

## **Lesson: Soil** (Length 2 lessons)

### **Specific Expectations**

B2.3 plan and conduct an investigation, involving both inquiry and research, into how a human activity affects soil composition or soil fertility (e.g., changes to soil composition resulting from the use of different compostable materials, organic or inorganic fertilizers, or pesticides), and, extrapolating from the data and information gathered, explain the impact of this activity on the sustainability of terrestrial ecosystems [IP, PR, AI, C]

### **Hook:**

Engagement Activity—

Students will work in small groups. They will read and summarize 1-2 paragraphs in either the article “Dirt Poor” (Bourne, 2008) <https://haitireshapecenter.wordpress.com/2008/08/22/article-on-rice-and-the-soil-in-haiti/>

Paragraph to be summarized will be assigned by the teacher. Once summary is complete, students will share their summary of the article with the class using a shared google doc or shared google slides and present to the class by individual groups.

**Group Presentation:** As a large group, chronologically (paragraph 1 first, paragraph 2 second, etc.) go through the summary so that all students get an understanding of the topic.

Alternatively you can watch the TEDx video “Soil -- from dirt to lifeline” Fred Kirschenmann at TEDxManhattan (<https://www.youtube.com/watch?v=VOblitSe3K0>)— (Video duration 15:19)

Have students use the following prompts when watching the video. Students need answer only one of the questions.

(Facing history <https://www.facinghistory.org/resource-library/teaching-strategies/3-2-1>, n.d.)

1. List three things you learned from the video today.
2. What questions, ideas, and feelings did this video raise for you?
3. What was your favorite moment of video? Why? What was your least favorite part of video? Why?
4. Evaluate the video. What did it do well? What should the video have done differently?
5. **3-2-1 Format:**  
**Three** things that they have learned from this video.  
**Two** questions that they still have.  
**One** aspect of the video that they enjoyed.

**Lesson:** Note on soil on PowerPoint—see attached

### **Activity: Examining soil layers to determine the best types of plants for the area**

As we learned in the lesson, the type of soil and the depth of the different layers of soil, determines what types of biodiversity and ultimately the type of plants that will grow in an area. We also learned that sometimes soil has to be amended to help support various types of biodiversity depending on its intended use. For your final project, you will use the soil data from the nearby location that you intend to restore. You will then decide whether or not the soil has to be amended to better support your modification plan. Information should be placed in a logbook to support the final project.

**Purpose:** To determine the depth and types of soil present in the restoration area based on soil sediment patterns.

### **Materials**

- 1L Mason jar and lid
- Trowel
- Restoration area soil sample

- Tap water
- Pencil
- Ruler
- Calculator
- Soil type key (see attached figure below)

### Procedure

1. Using the trowel, students can get soil from surrounding area or alternatively teacher can get trowel full soil sample (approximately 6 inches deep).
2. Soil is then placed into a 1 L mason jar until the jar is 1/3 to a ½ way full.
3. The remaining jar is filled with water. Tap water is sufficient for this purpose.
4. Cover the mason jar with a lid and shake the jar for 30s to 1min until water is well mixed with soil.
5. Place the jar in an undisturbed area overnight and the following day.
6. Examined for the soil type and the depth of that soil is present in the sample.

### Observations

Using the soil key, determine the soil types that your sample contained

Soil Type	Depth (cm)
Clay	
Silt	
Sand	
Loam	

### Analysis

1. Divide layer height by total soil height and determine the percentages of the types of soil in the sample.  
(<http://www.rainbird.com/homeowners/understanding-your-soil>)

Soil Type	Depth (cm)	Percentage of each type of soil
Clay		
Silt		
Sand		
Loam		

2. What type of soil is your sample mostly made of?
3. Using the chart above what are some of the benefits of your soil? What are some of the drawbacks of your soil?
4. Using the internet research how your soil has to be amended to support the particular type of plants that you want to place in your restoration plan?

