



Science Unit: *Temperate Forest*

Lesson 13: *Under Our Feet*

School year: 2004/2005
Developed for: Lord Selkirk Annex Elementary School, Vancouver School District
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Grade level: Presented to grades 1-2; appropriate for grades 1 – 3 with age appropriate modifications.
Duration of lesson: 1.5 - 2 hours (2 activities: examining topsoil/leaf litter, and soil sedimentation, this could be done in two lessons)

Objectives

1. Learn about soil composition, examining both living and non-living components.
2. Learn about invertebrates inhabiting forest soil.
3. Learn that soil has distinct layers and that the leaf litter layer and topsoil are the most richly diverse in soil organisms. Discover that the mineral components of soil sediment out into different layers when mixed with water.

Background Information

Soil is an important part of the forest ecosystem. Soil is a mixture of rock particles of different sizes (sand, silt and clay), and dead plant and animal matter (humus) in different stages of decomposition. A soil profile is a cross-sectional view of all the layers in the soil. Bedrock is the lowest layer and is made of solid rock. The next layer is subsoil, which is made of primarily mineral material and usually contains no macroscopic living organisms except for large tree roots. Topsoil is a thin layer (often less than 30 cm deep) at the top of the soil profile. This layer is dark in colour and rich in organic matter. Topsoil supports most of the life in the forest. The uppermost layer is the leaf litter layer, made up of dead leaves, needles, twigs, fungi etc., which slowly decompose to become topsoil. The decomposition process is carried out by fungi, algae, bacteria, and soil invertebrates (earthworms, millipedes, mites, nematodes, pillbugs, etc.).

Vocabulary

Leaf litter: The uppermost layer on the forest floor made up of dead leaves, twigs, needles, branches, and fungi, that slowly decomposes to make humus.

Humus: dead plant and animal matter in soil that holds moisture to keep the soil from drying out.

Subsoil: Mineral soil found beneath topsoil.

Bedrock: Solid part of earth's crust, below subsoil layer, also known as parent material.

Decomposition: The process of breaking up into parts.

Sand: Small grains of ground up rock.

Clay: Very tiny particles made of minerals 100x smaller than grains of sand.

Silt: Very small particles made of minerals, deposited by moving water, in between sand and clay particles in size.

Invertebrate: Animal that has no backbone or skeleton in its body.



Materials

Activity 1: Examining Topsoil/Leaf Litter Layer

- White paper
- 2 liters of forest topsoil and leaf litter per group of students
- Petri dishes or transparent plastic deli lids
- Newspaper
- Plastic bins or tubs
- Plastic spoons
- Dissecting scopes or magnifying glasses or bugboxes

Activity 2: Soil Sedimentation Experiment

- Large glass jars (one per group)
- 1 c of forest soil in Ziploc bag containing leaf litter, topsoil and subsoil (1 per group)
- Chopsticks or large spoons for stirring (one per group)
- Dissecting scopes or magnifying glasses or bug boxes

In the Classroom

Introductory Discussion

1. What is soil? Why do we need soil? What does soil smell like? Feel like? Look like?
2. Let students imagine they are walking through a forest. What are they walking on? What organisms live in the soil?
3. Using a flip chart make headings of non-living components and living components. Students can brainstorm as to what makes up soil.

Science Activity/Experiment

Activity 1: Examining Topsoil/Leaf Litter

1. Cover tables with white paper. Each table gets a tub or bin and 2 liters of forest topsoil/leaf litter. Each student has a plastic spoon and a petri dish or plastic deli lid.
2. Students can slowly and carefully separate out non-living soil components onto white paper (e.g. twigs, needles, fungi, moss, leaves, roots, rocks) and examine them closely.
3. Students can then look for live soil organisms (centipedes, millipedes, slugs, beetles, larvae) and place them on petri dishes to look at these under magnification using magnifying glasses, bug boxes or dissecting scopes.
4. Students may try to identify soil invertebrates using reference books listed below. Using the activity sheet, students can list the non-living components of their soil sample, and draw and label their living components.

Activity 2: Soil Sedimentation Experiment

Day 1

1. Cover tables with newspaper. Each group mixes 1 c of forest soil (including leaf litter, topsoil, subsoil) with 2 c water in glass jar.



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2. Mix with large spoon or chopstick for 2 minutes (each student may take a turn stirring). Let students make observations and drawings of the soil suspension on activity sheet. Label jar with table names and set aside for 24-48 hours.

Day 2

1. After 24 hours or longer, students may carefully observe jars and draw their findings on the activity sheet. Look for soil sedimentation or layering of soils based on particle size. Rocks, pebbles, or gravel should appear at the bottom, followed by sand, silt and then finally, the upper layer is clay. Organic material may appear to be floating on the surface.

Closure Discussion

1. What did students find in their soil samples? Living? Non-living? What was the most common organism found? The rarest? Did they look different under magnification?
2. Look at flipchart, tick off things found, and add other things found in the soil samples. What did students learn about soil and soil composition?

References

1. Bishop, Nic. 2002. Backyard Detective: Critters Up Close. Scholastic Books.
2. B.C. Ministry of Forests. 1999. Forests in Focus. Pp. 62-68, 102-106. ISBN 0-7726-3966-3
3. Fredericks, Anthony. 2001. Under One Rock: Bugs, Slugs and Other Ughs. Dawn Publications. Nevada City.
4. Rosinsky, Natalie, M. 2003. Dirt: The Scoop on Soil. Picture Window Books.
5. Webb, Angela. 1986. Talk about Soil. Franklin Watts Inc.

Under Your Feet: Forest Soil

Name: _____

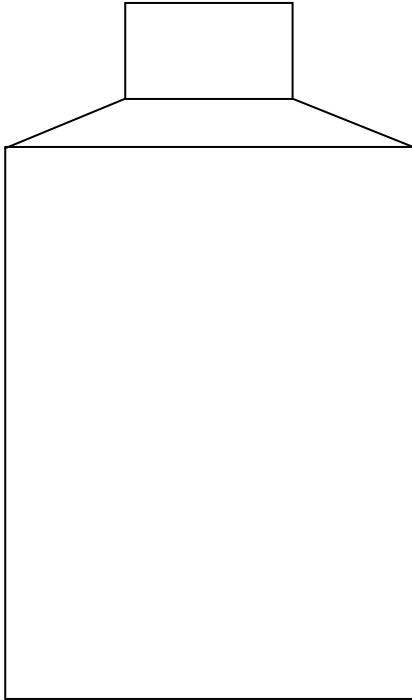
1. What did you find in your leaf litter layer?

2. Draw and label an invertebrate you found in your leaf litter.

Soil Experiment

Name: _____

Draw what you see and label.

Soil at time of mixing	Soil after 24 hours
	

Observations At Mixing Time:

Observations After 24 hours:
