Science Unit: *Aquatic Ecosystems*
Lesson 4: *Ponds and Pond Organisms*

School year:	2006/2007
Developed for:	Collingwood Neighbourhood Elementary School, Vancouver School District
Developed by:	Catriona Gordon (scientist), Lisa Evans and Sean Hughes (teachers)
Grade level:	Presented to grades K and 3; appropriate for grades K-7 with appropriate modifications.
Duration of lesson:	1 hour and 20 minutes

Objectives

1. Learn about freshwater ecosystems.
2. Learn about pond habitats.
3. Learn about the diversity of pond flora and fauna.
4. Learn about the adaptations pond organisms use.
5. Gain experience making observations of different pond organisms.

Background Information

Freshwater ecosystems include flowing water such as streams and rivers or standing water, such as ponds, lakes, marshes and other wetlands. Often ponds and marshes are easily accessible in the Lower Mainland, and represent a fascinating, miniature world of aquatic plants and animals. Pond or marsh plants consist of microscopic algae, duckweed, water lilies, cattails and bulrushes, to name a few. These plants provide food, shelter, and nursery grounds for the pond inhabitants. Many of the animals that live in ponds and marshes are invertebrates, animals without a backbone. They include microscopic zooplankton, as well as those seen by the naked eye, such as diving beetles, waterstriders, snails, mosquito larvae and leeches. Some pond insects have a long juvenile stage lasting 1-4 years, where they live underwater, while their adult stage can be very brief (90 minutes to a few weeks!). These include dragonflies, mayflies and damselflies. These young insects look remarkably different from their adult winged counterparts, due in part to the very different requirements needed to survive, breathe and move underwater compared to on land.

Vocabulary

Pond: a small body of freshwater, shallow enough for sunlight to reach the bottom and for rooted plants to grow.

Aquatic Invertebrate: Animals such as insects, crustaceans, and worms that spend part or all of their life cycles in water.

Invertebrate: animals without a backbone.

Habitat: the place where a plant or animal lives (its home).

Adaptations: a trait (body part, behaviour etc) that helps a plant or animal survive in its environment.

Algae: plants with no true roots, stems or leaves, living in water or moist environments (includes seaweeds).

Gills: feathery structures in aquatic animals that absorb oxygen from sea or fresh water.

Materials

- Seawater or saltwater (1 ½ Tbsp salt to 1 liter of water)
- Tap water
- Pond water
- 3 aluminum pie plates
- Poster of pond life
- Cut-outs of pond plants and animals
- Dissecting scopes and/or magnifying glasses
- Bug jars
- 10-15 litres of pond water with organisms and mud
- Aquarium
- Clean gravel
- Eye droppers (one per group)
- 1-2 Turkey basters
- Ziplock bags (one per group)
- Masking tape
- Petri Dishes (one per student)
- Small yogurt dishes for scooping
- Aquatic invertebrate key
- Aquatic plants
- Pond animal models from VSB Media Services (Bullfrog: VO 04-02.0114843991
  Frog Life Cycle: VO 04-02.0084847451
  Beaver: VO 04-10.0014862123
  River Otter: VO 04-10.0144862241
  Duck and Drake: VO 04-03.0174872141
  Great Blue Heron: VO 04-03.0094873991
  Freshwater Pond Community: 541470)
- Pond videos (available from VSB Media Services: The Pond – VIT 04-19.0514949871
  The Pond, A First Film – VIT 04.25.0084951981

Introductory Discussion

1. Introduce freshwater ecosystems. Brainstorm about freshwater ecosystems – rivers, streams, lakes, ponds, marshes, wetlands. Ask students about the differences and similarities between a marine ecosystem and a freshwater ecosystem.

   - Demonstrate an evaporation experiment with aluminum pie plates and 3 types of water. Pour an equal amount of tap water, pond water and seawater into 3 different pie plates and label. Let students predict what will happen after several days when the pie plates are left in a sunny window. Write their predictions for the three pie plates on a flip chart. Let students observe pie plates every day to see any changes.

2. Ask students to share with the class all they know about ponds/marshes.

   - Make a list of pond organisms, large and small. (insects, birds, fish, clams, snails, mosquitoes, beavers, bulrushes etc.)

