Is It a Wetland? Soil Percolation Teacher's Guide

Subject: Integrated Science (Life; Earth-Space; Physical)

Topic: Characteristics of Wetland Soil and soil percolation rates

Summary: Students will examine and classify two different soil profiles along the nature trail/boardwalk and determine whether or not the soils are characteristic of wetlands or not.
Students will examine the percolation rates of surface soil at the same locations. Percolation rate will be related to soil particle size and recharge and runoff rates.

Objective(s): After completing the field lab, students will be able to:
1. Identify characteristics of wetland soil
2. Use a Munsell color chart to identify specific soil classifications
3. Calculate percolation rates

Ecosystem(s): Hammocks; Pinelands; Freshwater Wetlands

Equipment (items per group):

- 1 x Munsell Soil Color Chart
- 1 x Auger/Spade
- 2 x large water jugs
- 1 x stopwatch
- 1 x Table
- 1 x Spotlight or flashlights
- 1 x GPS
- 1 x Meter stick
- 1 x White Posterboard/paper
- 1 x large coffee can open on both ends
- 1 x liter graduated container

Background:

1. **Reference Materials**: Soil profile and horizons introduction, Wetlands of Florida (poster), *Wetland Soils in Living Color, Part I* (Project WET), sedimentation tube, Get the Groundwater Picture (warm up) (Project WET)
2. **Equipment Training**: auger, meter stick, Munsell Soil Color Chart
3. **Vocabulary**: wetland, soil profile, weathering (mechanical & chemical), humus, soil horizon, texture, percolation

Procedure (Engage; Explore; Explain)

1. Students for this activity are divided into two groups. Both begin at the wetland soil site.
2. Ask the question: Where does a wetland begin, and where are its boundaries? What environmental factors define it?
3. Hook: We have been given several Cypress trees to plant at ISSP and they must be planted in a wetland area. Our job today is to study the soil in several areas to determine what area is the wetland and where we should plant our trees.
4. Group One examines a soil profile dug in advance with a meter stick placed vertically inside.
5. Students take turns examining the face of the pit and identifying the different horizons they observe in the soil.
6. A flagging stake will be used to mark each observable layer. Flags should be inserted beside the yardstick to make recording the depths easier. Record depth in centimeters from the surface where each horizon begins and ends.
7. Remove a handful of soil from each layer and placed on a poster board in order and label each. Record the color of each soil layer.
8. Group 2 examines the sample with the *Munsell Chart* to determine the presence of any wetland soil colors.
9. Complete the other observations listed on the data sheet. For texture spray each sample with water, rub a small amount between the fingers and record texture/content
10. Clear loose leaf-liter near the dug hole to expose soil surface, but try not to disturb the soil surface.
11. Insert one end of the coffee can approximately 5 cm into the soil
12. Pour 500 ml of water into the can and begin the stopwatch. Stop the stopwatch when the standing water is no longer visible and only the soil surface is visible. Record the time. This is the Dry Percolation Measurement.
13. Repeat the measurement a second time--now that the ground is saturated. This is the Wet (saturated) Percolation Measurement. Record the time.
14. After 15 minutes, groups "a" and "b" change places and repeats soil examination.

Sunshine State Standards:

Science: SC. A.1.3.1; SC.D.1.3.1-4; SC.G.1.3.4-5; SC.G.2.3.2-3; SC.H.1.3.4, 6; SC.H.2.3.1
Language Arts: LA.A.1.3.3; LA.B.2.3.1; LA.C.1.3.1
Mathematics: MA.A.1.3.2; MA.B.4.3.2; MA.D.1.3.2; MA.E.2.3.1
Social Studies: SS.B.2.3.8, 9

Is It a Wetland? Soil Percolation Student Data Sheet

General Information

Full Name:		Date:	
School (teacher):		Time:	

Hypothesis: If I measure several properties of soil in two different locations, than I hypothesize that the soil properties (choose one: will/ will not) distingue wetland soil from the other locations because…

_____

_____

Field Observations/Measurements/Data

Location #1: Latitude: Longitude:

Layer	**Depth** (in cm from surface)	**Color**	**Munsell Chart** (is color present on Munsell Chart? yes/no)	**Moisture/ Dampness** *	**Texture/ Content** **	**Other Observations** (Leaf liter, smell, etc)	**Dry Percolation time**	**Wet Percolation time**
1st								
2nd								
3rd								

Location #2: Latitude: Longitude:

Layer	**Depth** (in cm from surface)	**Color**	**Munsell Chart** (is color present on Munsell Chart? yes/no)	**Moisture/ Dampness** *	**Texture/ Content** **	**Other Observations** (Leaf liter, smell, etc)	**Dry Percolation time**	**Wet Percolation time**
1st								
2nd								
3rd								

* **Wet or Dry**: Wet = if water squeezed out; Damp = if soil holds shape; Dry = if sample falls apart after being squeezed
** **Texture**: Gritty = sand; Slippery = silt; Sticky = clay; or some combination sandy-silt

Is It a Wetland? Soil Percolation Assessment

1. Which site had the most moisture in the soil? Which horizon at that site contained the most moisture?

2. Look at your wet and dry percolation times for site 1. Calculate the rate of percolation for both wet and dry soil using the formula PERCOLATION RATE = .5 LITERS/ TIME. Do the same for site 2.

3. Wetlands are areas that are neither fully terrestrial nor fully aquatic. Based on your data, which site is considered a wetland? What specific data allowed you to draw this conclusion?

4. When you visit the beach you find very moist sand. Why do we not find soil at the beach? Would you expect to see horizons if you dug a hole at the beach? Why?

5. If you owned the property you examined today, why might it be important to know which portions were wetlands?

6. Based on what you learned, where else might you be likely to find wetlands?

Lab Performance	EXCELLENT	GOOD	FAIR	POOR
Follows lab procedures carefully and fully.	10 - 9	8 - 7 - 6	5 - 4 - 3	2 - 1 - 0
Uses laboratory time productively and stays on task.	10 - 9	8 - 7 - 6	5 - 4 - 3	2 - 1 - 0
Works well with partners.	10 - 9	8 - 7 - 6	5 - 4 - 3	2 - 1 – 0
Facilitator Signature:				

Is It a Wetland? Soil Percolation Portfolio Journal Prompt

Pretend that you have been hired by a contractor to choose a site for an organic vegetable farm. As a soil scientist, you use almost all of your senses to classify soil types. Explain how you would gather your data--be specific about what senses you would use. Why might you want to take along a team of scientists to record their own observations?