

# SOILS: INVESTIGATIONS AT COVE RIVER

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*Environmental Education @ the Cove River Site, and other coastal Connecticut settings.*

Soils, the thin layer called the pedosphere on top of most of the Earth's land surfaces is one of our most important natural resources. Every part of the ecosystem depends critically on soils. Through soil, water is filtered and impurities are removed. The food we eat, the clothes we wear and many building materials all grow from the soil and depend on its conditions. Soil affects the entire ecosystem.

The following unit serves as a tool for students in grades 6-8 to explore soil and the factors affecting it. The unit can be completed in and around school grounds, or classes can visit a field site. We have chosen the Cove River Property located in West Haven, CT for students to complete the field work portion of this unit.



# SOIL OUT MY BACKDOOR

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Purpose: To explore soil and soil properties

Key Concepts/Skills: sampling soil, classifying soil

Materials: News paper, 1 liter plastic bags, local map and photos of Cove River site, magnifying glass, soil

Engage:

Soils vary in their properties depending on where they have been sampled on a landscape and from what depth they were sampled. Begin this unit with a class discussion on soil. Brainstorm ways in which we use soil, different properties of soil; texture, smell, etc. For homework, ask the students to bring a soil sample to class in the one liter plastic bag you distribute. The soil should come from their own back yard or a park or lot close to where they live. Students should use their science lab notebooks to document their collection methods.

Explore:

1. Students spread out their soil samples for a close examination. Students should notice as many qualities about the soil as possible (look, feel, smell, debris, heavy or light, etc.) and record observations in lab notebooks.
2. Ask students to browse around the class and locate someone with a soil sample similar to their own. The similarities should be recorded in lab notebooks.
3. The students should also find a soil sample that is very different than their own and record those differences. Ask students to think, as they are

observing the many samples, about what factors cause samples to be like/different.

Explain:

4. Meet as a class to discuss observations of soil characteristics.
5. Discuss the five soil forming factors (parent material, climate, organisms, topography and time) with the class. Students should contribute ideas to the discussion, on which factors contributed to the characteristics of their own samples.

Elaborate:

6. Introduce students to the Cove River site through photos, maps and a brief historical overview. Discuss future plans of field work at the site.

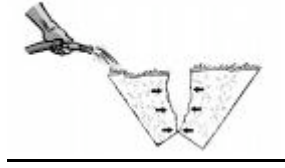
Evaluate

Science lab notebooks serve as a wonderful tool for both teacher and student to keep track of observations and thoughts during field work as well as experiments in the classroom. The lab notebooks should be used every class session.

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# SEEPING THROUGH SOILS

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Purpose: To develop an understanding of how water flows through soils and how the water changes as it travels.

Key Concepts/Skills: \*water flows through soil \*soil holds water \*soil properties affect flow rate and water holding capacity

## Materials:

2L plastic water bottles with the bottom cut off and screen attached to the bottom (10-12 depending on class size)

soil samples (can use samples from *Soil Out My Backdoor*)

500 ml beakers (10-12 depending on class size)

Masking tape

Catch basins (10-12 depending on class size)

## Engage:

Review with the class, the five soil forming factors from the *SOIL OUT MY BACKDOOR* activity. Have students gather around the table for the following demonstration:

### Explore:

1. Place 1.2 L of soil into 2L bottle.
2. Have students look closely at the soil. What characteristics do they notice? Record observations on the board.
3. Pour 300ml of water into a 500ml beaker.
4. Have students count in cm the height of the water in the pouring container. Mark the level with a piece of masking tape.
5. Ask the students to hypothesize what will happen when water is poured onto the soil. (Ask key questions such as how long it will take for the water to pass through...how much will pass? Etc...) Record hypothesis on the board.
6. Pour the water on the soil. Students can time how long it takes for the water to pass through as well as take note of the quantity of water that passes.
7. Observe the look of the water after it passes through the soil.

### Explain:

8. Record all observations on the board
9. Compare the hypotheses and the results of the experiment
10. After the water stops dripping from the soil, observe and record how much water passed through.
11. Have the class hypothesize what will happen if you pour another 300ml of water into the soil. Will it pass through quicker? Slower? More? Less?
12. Pour another 300ml over the soil.
13. Compare and record results on the board

Elaborate:

Students can now pair into groups of two to conduct the experiment on their own using the soil samples brought in from home.

Evaluate:

The students should record hypotheses and observations in lab notebook.

# DIGGING AROUND

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## Purpose:

To understand that variations in the landscape can affect soil properties

Students will investigate variations in the soils around the Cove River site to discover that soil properties vary considerably across a single landscape.

