Soils Studies: Living vs. Non-living Examination

Activity Overview
Students will dissect a cubic foot of soil and sort the contents into living and non-living groups.

Objectives
Students will:

- Observe the diversity of living and non-living components of soil
- Classify and sort soil components
- Understand the role of living and non-living matter in soil

Subjects Covered
Science

Grades
K through 12

Activity Time
1 hour

Season
Spring or fall

Materials
One cubic foot of soil, large sheet of paper (36" X 24"), writing paper and pencil, bug boxes (if desired)

State Standards
Science:

Use scientific sources & resources (B.4.1)

Select multiple information sources (C.4.3)

Use data to answer questions (C.4.5)

Identify data and sources to answer questions (C.8.2)

Evaluate data (C.12.3)

Choose & evaluate data collection methods (C.12.4)

Background

Soil is composed of living and non-living matter. The living parts of the soil include animals, plants, fungi, and micro-organisms. The nonliving, or physical components of the soil include water, air (atmospheric gases), rocks, and rock particles. Soil scientist, Dr. Francis Hole, describes soil as "the root domain of lively darkness and silence". Largely unseen by human eyes, these living and nonliving parts are a complex living system, which supports life and all activities happening above ground.

Billions of organisms live in the soil—from microscopic organisms such as fungi, bacteria and tiny animals to animals that can fit on a head of a pin such as mites, nematodes and springtails to ants, beetles, and earthworms. There are so many soil organisms in the soil that there is more biomass or weight below ground than above it. The biomass of soil organisms in one acre equals the weight of 12 horses. These organisms decompose matter, aerate the soil, and improve its structure.

Plants are part of the soil. Under the soil surface is a dense network of thin fibrous roots and thick deep taproots. A single acre may contain millions of miles of roots. The roots hold water and open channels for air and water to move through the soil. Each year 50 to 80 percent of the roots slough off adding organic matter to the soil. Roots feed small mammals, insects, and microorganisms living or burrowing underground. Decaying plant parts provide organic matter and nutrients to those living components of the soil. The organic matter provides stability to soil structure, increases water holding capacity, and aerates the soil.

Non-living matter includes rocks, stones, sand, etc. These inert materials are the backbone of the soil that provide support, density, and structure to the soil unit. The non-living material also supplies minerals for growing plants as well as habitat for living creatures.

Activity Description

You are going to examine one cubic foot of soil to determine what makes up soil. Spread out your soil sample on a large sheet of paper. Divide the soil into two piles—living matter and non-living matter. Living matter includes materials that were once alive but are now decomposing as well as living plants and animals. Non-living matter includes rocks, stones, sand, etc. List what you find in each pile. Discuss what role each of these elements play and how they may be important to your school restoration project.

Extensions

- Compare soil samples from different ecosystems or areas.
- Graph the contents of the soil.
- Put the soil back to its original condition before you separated its parts.
- Examine the soil using a microscope and describe your findings.

Additional Resources

- Baskin, Y. (2005). *Under ground: How creatures of mud and dirt shape our world. Washington D.C: Island Press.*
- Nardi, J.B. (2003). *The world beneath our feet: A guide to life in the soil.* New York, NY: Oxford University Press
- Stewart, A. (2004). *The earth moved: On the remarkable achievements of earthworms.* New York, NY: Algonquin Books of Chapal Hill
- Soil Science Society of America's comprehensive website has a wealth of resources, lessons and links. https://www.soils.org/lessons/resources/

Assessments

- Write a summary about the living and non-living matter you found in your soil sample. Describe the roles each component plays in the soil.
- What do you think would happen if all living matter were removed from the soil?