

POND MUCKING
Environmental Education Lesson
EDWARDS CAMP AND CONFERENCE CENTER

Summary

Using the boat bay as an example of a pond, the students will compare it to Lake Beulah to learn the differences between the two aquatic systems. Students will collect organisms using nets to study consumer and producer roles in the food chain.

Usage – Grades 3-12 April-October: The boat bay and beach area on Lake Beulah. The boathouse may be used for indoor space.

IL Standards

11.A.1a; 11.A.1b; 12.B.1a; 12.B.1b

11.A.2a; 11.A.2b; 12.A.2a; 12.B.2b

11.A.3a; 12.A.3c; 12.B.3b

Objectives

Upon completion of this lesson students will...

- Be able to identify at least three of the four main differences between a lake and pond ecosystem
- Be able to find and identify least 3 aquatic organisms
- Be able to explain interdependence.
- Have an understanding of what makes a healthy aquatic ecosystem.

Materials

- 5 gallon buckets
- long handled scoop nets
- sorting pans
- Pond Life books or laminated Identification sheets
- bug boxes
- ice cube trays
- Macroinvertebrate count sheet
- Sorting equipment
- eyedroppers (for very small organisms)
- microscopes (*by request*)

Introduction (10 Minutes)

What is a pond?

A pond is a rather small, shallow body of water with little difference in temperature between the surface and the bottom. Each pond maybe small in size, but the total area of ponds in the U.S. is very large. They are important wildlife habitats. Each pond is different and diverse containing a variety of plants and animals, making them fun to explore.

Pond zones are places in the pond that have their own special features. Each zone is characterized by the type of plants that grow there. The organisms in a pond are influenced by the presence of different kinds of plants so it is worth investigation the different zones.

Zone 1: *Emergent*

Closest to the shore, this zone is dominated by semi-aquatic plants that are rooted in shallow water and emerge out of it. i.e.: Arrowhead, cattails, river bulrush, etc.

Zone 2: *Floating-leaf*

This zone occurs in slightly deeper water. Because it does not dry out, the plants are truly aquatic and can not survive out of the water. For example: Yellow and white water lily

Zone 3: *Submerged*

This zone occurs furthest from shore and contains plants that remain completely under water except when they flower. i.e.: Milfoil, pondweed, coontail, elodea, etc.

Zone 4: *Free-floating*

The zone can actually occur throughout the pond. It contains floating plants that are not rooted in the mud. A pond surface may be completely covered by these plants making the surface look solid. In deeper ponds this may be the only plant that can survive where the water is at its greatest depth. i.e.: duckweed and water-meal

Pond Succession

Nature undergoes many changes; ponds are no exception. It is possible for the birth, development, and death of a pond to take place during a human lifespan or it may take hundreds of years. Succession is the sequence of plant communities that replace one another as the pond matures and finally disappears. In the beginning a new pond is colonized by pioneer plants that need few nutrients to survive. As these die and decay they add more nutrients, which allow different plants to become established. If left undisturbed by man, a pond will eventually fill up with silt and become solid land. As the plants and conditions change so do the animal populations that inhabit the area. A pond is always changing and we can see gradual changes from one year to the next. The boat bay was dredged out in the early 80's, which set back natural succession.

Our Aquatic Ecosystems (5 Minutes)

Conduct a preliminary discussion about aquatic systems. Explain differences between lake and pond ecosystems-most of these differences are visual and the kids can actually see them for themselves.

Lake- Bigger

Deeper (Lake Beulah is about 60 feet deep in its deepest area)

Colder (the water can only be warmed where the sunlight can reach, usually up to 10 feet)

Different kind of bottom (look at sand and gravel)

Animals are spread throughout the lake

Pond- Smaller

Shallower (plants growing all the way across)

Warmer (warm up quickly and uniformly due to lack of depth)

Mucky bottom (dead vegetation in various stages of decay)

Animals concentrated (sheltered habitat, a nursery for many kinds of animals)

Scientific Investigation (10 minutes)

Let the students know that they are going to have the chance to be scientists today. They will be investigating the boat bay in order to see how healthy the water is.

“What are some things that you can check to see if the water is healthy?”