## Skills/Concepts:

Observing and describing soil samples

Collecting data in the field

Identifying relationships between soil forming factors and resulting soils

## Materials:

Small shovel

Science lab notebooks

### Engage:

Gather students as a whole group at the Cove River Site. Explain that soils can vary greatly even in relatively small areas, depending on the factors that form it. Review the rules of safety and respect for the research site.

### Explore:

Students will work in groups of three-four. Each group should have their lab notebooks and a small shovel or trowel.

Students should select 5 different areas of the site to explore differences in soil properties.

Students should examine the soil at each point. How does it feel? Is it wet? Dry? What color is it?

### Explain:

Students should record characteristics from each of the 5 dig sites into their lab notebook.

### Elaborate:

Give the students time to find a quiet place at the research site. During this time the students should write a summary of the dig in his/her notebook, including details of what was learned about the soils at the Cove River.

### Evaluate:

As a follow-up to the field trip, the class should come together in a relaxed setting (in a circle on the floor or outside on school grounds) to share and discuss findings from their lab books about the trip.

# WHAT'S THE TEMP?

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## Purpose:

To develop an understanding of changes in soil temperature above and below ground level

## Overview:

The students will record the temperature at different levels above and below the ground at the Cove River Research Site. The students will graph temperatures and analyze data.

## Key Concept:

The Earth is a good insulator and it is used by many living things to escape the heat and cold.

## Materials:

thermometers

pencils

## Materials (cont.)

graph paper

clipboards

markers

shovel or trowel

rulers and meter sticks

## Engage:

1. Gather together as a whole group at the Cove River site. Sit and discuss the role temperature (air, water, body) plays in our lives.
2. Explain to the students that they are going to explore and record ground temperature at different depths. There are a number of excavation points throughout the property which will allow students to easily gather temperature measurements at depths below 12".
3. Demonstrate the use of a thermometer in soil as well as graphing the data.
4. Review rules of safety and respect for the property.

## Explore:

5. Divide students into pairs
6. Have each group gather materials (thermometer, pencil, trowel, graph paper, clipboard and lab notebooks).
7. The students should visit 5 different areas of the Cove River property. At each area, students should dig beneath the surface and record the temperature of the soil. Encourage groups to record data at a variety of depths. \*Students should wait until the temperature on the thermometer stabilizes at each elevation before recording it.

8. Throughout the field trip, students should keep an eye open for holes in the ground created by animals. Why is this?

Explain:

9. Using the graph paper, students should record data:
  - Depth of measurement
  - Temperature (degrees Celsius)
  - Temperature (degrees Fahrenheit)

Evaluate:

Students should use their lab notebooks to write a summary of their findings. What did their data show about the nature of temperature and elevation?

Elaborate:

To follow up on this field work, the class can research animal habitats and discuss the effects of temperature on various animals, noting which ones need to burrow to escape heat.

# “TOTALLY TUBULAR” SOIL

## STRATIFICATION



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### Purpose:

Students will observe the settling process. Students will record stratification of different soils in water. Students will identify types of soils or give a description of each.

### Skills/concepts:

understanding the settling process

making local connections

### Materials:

1. 4ftX2in clear plastic tube with stoppers at both ends (available at plastic shops or building supply stores)
2. Samples of soils gathered from the Cove River site.
3. Buckets (5)
4. Water
5. Small trowel for soil

\*The soils for this experiment will be gathered from the cove River property on the day of the field trip. This experiment is designed to be conducted on site, but can be done in the classroom alternatively

### Engage:

While at the Cove River site, gather together for a class discussion. Ask students to comment about the soils they observed as well as the different types of characteristics noticed. Show the students 5 buckets of soil collected from different areas throughout the site. Discuss the reasons why we use soil from a variety of dig spots.

### Explore:

1. Divide the students into groups of two. Each group will use the trowel to put different types of soil into the plastic tube until the tube is about 1/3 full.
2. Have the students record a hypothesis as to what will happen when water is added and mixed well.
3. Fill the tube with water and seal with a stopper.
4. Shake the tube until the water is dispersed.

### Explain:

5. Groups should observe the settling process and record actual results in lab notebooks. Students should sketch their observations as well.

### Elaborate:

6. Collect the tubes to the center of the group. Ask the students why the sediments settled in the order they did. Explain to the students that the densest particles will settle first, followed by the smaller particles. This demonstrates the sorting process in streams and eroded areas.
7. Does the sedimentation in the tube remind the students of any local geologic formations?

8. Walk to the river area (just past the front gate) to observe whether stratification is visible.

Evaluate:

All students should participate in field work. Lab notebooks are an excellent tool for evaluation.