BioS.I.T.E Kit Materials Card

Sorting through Sediment

30 droppers

15 green viewers

60 individual plastic observation dishes

5 large soil observation trays

30 magnifiers

30+ observation recording sheets

15 plastic water cups

30 rulers

1 sedimentation tube

2 sieve stacks

10 shovels

30 small spoons

30 straws

Content

Sediment: Matter that settles to the bottom of a liquid
Soil: The top layer of the Earth's surface, consisting primarily of clay, sand, silt, and organic matter in which plants may grow.

Water moving across the land breaks down the rocks and plants it encounters along the way creating sediment. Some of the sediment will remain on the surface of the earth to be worked on by the weather, plants, animals, and water. Soil is made of minerals (rocks), air, water, and organic matter such as living and dead plants and animals. Soil is important because it supports plants that supply food and shelter for animals, filters water, and recycles wastes.

There are many different kinds of soil with distinct characteristics. Getting to know the soil is essential to sustaining healthy habitats and communities. Soil scientists investigate soil by examining different properties:

Soil Color – Scientists recognize over 170 different soil colors. The color of the soil can indicate certain minerals are in it and scientists use books of color charts to identify the color of soil.

Soil Size and Texture - The particles in soil can be separated into different size groups, and each group has a name based on the size.

Clay	=	< 0.002mm particle size
Silt	=	0.002mm – 0.05mm particle size
Sand	=	0.05 – 2.0mm particle size
Gravel	=	> 2.0mm particle size

Soil Structure – How much the soil is loose or in clumps. Soil that is clumped has more organic matter in it, so plants grow better and it is less likely to erode. For example, sand in a desert is very loose and does not hold together well while soil under a grove of trees tends to be have lots of clumps.

Soil Porosity – Having many pores (holes) in the soil lets air and water in easily which is good for plant growth. Stepping on soil compacts it which decreases the number of pores causing less water to enter the soil. If the soil has lots of pores like sand, the water will drain all the way through it instead of being absorbed inside it and less plants will be able to grow in it.

Chemical Properties – Natural chemicals such as salt, calcium, magnesium, and gypsum affect the type of soil.

Flora and Fauna – Plant roots holds soil together and transport water into it.
Earthworms are one of the most important animals for soil health because their digging makes channels for water to flow, they eat dead organic matter, and they excrete worm

castings which are very nutritious for soil. Insects, rodents, fungi, and bacteria also help make soil healthy.

Soil changes over time - Throughout the year, the soil may change when leaves cover the ground in the fall, when grasses die in the dry season, when the ground freezes during the winter, and many other reasons. Soils in urban/industrial areas can be drastically altered by landfills, farming, earth movement, and heavy metal contamination. Agricultural areas often have undergone erosion, ripping, and land leveling. Drastically disturbed soils are common in regions where precious metals, rock aggregate, and fossil fuels have been mined.

BioS.I.T.E Kit Activity Card

Sorting Through Sediment

Questions will guide students through recording important observations followed by a reflection that gives students the opportunity to record their own thoughts. Using the sieves and sediment from their own backyards or the schoolyard, students can learn to make simple observations about the details in the world around them.

Introduction
Ask students to make a list of all the things that may be found inside the dirt of their back yard, at the park, or along a creek. Ask students to describe how the different soils could differ and see if they can come up with some explanations.

In addition to natural processes, human factors also greatly influence the composition of soil. Ask students to brainstorm the possible impacts of humans on soil and natural communities. Have students match some of the impacts with possible alternatives or solutions.

Show students the sedimentation tube and model it as a representation of how moving water in rivers mixes different sediments together. Ask students to explain what factors might cause more mixing to happen. (Rainstorms cause erosion and fast moving water) Ask students to hypothesize which sediment falls to the bottom first and which stays on the top. Then set the sedimentation tube down to settle so students can see the result; this takes about 5 minutes.

Collect Soil
Collect soil from at least two different areas using the shovels and the large observation trays. If students are collecting the soil themselves, have them observe differences in soil layers. How would they describe the soils they find at different depths?

Soil Size
Use the sieves to separate out different sizes of soil. Put about one cup of soil in the #5 sieve and gently shake the stack until the smallest particles fall through the other three sieves into the bottom pan.

Particles that stay in the #5 sieve	=	larger than 3.8mm	=	Large gravel
Particles that stay in the #10 sieve	=	1.9mm - 3.8mm	=	Small gravel
Particles that stay in the #60 sieve	=	0.23mm – 1.9mm	=	Medium sand
Particles that stay in the #230 sieve	=	0.074mm – 0.23mm	=	Small sand
Particles that fall into the bottom pan	=	smaller than 0.074mm	=	Silt and clay

Soil Examination
Place the sieved soil samples and non-sieved soil samples on the observation dishes and label them. Let students observe them using the spoons, straws, green viewers,

magnifying glasses, and rulers. Pass out water cups and droppers to explore the quality of absorption. Encourage students to record their observations. Do they see any signs of plant life, insects, or worms?

Soil Texture
Use the Hand Identification Chart for Soil Texture Analysis, droppers, water cups, and rulers. Have students use the droppers to add water to a 2.5 diameter across pile of soil until it gets to the “sticky point”. (See descriptions on the bottom on the Hand Identification Chart) Then, follow the instructions in the flow chart to discover the textural class of your soil samples.

Soil Color
Have students compare the colors of soils collected from different locations and colors of different sized soils. How would they categorize the colors they see?

Extension Activities
Have students continue their soil exploration in their own yards or parks. They can each bring a soil sample to compare with samples from other students.