- Use a poster/felt board to describe different pond habitats, including the mud, water column, surface of the water, edges of the pond. Discuss what pond animals/plants live where? Use cut-out pond animals for students to stick on board in appropriate habitat.

3. Briefly describe the activities that will be done during the lesson: Plastic bag ponds*, setting up the aquarium, and for Gr. 3s, setting up the pond succession experiment**.

Science Activity/Experiment

Plastic Bag Ponds

1. Students will be divided into groups of 3-5. Each group will have a magnifying glass and/or dissecting scope and a ziplock bag filled with pond water. They will stick the ziplock bag, using masking tape, to the window for better viewing. They will observe the aquatic animals, try to identify them and draw them.

2. For improved viewing, students can use a petri dish and scoop the animal out of the bag into the petri dish to see under the dissecting scope or large magnifying glass.

3. Once students have looked at their plastic bag ponds, the class can then set up the aquarium – a temporary home for their pond animals. Clean gravel can be put down first, then pond mud, and lastly, students can gently pour their plastic bag ponds into the aquarium. It will take time for the sediment to settle and for the water to clear. Place the aquarium in a cool place out of direct sunlight. Let students observe the aquarium over several days.

4. After a week, return the pond water and organisms to the original pond.

5. For older students, and if time permits, set up a long-term pond succession experiment**, using a large condiment jar (eg. restaurant-sized mayonnaise jar) filled with pond mud and pond water. Place 5 cm of soil or pond mud in the bottom of the jar. Then add 7.5 cm of water. Add an aquatic plant. Place the jar near a window and allow it to settle overnight. Do not replace water that evaporates. Once or twice a week let students add 3-4 birdseeds to the jar. While there is water in the jar, the seeds should germinate and then rot. Keep adding seeds. When the water has evaporated the aquatic plant will die and rot and then the birdseeds will have the environment suitable to grow. You will now have to add water, substituting rainfall, to keep the plants alive. This shows pond succession, which may happen over centuries.

Closure Discussion

Make a circle and ask students to talk about their observations and experiences. What did they like best? What did they like least? Review what adaptations pond animals have to survive and thrive in their particular environments. What new things did they learn about plants and animals that live a pond or wetland?

References

* Plastic Bag Pond. Canadian Parks and Wilderness Society (CPAWS) Education Website. www.cpawscalgary.org/education

** Forest in a Jar. Pp. 133-134. Project Wild Activity Guide. 1997. Canadian Wildlife Federation. Ottawa

Ganeri, Anita. 1993. Nature Detective Ponds and Pond Life. Franklin Watts. New York.

Gray, Shirley W. 2001. Wetlands. Compass Point Books. Minneapolis.

Hickman, Pamela. 1993. Wetlands. Kids Can Press. Toronto. Pp. 58-59 “How to set up an aquarium.”

Kalman, Bobbie. 2003. What Are Wetlands? Crabtree Publishing Company. New York.

Rivera, Sheila. 2005. Wetlands. Lerner Publications Co. (First Step Non-Fiction Series). Minneapolis.

Snowball, Diane. 1994. Freshwater Habitats. Mondo Publishing. New York.

Follman, Irene. 1997. Life in a Pond. Primary Science Resource Guide, Includes Transparencies, Reproducibles and Teacher’s Guide. Milliken Publishing. St. Louis.

Hickman, Pamela. 1990. Bugwise. Federations of Ontario Naturalists. Kids Can Press. Toronto. Pp. 4-12.

Needham, Karen and Launi Lucas. 2001. Strange Beginnings. Tradewind Books. Vancouver. 24pp.- this book is about local pond invertebrates and their juvenile and adult stages from a UBC professor.

Fredericks, Anthony D. 2005. Near One Cattail. Dawn Publications. Nevada City

Why is the Sea Salty? By Pam Hansen and Christy Bingham. http://yn.la.ca.us/cec/cecsci/cecsci.166.txt

Extensions

Watch a wetland video such as Eco-Explorers: Wetland Wonders. Inside Edge Communications. Gabriola Island, B.C. (20 min.)

Play a matching game of juvenile and adult pond animals. (Pictures available in Project Wild Activity Guide.-see reference above.)

Make a pond mural and have each child draw a pond organism to stick on to the mural.

