Ecosystem Ingredients Teacher's Guide

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

Topics: Abiotic Environmental Factors, Ecosystems, Microenvironments

Summary: This lab examines the influence of non-living or abiotic (temperature, light, water, salinity, wind, etc.) factors on plant assemblages by comparing micro-environmental conditions at different locations.

Objective(s): After completing the field lab, students will be able to:

1. Recognize abiotic versus biotic factors
2. Explain how abiotic factors influence the living components of an ecosystem
3. Use equipment to measure, record and analyze abiotic factors in SI (metric units)

Ecosystem(s): Beach Dune; Maritime tidal swamp; Coastal Strand; Maritime Hammock; Mesic Flatwoods

Equipment:

- Data sheet
- Weather meter (1/group)
- Thermometer (1/group)
- GPS (1/group)
- Digital Soil Thermometer (1/group)
- Digital Camera (1/group) (optional)
- Refractometer
- Vegetation type ID sheet (1/group)

Background (Pre-field Classroom Activity)

- Reference Material:
- Vocabulary:
- Equipment Orientation:

Procedure (Engage; Explore; Explain)

1. Ask students why some plants and animals live in some areas but not in others. Explain that in any given place there are two general categories of ingredients: 1) those things that are living (e.g., plants and animals) and 2) those things that are not living (e.g., temperature, water, salinity, wind, elevation, etc.). Explain that the non-living factors (also called abiotic factors) influence what types of living things can survive in a given area. Some non-living factors are more important in some areas than they are in others. Ask the students to formulate a hypothesis about which non-living factor they think influences which types of plants can or cannot grow in this area.
2. Explain to students that they will examine and compare these ingredients (non-living factors) at three different locations.
3. Assign two or three students to each of the instruments being used (GPS, weather meter, thermometer, soil thermometer, vegetation guide) and describe the proper use of the equipment. There should be three sets of the equipment.
4. Divide the group into three with each group having one complete set of equipment. Explain that they will each start at a different location and will move to the other locations after 7minutes. Each pair should be responsible for measuring and recording the same parameter at each location.
5. At the end of the boardwalk, students should copy the measurements of the other parameters from the people in their group so their data sheets are complete.
6. Students should answer the discussion questions at the bottom of their Data Sheet.

Sunshine State Standards

Science: SC.D.1.3.4; SC.D.2.3.2; SC.G.1.3.2; SC.G.2.3.2; SC.H.1.3.7; 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.4.3.1; MA.B.4.3.1
Social Studies: SS.A.6.3.2; SS.B.2.3.9

Ecosystem Ingredients Student Data Sheet

General Information

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

Student Hypothesis and Rationale

If some non-living factors are more important in determining what plants can or cannot survive in this area, then I think that (choose one: temperature, humidity, rainfall, or wind) is the most important non-living factor affecting plant life, because _____.

Field Observations/Measurements/Data

"Ingredient" (units)		**Location 1**	**Location 2**	**Location 3**
GPS	Latitude:			
	Longitude:			
Sunlight at ground level (lux)				
Air temperature at ground level (C)				
Wind speed at ground level (mps)				
Humidity at ground level (%RH)				
Soil Temperature (C)				
Water (water is visible; soil is damp; soil is wet; soil is dry)				
Number of plant types present (refer to plant type chart)				

Ecosystem Ingredients Assessment

1. Which non-living factor differed the most from site to site? Which differed the least from site to site?

   Most:

   Least:

2. Which ecosystem had the greatest variety of plant types and how many more plant types did it have than the next highest location?

3. Was your hypothesis supported by your data? Whether your hypothesis was supported or not, what conclusions or inferences can you make based on your observations, measurements and results?

4. If you were in a mountainous area in the USA and water availability, elevation, slope, temperature, humidity, wind speed and nutrient availability were all constant, why might plants be different on a south facing slope versus a north facing slope?

5. Give an example of how people influence or affect abiotic conditions on a micro-level and a global level.

Portfolio Journal Prompt

Farmers influence abiotic conditions to produce more crops. If you could design your own farm and could adjust the abiotic conditions any way you wanted, what would your farm look like (describe which abiotic conditions you would change and how you would change them.).

Ecosystem Ingredients *Reference Chart*

Sea Oats

Sea Blite

Seashore salt grass

Cord grass (Spartina)

Sea Rocket

Mangroves

Beach elder

Sea purslane