A Perfect Pond Study Lesson Plan

The following lesson plan can be used once you have selected a site and the students are well versed in how to use the equipment and know at least some of the science concepts involved.

Materials: Essential equipment

- ❑ basins: 30 x 60 cm
- ❑ basin labels
- ❑ homemade nets
- ❑ rubber boots
- ❑ turkey baster
- ❑ yogurt containers
- ❑ magnifying glasses or boxes
- ❑ water scope
- ❑ thermometer

Optional (but recommended) equipment

- ❑ Water quality kits
- ❑ long-handled net
- ❑ field microscope
- ❑ old carpet, one per student

Instructions for the Teacher

When you reach the pond, assemble the students in a comfortable spot on the bank. The sun should be facing you as you speak; this means that your students won't have to all squint!

Keep your eye out for birds or other wetland creatures that might represent a "teachable moment."

1. Welcome the students to the wetland ecosystem, and tell them that you will first look at the big picture. Ask the students if the plants and animals in the water are part of this ecosystem - they should answer yes. Next, ask the students the same question about the water-loving plants (cattails, rushes, sedges, willows, alders) that surround the area - of course, these too form part of the ecosystem. Ask the students "Where does this water come from? What other ecosystems can you see from here? Can these other areas have any impact on the wetland ecosystem?"

   Communicate your expectations of the students. Working in an outdoor environment means a different teaching environment; stating your expectations clearly will help the group succeed at the task. Be sure to include the following:

- the boundaries of the area
- the worksheets or other writing activities that you expect the students to complete
- respect for the lives of the animals that live in this pond community
- rules of conduct (may include no shouting, courteous behaviour to passers-by, making way for pedestrians, etc.)
- which areas of the pond are off limits, if any
- how far students may wade into the water
- the signal that will be used to draw them together (this could be a whistle, a handclap, or an animal noise)

2. Ask the students:
   "Imagine if a large adult came to your home, stamped around with their muddy boots, stole all of your food, broke all of your furniture, and smashed all of your windows. How would you feel?"

   Students, quite naturally, would be incensed. You may hear answers like "mad!," "sad," and "bad!" Ask them if they expect visitors to their home to treat it with respect - they should answer in the affirmative.

3. Next, tell the students:
   "Right now, you are in someone else's home. Can you name an animal or plant that might live here?"

   Students should be able to come up with a variety of organisms that make this area their home, or habitat. Ask the students to suggest ways in which their behaviour will show that they are treating the wetland organisms' home with respect. You might get a list similar to the following:

- ❑ Leave the flowers intact, because an insect might use the nectar for food.
- ❑ pick up litter, because an animal might get caught up in the garbage, and humans don't like to see garbage either.
- ❑ Leave plants in place and healthy, because not only does it have a right to live here , it also acts as a producer to provide food and shelter for the consumers.
- ❑ Keep the invertebrates immersed in water, because they won't be able to breathe if they are held in the air (that would be like someone holding our head underwater).
- ❑ Pour water containing organisms from a low height, because some of the creatures are very fragile.
- ❑ Tread gently and carefully around the fragile edge of the pond.

Note: if you judge that a part of the wetland is becoming impacted by the visiting students, don't hesitate to close off this portion of the study area - doing this will model an important conservation ethic to the students.

4. Review how to use tools. Take the various pieces of equipment out of their container, and ask students how they are used.

   Introduce how you will use the basins: spread three on the grass, and label each one with a label that says **surface of water, water column,** or **pond bottom**.

5. ***Let the students go***. A pond study is an outstanding opportunity for students to practice informal science-based inquiry, even though to the uninitiated it may look like "kids playing around in the water!" Allow them to select whatever tool they wish, remind them of your behavioural expectations, and allow a half-hour to pass as they discover some surprising creatures in the process. Remind students to transfer their captive organisms into the basins.

6. After the joy of discovery starts to wane, gather the students. Choose from the following "menu" of activities:

- Ask the "experts" to gather into groups and to prepare a presentation to the rest of the class regarding what they have found out about birds, plants, or their type of invertebrate.