Make frog art using construction paper.

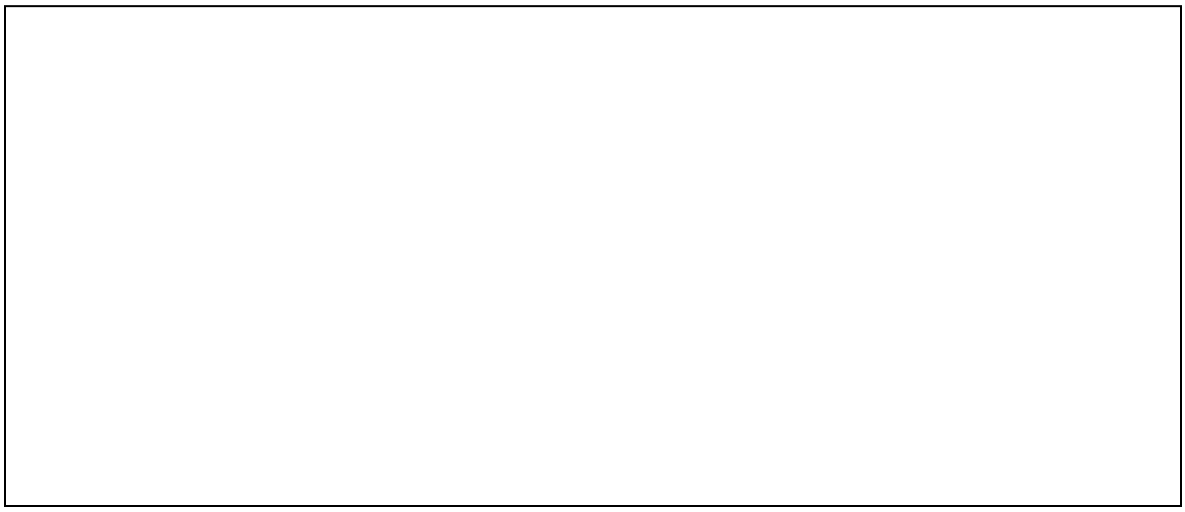
Read a pond book such as “Near One Cattail”.

Evaporation Experiment

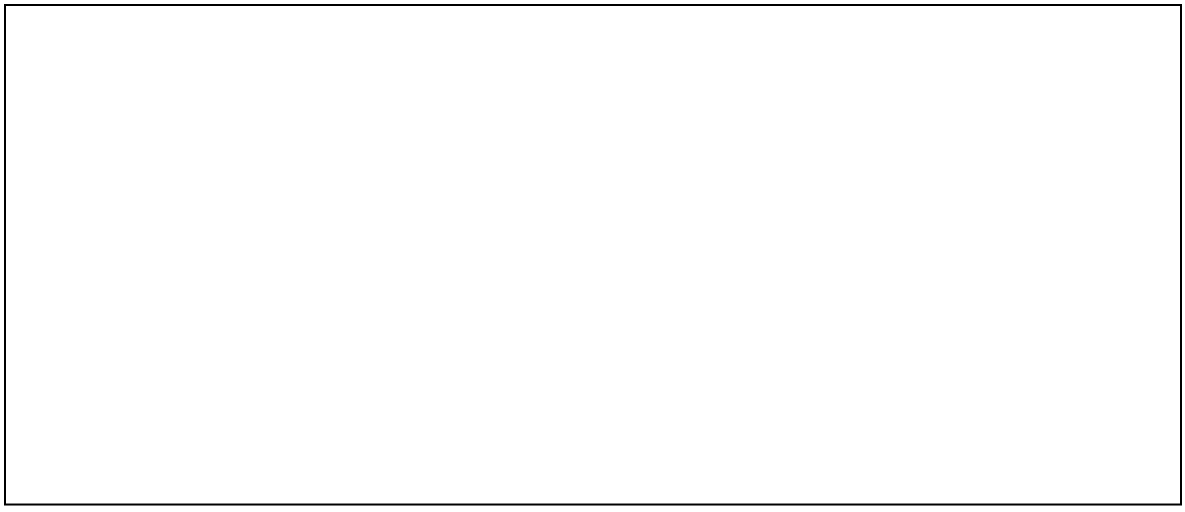
Name of Scientist_____

Draw the three trays on Day 1. Draw them again on Day____.
Label your drawing.

