Ecosystem Survey Using Classification and Plant ID

Summary

Scientists use many tools to evaluate the health of a habitat. One way to classify and determine the health of a habitat is to identify the organisms that live there and compare those to other habitats. To do this biologists use identification keys. In this exercise students will use identification keys to identify plants in various habitats and determine adaptations for success / evolution of different species.

Time Frame

1 class periods of 60 minutes each

Group Size

Small Groups

Materials

- Plant Identification key
- Activity Sheet
- Meter tape
- Meter sticks
- Trowels
- Graph paper
- Rulers
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- Optional Materials
- Soil pH test kit OR baking soda and vinegar
- Soil nitrate test kit
- Temperature probe OR thermometer
- Soil moisture probe OR tactile test

Background for Teachers

Identify an area suitable for habitat evaluation. The area should contain several micro-habitats. These may include riparian, shrub, grass, forest, desert. Habitat alteration is both a natural and human-caused phenomenon. It is best to have areas that have been altered by nature &/or man (land slide, development, restoration).

Groups will explore two micro-habitats. The difference between these two sites is the time each has had to recover from human-caused alterations. If possible identify micro-habitats that represent different stages of succession (changes in the structure of an ecological community) and it is the students job to determine how these two sites differ and the adaptations of organisms to survive different environmental pressures. .

In this project students will learn to identify plants, identify adaptations to micro-climates and make biodiversity estimates (number of species), measure other indicators of habitat health (moisture, temperature, etc), and compare adaptations and biodiversity data to the other indicators of health.

Student Prior Knowledge

Students should be familiar with how to use a dichotomous identification key and the following vocabulary:

- Biotic

Abiotic
Species richness
Biodiversity
Adaptation
Evolution
Classification
pH
Nitrate
Transect
Correlation
Habitat
Invasive species
Habitat alteration
Abundance

Intended Learning Outcomes

1. Use Science Process and Thinking Skills
   a. Observe objects, events and patterns and record both qualitative and quantitative information.
   b. Use comparisons to help understand observations and phenomena.
   d. Select and use appropriate technological instruments to collect and analyze data.
   3. Demonstrate Understanding of Science Concepts, Principles and Systems
   a. Know and explain science information specified for the subject being studied
   d. Solve problems by applying science principles and procedures.
   4. Communicate Effectively Using Science Language and Reasoning
   a. Provide relevant data to support their inferences and conclusions.
   b. Use precise scientific language in oral and written communication.
   5. Demonstrate Awareness of Social and Historical Aspects of Science
   a. Cite examples of how science affects human life.

Instructional Procedures

- Intro to two sites
  - Prior to beginning this station, students should be introduced to the two sites where the project will focus. (Hopefully two sites moving along a "biodiversity gradient" from less to more species).
- Intro to classification, adaptation and evolution
  - Briefly describe the difference between them and give examples
- Intro to species richness
  - Explain that one biotic measure they will use today is the number of species in a location. The scientific phrase for this is Species Richness.
- How to use a plant identification key
  - Point out that when using a dichotomous key, users are always given two and only two choices at each step. Through a series of dichotomous choices students will arrive at a species identity through a process of elimination
  - Give a brief demonstration using a key
- How to use probes or tactile soil testing
  - Demonstrate how to prep soil, place probes, and read values
- How to use pH and nitrate kits (kits are available for free check out from USU County Extension Offices)
  - Show the students the instructions and briefly outline the process of mixing different

reagents with the soil

How to conduct a transect sample

Demonstrate that at each sample site students will place two meter sticks at 90 degrees (perpendicular) at the 50 cm mark of each meter stick. Explain how they will identify the closest plant in each of the quadrants created by the two meter sticks.

Collect data using student data sheet

Students will then be broken up into 4 groups. Within each of these groups:

two students should focus on identifying and counting species in each location

two students should focus on taking measurements with probes and test kits (soil pH, nitrate, temperature, moisture)

one student should be a recorder and document all findings

group roles can change between sites

Groups will spend 30 minutes collecting data in each of the two or three chosen locations. Students should be given about 10-15 minutes per site

Calculate results

Graph Species richness to various abiotic factors / micro-climates

Once students have collected their data, it is important that they be able to illustrate their findings in a very clear way so that others can understand their work. Remember, the goal of this project is to use classification keys and determine how the organisms adapted / evolved for each sites.

Using graph paper, graph success (species richness) of each species to disturbances, restoration and invasive species.

Compare results to other group. Use this information to answer the assessment questions on the student worksheet.

Extensions

Group presentations of findings

Assessment Plan

Use the attached worksheet as an assessment tool.

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