- Have students prepare individual drawings of their favourite invertebrate. Beside the drawing, students should write a description of how it moves, what adaptations they think it has, etc. (prepare worksheet), and the name of the creature if they know it.

- Ask students to gather into groups and prepare a large cross-section drawing that will be entitled "The Pond Community." On this diagram they should show the different organisms and where they are found: e.g., the horsefly larvae should be drawn on the bottom of the pond, the dragonfly should be resting on a grass stem, and the water strider should be on the water's surface. Of course, students will have to visit each of the three basins in order to draw all of the creatures. Tell students that they will be asked to present their drawing to the rest of the class.

- Create a 15-20 minute long "quiet time" and have students write a descriptive entry in their journal that states how the students feel about the natural area, including paragraphs that start with the words "I feel...", "I see...", "I smell..", etc. (Note: you may wish to have them use the carpet seats during this activity so that they will be more comfortable).

- Measure water quality. Using water quality kits, have students measure inorganic parameters, and compare their results with the graph on this page that shows the normal range for inorganic parameters. This will help students judge what is right or wrong with their pond water.

- Have students sketch the wetland ecosystem, including all of the elements that help form the "big picture" of the area.

7. Before you leave the wetland site, it is important that you discuss with your students whether or not this is a healthy ecosystem.

   Ask the students
   "What things indicate to you that this is a healthy ecosystem?
   Answers may include the fact that there are lots of different creatures living here, that there is no pollution here, etc. Tell student that each of these things is called an "indicator", and that the best indicators are ones that can be measured. Have students discriminate between true indicators (e.g. number of different species) vs. more indicators that are more difficult to measure (e.g. "This looks like a pretty area").

   "What things would tell you that this is an ecosystem that is not very healthy?
   In order to best answer this question, have students scan the area, looking for signs of humans: water pipes or other pipes that discharge into the wetland; signs of change around these pipes, or in other areas of the pond; or obvious signs such as rusted metal or other discarded human items.

Note: it is possible too that the types of organisms found here may also be used to help diagnose the health of the ecosystem, although this can be difficult since conditions change dramatically from season to season. Some specific wetland ecosystems may allow the use of indicator species (mayflies stoneflies, caddisflies); the presence or absence of these invertebrates indicates the relative health of the ecosystem.

Choosing an outdoor site

Your choice of outdoor site should be based on the following criteria:

- ❑ ***Does the site meet the requirements of the curriculum?*** The Specific Learner Expectation of the Wetland Ecosystems calls for students to be able to 'recognize and describe one or more examples of wetland ecosystems found in the local area; e.g., pond, slough, marsh, bog, fen.' Could your site be categorized as one of these? Note: for more information on what these sites are, consult ***Wetlands; Webbed Feet Not Required*** (see Other Teaching Resources for details).

- ❑ ***Can the site be readily accessed from the school?*** The ideal is a site that is within walking distance and is a permanent wetland. If this is not possible, you should consider investigating areas that are within a short driving distance from the school, in order to reduce both financial and environmental costs. Consult a street map of your area to reveal some wetlands you may be unaware of.

- ❑ ***Is the site safe?*** Check the bottom of the wetland - if it is a pond, does it have a steeply sloping bottom that would make this a hazardous field study site? Are there unpleasant additions to the bottom such as old rusty metal or broken glass? If so, check around the perimeter of the pond for alternative areas.

- ❑ ***Is the site easy to teach at?*** The ideal setting for a pond study has an adjacent flat grassy surface where basins can be placed and where you can gather all of your students together in your "outdoor classroom." It should be in a quiet area, adding a little tranquillity to the morning, enabling you to more easily communicate with your students.

- ❑ ***Is this a natural pond ecosystem?*** There is more to a pond community than just those things that live in the water. If possible, choose a pond with emergent vegetation (i.e. plants that emerge from the water's surface) and the adjacent water-loving trees and shrubs that help to define a pond community.