HU GK-12 Activity

TITLE: Live from César's Palace it's… Natural Ecosystem Restoration!

PREPARED BY: Jennifer Perrella & Thomas J. Hardy

DCPS STANDARDS: E.3.4, E.3.10

GOALS:

1. Scholars will be able to explain the process of succession in aquatic and terrestrial ecosystems.
2. Scholars will be able to explain how climate change, human activity, and colonization of non-native plant species influence ecosystem equilibrium.
3. Scholars will understand how local disturbances and succession act in a cyclic fashion causing ecosystems to fluctuate in and out of equilibrium.

OBJECTIVES:

1. Given a cup filled with spring water, grass, soil, and leaves, scholars will observe and document the changes that occur in a microscopic community over time.
2. Given a tour of the outdoor classroom at Chavez, scholars will make observations on the differences between primary and secondary growth.
3. Based on the above observations, scholars will classify the types of plants present (i.e. grasses, trees, shrubs, weeds, etc.) in a primary versus a secondary growth habitat.

PREREQUISITE KNOWLEDGE:

Background

The organisms in an ecosystem work similarly to the parts of a machine, each assists in cycling nutrients for use by other organisms. Each organism plays an important role in maintaining whole ecosystem functioning. Interactions between species and abiotic physical factors maintain the ecosystem in a dynamic balance. Even in the most stable ecosystem, however, change is inevitable. Change usually occurs gradually, but sometimes it may be sever, such as fires, storms, or landslides. These types of disturbances can cause rapid changes. Many scientists believe that ecosystem stability undergoes constant change. Although change occurs continuously, the ecosystem maintains the flow of energy and nutrient cycling necessary for life.

Change is a fact of life in all ecosystems and will always occur. In response to change, living things have evolved to be able to survive and adapt to it. As an environment changes, the community living in that environment changes as well. In many cases, different communities follow one another in a definite pattern in a process called succession. Stability is measured by how easily a disturbed ecosystem is able return to its original condition. Thus, a holistic view of an ecosystem involves observing changes; how organisms respond to this change and the length of time it takes to recover.

ESSENTIAL QUESTIONS:

1. What changes do you suppose would happen to a microscopic community over time?
2. In what ways may nonnative species affect succession?
3. How do the plant communities in the Chavez parking lot differ from those in the outdoor classroom?

LABORATORY MATERIALS:

Part 1 – Aquatic succession experiment

Paper, tap water, Styrofoam cup, soil, grass, dropper, glass slide, cover slip, microscope, pH paper, and leaves.

Part 2 – Outdoor field activity

An empty parking lot, a habitat with noticeably more trees and older growth, field notebooks, pencils, and a field guide to the identification of North American plant species.

DIFFERENTIATING INSTRUCTION:

English language limited scholars will be paired with bilingual scholars for this activity. The scholars will be broken into two groups and Thomas give one tour in English and the other in Spanish. Each scholar will make observations at his/her level of understanding.

RATIONALE:

This activity is designed to demonstrate that ecosystems have cyclic fluctuations around a rough state of equilibrium and change results from shifts in climate, natural causes, human activity and the colonization of non-native plant species. These cyclic fluctuations may cause native species to temporarily disappear but they are later able to re-establish themselves through the process of succession. This activity will help scholars understand the process of succession and reinforce the concept of ecosystem equilibrium and the various factors that influence it.

RESEARCH ACTIVITY:

Part 1 – Aquatic succession experimental set-up

1. Fold a piece of lined paper in half vertically creating two columns. Label one-column “Date” and the other column “Observations.”
2. Place a small layer about 2 cm thick of soil in the bottom of a Styrofoam cup. Loosely fill the rest of the cup with a mixture of grasses and leaves.
3. Pour spring water into the cup.
4. Place the cup in a cool place overnight.
5. For the next 3-4 classes take 5 to 10 minutes to allow the scholars to examine the water in the cup for signs of living things, such as cloudy water or strong odor.
6. Use a dropper to remove some of the water. Place a drop of it on a glass slide, and put a cover slip over it.
7. Place the slide under the microscope. Start with low power, and focus on some debris. Switch to high power.
8. Record the date in the data table and write down your observations.

9. Count or estimate the number of organisms under one field of view.
10. If available, use pH paper to take a reading of the pH on the first and last day of the experiment.

Part 2 – Outdoor field activity

1. Walk through the parking lot at Chavez on your way to the outdoor classroom.
2. Have scholars make observations on the types of plants observed in and around the parking lot.
3. Once you arrive at the outdoor classroom, have scholars observe the plants in this area.
4. Scholars will compare the plants they observed in the parking lot to those observed in the outdoor classroom.

EVALUATION AND ASSESMENT:

1. Scholars will create posters depicting and explaining the process of succession, both primary and secondary in terrestrial and aquatic ecosystems.
2. Scholars will select a specific nonnative species and will in three paragraphs analyze the fluctuations caused by the presence of that nonnative species.
3. Using an example in current events, (i.e. the wild fires in California), scholars will explain the types of organisms that will re-colonize the area by making a timeline of succession events based on the tree species found in that area.