



Y-CITYSCI: A Youth-Led Citizen Science Network for Community Environmental Assessment

Environmental Assessment Curriculum: Lesson 5

Grade Level: Middle school

Duration: 1 hour

Introduction to Soil Pollution

Next Generation Science Standards

Disciplinary Core Ideas:

ESS3.C: Human impacts on Earth systems

ESS3.A: Natural Resources

Crosscutting Concepts:

Cause and Effect

Stability and Change

Science and Engineering Practices:

3: Planning and Carrying Out Investigations

Objectives

- 1) Students will understand how soil pollution affects their environment and health.
- 2) Students will know how to use scientific tools to collect and analyze soil samples.

Materials

- Smart Board/ projector
- [“What Is Soil Pollution”](#) webpage
- T-probe (1 per group)
- Clear test tube or bottle (3 labeled 1-3 per group)
- Hand trowel or other tool to get soil out of the T-probe like a large spoon
- Munsell soil color chart (1 per student)
- Soil Data Collection sheet (1 per student)

Activities

Bell Ringer: Show the students the “What Is Soil Pollution” webpage and briefly discuss topsoil pollutants (pesticides, herbicides, ammonia, petroleum hydrocarbons,





lead, nitrate, mercury) and the top five causes of soil pollution (industrial activity, agricultural activity, waste disposal, accidental oil spills, acid rain).

Lecture: After discussing what soil pollution is and what potentially causes it, lead a discussion on how this pollution affects the environment and human health. Have students lead the discussion by sharing their thoughts and reasoning. Possible risks include: soil leaching harmful pollutants into water systems, harmful chemicals leaching into food grown in soil, respiratory illness, bronchitis, cancer, and asthma.

Pass out Munsell color charts (or books) to students and go over how to use them to match and identify soil colors of samples.

Activity: Put students into small groups. Each group should be given a T-probe for soil core sampling, hand trowel or metal spoon, three clear test tubes (or clear water bottles with the tops cut off) to store the soil samples, and a “Soil Data Collection” sheet (they should also use the Munsell chart). Explain how to use the T-probe and have students gather three soil samples on the school grounds, use their hand trowel or spoon to scope out a portion of the sample, and store them in the test tubes. As they collect samples they should record the location of where the sample came from, and be sure the test tube number matches the number on the data table. Instruct them to add any notes they may find informative, like what is at the surface where they sampled the soil (e.g., grass, lots of fallen leaves, etc.)?

Discussion: Have all groups come back into the classroom and share where they got their soil samples and the colors of their soil. Were there multiple colors in one sample? Discuss why there may be variations in color across the school grounds. Did the students find it easy to collect sample with the T-probes?

Go over a few types of scientific tools that can be used to further analyze the soil samples (such as x-ray fluorescence), and how they can be used to check for pollutants in the soil.

Extension

You can arrange for a lab to test the student soil samples for contaminants, and share and discuss those results with the students at the next session. This is an opportunity to make the issue of soil pollution relevant to the students by sharing what chemicals are present in their school’s soil and how those chemicals may affect the environment and their health.

Resources

[Information](#) on how to read a Munsell color chart.





Name: _____

Soil Data Collection

| Number | Location | Munsell Color(s) | Notes |
|--------|----------|------------------|-------|
| 1 | | | |
| 2 | | | |
| 3 | | | |