

Lesson #4 WHAT'S THE TEMP?



Overview: - In this activity, students measure and record soil temperature of different areas and depths of the Cove River field site. By measuring and recording the varying temperatures, students can examine factors that cause soil temperature change.

Objectives: - Students will record the temperature at 5 different levels below the ground at the Cove River research site. Students will carry out soil temperature measurements accurately and precisely graph temperature readings. Students will be able to relate soil temperature measurements to the physical and chemical properties of soil.

Key Concepts: The Earth acts as an insulator. Many living things use the soil to escape heat and cold.

Subjects: Social Studies, biology, Ecology, Geography, Mathematics

Duration: 1 class period (40 minutes)
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Setting: In the field, outdoor natural landscape

Season: Spring, Summer, Fall

Interdisciplinary Connections

Frameworks: mathematics; graphing measuring and recording data

Introduction (background):

This lesson is designed to get students exploring the temperature of soil and how it can vary over a landscape at different depths. The temperature of soil affects climate, plant growth, the timing of budburst or leaf fall, the rate of decomposition of organic wastes as well as other chemical and biological processes that take place in the soil. Soil temperature is linked to atmospheric temperature because soil acts as an insulator for heat flowing between the solid earth and the atmosphere. The temperature of soil also determines the life cycles of small creatures that live underground, such as those that hibernate. When the temperature of the soil rises, it indicates the end of winter hibernation. Finally, soil temperature data can be used to make predictions about how the ecosystem will be affected by warming or cooling global temperatures. See appendix A for more background information.

Materials:

Thermometers
Pencils
Graph paper
Clipboards
Markers
Small shovels
Rulers and meter sticks

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



Produced by the Graduate Students in Environmental Education EVE 546 Spring 2009



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Preparation / Set Up (if necessary):

For this lesson, students can work in groups of two. Each group will need a thermometer, ruler, meter stick and shovel. Every student will need his or her own clipboard and data recording tools. There are various places on the property that can be used to measure soil temperature. Encourage the students to gather measurements from five very different areas and depths. There are existing ditches of about 1.5 meters in depth on the site that are

currently used for research. These areas are enclosed with orange fencing. The students can take measurements from these sites, but only under the supervision of a field teacher.

Engage:

Who does soil temperature matter to?

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:
 - A. Depth of measurement
 - B. Temperature (degrees Celsius)
 - C. 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? How does the soil temperature relate to the 5 properties of soil? Ask the students to write who they think is affected by soil temperature and why.

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.

As a follow up to this lesson, students can use the schoolyard to collect temperature data over a prolonged period of time. For example, the class can take daily or weekly measurements for 4-6 weeks to compare changes in soil temperature and the natural world around them. This experiment would be most effective if conducted over the time of change from fall to winter or winter to spring.