Mini-Ecosystems

Summary

Students will make small-scale environments and will describe interactions between living and nonliving things in their environments.

Time Frame

5 class periods of 15 minutes each

Group Size

Small Groups

Materials

- big glass jars (from restaurants), 2-liter or 3-liter bottles, or aquariums. [The number you need will depend on how many you choose to make.]
- various plants, insects, etc. [Most can be purchased from local pet stores, such as water plants, crickets, meal worms, etc... If not, order in advance from science catalogs.]
- soil and/or pond or stream water as needed.
- reference materials as needed

Background for Teachers

Ideas and materials for different terrariums are listed in the lesson plan. You may prefer to have your students help research, build, and supply what is needed for each terrarium. If you do, plan on taking at least a week on this project. If money or time is an issue, have each class on your grade level make one and rotate the models or keep them in a central place where they can be observed.

Intended Learning Outcomes

- Observe objects and patterns and report conclusions.
- Compare things.
- Explain science concepts.
- Record data.
- Report observations.

Instructional Procedures

Step 1: Read *A Most Unusual Lunch* by Robert Bender to the class. Identify the living and non living things in the book. Discuss the interactions represented in the book (beetle, frog, fish, snake, crocodile, lion). What do you think the beetle ate? (bark, leaves) What ate the beetle? What were the interactions between the various plants and animals? Tell students they are going to build their own small-scale environment so they can observe the interactions more closely.

Step 2: Research and plan desired ecosystems as a class or in small groups. Make a master list of what is needed and make assignments of what to bring or collect.

This type of ecosystem should be self sustaining. All you will need to do is research and include the food each animal needs. If you do not wish to add animals to your ecosystem, make a plant terrarium that waters itself. If you would rather make an artificial habitat, skip to the next step. Here are a few ideas of different types of small scale environments that can be made.

WOODLAND:

- Plants- mosses, small ferns, liverworts, and tiny Virginia Creepers.
- Animals- small toad or salamander.

Ground- small pebbles, charcoal, sand, and soil.
Directions- layer sand, pebbles, and charcoal. Top with a layer of soil. Plant your plants. Then add an animal and its food supply. Observe what happens.

POND:

Plants- Cabomba, Vallisneria, Anacharis, or Elodea.
Animals: guppies, snails, tadpoles, newts, crayfish, or water insects.
Ground- aquarium gravel, charcoal, and sand.
Directions- Put a layer of sand on the bottom, then add a layer of charcoal. Top with a layer of soil. You may add shells, sticks, and stones. Fill with tap water that has been allowed to air out for 1 or 2 days or fill with pond water.

DESERT:

Plants- Pincushion cactus, an opunita, fishhook cactus, or nightblooming cereus.
Animals- desert tortoise or horned lizard.
Ground- potting soil, aquarium gravel, charcoal, and sand.
Directions- mix the soil, gravel, and charcoal together and layer on bottom. Cover with a layer of sand. Add a small dish of water for the animals.

Step 3. Instead of an ecosystem, you can create an artificial habitat for pillbugs, silkworms, mealworms, earthworms, fish, ladybugs, caterpillars, ants, mice, etc. Each group could make their own in a big glass jar. Have groups decide what their animal or insect needs in order to live. Collect materials and prepare an environment that is similar to their natural habitat. You most likely will have to feed your animal.

Step 4. Once you have your materials, begin making your ecosystems or habitats.

Step 5. Observe your mini-ecosystems or artificial habitats for at least a couple of weeks. Instruct students to record daily observations in their science journals. Ask them questions such as:

What were the living things in your environment?
What were the non-living things?
Describe the changes that occurred in your environment during your period of observations?
How does your small scale environment compare to a larger environment?
What question could you ask about interactions between living and nonliving things in the environment that could be investigated by observation?
Did you end up with a balanced environment?
Ask students to write a paragraph describing the interaction of organisms within an ecosystem.

Step 6. When students done making observations be sure they return insects or animals to their natural habitats.

Extensions

Experiment by adding more plants or animals. What happens when more plants are added? What happens when more animals are added? Have students observe over a period of time and record observations in their science journals.

Have students draw and label a food chain for different habitats.

Play Oh, Deer! game/simulation found in the Project Wild manual.

Have students observe what happens to a small squash, apple, or other food item over a period of time. Place the item in a clear plastic container with a lid. Record observations in science journals. Some items may take months to completely decompose, but it is fascinating to watch. Observe as the item is eaten by bacteria, liquefies, and begins to evaporate. You may want to dump the liquid into a flower bed for fertilizer.

Make a decomposition column, fermentation chamber, or ecocolum. Information and directions are in the Bottle Biology book. The price is $15.95 + $3 postage. To order call 1-800-228-0810, fax 1-800-346-2377, or send to Kendall/Hunt Publishing Co. P.O. Box 1840 Dubuque, IA 52004-1840.

Watch any of the Magic School Bus series listed in bibliography or have students read the books.

Assessment Plan

Collect science journals. Look for recordings of observations and an explanation of how organisms interact with their environment.
Go outside or look out a window. Ask students to identify five living and five non-living things they see. Ask them to identify three interactions between living and non-living things that they see. Ask them to predict how a drought would effect the environment they are observing.

Bibliography

Lesson plan originally created by Heidi Kunzler.
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