### Evaluation

Student Criteria	Exceeds expectations	Met expectations	Has not met expectations
I can identify the soil types in the restoration area.			
I can identify how the soil has to be amended to improve health of the ecosystem.			

### Extensions

1. Test soil for nutrients using nitrogen, phosphorus and potassium (NPK) kit?
2. Examine how composting is done. As a class create a vermicompostor or have students have a one week compost collection project.

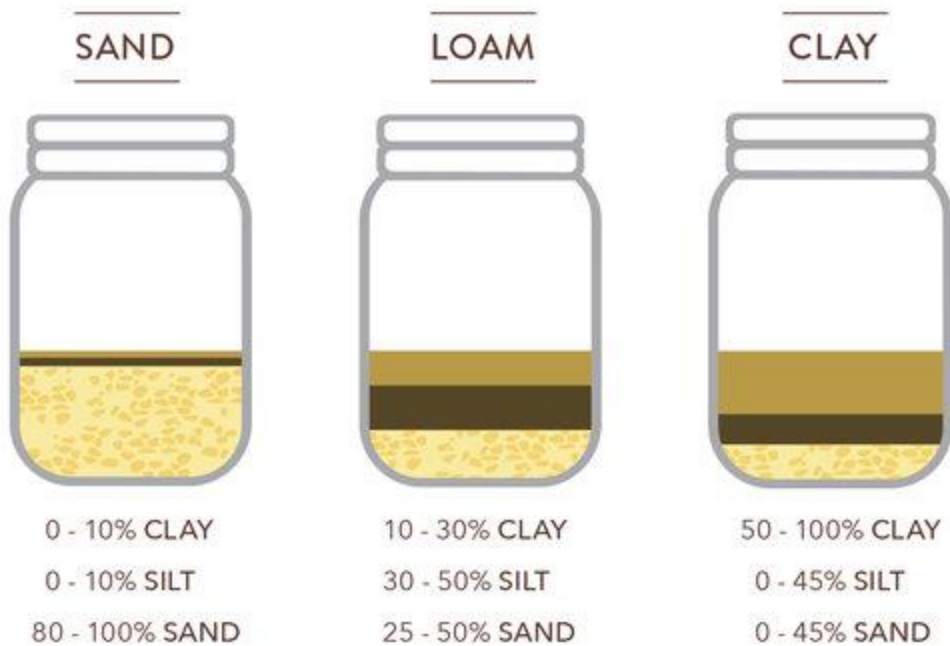
## References

(n.d.) <https://www.facinghistory.org/resource-library/teaching-strategies/3-2-1>

(n.d.) <http://www.rainbird.com/homeowners/understanding-your-soil>

Bourne, J.K., (2008) "Haiti Soil" National Geographic 30 September, 2008 Retrieved from <https://www.oursoil.org/national-geographic-haiti-soil/>

Kirschenmann, F. (2012) "Soil -- from dirt to lifeline" Tedx Talks retrieved from <http://www.tedxmanhattan.org/2012talks>



SOIL TYPE	SOIL TEXTURE	SOIL COMPONENTS	INTAKE RATE	WATER RETENTION	DRAINAGE EROSION
Sandy soil	Coarse texture	Sand	Very high	Very low	Low erosion Good drainage
		Loamy sand	High	Low	
Loamy soil	Moderately coarse	Sandy loam	Moderately high	Moderately low	Low erosion Good drainage
		Fine loam	Moderately high	Moderately low	
	Medium texture	Very fine loam	Medium	Moderately high	Moderate drainage
		Loam	Medium	Moderately high	Moderate drainage
		Silty loam	Medium	Moderately high	Moderate drainage
		Silt	Medium	Moderately high	Moderate drainage
	Moderately fine	Clay loam	Moderately low	High	
		Sandy clay loam	Moderately low	High	
		Silty clay loam	Moderately low	High	
Clay soil	Fine texture	Sandy clay	Low	High	Drainage Severe erosion
		Silty clay	Low	High	
		Clay			