



Maintaining a Balance (Learning Experience #2)

Lesson Plan



Overview

Students will discover how changing one element in a habitat can upset the balance in an established community through the use of a model.

Lesson Essential Question: What are some ways that an exotic species can upset the balance among existing species in a living community?

Objectives

The students will:

- work productively as a part of a project team.
- use a variety of resources to find information.
- make a model of a habitat, with and without loss of sheltering plants.
- predict what will happen when one vital part of a habitat is removed.
- keep accurate and complete written records.

Materials for *Maintaining a Balance* (Learning Experience #2)

- One packet containing one copy of each of the following documents per group:
 - *Gotta Have It* (Student Sheet #1)
 - *Here then Gone* (Student Sheet #2)
 - *New Kid in the Neighborhood* (Student Sheet #3)
- Materials needed for a model of a community with habitat loss, per group.
 - Two (2) 2L colorless soda bottles with tight fitting caps
 - Sand or gravel to cover bottom 2 cm.
 - Water (must be allowed to stand open to the air for at least 24 hours)
 - Two or three freshwater plants with intact roots
 - Two (2) fish that require shelter from plants, e.g. common goldfish
 - Light source: window sill or lamps
 - Fish food appropriate for chosen fish





Materials for *Maintaining a Balance* (Learning Experience #2) – continued

- **OR** Materials for a classroom demonstration of a community with habitat loss:
 - Two (2) 10 gal. glass or plastic aquariums
 - Sand or gravel to cover bottom 2 cm
 - Water left allowed to stand open to the air for 24 hours
 - Five or six freshwater plants with roots
 - Six fish that require shelter from plants, e.g. common goldfish
 - Light source, window sill or lamps
 - Fish food
 - * **OR** Materials for terrariums, using 2L soda bottles or 10 gal aquariums as containers:
 - Substrate: garden or potting soil, several small rocks, leaf litter
 - Plants: herbaceous sun-loving
 - Animals: small invertebrates that prefer cool damp shade, e.g. isopods
 - Pieces of potato for isopod food
 - Light source, window sill or lamps
- * **Note:** The models may be terrariums instead of aquariums

General Materials needed for Learning Experience:

- Notebooks or small binders or folders to be used as journals, one per student
- Black construction paper or dark cloth (optional)

Grade Level 8-12

Subject Areas

Environmental science, ecology, biology, government, economics



Timeline

Teacher preparation: 60 minutes

Learning Experience: 60 minutes; an additional 10 minutes per day is required for student observation of animal behavior and discussion for one week. Students may complete research on observation days.

Setting

Classroom and/or lab

Skills

Read and follow directions for model setup; research in print and online resources; cooperate and communicate with team and classmates; observe and describe animal behavior.

Vocabulary

Abiotic, biotic, community, exotic, habitat, invasive, isopod, niche, non-native, population

Advanced Preparation Required

- Make copies of the student sheets listed, one of each for each project team.
- Gather materials needed for model habitats. The habitats can take many forms:
 - one set of aquariums (or terrariums) for each team, using 2-liter soda bottles**;
 - one demonstration set of aquariums for use by the entire class, using 10 gallon glass or plastic fish tanks;
 - or one demonstration set of terrariums for the class, using 10 gallon glass or plastic fish tanks.

Goldfish may be purchased from a local pet store; isopods (also called pill bugs, sow bugs or roly-polys) may be purchased from a pet store, ordered online, or discovered under rocks or leaf debris in gardens or wooded areas.

**See *Bottle Biology*, Bottle Biology Project, Department of Plant Pathology, College of Agricultural and Life Sciences, University of Wisconsin-Madison, Kendall/Hunt Publishing Co., 2003.



Procedure

1. Post the essential question for the scenario and the learning experience essential question. Ask students to confer with their team and suggest answers to these questions following the completion of *Fishzilla* (LE #1). Student answers, together with an explanation, should be recorded in their science journals and shared with the class. Students will reflect on the essential questions at the end of the Learning Experience.
2. Introduce the learning experience by asking students to confer with their teams and make a list of all of the necessities that a population of organisms must obtain from its environment in order to live and reproduce. Students should record the answers to questions posed in *Gotta Have It* (Student Sheet #1).
3. Facilitate a class discussion, inviting students to share their answers, including where the essential requirements for life might come from and what would happen if one of those essential requirements was no longer available due to the introduction of an exotic species. Record student answers on a chart and post for future reference by the class.
4. Explain that the teams (or entire class) will two models of a simple habitat that includes a substrate, an animal, water (if an aquarium) or air (if a terrarium). One of the habitats will have plants that provide at least one of the requirements found on the class list and the other will not. Students will answer the questions in *Here then Gone* (Student Sheet #2) as the groups plan and construct models and data tables for recording observations. After the models are ready, the habitats should all be provided with a source of light. If the models are placed on a window sill, protect them from extremes in temperatures.
5. Each student should describe the group models in his or her journal and predict what the similarities and differences in the animal's behavior and appearance may be after a week.
6. Each project team will answer the questions in *Here then Gone* (Student Sheet #2). For the next several days, students will observe the animal(s) in the habitats for several minutes, and describe the animal's behavior and overall appearance.
7. Students should notice that the goldfish or isopod in the habitat with plants prefers to hide in the shade and shelter provided by the plants. Ask students to suggest an experiment to confirm that it is the shade that attracts the animals, and record ideas in their journals. (Add equal amounts of food to each habitat.)

8. At the same time each day when students are taking a few minutes to observe the model habitats, they will research an example of a non-native (exotic) species in the local region. Students should describe how the non-native species arrived, its effect on the natural communities of the area, and efforts to control the population (if any). Each team should organize its information on *New Kid in the Neighborhood* (Student Sheet #3). Student groups will compose an article for a school or local newspaper and make a presentation to the class.