*Chemical level, anything non-natural objects in the water, **living things**.*

Today you are going to be looking for living organisms in the water in order to see how healthy our boat bay is.

Are You Me? (10 minutes)

This is to introduce students to various organisms that they could find during the class.

1. Hand out a picture card to each student
2. Have students find their match and stand together
3. Hold cards together and read about the plant/animal
4. Have each student tell the group something interesting about their topic

You can also allow the students to explore the boathouse. There are several interpretive panels that describe common plants and animals of the pond as well as information about some of their life cycles.

Macroinvertebrate Mayhem (10 minutes)

Introduce to the students that the best way to check if the water is healthy is to see what kinds of organisms they find. Animals called **indicator species** are very intolerant to any type of pollution and will be present in great numbers where the water quality is less good.

They will have a chance to explore this idea through this next activity.

- Each student will take on the role of the animal on their Are You Me cards.
- The students with the Leopard Frog card will take on the role of an Environmental Stressor.
- The goal is to get from one side to the other without being tagged by the stressors.
- If the animal is tolerant to pollution they are allowed to run across the field.
- If their animal is semi-tolerant then they can only walk across the field.
- If their animal is intolerant to pollution then they must perform the actions as follow.
 - Mayfly nymph – must flap their arms and spin in a circle
 - Mayfly nymphs must wiggle their bodies to absorb enough oxygen
 - Stonefly nymph – must perform a pushup every ten steps
 - Stonefly nymphs must push oxygen over their gills under their body.
 - Caddisfly larva – must hop in a sack to cross the field
 - Caddisfly larva make and carry their own shell with them
 - Gilled Snails – must walk heel to toe to the other side.
 - Gilled snails are very sensitive to low oxygen levels

Pond Exploration (25-45 minutes)

Separate the students into groups of 3-5 and pass out equipment. Explain the sampling procedure below and show the sampling area (along canoe launch pier, the boat bay and the beach area of the lake.) **Please stay off the rock wall for safety!** Remind students we are studying the organisms and returning them to their environment. We do not want to kill them. If

another group is canoeing please allow them to use the pier when launching and returning the canoes.

Fill your trays and 5 gallon pail with water from the boat bay. Use the large pond nets to scoop through water plants-this is where most organisms live. Demonstrate proper techniques of sampling with the aquatic nets. (Not too deep and plenty of vegetation). They need to swish the weeds around in the water in the pan. Look carefully for tiny organisms hiding in the weeds. Emphasize that all organisms found in the water rely on water to live and breathe and need to be put in a water tray or pail as soon as they are collected. The ice cube trays work great for holding and viewing insects. The small aquarium nets can be used to aid in catching and transferring the insects to the pan. The organisms can be identified through the use of laminated Pond Critter ID Guides. Tell students to save one of every organism that they find by putting it in water in their ice cube trays or buckets, to later show their classmates. (Not everyone is going to find the same things.) After collection and identification allow about 10 minutes for quick clean up and to go over what was found. Have each group name and describe one or two of the organisms that they found. Remember to return the organisms to the boat bay when finished, and rinse all nets, trays and buckets before returning them to the Program office.

Conclusion (10 minutes)

Hold a wrap up discussion to review the themes and objectives. Here are some questions to get started...

1. Use the macroinvertebrate count sheet to help explain what aquatic insect can tell us about the quality of our water in the pond
2. What kind of aquatic ecosystem have you investigated?
3. What are its characteristics?
4. What are indicators of a healthy aquatic ecosystem?
5. Describe species discovered: encourage discussion of some of the more commonly found Organisms such as dragonfly and damselfly nymphs, water boatman, and snails

Pre-Activities

Teach these vocabulary terms-

- Producer-an organism that converts sunlight into useable energy (plants)
- Consumer-an organism that eats other organisms to obtain energy
- Primary Consumer- an organism that eats plants to obtain energy that was converted from sunlight (herbivore)
- Secondary Consumer- an organism that eats primary consumers to obtain energy that they received from plants
- Tertiary consumers- eat secondary consumers, and so on
- Interdependence- the interrelationships of organisms with one another and with various elements of their environment.
- Food Chain-the transfer of food energy through a series of organisms with repeated eating and being eaten.
- Food Web-an interlocking pattern of food chains