and they protect the soil and prevent erosion. Plants and soil work together to help one another!

Questions:

Write the main idea for each paragraph:

- 1 _____
- 2 _____
- 3 _____
- 4 _____
- 5 _____
- 6 _____

How can erosion effect food production? _____

What can farmers do to prevent soil erosion? _____

Erosion Mountain

Testable question: *Do terraces change the pattern of soil erosion on a slope? If so, how? If not, why not?*

Hypothesis: _____

Materials

- Soil or sand
- Twigs, grass, moss, leaves, and other organic (once living) materials
- Rocks
- Water in a cup, bucket, or watering can

Steps:

- 1. Build a mountain of soil or sand about 15" high.**
- 2. On one side, build terraces (steps cut into the side of the mountain).** Place a barrier, like small pieces of grass or moss, along the edges of your terraces.
- 3. On the other side, leave the slope as it is. Place twigs, grass, moss, or leaves along the slope to represent crops being farmed without terraces.**
- 4. Pour water slowly down each side of the mountain.** Watch what happens, and record your observations in the table.

Observation Table:

	Terraced Side	Unterraced Side
Describe what happened to the water		
Describe what happened to the mountain's surface		

Questions:

1. What effect did the terraces have on how the water moved?

2. What effect did the terraces have on how the mountain's surface was changed by erosion?

3. Was your hypothesis correct or incorrect? Why?

4. Are terraces a good solution to the problem of topsoil erosion?
 Why or why not?