

# Soil and My Backyard



## **Purpose**

To explore soil and soil properties

## **Overview**

Students discover the variability of soils, derive relationships among soils and the soil forming factors, and link the GLOBE Soil Investigation to the students' local environment. Students use soil samples from their homes to identify properties that characterize their soils. They compare and contrast their soils to those of their classmates. As a class, students describe relationships between the properties of their soils and how and where they were sampled. Older students construct a soil classification scheme.

## **Student Outcomes**

Students will be able to characterize soils.

Students will be able to differentiate soils based on their physical properties.

## **Science Concepts**

### *Earth and Space Science*

Earth materials are solid rocks, soil, water, biota, and the gases of the atmosphere.

Soils have properties of color, texture, structure, consistence, density, pH, fertility; they support the growth of many types of plants.

The surface of Earth changes.

Soils are often found in layers, with each having a different chemical composition and texture.

Soils consist of minerals (less than 2 mm), organic material, air and water.

Water circulates through soil changing the properties of both the soil and the water.

## **Scientific Inquiry Abilities**

Identify answerable questions.

Design and conduct an investigation.

Use appropriate tools and techniques including mathematics to gather, analyze, and interpret data.

Develop descriptions and explanations, predictions and models using evidence.

Communicate procedures and explanations.

## **Time**

One class period to observe soil properties and one or two periods for discussion

If soils are to be dried and changes observed, an additional class period will be needed.

## **Level**

All

## **Materials and Tools**

Newspaper

1 liter plastic bags

Local map (topographic or road map which encompasses the school district)

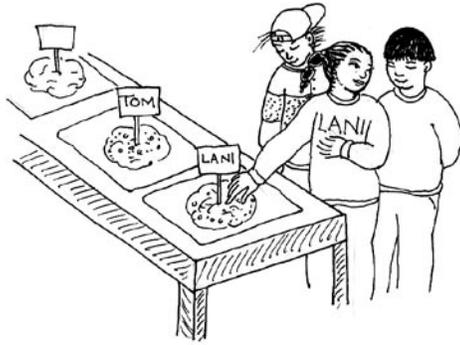
Magnifying glass

## **Preparation**

On the day of the activity, prepare an area in the room for observing the soils. For example, cover lab tables with newspaper. If students will be drying their samples, you will need to identify a place where soils can be left undisturbed for several days. See the instructions for drying soils in The Soil Protocols – *How to Perform Your Soil Measurement*.

## **Prerequisites**

None



## **Background**

Soils vary in their properties depending on where they have been sampled on a landscape and from what depth they were sampled.

## **What To Do and How To Do It**

Ask students to hypothesize how many different types of soils the individuals in the class can find in their neighborhoods. They need to use previous experience or knowledge to answer the question.

### **Before Class**

Have students bring soil samples from home, using 1 liter plastic bags. They should document their collection methods (such as noting the location from which each sample was taken, the depth of the soil, storage methods, etc.). For younger students you may want to establish a class protocol for sample collection – either through a brainstorming activity or by providing one.

### **During Class**

1. In the classroom, students should spread out their soil samples and examine them closely. Record observations about the soil in the GLOBE Science Notebooks.
2. As your students examine their soils, help them to think about what they are observing by asking: What properties do you notice? Are the soils wet or dry? What colors do you see? Can you identify the components (organic material [both plant and animal], rock fragments, sand, clay, etc.) of your soils? How does the soil smell? How do the soils feel? How do dry soils differ from the original soil samples?

Are there differences within a single soil sample? How does your sampling procedure affect what you see? How would you group or classify the soils?

3. Have each student find one person in the class that has a soil similar to their own soil. Record how they determined that the soils were similar.
4. Have each student find one person in the class that has a soil that is different from their own soil. Record how they determined that the soils were different.
5. As a class, brainstorm and list on the board the different characteristics the students used to describe their soils. Ask the students to group characteristics that appear to belong together. Use words that describe these similarities, such as same color, same “feel,” a number of roots. Have students describe how the observed soil properties relate to the soil forming factors.
6. Discuss what factors could lead to the different characteristics (five soil forming factors, sampling effects, etc.).
7. Ask the students to compare their observations with their hypotheses about how many types of soil they are likely to have represented in the class samples.
8. Ask them to discuss how their knowledge of the soil characteristics changed based on their investigations. What did they learn? Be specific listing such things as soil characteristics, how soil may vary in characteristics within a relatively small area, etc.

### **Adaptations for Younger and Older Students**

Younger students should focus on making observations and comparisons.

Older students can perform more in-depth investigations in teams or as a class by:

- Identifying resources for more information (e.g. county soil survey reports, soil maps, or other local information)

- Developing a standardized procedure for soil sampling and having your students bring in a second sample collected by following the class procedure. Compare each set of samples.

- Developing a scheme to classify soils based on soil properties.

- Drying the soil samples for different lengths of time and comparing physical differences between soil in various states of moisture.

- Plotting on a local map sample collection sites and the distribution of the various soil classes.

### **Further Investigations**

Find out where there is digging (excavation) going on nearby and visit the site, comparing what you observe there with the soil characteristics described in your backyards.

**Remember:** Safety is always your first concern.

Select another school in a part of the world known for certain characteristics (e.g. a rainy season, thick vegetation, etc.). Pick a school that has a history of submitting messages and/or data. Write a message to the students via GLOBEMail, e-mail or regular mail describing your soil and asking them to describe their soil to you. How do the differences in your climates (for example types of seasonal cycles, temperature ranges, amounts of precipitation, types of land cover) relate to the differences in your soils? Compare your results with those of the other school and discuss any difference with your GLOBE colleagues at your school and the other school.

Investigate what kinds of soils make the best homes for earthworms or other soil-dwelling creatures.

Develop a scheme for grouping (classifying) soils based on soil properties.

Compare the class's classification scheme to GLOBE's (see *Soil Characterization Protocol*). Have the students compare the soil properties in the *Soil Characterization Protocol* to the properties that they chose for their scheme.

### **Student Assessment**

Give students samples of a mystery soil. Depending on their ability, they could:

- Describe the soil in their GLOBE Science Notebooks, using as many adjectives as possible and covering as many soil characteristics outlined in the *Soil Characterization Protocol Field Guide* as can be observed.

- Consider the implications of the characteristics of the soil for its possible history and location.