



Soil Treasure Hunt

Purpose

- To help students learn about natural things commonly found in soil and how these things impact how the soil looks and feels.
- To introduce students to the concept of decomposition.

Overview

Students will make predictions about what they think they will find in a sample of soil. They will investigate the sample and sort out the various items they find. Next they will spend time outside observing one or more sites to see what they find in the soil. After recording and sharing their observations they will create their own stories about the things they found in the soil.

Student Outcomes

After reading and/or listening to the *Elementary GLOBE* book *The Scoop On Soils*, students will know about various things found in soil including rocks, critters, roots, and other organic material. They will also understand that animals and microorganisms aid in the decomposition process that contributes organic materials to soil.

Next Generation Science Standards

- DCI ESS-2A: Earth Materials and Systems
- Science Practice 1 Asking Questions
- Science Practice 4 Analyzing and Interpreting Data

CCSS.ELA Anchor Standards

- W.2 Write informative/explanatory texts...
- W.4 Produce clear and coherent writing...
- W.7 Conduct short as well as more sustained research projects...

Time

- Part 1: One 30-minute class period
- Part 2: One 30- to 45-minute class period

Level

Elementary (most appropriate for grades K-4)

Materials

Part 1:

- *Elementary GLOBE* storybook: *The Scoop on Soils*

For each student group:

- A soil sample from a site near your school
- Mesh wire strainers
- Tweezers, toothpicks,, eye droppers, magnifying lenses, rulers
- Pencils
- Markers, colored pencils, or crayons
- Copies of the *Soil Treasure Hunt Student Activity Sheet 1* (one per student)

Part 2:

- Shovels or trowels
- Mesh wire strainers
- Tweezers, toothpicks, eye droppers, magnifying lenses, rulers
- Pencils
- Markers, colored pencils, or crayons
- Copies of the *Soil Treasure Hunt Student Activity Sheet 2* (one per student)



Preparation

- Read the *Elementary GLOBE* storybook *The Scoop on Soils* – either read it to the class or have students read it to themselves. The book can be downloaded from www.globe.gov/elementaryglobe.
- Collect soil samples near your school. The samples may contain some of these materials: rocks, sticks, leaves, seeds, roots, insects, worms, tree needles or leaves, and sand, silt, or clay. Students can also bring in samples from their homes, taking soil at the surface or deeper to demonstrate differences in soil properties. Note: caution students not to dig a hole without adult supervision.
- Cover the classroom workspaces with newspaper.
- Make copies of *Soil Treasure Hunt Student Activity Sheets*.
- Read about digging soil profiles in the soil chapter of the *GLOBE Teacher's Guide* (www.globe.gov) to learn more about site selection and safety procedures.

Teacher's Notes

Soil Composition

Soils are composed of four main components:

- Minerals of different sizes
- Organic materials from the remains of dead plants and animals
- Water that fills open pore spaces
- Air that fills open pore spaces

Five Soil Forming Factors

They are:

1. *Parent Material*: The material from which the soil is formed. Soil parent material can be bedrock, organic material, loose soil material deposited by wind, water, glaciers, volcanoes, or material moving down a slope.
2. *Climate*: Heat, rain, ice, snow, wind, sunshine, and other environmental forces break down the parent material and affect how fast or slow soil processes go.

3. *Organisms*: All plants or animals living in or on the soil (including micro-organisms and humans!). The amount of water and nutrients plants need affects the way soil forms. Animals living in the soil affect decomposition of waste materials and how soil materials will be moved around in the soil profile. The dead remains of plants and animals become organic matter that enriches the soil. The way humans use soils affect soil formation (i.e. agriculture, development, etc.).
4. *Topography*: The location of soil on a landscape can affect how climate processes impact it. Soils at the bottom of a hill will get more water than soils on the slopes, and soils on the slopes that directly face the sun will be drier than soils on slopes that do not.
5. *Time*: All of the above factors assert themselves over time, often hundreds or thousands of years.

The way the five soil-forming factors interact is always different from one place to another, so soils differ greatly from each other. Each section of soil on a landscape has its own unique characteristics. The face of soil, or the way it looks if you cut a section of it out of the ground, is called a **soil profile**. Every soil profile is made up of layers called **soil horizons**. Soil horizons can be as thin as a few millimeters or thicker than a meter.

Soil profiles and their horizons change as you move across a landscape, and also change as you move downward deeper into the soil at one location. In fact, soil samples taken at the surface may have entirely different characteristics and appearances from soil dug deeper in the soil profile. Soil horizons are different as you dig deeper, mainly due to the mixing of organic material in the upper horizons and weathering and leaching in the lower horizons. Erosion, deposition, and other forms of disturbance might also affect the way a soil profile looks at a particular location.

See the soil chapter of the *GLOBE Teacher's Guide* for more information on soil (www.globe.gov).



