

The Forest Sponge

N°. 47

JUNIOR

Science | English/Language Arts



LESSON SUMMARY

To give students an opportunity to demonstrate how forests can help prevent soil erosion.

Activity Information

Grade Level: Junior

Estimated Duration: 45 minutes to 1 hour

Materials: Two plastic flower pots with holes in the bottom, small piece of filtering material (felt or coffee filter paper), two 1 L jars, two cups of potting soil, measuring cup, water, paper towels, container for used wet soil, bucket (or large jar) to hold water, plastic table-cloths.

Setting: Indoors

Key Vocabulary: Erosion, forest



Forest Facts

- Erosion is the gradual loss or wearing away of the earth's surface by the action of wind and water.
- Forest cover, which includes trees and their soil-gripping root systems, small plants, mosses, and forest litter, acts like a giant sponge and helps to reduce erosion by absorbing rainwater and releasing it gradually.

ACTIVITY

1. In preparation for the activity, read the excerpt- Gone with the Wind and Water- from the Evergreen Challenge: The Agreement Forest Story, 1986. Discuss the concept of soil erosion and the importance of forest cover.
2. Have students brainstorm and design their own experiments that will demonstrate how forests help prevent soil erosion. Alternatively, use the experiment that follows:
 - a) Place two plastic flower pots with holes in the bottom into the mouths of two 1 L jars. Place filter material (e.g., felt) on the bottom of one of the flower pots. The filter simulates forest cover. Add the same amount of soil to each of the flower pots. Measure and record the depth of the soil.
 - b) Ask your students to predict what will happen when water is poured into each of the pots.
 - c) Carefully pour 1 L of water into each flower pot. Allow the water to drain into the jar.
 - d) Have your students use the experiment sheet to record the amount of water that drained through the two pots, the clarity of that water, and the amount of soil left in each pot (either by measuring with a metric ruler or transferring the remaining soil back into the measuring cup). Share observations as a class. What are the differences in the colour and the amount of drainage water and the amount of soil remaining in the two pots? How does this compare with student predictions? (The pot with the filtering material represents an area with some forest cover. The loosely-interwoven tree roots can stabilize the soil, but some erosion will take place. The pot with no filter represents an area with no forest cover. Because there are no roots, plants, mosses, or forest litter to hold the soil in place, soil may wash away during a major rainstorm.)

Gone with the Wind and Water

In some parts of Ontario, the trees, the soil, and people's livelihood were gone with the wind by the early 1900s. Large tracts of land that once supported thriving farms had turned into empty wastelands.

Too much land had been cleared. Areas of sandy soil that previously grew magnificent trees could not sustain the agricultural practices of the day. At first, settlers attempted to grow crops, but as large areas of land were cleared and as the nutrients of the soil became depleted, something happened. The open fields of sandy soil gradually turned into barren deserts.

Winds sweeping across the vast open spaces picked up the light sands and deposited them elsewhere. Great blow pits up to 3 m in depth were dug out by the wind. These shifting sands became large drifts. A ban of sand 2 ½ m in height could be blown onto a farmer's field over a period of 4 to 5 years. This blow sand might initially cover an area of 3 to 4 ha but, in time, the wind would carry the sand over a much larger area. Some farms had pits and banks of blow sand covering 30 or more ha.

In certain areas, conditions got so severe that even a light breeze would begin lifting sand into the air. During strong gusts, dark clouds of sand would move across the horizon like a threatening rain storm. Along roadways, fences became just rows of stubs sticking out of sand drifts. Soon farmers had to build new fences on top of the old buried ones. Even roadways at times became impassable for the horse and buggy.

In hilly areas, precious nutrient-rich topsoil exposed by clearing and plowing was washed down the hillsides by the rain. The rain-water also carved out deep gullies, streams and rivers to be deposited finally in the lakes, leaving the soil impoverished and fish-spawning areas covered with silt.

The lack of forest cover in the upper reaches of the river valleys, coupled with the loss of topsoil on the farmlands led to serious problems. Watershed lands lost much of their ability to store water. As a result, many farmlands were stricken with drought and the villages and towns along the rivers suffered from spring flooding.

This loss of topsoil through wind and water resulted in reduced productivity of many farms, and ultimately in the loss of them. In this way, nature voiced a challenge- manage the land properly or lose it.

(Excerpted from Evergreen Challenge: The Agreement Forest Story, 1986, Queen's Printer for Ontario, Ontario Ministry of Natural Resources)