Watershed Web: A Field Trip

Learning Objective:
To explain succession principles. To observe habitats closely. To define the term "limiting factor".

Grade Levels:
K-2, 3-5, 6-8

Time Required:
One hour

Subjects:
Nature study and science

Materials Required:
- A vegetated area, preferably very wet (pond, stream, or wetland)
- Notebooks or clipboards
- Pens or pencils
- Hand lenses (optional)

Lesson Plan:

Ecology is often described as the study of the distribution and abundance of plants and animals. This definition is incomplete, however, because it fails to emphasize the non-living components of the environment; it also does not highlight the constantly changing nature of ecosystems. The distribution of plants, for example, draws attention to these missing criteria of a definition of ecology, since plants respond dynamically to the conditions of soil and water.

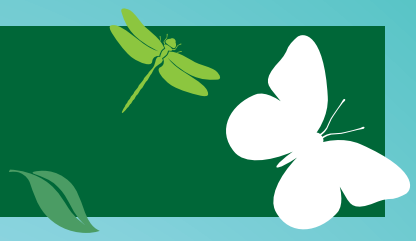
To actually witness succession – the pattern of the establishment and turnover of plant species – would require careful measurements on the same geographic area over decades. However, plant succession can be seen over space, as well as time. A very good place in which to observe a freeze-frame of plant succession is any vegetated area around a body of water, especially if that vegetation slopes down into a pond. Hypothesize with your class how wet the soil is as you travel away from the body of water. *Do streams feed this body of water? Does the air humidity or temperature change depending upon the distance from it? How might these affect the distribution of plants around it?*

Observing at the ground level – better still, with a hand lens – will allow you to gain the perspective of the much smaller organisms that typically inhabit such areas. Before setting out, make sure students are wearing appropriate clothing (long pants, long sleeved shirts, etc.) and that they can identify poison ivy/oak/sumac or other such plants in your area. Crawl with your students in a path away from the water and test your hypothesis. Return to the body of water via a different route and compare your observations (in reverse order). Encourage the children to leave the environment as they found it by not picking any of the vegetation. By discussing the activity with your group before reaching the study area, you can conduct it with a minimum of noise pollution – in quiet – and increase the likelihood of witnessing wildlife, as well.

This setting can offer students of the intermediate and especially upper grade levels an excellent team-working exercise. On one piece of paper, roughly map the physical features of the land, and identify some paths away from the water. Assign a pair of students to each path, with one recording in a notebook (the scribe) what the other (the crawler) observes. The crawler chooses a landmark at a reasonable distance away from the water and then crawls along the ground toward it observing out loud any major changes in plants and soil conditions. Walking directly behind and occasionally re-orienting the crawler, the scribe records in the notebook his or her own number of paces along with any of the crawler's naked-eye, or hand lens, observations.

"Watershed Web" from Nature's Web, National Wildlife Week Educator's Guide (National Wildlife Federation, 1997).

Watershed Web
(continued)



Regroup your students to share and record their observations on the map. What trends in soil conditions and plant distribution do your students notice? Where were plants more sparsely or densely gathered? Were they the same kinds of plants? Can you guess, or do you know, which of these plants tend to grow faster or slower? How might the contours of the land or other physical features, like trees, which might shade non-woody plants, have affected these? Mapping such observations may suggest patterns of plant distribution and soil conditions – a snapshot of plant succession.

Limiting factors are the conditions that most impact how organisms develop and persist. Among animals, a common limiting factor is food. Shading is a factor that limits plant abundance and distribution, since it impedes how plants get the source of their food – the sun. Water limits both animals and plants. If your study area was a stream, this pattern governed by limiting factors may appear simply as strips of plant and soil types running parallel to the streambanks. If your study area was a pond, this pattern of similar plant growth and soil conditions may be a series of rings, since the ground will be drier at greater distances from the pond, and water is a principal limiting factor of plants. Now test this out by sending the pairs, with the crawler and scribe roles reversed, along the parallel strips or rings of similar plant distribution and soil conditions. Can students identify particular zones where only some kinds of plants appear? What characteristics might they share in common?

Extension:
To extend the activity to another level of difficulty, conduct a transect study of collecting data at intervals along a straight path such as apparent soil moisture and pH; or conduct a seedling survey, counting all plants of a certain height (usually, less than 10cm) in neighboring square meter areas. This will give your students field biology practice and show them how ecologists and other scientists constantly apply mathematics, and allow you to quantify your map-making.

