

LESSON 11

Who Lives Here? Plants as Environments

OBJECTIVES

Students will understand that plants provide habitat for animals. Different types of plants provide living conditions for different animals, which may in turn influence other species living in the same area. Changes in vegetation may have cascading effects on animals living in an area as the components of an ecological web.

METHOD

Using equipment made with common, easily-obtainable materials, students collect invertebrates living on local plants. They sort and count the different types they find, and compare *assemblages* of invertebrates on different plant species. Students create an ecological web based on their findings and discuss how changes in vegetation due to plant invasions might have cascading effects on an area.

MATERIALS

- ✎ Insect collecting equipment (any or all of the following):
 - “Shake-it” containers (see attached instructions for making your own)
OR a flat white cloth such as a pillowcase or part of a sheet
 - Sweep nets (make your own using the attached instructions or order from a biological supply company).
 - Small jars, Ziploc® plastic bags, or other suitable containers to temporarily hold invertebrates
- ✎ Hand lenses (enough for each student or to share)
- ✎ Invertebrate identification guides (*Golden* makes easy-to-use and inexpensive guides)

BACKGROUND

Plants serve many ecological functions, including providing habitat for animals. Important but often overlooked animals include invertebrates, which live almost everywhere and play huge roles in the ecological web of life. Invertebrates living on plants may eat plants, parasitize plants, eat others that eat the plants, or pollinate plants, as well as serving as food for reptiles, amphibians, birds and mammals.

The number of different kinds of organisms living in an area is one measure of its *biodiversity*. Generally, the more complex a plant community, the more biological niches available for other organisms, and the greater the biodiversity. Invasive plants may affect which invertebrates live in an area and in turn have cascading effects on other organisms.

Grade level: K-8**Subject Areas:** Biology**Duration:** One 60-minute session or two 30-minute sessions, plus travel time to field site if necessary**Setting:** Classroom and field site with some variety of plant species; this could be in or near your schoolyard.**Season:** Spring, Summer, Fall**Conceptual Framework Topics:** Organisms and environments, interdependence, populations, habitats, classification, biodiversity

PROCEDURE

1. Ahead of Time

Make "Shake-it" collecting containers or sweep nets, or gather white sheets of cloth about the size of a pillowcase. NOTE: Check with students and parents to determine if any students have known allergies to insect bites or stings. You may need to have these students only handle insects in safe, closed containers such as jars or thick bags.

2. Choose the location(s) for your study. Areas with shrubs, bushes or small trees will best be sampled using shake-it boxes or sheets. Areas with grass or small plants will best be sampled with sweep nets. For a more interesting study, you may want to have students compare invertebrates found on different types of plants or in different environments.

3. At your site with your students, tell them that you will be sampling an area to see how many invertebrates live on the plants there. Discuss or review with students what invertebrates are. Ask them how many different kinds they think they might find. Have them predict which kinds of plants or areas will have them most kinds of invertebrates.

4. To collect invertebrates from bushes or small trees, place a piece of white cloth under a plant and shake it to dislodge insects. Transfer invertebrates to jars to examine them. Or use a shaker box. To use, hold the open end of the box under a plant and shake the plant (obviously this will work better for shrubs or large plants such as balsamroot). Tip the box to let insects slide down into the bag. Invertebrates can be examined in the bag or transferred to small collecting jars.

5. To sample using a sweep net, first make certain that the net is assembled and ready to use. If using a homemade net, bend your coat hanger circle so that there is a flat side to your sweep net. A good shape is a triangle with the handle extending from one of the points.

6. Have students practice making a back and forth "figure 8" swing in such a way that the opening of the net is always first to sweep the area.

7. Pick an area as a "practice" site and practice sweep net swings with students. Have each student go back and forth over the area using the "figure 8" motion until a student has swept about a square meter area.

8. Immediately grasp the net about half way up to make sure your captured animals do not escape.

9. While another student holds a Ziploc® bag open, place the net over it, loosen your grasp and turn it inside out into the bag. Carefully shake and remove the net from the bag, making certain to seal it so the animals do not escape.
10. Once you have captured the organisms, you can observe them through the jar or bag and try to: identify their species, family and/or class, or simply sort them into types so that you can see how many different kinds you have found.
11. Explain to your students that this variety of animals is one type of *biodiversity*, the range of different kinds of living things in an area. Discuss whether they think they have found more or less diversity than they expected.
12. Once you have gathered all of the necessary information, release your animals back into the area(s) where you originally captured them.
13. Back in the classroom have your students make an ecological web of all the organisms in the area they can think of that are interdependent, starting with the plants and invertebrates you sampled.
14. Discuss with your students how they think changes in the plant community, such as a weed invasion, might change the invertebrates they would find and the rest of their ecological web.

Extensions

Design and conduct an experiment to compare the number and diversity of invertebrates living in native vegetation to sites with a lot of invasive species.

Making Shaker Boxes and Sweep Nets for Collecting Invertebrates

MAKING SHAKER BOXES:

A shaker box is a tool for easily collecting the invertebrate animals living on plants, many of which would not be seen even in a fairly close inspection of a plant. These are very inexpensive to make and easy to use.

Materials for each box:

- Shallow cardboard box: a file folder box, an 8.5"x11" paper ream box, or a file box top all work well. Any box about 8" wide and 2" to 4" inches deep will work.
- 1 sheet of white paper (optional)
- 1 gallon plastic Ziploc® bag or supermarket produce bag
- Two 1" binder clips, OR tape, OR stapler
- Scissors

Using the box

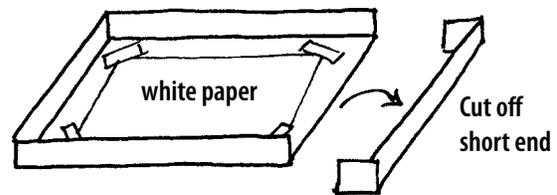
Hold the box under a leafy branch and shake the branch.

When an invertebrate falls into the box lid, tip the lid so that the invertebrate slides into the bag.

Scoop the invertebrate out into a container or keep in it the bag for observation.

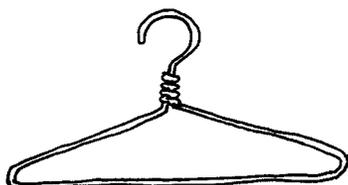
Instructions:

- Cut one short end of the box off
- Unless the box is white and smooth inside, tape white paper to the inside bottom of the box
- Place the cut end of the box inside the mouth of the plastic bag so the box contents would empty into the bag
- Tape, staple or clip the bag onto the box

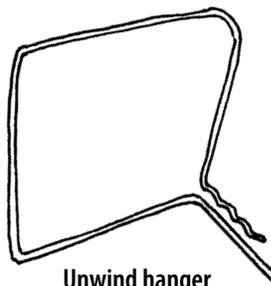


MAKING SWEEP NETS:

You can purchase very inexpensive mesh bags that are used as paint strainers in a hardware or paint store. A pillowcase may also be used. The top (opening) of a bag can then be sewn or even stapled onto a stiff wire (coat hangers work well for this) bent into a circle with the ends of the wires stretched out together. These ends can be fastened to a wooden handle (a dowel or rake handle) with duct tape.



Start with coat hanger



Unwind hanger

