John Muir Study Guide
Science Lesson Plan
Grade Two

Soil

Although John Muir is most renowned for his work as a naturalist, he also was a successful fruit rancher for many years. He understood how important fertile soil is for plant growth.

Objective:

Students will be able to:

- name the various materials that comprise soil, including weathered rock and other organic matter;
- explain that soils differ in their color, texture, capacity to retain water, and ability to support the growth of many kinds of plants.

California Science Standard Grade Two, Earth Sciences:

3c. Students know that soil is made partly from weathered rock and partly from organic materials and that soils differ in their color, texture, capacity to retain water, and ability to support the growth of many kinds of plants.

Materials:

John Muir on Soil Reading Handout (also provided below)
One-quart plastic bags
Soil samples
Paper plates
Magnifying glass
Strainer
Pan
Paper
Pencils

Preparation:

Share this story with the students.

In his book, *The Story of My Boyhood and Youth*, John Muir tells about how his family left Scotland when he was eleven years old, and moved to a farm in Wisconsin. For four years he worked hard in the fields to grow wheat, corn, and potatoes. But it wasn't long before repeated plantings of the same crop caused the soil to wear out, and less wheat and fewer vegetables were produced in the same amount of farmland as before. Farmers later discovered that if they planted their fields with clover and then plowed it under once it had grown, the soil could be made fertile again as nutrients were added to the soil.

Many years later John Muir became the owner of his father-in-law's fruit ranch. He worked hard planting vines and young trees to earn enough money to provide for his family. He was so successful at his work that after 10 years he was able to sell part of his ranch so he would have time to travel and write about nature.

Before beginning the activity, explain to the students that soil is made up of rock material that has been broken down over time into tiny grains by wind and rain. Soil also contains a variety of materials including minerals, and decayed plant and animal material.

Activity:

Have students fill a one-quart plastic bag about 2/3 full of soil either from their yard at home or near the school. Tell them to find samples of soil from areas other than their yards so a wider range of soil types can be examined. Also have samples of sandy and clay soils for the purpose of demonstration.

Tell the students to pour their sample onto a paper plate and look carefully at all of the material in the soil.

Have the students answer the following questions.

What is the color of the soil? (Dark brown, light brown, reddish-brown, etc.)

How does it feel? (Gritty, sandy, smooth, etc.)

What kinds of things can be seen in the sample? (Leaves, small twigs, rocks)

What is the texture of the soil? Is it soft, or does the sample have hard clumps in it?

Ask the students how they think the soil may have formed. Remind them that soil is a mixture of organic material such as leaves and twigs that have decomposed, and pieces of larger rocks that were broken down by the process of weathering.

Ask the students which kind of soil they think would be best for plant growth.

Tell the students how important soil is for holding the water that plants need for growth. Conduct the following experiment to show the water retention capacity for different soil types.

Take three different samples of soil. One should be a sample of very sandy soil, the second a sample of fertile soil, and the third one a sample of hard, clay-like soil. Put one of the samples in a strainer and hold it over a pan. Pour water over the soil sample to see how well it absorbs the water. Water will not be absorbed as readily for the clay samples, and water will make the sandy sample unstable. Ask the students how this will affect a plant that tries to grow in this soil. Have them write down their observations and conclusion.

Extension:

Choose three very different types of soil from the samples brought to class by the students. Have the students plant flower or vegetable seeds in each type of soil, water them and place them in the Sun. Have the students continue to water the plants over the course of a couple of weeks, and monitor the development of the seeds into plants. Ask the students to determine if one kind of soil was better for plant development than the others, and ask why they believe this was the case.

Source:

http://www.sierraclub.org/john_muir_exhibit/writings/the_story_of_my_boyhood_and_youth/
