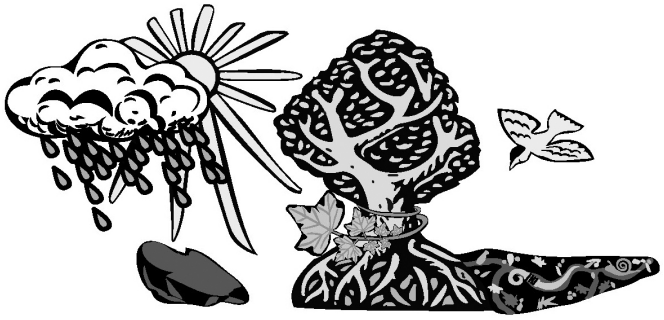

FOREST ECOSYSTEMS

INTRODUCTORY LESSON

OVERVIEW:

For the purposes of this lesson there are two important factors that are essential to understanding the definition of an ecosystem. Ecosystems are composed of living (biotic) and non-living (abiotic) elements that are connected. This connection is defined as: all living things in an ecosystem depend on other things, both living and non-living for survival. During this Introductory Lesson students should be able to identify biotic and abiotic elements of an ecosystem and start to understand how parts of the system are connected or interdependent. If students grasp these concepts already, please refer to the Extension Ideas (on page 7) for ways to enhance student learning.

OUTCOMES:

1) Students will gain awareness of systems.
2) Students will gain awareness that a system has different parts.
3) Students will gain awareness of ecosystems.
4) Students will begin to understand the connections between parts of an ecosystem.

GRADE LEVEL: 4th - 7th

TIME: 45 - 60 minutes

MATERIALS

- ❑ **Picture of tree and forest parts (bird, rock, sun, English ivy as an invasive plant, cloud and soil)**
- ❑ **Forest Ecosystem Cards**
- ❑ **The Tree in the Ancient Forest book**

ESSENTIAL ACADEMIC LEARNING REQUIREMENTS:

Please visit **mtsgreenway.org** and go to the education link for a complete listing of standards.

BACKGROUND INFORMATION FOR TEACHER:

PHOTOSYNTHESIS in green plants is a process which provides the primary food source in a forest ecosystem, and is represented by the formula: $CO_2 + H_2O$ + sunlight + chlorophyll = $C_6H_{12}O_6 + O_2$ (or carbon dioxide + water + sunlight + chlorophyll = food + oxygen). Because green plants, which contain chlorophyll, are the only elements in the forest capable of producing food in this way, they are called PRODUCERS. The food produced through photosynthesis serves as a source of energy for the further production of flowers, cones, bark, berries, fruits, and other vegetation. This, in turn, serves as a food source for a tremendously diverse range of insects, birds, mammals, fish, and other living things, that consume this vegetation and also, in many cases, each other – they are called CONSUMERS. Finally, bacteria, plants (such as mushrooms and fungus) and animals (such as worms and some insects) feed on dead plants and animals, break down their structures and return their elements to the soil – they are called DECOMPOSERS. All elements in a forest ecosystem can be seen as representing one of these categories: PRODUCERS, CONSUMERS, and DECOMPOSERS, or "PCDs". A healthy forest ecosystem depends on the presence and interaction of all three PCDs, and on the ongoing primary process of PHOTOSYNTHESIS.

We have listed some ideas about forest ecosystems to provide a context for understanding the interdependency of forest elements.*

1) Air provides oxygen and carbon dioxide for plants and animals to breathe.

2) Water is needed by plants and animals to survive.

3) Water causes erosion and breaks rocks apart to make soil.

4) Soil provides nutrients for plants.

5) Soil and rocks provide homes for animals, fungi and bacteria.

6) Plants provide food and homes for animals. Some animals provide food for other animals.

7) Decaying plants and animals provide nutrients for soil.

8) Sunlight provides energy that green plants change into food – carbohydrates or sugars - through photosynthesis.

9) Sunlight raises the forest temperature so creatures don't have to use as much of their own energy to stay warm.

*Adapted from Forests of Washington, Project of the Washington Forest Protection Association, 1999.

PROCEDURES

1 Show graphic of the tree that is included in the materials we sent you. Tell the students that when they look at this picture they can see the whole tree but the whole tree itself is made of smaller parts. Ask students to identify the parts of the tree that they see. Write the parts that they mention in random order (not a vertical list): trunk, roots, branches, leaves, bark, etc. This can be done on the board so that the tree image can be left on the document camera.

2 How are these parts of a tree connected or interdependent? