Science Unit: *Temperate Forest*
Lesson 15: *Forest as a Filter**

School year:	2004/2005
Developed for:	Lord Selkirk Annex Elementary School, Vancouver School District
Developed by:	Catriona Gordon (scientist), Barb Parrott and Nina Kumar (teachers)
Grade level:	Presented to grades 3 - 4; appropriate for grades 3 – 7 with age appropriate modifications.
Duration of lesson:	1 hour and 20 minutes
Notes:	*This lesson is based on B.C. Ministry of Forests. Forests in Focus. p.58-61. "The Great Green Filter".

Objectives

1. Learn about the importance of forest plant cover in reducing soil erosion.
    - Using simulated rain, compare erosion from bare soil with erosion from forest cover.
    - Discover that the forest acts as a giant sponge during times of precipitation (rain, snow, fog).

Background Information

In the coastal temperate rainforest ecosystem, rainfall is very heavy, up to 2000+ mm per year. This forest ecosystem has developed ways of minimizing soil erosion (loss) during heavy rainfalls. Forest soils and nutrients are held in place by trees and plant cover, roots and leaf litter, which all protect the soil and nutrients from being washed away. Vegetation in the forest acts as a giant sponge or filter, distributing rainfall and slowly absorbing rainwater. Forest cover is especially important on hillsides and river or stream banks which are more susceptible to soil erosion. Forest cover also reduces sunlight and therefore temperature on the forest floor. This helps to reduce moisture evaporation from forest soils during warm, dry weather. Forest trees and plants also help to filter out pollutants from the air.

Vocabulary

Soil erosion: Loss of soil by water or wind.

Materials

Each group of 2-3 students will need the following:

- 2 large pop bottles (jars) cut at the top, tops inverted like a funnel
- 1 cup soil (can be pre-measured and placed in Ziploc bag)
- Large bucket for disposal of soil and water
- 1 small water bottle marked at 250 ml and lid punctured with small holes
- 1 plastic measuring cup
- 1 disc of turf (grass complete with roots and soil) cut to fit into coffee filter and funnel approx. 1 cup in volume.
- 1 coffee filter

In the Classroom

Introductory Discussion

1. Why is soil important to the forest?
2. Has anyone been in a forest during a rainstorm? What does it feel like?
3. What happens to bare soil when it rains? How about forest soil?

We are going to simulate rainfall on bare soil and on a mini-forest and compare the outcome.

Science Activity/Experiment

1. Set up 2 bottles with funnels. Label bottles 1 and 2. In the funnel of Jar 1, place 1 cup of soil from Ziploc bag. This simulates bare ground.
2. In Jar 2's funnel, place coffee filter and 1 disc of turf. This simulates forest cover and roots.
3. Fill the small "rain" bottle with 250 ml of water.
4. Slowly water soil in Jar 1 with 250 ml of water from rain bottle to simulate rain. Then water Jar 2 with another 250 mL of water from rain bottle.
5. Wait until both funnels have stopped dripping and observe jars. Note the colour of the water at the bottom of both jars and record.
6. Measure water at the bottom of each jar with a measuring cup and record.
7. Dump contents of soil erosion experiment in to bucket for disposal outside in schoolyard to avoid clogging drains.

Closure Discussion

Was there a difference in colour, clarity and volume between the jars? Which jar lost more soil from the funnel? What would happen in the forest during a heavy rainfall? What would happen in a clearcut (bare soil, with trees removed) during a rainstorm? How about on a steep hillside? How could you test for soil erosion in the forest?

References

1. B.C. Ministry of Forests. 1999. Forests in Focus. Pp. 58-61. "The Great Green Filter" ISBN 0-7726-3966-3
2. Gage, Susan. 1998. TRFic: A Temperate Rainforest Teacher's Guidebook and Poster Kit for Intermediate Grades. Sierra Club of British Columbia. Pp. 38-40.

Extension of Lesson Plan

1. Students can try a third option: simulate soil with roots (no forest cover) by using a coffee filter with some holes poked in it and 1 cup of soil.