Bay Area Scientists in Schools Presentation Plan

Lesson Name_____Soils: The Ground We Stand On
Presenter(s)_____Minda Berbeco, Olivia Yu – UC Davis
Grade Level_2nd____ **Standards Connection(s)**_ Earth Science: Soils, created from rock and organic materials, differ in color, texture, water retention, and ability to support growth. Soil helps us to meet needs (Plants need soil to grow. Animals eat plants to grow. We need to eat plants and animals to grow.

Next Generation Science Standards:

2-PS1-1. Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.
2-PS1-3. Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.

Science & Engineering Practices	***Disciplinary Core Ideas***	***Crosscutting Concepts***
Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions. Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. (**2-PS1-1**)	**PS1.A: Structure and Properties of Matter** Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. (**2-PS1-1**) Different properties are suited to different purposes. (**2-PS1-2**),(**2-PS1-3)** A great variety of objects	**Patterns** Patterns in the natural and human designed world can be observed. (**2-PS1-1**) **Energy and Matter** Objects may break into smaller pieces and be put together into larger pieces, or change shapes. (**2-PS1-3**)

Common Core Standards:

ELA/Literacy:

W.2.8 Recall information from experiences or gather information from provided sources to answer a question.
W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations).

SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings.

Mathematics:

MP.2 Reason abstractly and quantitatively.
MP.5 Use appropriate tools strategically.

FOSS Connections:

Grade 2 Module: *Pebbles, Sand, and Silt*
Investigation 4: *Soil Explorations*

Teaser:

This is a giant rock and here is a pile of sand! How did this sand come from this rock?!? Where did this soil come from? Is it from the beach? A mountain top? A river? A garden? How can you tell?
Are they related? As we travel from the mountains, through rivers, your backyard, then to the beach: what do these places have in common and what do you notice is different about their ground?

Objective:

We will explain several key properties of soil (texture, color, structure) and the processes that turn rock into soil. We will demonstrate how rocks through chemical and physical weathering can become sand, silt, and clay. We will also show students how vegetation is turned into compost.
Students will learn to identify the components of soil based on feel. Students will learn the role of weathering and soil organisms on converting rocks into soil.

Vocabulary/Definitions: *3 – 6 important (new) words*

- **texture:** sand, silt, clay
- **compost**
- **structure**
- **weathering**

Materials:

What will you bring with you?

- Soil samples (sand, garden soil, rocks),
- trowels if students are able to go outside
- Worms? (I can bring in my worm bin).
- Petri dishes
- Large trays (baking pans)
- Plastic water bottles

What should students have ready?

- Markers, crayons and large sheets of paper
- Paper funnels

Classroom Set-up:

- Will there be a sink or access to water for activity?
- Can the teacher or students collect soil samples from the school yard or someplace outside before the volunteers arrive?
- Students will work in groups of 4-5.

Classroom Visit

1.

Personal Introduction: _____5____ Minutes

Olivia Yu and Minda Berbeco: we are scientists who study soil!! We get to play in the dirt for our jobs!!

Ask: why is soil important? (answer: where we walk, how food grows etc.)

Have students discuss/compare their beach/river/lake/hiking experience if any. Gardening experience?

Topic Introduction: ___10____ Minutes

Ask students about whether they have been to the beach, rivers, mountains. Playing in the backyard. Ask them to describe the feel of the ground at each place. Ask about plants, landscape. We will bring rocks of various sizes and shapes and give an overview of physical processes (water transport and erosion). Students will be asked to make connections among angular large rocks, smooth pebbles and sand. Perhaps present basic information regarding mineral colors.

2. Learning Experience(s): _30_____ Minutes

What will you do, what will kids do? Demonstrations, hands-on activities, images, games, discussion, writing, measuring… Describe in order, including instructions to kids.

A. Opener: This is a giant rock! And here are tiny pebbles and a pile of sand. How did this rock become this sand? Students need to work in groups of 4-5.
For clarity, I think we could split up the lesson into two sections: soil composition and soil formation. We could prepare balls of soil with different texture and composition. Each group will get a ball of soil (labeled from A-D on the Petri dish holding the ball) and a bottle, then have the students write down on the worksheet about how the soil feels (soft or rough etc.), color differences and size differences on their worksheet. We'll share as a class.

B. Then we will ask the students to put the ball of soil (or broken chunks) into the bottle, add water, shake it up until the ball of soil is homogenized. We will set the soil solution aside and return to it in 10 mins after letting the sand and silt settle a bit.

C. Drawing time: Ask them to draw on a large sheet of paper: mountain on one side, ocean on the other, river running through middle. Where is Berkeley/Oakland? We

will ask the students to guess where their soil balls are located write down the letters corresponding to their landscape position on their map.

D. Back to the soil in the bottle: have the students either pour out the contents of their soil solution into a large tray or just observe the layers in the bottle.

E. After, ask the students as a class: How do the different soil balls differ? Introduce sand, silt, clay fractions. We will pass around pure sand, silt, clay fractions in containers among the groups. What is weathering? What size are the particles for each container?

F. Take out worm bin. Ask students to describe color, feel, and appearance in relation to their soil ball. What do worms like to eat? How did we get from this large piece of vegetable to this 'brown' organic matter?

3. **Wrap-up: Sharing Experiences** 10 Minutes

We will review the role of water and physical weathering on changing large sharp rocks into small particles and the role of soil organisms on soil structure and vegetation decomposition. Next time you are in your backyard, look at the soil! If the soil is sandy, what does that tell you about where you are located? What if you live on very sandy soil, but don't live near the ocean? What does that mean about the area you are living in? What do lots of worms in your backyard mean?

4. **Connections & Close:** 5 Minutes

Which soils would you build a house on? Which soils would you plant crops on? Why?

Total 50 – 60 Minutes

Differentiated Instruction:

English Learners: Repeat directions, if necessary, and physically model how to draw soil map and write observations. Write vocabulary, e.g. sand, soil, on the board and read words aloud. Vocabulary words can also be visually demonstrated using an illustration or action, and/or redefined in very simplistic terms.

Advanced Learners: Have students compare the soil in different bottles of water. Have them hypothesize why the ratio of sand: silt: clay differs between bottles.

Follow-up – After Presentation

ELA Activity:

Students answer the following prompt:

"Write a letter to a friend explaining what you learned about soil and rocks and why they are important. Draw different particle sizes of rock."

Reading Connections:

- Soil (True Books: Natural Resources) by Christin Ditchfield
  http://www.amazon.com/Soil-True-Books-Natural-Resources/dp/0516293680
- A Handful of Dirt by Raymond Bial
  http://www.amazon.com/A-Handful-Dirt-Raymond-Bial/dp/0802786987/ref=pd_sim_b_4

- Dirt: The Scoop on Soil by Natalie M. Rosinsky
  http://www.amazon.com/Dirt-Amazing-Science-Picture-Window/dp/1404803319/ref=pd_sim_b_1

Mathematics Activity:

Have students weigh and record the weights of the different sand, silt, and clay samples collected from their soil samples.

Other:

Creating a Soil Map: http://urbanext.illinois.edu/gpe/case2/c2a.html

Visit a Stream, Observe Soils from Schoolyard, Make Edible Soil with Oreo Cookies: http://dev.cosi.org/files/file/visit/field-trips/FieldTripWS-Stream.pdf

US Department of Agriculture – Natural Resources Conservation Service Lesson Plans: http://soils.usda.gov/education/resources/lessons/index.html

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