



# Conservation Education Teacher Guide

## SOIL SLEUTHS

Students will discover the properties of soils through demonstrations, experiments, and activities. This program offers a hands-on learning experience for all!

### The Dirt on Soil

**What is Soil?**-Soil is a living resource that supports plant life. It is made up of different size mineral particles (sand, silt, and clay), organic matter, and pore spaces, which are potential living spaces filled with air, water, or living organisms. Soil has biological, chemical, and physical properties that are always changing.

**Sand, Silt, and Clay**-The three mineral components of soil are sand, silt, and clay. These minerals help determine the soils structure, behavior, texture, and even its name. Sand is the largest particle and it has more pore space between its particles than silt or clay. Silt particles are smaller than sand, but larger than clay particles. Likewise, there is less pore space between silt particles than between sand particles, but more than between clay particles. Clay, the smallest particle, has the least amount of pore space.

**So what do they do?**-All clusters of soil particles have the ability to attract and hold water. Water moves quickly through a sandy soil because of the large pores, or empty spaces between the particles. A clay-type soil, however, will actually attract water and absorb it like a sponge. Clay particles, as a clump, swell as they get wet and shrink as they dry. These particles have the ability to pull and hold onto water with **2,500** pounds of force!

**The porosity of the soil**- the available pore space of a soil type- determines how quickly water will move through the soil. Some of the water is held by the soil particles. Gravity pulls the rest of the water, called free water, downward. The water held by soil particles helps plants grow.

#### Pre-Visit Activities- Portable Soil Profile!

##### Instructions:

- Place one layer of rocks on the bottom of a beaker or clear plastic container.
- Add a layer of light colored subsoil over the rocks and fill the beaker about  $\frac{2}{3}$  full.
- Place a 1 inch layer of light colored topsoil over the sub soil. Spread organic matter over the topsoil.
- Label the layers using a marker on the beaker.
- Extension: add worms to some of the beakers watch as they mix up the soil, discuss the benefits of worms in the world of soil.



##### Lower grade adaptation:

- Use different colors of Play Doh in clear plastic cups to identify the different layers. After completion cut a straw in half and insert into the container to show the different layers.
- My Soil Sample-Have students bring in a soil sample from their yards in clear plastic bags for further discussion at time of visit.

Ohio Learning Standards,  
Ohio  
Revised Science Standards  
and  
Model Curriculum

Kindergarten

Earth and Space Science: 1  
Life Sciences: 1, 2  
Physical Science: 1

First Grade

Earth and Space Science: 1  
Physical Science: 1  
Life Sciences: 1, 2

Second Grade

Physical Science: 1  
Life Sciences: 1

Third Grade

Earth Sciences: 1, 2, 3  
Physical Sciences: 1, 2

Fourth Grade

Earth and Space Science: 1, 2, 3  
Life Science: 1

Fifth Grade

Life Sciences: 1, 2  
Physical Sciences: 1

Sixth Grade

Earth and Space Science: 1, 2, 3, 4, 5  
Physical Sciences: 4

Seventh Grade

Life Sciences: 2

Eighth Grade

Earth and Space Science: 3, 4  
Life Sciences: 1

Post-Visit Activities-  
Habitat Profile and Report

Lower Grades:

- Use three different grades of sandpaper to represent the three components of soil. Coarse (sand), medium (silt) and fine (clay).
- Have students create a habitat profile. Using the different sandpaper pieces have them design the type of soil found in their habitat. Have them explain why?

Upper Grades:

- Have students research different topics on soil and give an oral report with a visual demonstration of some form. Display board, diorama or tools used by a soil scientist.
- Presentation topic ideas; soil erosion, non-point source sediment pollution, or have them come up with their own topic:
- Searching for Soil on the web:
  - [https://agri.ohio.gov/divisions/soil-and-water-conservation/resources/Soil\\_science](https://agri.ohio.gov/divisions/soil-and-water-conservation/resources/Soil_science)
  - [www.osu.edu/](http://www.osu.edu/)
  - [www.oh.nrcs.usda.gov/](http://www.oh.nrcs.usda.gov/)

Pre/Post visit activities are adapted from the National Association for Interpretation Interpretive Booklets and may need to be adjusted depending on the grade level.

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Geauga SWCD Mission:

"To conserve, protect, and enhance the resources of Geauga County by providing leadership, education, and assistance to all."