



# Discovering the Science of the Environment

With Support from the National Resource Conservation Service



IUPUI SCHOOL OF SCIENCE

## Purpose of the lab:

The purpose of this lab is to demonstrate that less disturbed soils contain more “soil glue” and are held together better than more disturbed soils, when soils of the same type are compared. Students will be able to see, feel, and touch the differences between the two soil samples. The lab aims to show students the connection between what they have learned about erosion, weathering, and agricultural techniques to why the same type of soil has such different properties and why it is important to protect soils from disturbance.

## Materials and Preparation:

Each pair/group will need:

- 2 Wide-mouthed glass jars
- 2 Pieces of 1/4-inch wire mesh about 11/2 x 6 inches
- 2 Clods of soil, each about the size of an egg, from the top two inches of soil from two different areas.

## Teacher Set-Up:

1. Shape two wire mesh baskets to sit about 1½ inches below the rim of each jar
2. Fill each jar with water to within ½ inch of the top
3. Place the samples from two different sources (one healthy and one eroded/bad) in front of the jars.

**Background:**

Soil organisms increase in abundance and in the variety of species represented when soil is not disturbed. Fungi in particular make proteins, such as glomalin, that ooze into the soil and help glue soil particles together. When soil is heavily cultivated (tilled) or disturbed during construction, the surface layer (topsoil) is often drastically changed, buried, or removed. Change takes place when oxygen gets into the soil and provides energy for decomposers to convert dead organic matter to energy, carbon dioxide, and water. This reduces the amount of organic matter in the soil and the amount of glue that is available to hold soil together as aggregates. Soil habitat is destroyed and live soil creatures are reduced in number and/or variety, or they are eliminated. When the soil is not disturbed, more animals, plants, fungi, and microorganisms thrive in the soil. The amount of soil glue, such as glomalin, increases and the soil holds together better.

**Essential Question:** How is soil a valuable resource and what are humans doing to change soil quality.

**Student Outcome:** Model how weathering and erosion affect soils and their ability to produce crops.

**PreLab:**

1. With your group/partner, write down as many characteristics as you can that describes “healthy” soil.
  
2. With your group/partner, write down as many characteristics as you can that describes “unhealthy” soil.
  
3. Look at the two soil samples placed in front of you. Write down differences you see between them. (ex: Difference in texture? Look? Smell?)

4. List why you think the two soil samples look different. What do you think could have caused the differences? (Think about this: Is there a difference in soil characteristics depending on how we take care of it?)

### **Soil Glue Lab**

Now that you have made your initial observations on the soil samples, let's take it one step further. Where soil comes from is an important aspect of its physical and chemical properties.

1. Ask your teacher about the source of the samples and record the information in the table below. Appropriate questions include (but are not limited to):
  - a. Where did you get the samples?
  - b. What depth is the soil from?
  - c. Are the samples from the same location?
  - d. What kind of activities occur on the soil, if any?

Sample A	Sample B

2. Write your prediction of how each sample will react when submerged in water.

Sample A	Sample B

3. Shape the wire mesh to create a basket that sits below the rim of the jar by about 1½ inches. (The wire mesh should be submersed in the water).
4. Place Soil Sample A in the mesh in the first jar, and place Soil Sample B in the mess of the second jar.
5. Record your initial observations in the table below.

Sample A	Sample B

6. In the table below, record your observations after 1 minute.

Sample A	Sample B

**Post-Lab**

1. Use the space below to illustrate the reaction each sample had after immersed in the water.

Sample A	Sample B

