

**Grade Levels:** 3<sup>rd</sup> – 5<sup>th</sup>

**Description:**

Students will explore three different ecosystems found at GBBG (forest, garden, and pond), discovering the organisms that live in each ecosystem and comparing the characteristics of each ecosystem.

**Objectives:**

Upon completion of this lesson, students will be able to

- Define the term ecosystem
- Name the 4 components that make up a habitat: food, water, shelter, and space
- Compare and contrast characteristics of different ecosystems: forest, garden, and pond
- Describe the roles of different organisms in each ecosystem (producer, consumer, decomposer) and the relationships between these organisms (predator, prey)

*Please use the following materials as an aid to help prepare your students for their visit to Green Bay Botanical Garden. The vocabulary list consists of terms that may be used during your visit and the activities listed below are designed to familiarize your students with the topics that will be covered during their visit. They are listed as options – it is not necessary to complete them all or do them in any particular order. Please feel free to modify the vocabulary definition or activities in any way to better suit your students. Keep in mind, their experience will be enhanced if they are familiar with the concepts before their visit, or if the learning that took place in the Garden is reviewed and reinforced back in the classroom.*

## **Vocabulary**

Abiotic factor: non-living element in an ecosystem (water, air, rocks, sunlight, etc.)

Biotic factor: living element in an ecosystem (plants, animals, microorganisms, etc.)

Consumer: an organism that must eat other organisms to get energy

Decomposer: an organism that feeds on dead organic matter, helping to break it down

Ecosystem: living and non-living elements that live together in a self-sustaining community

Habitat: the natural surroundings of a plant or animal, where an organism finds the food, water, shelter, and space it needs to survive

Predator: an animal that hunts down and eats other animals as food

Prey: the animal that is hunted down and eaten by a predator

Primary consumer: an organism that eats producers, or plants, to get its energy

Producer: green plants and algae that carry on photosynthesis to produce their own food

Secondary consumer: an organism that eats another consumer to get its energy

## Activity 1:

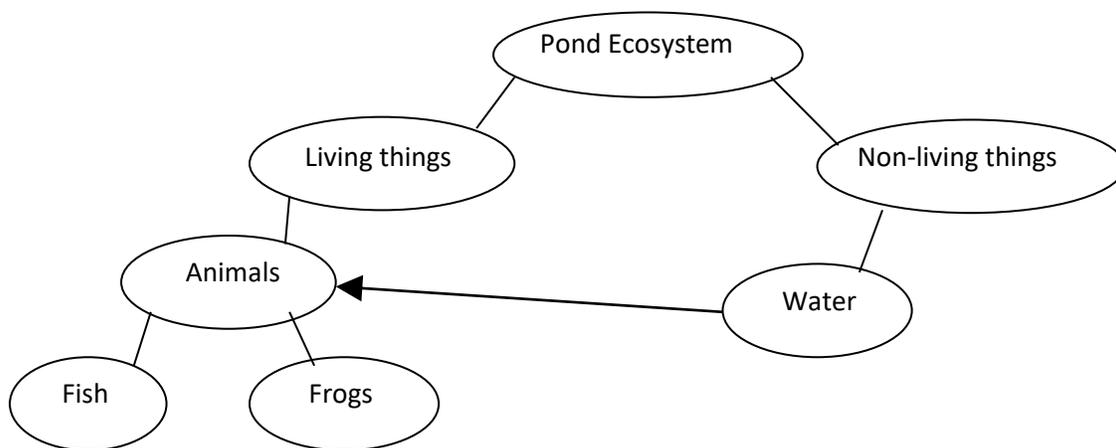
Create a classroom pond using an aquarium or clear plastic tub. Fill the tub with water and let it sit for several days before adding plants or animals (this will allow the chlorine in the water to evaporate). Visit a local pond to collect some duckweed for the pond and go to a pet store or garden center that sells aquatic plants. Add a few easy to care for animals to the pond like snails or tadpoles. As you add each item, discuss its needs (food, water, nutrients, shelter) and how it will get those things from its environment.

## Activity 2:

Build a terrarium for the classroom. Find an appropriate container such as a large glass jar, fish tank, or clear plastic container. Cover the bottom of the container with ½ inch of sand or gravel to improve drainage then fill to one third full with woodland soil or potting mix. The soil should be kept moist enough to stick together in balls when squeezed in your hand. Plant the container with small plants like a cutting of ivy, spider plants, miniature ferns, or moss and water the plants well. Cover the container with plastic or glass and place the terrarium in a well lighted spot in the classroom. You'll know the terrarium contains the right amount of water if the sides and top of the container get misty with water droplets when in bright light. If you have just the right amount of water, you may not have to water again. Enjoy!

## Activity 3:

Draw an ecosystem concept map to see the connections that exist in a given ecosystem. Select an ecosystem the students are familiar with. List all the living and non-living elements of the ecosystem the students can think of. Now consider the interactions between these elements and connect them with arrows. For example, all the animals and plants listed require water to survive so draw arrows from water to the plants and animals. Use this diagram below as a guideline and starting point.



