

Hold Your Ground

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Summary

Students learn about erosion and investigate factors that affect it.

Grade level

Second (adaptable to other grades)

Time required

90 minutes, plus a fieldtrip

Materials

Stream tables

Student made trees – toothpicks, twigs, dowels, paper, glue, markers (See Teacher Tips)

Water

Rulers

Perforated cups as water sources

Various substrates (sand, soil, rocks)

Large garbage cans

Paper towels

Science journals

[Satellite image of the Flathead Reservation](#) – see Resources

Goals

By completing this lesson, students will

- 1) develop their abilities to use the process skills in investigating questions,
- 2) learn how trees help anchor the soil and prevent erosion and
- 3) learn how tribal foresters manage to limit erosion.

Science standards addressed

National Science Standards

- Abilities necessary to do scientific inquiry
- Changes in environments
- Properties of Earth materials
- Organisms and environments

American Indian Science Standards

- Various forms of scientific and technological work currently engaged in by American Indian men and women and in what ways their fields require the process of problem

identification, design and solution

Teacher tips

This investigation provides an opportunity to test many different variables that could affect erosion – slope, substrate, tree diameter, number of trees, tree spacing, volume of water, etc. For students with less experience in inquiry learning, limit the variables that they investigate to those involving slope or trees, to help keep their investigation focused. Have students make eight trees each, by making paper foliage and gluing it to twigs, toothpicks, wooden dowels, etc. Encourage them to make trees of varying trunk diameters, if appropriate for their investigation.

For students with more experience in inquiry learning, this lesson provides a good opportunity to develop the concept of a variable. If students are older or more advanced in their abilities to design and conduct experiments, provide materials that encourage students to investigate other variables such as

- Substrate type - Provide a variety of substrates for them to test including sand, loamy soil, rocks and/or clay. Allow students to mix the substrates.
- Water volume - Provide water cups with a number of different perforation patterns by varying the size of the hole(s) and the number of holes.

If you do not have access to stream tables, they can be easily made from kitty litter pans by drilling a hole in the middle of the lower edge on one end of the pan. After adding the substrate, place a ruler across the upper edge of the pan to serve as a ledge for the water source. Balance the cup on the ledge.

Background information

The Flathead Reservation contains about 425,000 acres of forested land. Timber harvest is a major economic activity on the Flathead Reservation, averaging 28 million board feet per year. Professionals in the CS&K Tribal Forestry Department manage the forests for sustainability. The removal of trees often increases soil erosion in an area, which can have a number of significant effects on an ecosystem. Loss of topsoil can decrease the vegetative capacity of an area, change the chemical content of the soil, and affect the microorganisms living in the soil. Deposition of soil in streams can increase water turbidity, clog the gills of fish, smother fish eggs, and increase the temperature of the water. Further downstream when the soil is dropped out of the water, changes in the terrain will occur. In deciding how to log an area, forestry personnel include in their plan methods to minimize erosion, for example, by choosing what types of equipment and access points they will use, how close they will log to streams, how they will revegetate the area to prevent future erosion, and by installing water bars.

Procedure

Engagement

- 1) Show students a satellite image of the reservation. Ask them to identify landmarks and to predict what the green areas are.

- 2) Ask them if they know anyone who works in the woods. Brainstorm and make a chart about uses of timber. Explain the importance of timber harvest to the local economy and health of the forest.
- 3) Introduce the word erosion. Ask students to predict how trees and logging affect erosion.

Exploration

- 1) Introduce students to the materials and demonstrate how a stream table is used. Ask small groups to design an experiment to test variables that affect erosion. Have them draw and write their plan along with a data table in their science journals. Assist students in designing a fair and telling experiment.
- 2) Ask each student to make eight trees for use in their group's erosion investigation.
- 3) Ask students to use their trees to test factors that affect erosion. Ask them to write up their results and a conclusion in their journals.

Explanation

- 1) Allow groups to explain the results of their experiment to the class. Record the results of each on chart paper.
- 2) Using student results, come to a class conclusion about the factors that affect erosion. Talk about some ways to prevent erosion in the forest.

Elaboration

Take students on a fieldtrip with a tribal forester to a recently logged or burned area to view erosion. Ask the forester to talk about the effects of erosion and to show students what is done to prevent erosion.

Evaluation

- 1) Observe and talk with students as they design, implement and record their experiments. Look for evidence of process skill use, and use a rubric or checklist to assess.
- 2) Review student journal records and their explanation of results for evidence of content understanding and the ability to apply their results to form a conclusion.

Vocabulary

erosion timber

Resources

Satellite image of the Flathead Reservation

http://yoda.cec.umt.edu/sid/bin/show_newjava.plx?image=flatheadres.sid&client=Native_Lands§ion=Flathead%20Reservation&title=Native%20Lands