Day 1



Day ____



Observations:

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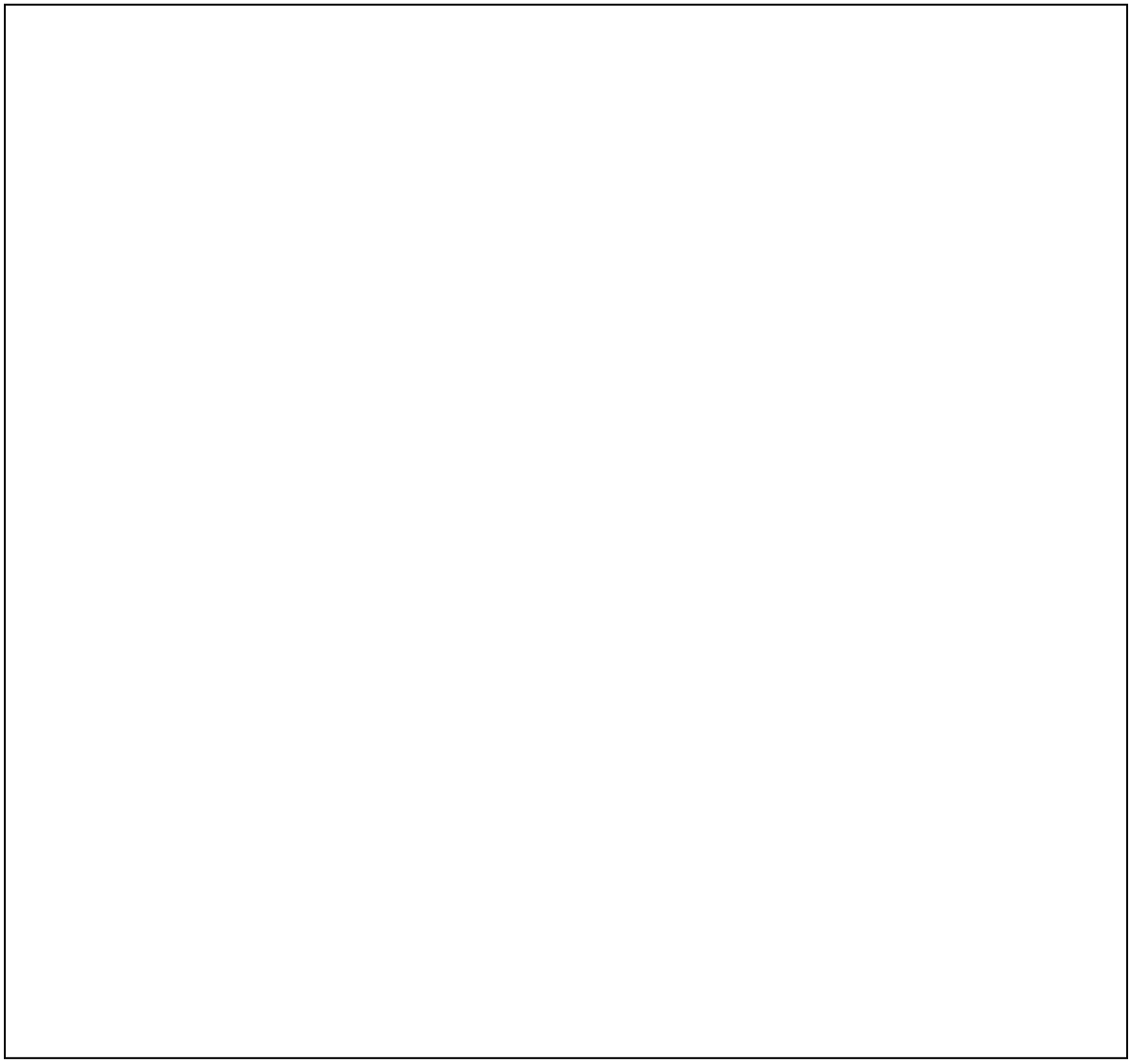
Pond Animals

Name of Scientist_____

Draw three pond animals that you found. Add lots of detail.



Can you identify your pond animals?

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