## **Activity 4:**

Creative Science Writing. Have students brainstorm and write a few paragraphs in response to one of these statements:

- What would our planet be like if there weren't any trees?
- Pretend you have been sealed in a giant glass jar. What items must be placed in the jar to keep you alive?
- If you could be a plant, which plant would you be? Explain why you chose this plant and draw a picture of your plant self.
- Pretend you are the voice of one of these ecosystems: forest, jungle, ocean, or pond. Tell about the living and non-living items in your ecosystem, what is good or bad about your ecosystem, and how people interact with your ecosystem.
- Explain what would happen to the plants, animals, and people on earth if the sun burned out.

## Activity 1:

Set up an experiment to study the effects of pollutions such as acid rain, road salt, and agricultural runoff like fertilizers on plants in an ecosystem.

- Arrange students into at least four groups. Each group should have 4 identical plants (or each group can be responsible for one plant): 1 control plant and 1 for each kind of pollution.
- Decide how often the plants should be watered and how much water they should get each time. You may want to care for the plants with pure water for a week to determine this amount.
- To begin the experiment, create your polluted water:
  - Acid Rain = 20 mL vinegar added to 2 liters water to make acid rain with a pH of 4.0.
  - Road Salt = 6 mL (about 1 ¼ tsp.) salt to 1 liter water
  - Agricultural Runoff / Fertilizer = Read the directions on a container of plant fertilizer to determine the recommended dose. Add 10 times as much fertilizer to the water as recommended to mimic agricultural runoff.
- Have students label their plants with which pollution will be added to each. Keeping with the same watering schedule and amount as previously decided on, water the plants with the designated “polluted water”.
- Continue this experiment for several weeks, recording the changes in the plants each time they are watered. Have each group compare their results and decide on the effects of each pollution. Predict and discuss what might happen to animals in an ecosystem polluted by these substances.

## Activity 2:

What Did Your Lunch Cost Wildlife? (a Project WILD activity) – this activity will help students realize the impact their food has on wildlife and the environment, and how changing their habits could benefit wildlife and the environment.

- Ask students to create a list of foods they either bought or brought for lunch. Be sure to include any packaging materials the food came in.
- Ask students to pick one food and trace it all the way back to its origins, including where and how it grew, was harvested, was transported, was packaged, and was made available to the consumer. Make a simple flow diagram of the path the food took.
- Next, ask students to list the possible impacts to wildlife and the environment along the path their food took to get to them. Have students report back to their classmates about their findings.
- Have the class think of changes they could make to their eating habits that would be likely to have a beneficial, or less harmful, effect on wildlife and the environment and how each change would help.
- Have students pick one change to make to their habits, and after a week discuss how easy it was to change, whether they were able to stick to it, and how they felt they did.

## Activity 3:

My Use or Your Use or Our Use (a Project Learning Tree activity) – this activity will help students describe the implications of using a plot of land for a specific purpose.

- Choose a piece of forested land in the community that the students are familiar with (a nearby park or the schoolyard). Present the students with this hypothetical situation: the community has acquired this land because the owner has not paid the property taxes. The city council is uncertain whether to keep the land or sell it. If the council decides to sell the land, they must also decide who to sell it to.
- Have students or groups of students assume one of these possible roles or others that you include. This exercise is often more valuable to students if they are familiar with the roles and can help develop a list.
  - housing developer
  - representative from a paper company
  - tree farmer
  - recreation director
  - representative from a mining company
  - cattle rancher
  - representative from a conservation group
  - private business person
  - home owner
  - golf course manager
  - farmer
- Each student or group should research the part they choose by interviewing a person in the community, using the internet, or visiting the library. Once the research is completed, students can write a statement listing the reasons the land should become theirs. They should consider the price they would pay for the land, the advantages of their group owning the land, the long range effects of their group using the land, and the advantages to the community.
- When the research is done and statements are written, students should share their opinions with the class. A mock city council meeting can be held during which the council (teacher) hears the arguments and makes the final decision on who should receive the land.

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**Teacher Resources:**

Project Learning Tree Guide (available at [www.projectwild.org](http://www.projectwild.org))\*

Project WILD Guide (available at [www.plt.org](http://www.plt.org))\*

**Student Books:**

Banting, Erinn. 2006. *Galapagos Islands: A Unique Ecosystem*. New York: Weigl Publishers.

Cole, Henry. 1998. *I Took a Walk*. New York: Greenwillow Books.\*

McKinney, Barbara Shaw. 1999. *Pass The Energy, Please!*. Nevada City, CA: Dawn Publications.\*

Pascoe, Elaine. 2003. *The Ecosystem of an Apple Tree*. New York: PowerKids Press.

Patent, Dorothy Hinshaw. 2003. *Life in a Grassland*. Minneapolis, MN: Lerner Publications Company.

\* *Books available for checkout in Green Bay Botanical Garden's Children's Library*