Colors of our Earth

Author(s): Markus Grafe (teaching and preparation assistance by Ted Peltier)

Objective of the Lesson: This exercise is designed to introduce students to soil profile classification. Classification of soils is an important aspect of studying soils as it aids in predicting how soils will react to weathering, transport nutrients or pollution. Soil classification also helps in determining the types of plants that are appropriate for a specific soil type.

Standards Addressed:

Science

K-3	4-5	6-8
Standard 1 *Nature and Application of Science and Technology* A-1, A-2, A-3	**Standard 1** *Nature and Application of Science and Technology* A-1, A-4	**Standard 1** *Nature and Application of Science and Technology* A-1
Standard 2 *Materials and Their Properties* A-1	**Standard 2** *Materials and Their Properties* C-1	**Standard 2** *Materials and Their Properties* B-1
Standard 5 *Earth's Dynamic Systems* A-1	**Standard 5** *Earth's Dynamic Systems* A-1, A-2	**Standard 5** *Earth's Dynamic Systems* B-2
Standard 8 *Ecology* A-1 B-1	**Standard 8** *Ecology* A-1	

Agriscience

6-8
Exploring Agriscience Careers **Standard 7** *Natural Resource and Environmental Careers* B-1, B-4

Materials Needed:

- ✧ Shovels or augers (not the 6' ones, but maybe 3 to 4' ones)
- ✧ Water squirt bottles
- ✧ White paper
- ✧ Water color sets (1 per group) or finger paint
- ✧ Scotch tape

Teaching Tips:

- ✧ This lesson is designed to take place outdoors. Be sure to have plenty of water available to students.
- ✧ Students will work in groups of about 4 to 6 students.
- ✧ Each group is assigned two shovels, a squirt bottle, a 3 feet long soil pan, scotch tape, paper and watercolor set. For younger students, it is advisable to use watercolors.
- ✧ This is planned as a 45-minute lesson. Approximate amounts of time to complete each activity are included.

Procedure:

Activity 1 (approx. 15 minutes)

1. Each group carves out/excavates a 3-foot vertical distance at or on a ridge using shovels (like at the side of roads). If augers are available, 3 to 4 foot holes may be excavated practically anywhere, but preferably well spread and if possible in different topographic regions (summit, slope, drainage canal, foot area).

Activity 2 (approx. 20 minutes)

1. Groups are assembled around a randomly picked hole, and the instructor demonstrates how the soil is sectioned by color. Show how the soil has to be moistened to see the true color of the soil.
2. The groups return to their respective pits and count up the number of horizons they see.
3. Paper is taped together until it is as long as the depth of the pit. On the paper, each group roughly shows the depth of each horizon using the watercolors and moistened/liquefied soil (use squirt bottle to wet soil to convert into "water color").
    - ✧ This exercise will help to show how subtle some changes in color may be.

Demonstration

1. To show additional criteria in identifying soil horizons, the instructor chooses a random pit and starts passing around soil from different horizons. The soil knife is thrust into the profile at an angle, and soil particle is chipped out. Show how sand diminishes soil structure, how silt, clay, and organic-matter add structure and stability.
2. The class finishes by every group refilling their pits with the excavated soil in order to avoid stepping hazards.
3. Soil profile paintings can be put up in the classroom. Allow creativity like flowers on the top, earthworm sticking out, bugs, etc.

Check for understanding:

<u>Possible Questions</u>

1. How do we distinguish between soil horizons?
2. Why is soil classification important?

Suggested Answers

1. Soil horizons can be differentiated by color, structure and consistence (how well it stays together).
2. Understanding the composition of a soil is important in predicting how water and nutrients will move through the soil. It is also important to know which organisms might be living in the soil. Placing a soil in a known classification scheme aids in

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Summary of learned material:

Soil color is an important physical characteristic that can aid in distinguishing between soil types. The surrounding environment can influence the color of a soil. Differences in organic material or mineral compositions can change soil color, as well as pH and oxygen levels. A classification scheme that includes color as a characteristic helps soil scientists to compare their soil samples to other soils that may be better understood.

Additional Resources:

General sites – Soil:

http://www.dnr.state.mn.us/young_naturalists/soil/index.html - Includes a section on soil color

General sites – Soil Color:

http://nesoil.com/properties/color/sld001.htm - Power Point slide show online

http://soils.usda.gov/education/resources/lessons/color/color.htm