Habitat Alteration Module: Habitat Succession

Summary

This activity is part of the TGLL Habitat Alteration Module. This is a long-term project, ideally spanning from 2-3 months. This project will involve observing habitat succession at sites that either vary naturally, or at sites that are experimentally manipulated by students (human alterations).

Main Core Tie

Science - Biology

Standard 1 Objective 3

Additional Core Ties

Science - Biology

Standard 5 Objective 2

Time Frame

10 class periods of 30 minutes each

Group Size

Small Groups

Life Skills

Aesthetics, Thinking & Reasoning, Communication, Social & Civic Responsibility, Systems Thinking

Materials

- Camera
- Rulers
- Soil kits or use vinegar and baking soda to test pH
- Fencing or Flags
- Soil temperature and moisture probes or use regular thermometer and tactile analysis
- Data sheets
- Soil (optional)
- Soil nutrients (optional)
- Native seeds (optional)
- Grow lights (optional)
- Soil pots (optional)

Background for Teachers

This activity is part of the TGLL Habitat Alteration Module. For this activity, it is important to teach part one of this module, "What is a Habitat," first. This activity will run between 2-3 months, and should be initiated either at the start of the school year, or in the spring (during the plant growing season) in order to avoid the cold winter months (plant non-growing season).

The instructor should also identify potential sites at which to conduct the activity (either indoors or outdoors) in accordance with school regulations.

Background Information: A habitat is the area in which an organism lives and the environmental

(biological and physical) factors that surround it. Habitat alteration is the process of environmental change in a habitat. Habitats are always undergoing change and changes can be caused by physical processes (such as earthquakes, changes in climate) or by the activity of organisms (such as beavers altering stream flows). Changes can be subtle, such as a woodpecker drilling a hole in a tree, or extreme, such as human conversion of vast tracts of rainforest to agricultural land. Humans are ecosystem engineers; an ecosystem engineer has a proportionally large effect on the environment around them. These effects can be both intended (such as logging forests to gather resources) and unintended (such as increasing erosion and soil run-off in that same area). Habitat alteration can generate numerous physical and biological consequences, such as altered ecosystem properties (e.g. movement of nutrients) and changes in biodiversity.

Habitat succession is a type of habitat alteration that refers to more or less predictable and orderly changes in the composition or structure of a habitat, including its physical (e.g. soil nutrients) and biological characteristics (e.g. type of plants and species diversity). The trajectory of succession can be influenced by site conditions, by the interactions of the species present, and by other factors such as availability of seeds. In this activity students will explore habitat alteration by altering the physical environment and monitoring the habitat succession (physical and biological change) that takes place.

Student Prior Knowledge

Students need to understand how to measure biodiversity (i.e. the ability to differentiate plant and insect species and count their numbers), how to measure plant growth rates, how to measure soil characteristics using soil kits or use tactile analysis (moisture content, composition -clay, silt, sand), how to measure soil temperatures using temperature probes, and how to "identify" or "create" different habitat types.

Intended Learning Outcomes

1. Use Science Process and Thinking Skills
    a. Observe objects, events and patterns and record both qualitative and quantitative information.
    e. Plan and conduct experiments
    h. Construct models, simulations and metaphors to describe and explain natural phenomena.
    3. Demonstrate Understanding of Science Concepts, Principles and Systems
    a. Know and explain science information specified for the subject being studied.
    4. Communicate Effectively Using Science Language and Reasoning
    a. Provide relevant data to support their inferences and conclusions.

Instructional Procedures

This is a specific example for the succession of grasses in a schoolyard. See extensions for other examples and ideas how to develop this project.

Select two or more grassy sites (1 meter squared) in the schoolyard/lawn and mark them off using flags or tape or fencing.

After discussing with the class, select an alteration to apply to one of the sites (e.g. seeding, adding fertilizer, removing all vegetation, etc).

Identify which variables to record.

In addition, discuss the amount of maintenance for each site (i.e. how much water, weeding, etc).

Demonstrate how to perform maintenance and how to apply treatments so that students can do these themselves in the future.

Prepare datasheets or notebooks. For examples on how and what data to collect see attached excel file. For plant and insect identification, it is okay to identify based on how they look. That

is, the exact species name is not important, but, the number of different kinds is.
On the first day of the experiment, take photos of the two sites and have the students take notes and then apply treatment.
Pick one day a week to perform maintenance and take notes, measurements and photos on the plot (about 30 mins). Continue for about 10 weeks.
In addition to working on the plots, students will use in-class time to prepare ongoing graphs, tables and a photo series to keep track of the plots.
To summarize the project and assess student performance, assign each variable to a small group of students. The students will then present a graph, table, or photo to the class demonstrating the differences or similarities between plots. Tell the students to focus on an explanation of why they see a difference.
Rubric for lab report assessment portion below.

Extensions

Other potential sites
- Planter beds
- Indoor pots under grow lights
- Larger sites
- Many small sites (one for each pair of students)

Other potential variables (locations or treatment)
- Shaded vs not shaded
- Riparian vs inland
- Natural areas vs human altered
- Watered vs unattended
- Fertilized vs unattended
- Disturbed (ripping up weeds) vs undisturbed

Rubrics

Science Lab Report Rubric

Bibliography

- Wikipedia - Habitat
- Wikipedia - Ecological Succession

Authors

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