Little Limnologists

The Greek word "limne" means pool or freshwater marshy lake, thus a "little limnologist" is a small person who studies bodies of fresh water. With the easy-to-follow directions provided, your students will investigate pond life and, just like professional limnologists, publish their findings.

Background

Ponds are bodies of fresh water that are distinguished from lakes by their smaller size and shallower depth. Ponds may be fed by springs, streams, groundwater and, of course, rain and its accompanying runoff.

A variety of plants such as pickerelweed, cattails, water lilies, duckweed, pondweed and coontail live in ponds. These plants, along with phytoplankton (microscopic plants), are the basis of the pond's food chain.

Microscopic animals, or zooplankton, are typically abundant and diverse in ponds. Among these are daphnia and hydra, which can be found in many small water samples.

Although frogs, tadpoles, snakes, turtles and an assortment of fish are the pond animals that seem to get most of the attention, the often missed and sometimes more unusual of the pond's inhabitants are its many "spineless wonders," the invertebrates. The larvae or nymphs of many insects, such as mosquitoes, damselflies and dragonflies, abound in virtually every pond. Other fascinating pond insects include water striders, whirligig beetles, water boatmen and predacious diving beetles. Tiny clams and mussels, snails, worms, amphipods and isopods all live in and around the murky mud bottom. Ponds also attract an array of birds—wood ducks, green herons, prothonotary warblers and mallards—and mammals such as muskrats, beavers and otters. Close inspection of a pond reveals a whole different world.

Procedure

Before the Trip:

1. Visit the site and pond to become familiar with its resources and select appropriate study sites. Meet with staff at the site.
2. With the class, make a list of familiar plants and animals that live in and around ponds.
3. Describe the activity to the class.
4. Divide the class into teams of three to five students.
5. Discuss how to handle pond animals. Hold them gently, promptly put them into containers with fresh pond water for observation and keep only one of each species for study. All animals, insects and larvae should be quickly and carefully transferred to the study pans. Observe but do not touch insects and animals such as predacious diving beetles, water boatmen, snakes, etc., because all can give painful bites.
6. Discuss the use of field guides and how to take good notes for identifying wild plants and animals. With younger students, discuss characteristics of insects, mammals, reptiles and amphibians. Use pictures and illustrations to build students' observational skills and encourage them to pick out similarities and differences among several insects, birds, plants or reptiles.
7. Make three copies of the accompanying Field Notes page for each student. Younger students may use plain paper instead for drawing pictures of the animals or plants.
8. Give a copy to each student to prac-

Grade Levels: 3-6

Objectives

Students will investigate variations in pond inhabitants by:

- *Collecting* specimens from several areas of a pond.
- *Observing* and making field notes about two specimens in detail.
- *Classifying* and identifying the specimens.
- *Organizing* and producing a class "field guide."

Materials

Per team:

- Long-handled, fine-meshed dip net
- 5-gallon bucket
- enamel or plastic dissecting tray
- quart jar or small clear plastic bottles (like medicine bottles)
- magnifying glass
- field guides
- ruler
- pond viewer—one large can, rubber band, masking tape, plastic wrap

Per student:

- boots or old sneakers
- change of clothing (just in case)
- Three copies of Field Notes page
- clipboard
- pencil

When

Late spring through early fall. Daylight hours are suitable. A quiet visit in early morning or evening may provide glimpses of pond visitors and inhabitants such as herons, beavers and otters.

Time Required

Allow at least an hour for pond investigation.

tice sketching and taking descriptive notes about a plant or animal in the classroom or on the school grounds. Discuss the concepts of habitat and animal behavior so students understand these sections on the Field Notes page.

9. Make pond viewers for each team. Remove the top and bottom of large cans, tape the cut edges and use a rubber band to hold a piece of clear plastic over one end. To use, put the covered end into the water and look down through the open end.

At the Park:

1. Near the pond area, find a place to sit. Review procedures, safety tips and respectful handling of animals. Demonstrate the use of the equipment. Three different netting techniques may be used:
   - To catch the quicker animals that are likely to flee (frogs, turtles or minnows), approach the edge of the pond slowly with the dip net ready to scoop them up.
   - To catch slower animals and water plants, reach out into the pond as far as possible with the dip net and drag it along the bottom to scoop up some of the bottom muck, leaves and vegetation. Carefully search through the contents of the net to find an assortment of organisms.
   - In a few locations, the pond may be shallow enough and the bottom firm enough to permit wading. By moving slowly and quietly through the shallows, a variety of animals may be caught that would otherwise be missed. Be sure to inquire about wading conditions with the staff.
2. After the demonstration, break into teams and spread out around the pond. Proceed with collecting. Each team should:
   - Put active animals in buckets half filled with pond water. Put slower animals in pans with about an inch of pond water in the bottom.
   - Pay attention to where in the pond the animals were found (on the surface, in the mud, etc.).
   - Return everything except the specimens to the pond immediately, including globs of mud and leaves. Check the ground for things that might have fallen or wriggled out of the net and return them to the pond, too.
   - Use a jar or a small clear plastic bottle to collect pond water and examine it with a magnifying lens to find minute organisms.
   - Try peering into the pond with the pond viewer.
3. Move among the teams and encourage them to collect a variety of plant and animal specimens. Informally ask students to point out interesting and important identifying characteristics of their specimens and features that seem to be special adaptations for life in and around the pond.
4. After each team has collected from six to 10 specimens, move to a dry (and preferably shady) spot with the specimens. Working alone, each team member prepares Field Notes pages for three or four different specimens, including important identifying features such as:
   - Special markings and colors.
   - Position and numbers of legs, fins, eyes, leaves, etc.
   - Conditions in which the specimen was found, e.g., in mud, attached to leaves, swimming near surface, floating on water, rooted along the pond's edge.
5. If enough field guides are available, have students identify their specimens after taking the Field Notes or save identification for back at