What To Do and How To Do It

Part 1:

1. Hold up a bag of soil, tell the students where you collected it and how deep you dug to collect the soil. Ask the students what they think they might find in the soil sample if they were to study it carefully. Tell the students that this soil is different from the sand/silt/clay samples you investigated in the *Getting to Know Soils* learning activity, emphasizing that it came from a natural place rather than a lab that separated the soil type from a natural sample.
2. After developing a list of predictions on the board, distribute a bag of soil and various tools (strainer, magnifying lenses, etc.) to small groups of students.
3. Have each student write a prediction and a question about soil on his or her *Soil Treasure Hunt Student Activity Sheet 1*. Younger students will need assistance with this step.
4. Give each group of students a bag of soil. Explain to the students that this sample has lots of the ingredients in it that make up soil. Have the students use their fingers and other tools to sort out the different things they find in the soil. They can put them in piles based on their categories (rocks, plant parts, animals, other things). Have each student record his or her observations on the *Soil Treasure Hunt Activity Sheet 1*.
5. If the students find living things in the soil such as insects and earthworms, have them draw what they found and then release them outside where the soil sample was collected.
6. Have the students share their observations with the class. Use chart paper to record their observations. They can share verbally and the teacher can record the observations, or students can write their observations on sticky notes and put them on the chart paper.

Part 2:

1. After reading the storybook, discuss how the GLOBE Kids find different things in soil from different places. Show students illustrations of journal pages from the book and remind students how the kids in the story recorded their observations of soils.
1. Take students outside and dig into the top layer of the soil. This may be the layer that has plant roots and critters in it or it may just be mineral soil if there is no vegetation growing on it.
2. Have the students take time investigating what they see in the soil. Ask them to look for "treasures" like rocks, critters, and plants.
3. Give each student a copy of the *Soil Treasure Hunt Student Activity Sheet 2* and have each student record his or her observations. They can rub the soil on the paper to show its color.
4. Take a photograph of the soil pit that the students can refer back to later.
5. Return to the classroom and discuss as a class what each student or group found outside in the soil.
6. Have each student write and illustrate a story from the perspective of one of the critters seen in the soil outside. Ask the students to include details about what tasks the critter has to do to survive, find a home, eat, etc. They should include details about what the soil is like, what things they find in the soil, etc. If no critters were found in the soil the students can write stories about rocks or plants.
7. The students can share the stories with the class. You can also display them in a classroom gallery or put them together in a book.

Adaptations for Younger and Older Students

Younger students can draw the illustrations and dictate their stories to an adult for Part 2 of this activity. Then compile the stories into a book for the class.



Further Investigations

- **Soil Word Wall:** Generate a list of words students might use to describe soil. This list should include ways to describe soil's color, texture, and structure. Also include words that apply to the different senses. Your students can help you generate the list. Keep the list up on the wall while you are doing the *Elementary GLOBE* soil activities so students can refer to it; it will help them think of words to use on their student activity sheets.
- **Soil Profile:** Extend the time you spend outside looking at a soil profile by digging holes in different areas and comparing what the soil is like and what you find in the soil in the different locations. Example locations could be at the top or bottom of a hill, under a tree, in an open lawn, near a stream, in an area disturbed from construction, on a trodden path, in a wet spot, etc. Use the *GLOBE Teacher's Guide* for more information (www.globe.gov).
- **Soil Collage:** Go out and dig in a certain area to find treasures in the soil. Sort the items and glue them on a piece of cardboard. Also glue different types of soil on the collage. If the students find live animals in the soil, have them draw them on paper and glue the paper to the collage. Then have them return the critters to the spot where they were found.
- **Soil: The Great Decomposer Learning Activity:** This can be found in the soil chapter of the *GLOBE Teacher's Guide* (www.globe.gov).
- **Earthworms:** Fill a clear plastic or glass container with sand, potting soil, and dead leaves. Put earthworms in the container and cover the outside of the container with black construction paper. Water the container so it is moist but not soggy every 2-3 days. After 3 days, take the paper off the outside of the container and observe the differences in how the soil looks. Notice what the earthworms have done to change the soil. Cover the container again and keep checking every 2-3 days for changes.
- **Seeds:** Plant fast-growing seeds in clear plastic cups. Use soils with different properties (such as different colors, textures, structure, organic matter, rocks, etc.). Water the seeds and place them in a sunny window. As the plants grow, observe what happens in the soil. Can you see the roots? Does the presence of roots change how the soil looks?
- **Field Guide to "Soil Critters":** Create a field guide to illustrate the critters your students might find in your local soil. Some common critters are earthworms, insects, spiders, centipedes, and millipedes. You can either put information about the critters on a bulletin board in the classroom or print up small guides the students can take outside to use as a reference when they are exploring in the soil.



Soil Treasure Hunt Student Activity Sheet 1

Name _____

Date _____

My Soil Investigation!

My prediction or question about the soil is:

These are the things I found in the soil:



Soil Treasure Hunt Student Activity Sheet 2

Name _____

Date _____

Outdoor Soil Investigation!

This is where I studied soil outside:

Soil Color

(Rub a little soil above to show color.)

These are the things I found in the soil: