



## Earth Science Education Activity

# Making a Model Soil Profile

**Background:** If you look in a soil pit or on a roadside cut, you will see various layers in the soil. These layers are called **soil horizons**. The arrangement of these horizons in a soil is known as a **soil profile**. Soil scientists, who are also called pedologists, observe and describe soil profiles and soil horizons to classify and interpret the soil for various uses.

Soil horizons differ in a number of easily seen soil properties such as color, texture, structure, and thickness. Other properties are less visible. Properties, such as chemical and mineral content, consistence, and reaction require special laboratory tests. All these properties are used to define types of soil horizons.

Soil scientists use the capital letters **O**, **A**, **B**, **C**, and **E** to identify the master horizons, and lowercase letters for distinctions of these horizons. Most soils have three major horizons -- the surface horizon (**A**), the subsoil (**B**), and the substratum (**C**). Some soils have an organic horizon (**O**) on the surface, but this horizon can also be buried. The master horizon, **E**, is used for subsurface horizons that have a significant loss of minerals (eluviation). Hard bedrock, which is not soil, uses the letter **R**.

**Key Question:** What are properties of soil in my community?

## MATERIALS

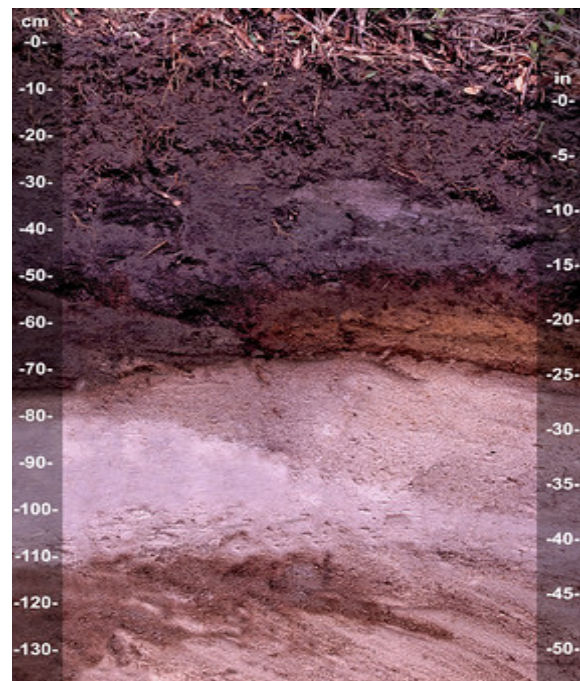
- ◆ printed soil cards (or 3" x 5" index cards)
- ◆ double sided tape, preferably 1" thick and with a cover on one side
- ◆ real or model soil samples in different colors
- ◆ pencils
- ◆ soil core sampler (optional)

## STANDARDS

### NGSS

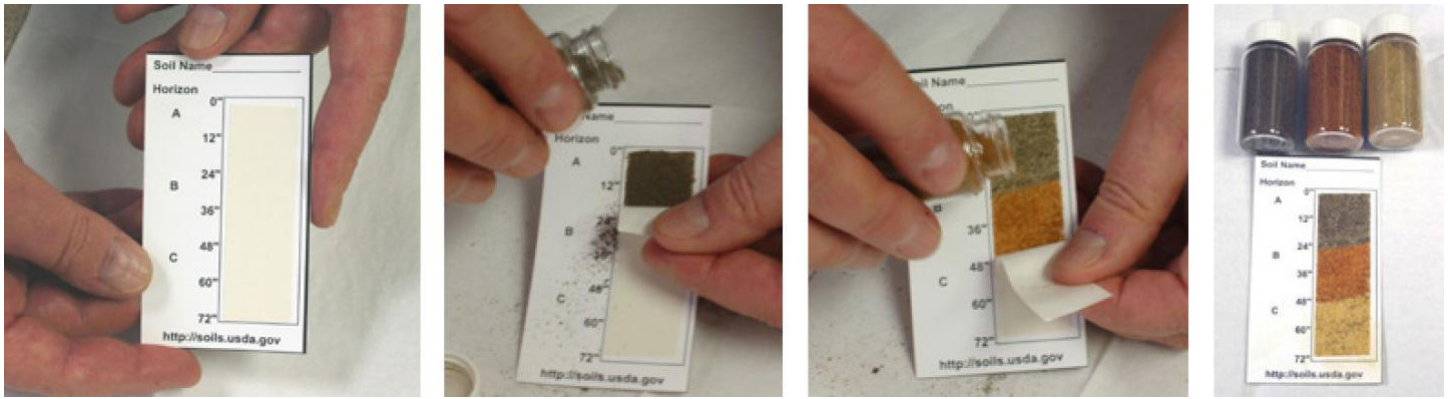
DCI: ESS2.A Earth's Materials and Systems  
SEP: Developing and Using Models; Constructing Explanations and Designing Solutions  
CCC: Patterns; Structure and Function  
SDG 13: [Climate Action](#)

Learn more about the United Nation's Sustainable Development Goals (SDGs) and explore resources for educators from UNESCO: <https://en.unesco.org/themes/education/sdgs/material>



An image of the Murville Series soil profile, showing distinct soil horizons with varying textures, colors, and compositions.

Credit: John Kelley, USDA NRCS



Example of a model soil profile.

Credit: NRCS

## HANDS-ON ACTIVITY

1. Download and use the Soil Web application on a phone to learn about the soil where your school or home is located.
2. In the application, examine the soil profiles of a selected location (if you are working with a group or as a class, have each person select a different location in the community). There may be multiple soil types and profiles that are associated with the selected location. Choose the soil series with the highest percent match for the remainder of the activity.
3. On a printed soil profile card, create a model soil profile using pencils, double sided tape, and some soil samples.
  - a. Attach a strip of carpet tape to the box on the card.
  - b. Pull back the tape cover at the top of the box to expose the sticky tape to the depth of the surface horizon. Place soil from the surface horizon on the tape to represent the depth of this soil.
  - c. Pull back the tape for each additional layer one at a time, following the same procedure.
4. If you are working with a group or as a class, make observations of the different soil profiles.
5. Optionally, go into the field and collect a soil core from the selected location and make observations of the core.

## ANALYSIS

1. What are some of the key characteristics of the soil profile you created?
2. If you collected a soil core, how does it compare to the data in the application and the model you created? If there are differences, what factors do you believe contribute to these differences?
3. If you were able to observe other soil profiles, how do others compare to the model you created? What are some similarities and some differences?
4. What factors do you think contribute to the differences in soil profiles across various locations within our community?
5. Can you identify any connections between the soil profiles you examined and local environmental concerns? What about connections between the soil profiles and topography?

## SYNTHESIS

Consider how a soil profile might change depending on topography. Predict how the profile you modeled would be different if it were at the top of a hill, on the slope, and at the bottom of a hill. Explain your predictions. Then, go out into the field and collect samples and make observations. Analyze and interpret the findings, relating them back to your initial predictions.

## EXTENSION

Collaboratively create a detailed map showcasing soil profiles across our local community. Analyze the diversity of soil profiles in different geographical areas and identify patterns or correlations between soil types, land use patterns, and environmental factors. Explore how variations in soil profiles may influence vegetation, agriculture, and land management practices within our community.