Resources

Amos, W.H. 1967. "The Life of the Pond." McGraw-Hill Book Co., NY.

Buck, M.W. 1955. "In Ponds and Streams." Abingdon Press, NY.

Court, J. "Ponds and Streams." Franklin Watt, NY.

Parker, S. 1988. "Pond & River" (Eyewitness Books). Knopf, NY.

Reid, G.K. 1967. "Pond Life. Golden Guide Series." Western Pub.

Stone, L.M. "Pond Life" (A New True Book). Children's Press, Chicago.

Tafuri, N. 1984. "Have You Seen My Duckling?" Greenwillow Books, NY.

Zim, H. 1967. "Golden Guide to Pond Life." Golden Press, NY.

Aquatic Organisms and Habitat http://www.rivanna-stormwater.org/aquatic.pdf.

Extensions

1. Have older students write a full report about one specimen, including a description of its life cycle, human use of the species (if appropriate), how it interacts with other pond inhabitants, where it fits into the pond food chain, etc.
2. Ask younger students to make pond animal or plant puppets or masks out of socks or paper bags and paper and textile scraps. Children choose their favorite animal seen on the trip. Each team makes up a short puppet show about the animals and how they live together in the pond and presents the show to the class. Build on environmental awareness by encouraging students to be air, water, etc., as well as plants and animals.
3. Collect a few jars of pond water to take back to school to study under a microscope.
4. Have the students prepare a dichotomous key or a flowchart-style key for the class field guide and use the key to identify the plants and animals.

school. Various field guides can be found in local libraries.
6. When all teams have completed their notes, put all the specimens together for group observations.
7. At the end of the session, collect all Field Notes pages for safekeeping after students put their names on them.
8. Together, return all specimens to the pond, clean up and account for all materials and equipment, and leave the location in its original state or better.

Follow-up:

1. Return the Field Notes pages to their owners for completion. If identification of the specimens was not done at the site, students may use field guides and other references to identify the specimens from their notes at this time.
2. When all pages are completed, collect them to make a class field guide. Students decide how the guide should be arranged, i.e., how the specimens should be classified—by animal categories, habits, physical characteristics, etc.—as authors do when making real field guides. The class may even wish to make a table of contents, title and authors' page, and index.
3. If possible, make a photocopy for each student who may then color the drawings similar to the natural coloring of the animals.
4. Hold a class discussion to consider the following questions:
   - *How are the organisms similar/ different?*
   - *What adaptations do they appear to have to suit them for the pond?*
   - *What do you think each might eat? What might each one be eaten by?*
   - *What happens to them in winter?*
   - *What might make life difficult for them (e.g., muddy water, pesticides, marsh draining project)?*
   - *Do humans have any impact on the organisms?*
   - *Could the organisms live in a stream, mountain lake or ocean?*
   - *Is the pond community relatively stable or changing rapidly?*

Variations

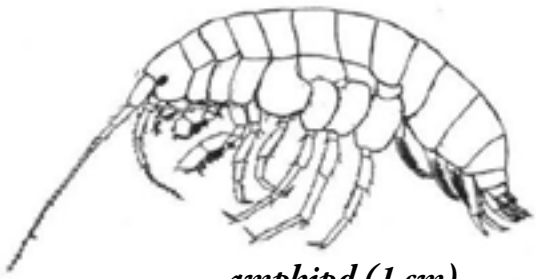
Younger students:

Place small pond specimens one at a time in a Petri dish of water and project the image of their shapes and movements on the wall or a screen using an overhead projector. Read the book "Have You Seen My Duckling?" (see "Resources") as a follow-up to the pond field trip. Students can make up their own versions of the story in writing or do a skit as a class.

cyclops (.2 cm)

water boatman (corixid bug) (1 cm)

scavenger water beetle (1-2 cm)



amphipd (1 cm)

dragonfly nymph (to 2 cm)

SOLS: Science 3.4, 3.5, 3.6, 4.5, 4.9, 5.1, 6.7, 6.9

Field Notes

Name:	**Sketch**
Plant's or animal's name:	
Habitat:	
Size (measured or compared):	
Behavior:	
Special features:	

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Plant's or animal's name:	
Habitat:	
Size (measured or compared):	
Behavior:	
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