Earth's Surface: The Fallen Log — Teacher's Guide

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

Topics: Decomposition, soil formation, nutrient cycling (carbon cycle), microhabitats

Summary: Students will examine and compare fallen logs and learn about decomposition, nutrient cycling, microhabitats, and soil/humus formation

Objective(s): After completing the field lab, students will be able to:
1. Identify different micro-habitats in fallen logs
2. Identify how the activities of organisms affect soil formation
3. Describe the process of decomposition in creating rich soil
4. Explain how carbon moves from the atmosphere to trees and back

Ecosystem(s): Hammocks; Pinelands; Upland

Equipment (per group):

- 2 x Clear containers with lids/Petri dishes
- 3 x Clear plastic bags
- 1 x Hand Lens or field microscope
- 1 x GPS
- 1 x Field guide on insects
- 1 x Field guide on fungi
- 3 x Tweezers/forceps
- 1 x Thermometer (optional)
- 1 x Soil Thermometer

Background:

1. Reference Material: Introduce or review the carbon-oxygen cycle, review the role of bacteria in decomposition, review the role of decomposition in creating rich soil
2. Vocabulary: photosynthesis, respiration, decomposition, fungus, bark, humus, microorganisms, plants, carbon cycle, decomposers, fossil fuels
3. Equipment Training: Microscopes (if used), "magiscopes"

Procedure (Engage; Explore; Explain)

1. Bring students to a location with previously identified dead logs (preferably one recently dead and one heavily decomposed).
2. Hook: You and your best friend are walking in the woods on a beautiful fall day. You see two fallen trees lying near each other. You friend kicks one of the trees--it immediately falls apart, almost like dust!! You decide to kick the other tree but (OUCH!!) you hurt your foot and the tree does not even move! We are going to examine two different trees and see what could have caused these drastic differences and how this relates to our unit on earths surface (soil)
3. Ask the Question: "What would the area (forest, woods) look like if logs (or any plants or animals) did not decompose?"
4. Problem: what makes the soil at ISSP so rich and full of living trees/plants?
5. Divide the students into two groups. Each group should examine a log and complete the questions on the data sheet. Have the students collect interesting and small items in the clear containers for viewing under the field microscopes.
6. After the students have completed the data sheets and examined items (including at least one fungus) under the field microscope, have them switch and examine the other log.
7. After the students have examined both logs, regroup and go through the assessment questions.
8. At this point you can introduce the life cycle of a tree. Describe the role of decomposers in the cycling of nutrients and focus on the carbon containing woody tissue of trees. Introduce the cycling of carbon by describing how carbon moves from the atmosphere to wood in the tree (through photosynthesis), then follow three paths after the tree dies: 1) decomposes and return to atmosphere through respiration of decomposers, 2) burns returning carbon to the atmosphere as smoke, and 3) is buried under sediments and over time and with the right geologic conditions is converted to hydrocarbons like coal, oil, and gas.

Sunshine State Standards:

Science: SC.D.1.3.2, 4; SC.G.1.3.3, 4, 5; **Language Arts**: LA.A.1.3.3; LA.B.2.3.1; LA.C.1.3.1
Mathematics: MA.D.1.3.2; **Social Studies**: SS.B.2.3.6; SS.B.2.3.9; SS.A.1.3.2

Earth's Surface*:* The Fallen Log Student Data Sheet

General Information

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

Hypothesis: If two trees are found on the ground after they have fallen, then I (will/will not: circle one) be able to tell which tree has been dead for a longer period of time because_____
_____

Field Observations/Measurements/Data

Item	Log #_____	Log #_____
Is the log wet or dry? • On top: • On bottom:		
Is there bark on the log? What is its condition?		
What kinds of plants are growing on the log?		
What kinds of animals are on the bark?		
What kinds of animals are under the bark?		
What kinds of animals are under the log?		
What do the animals you see appear to be doing?		
What evidence of animal activity do you see on or around the log?		
Is the wood hard or soft (soft can be easily broken by hand)		

Earth's Surface*:* The Fallen Log — Assessment

1. On which log do you see more animal activity? Why?

2. Compare the two logs. Which one had more plant live growing on it? Why?

3. Which tree has been dead the longest time? The least time? What makes you think so?

4. How would forests be different if trees were cut and removed before they died and fell?

5. What is the relationship between decomposers and rich soil?

6. Imagine that your mom and dad are looking to grow a vegetable garden this year. Describe land/soil features that would help them grow the best vegetables.

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:				

Portfolio Journal Prompt:

In the forest, decomposing plants and animals eventually add to the fertility of the soil so other plants can grow. Before you begin writing, think about how this continuous cycling of matter might take place under a single tree. Now, explain how this ecological concept might relate to the Chinese saying, "The fallen leaf returns to its roots."

Complete the Carbon – Oxygen Cycle concept diagram below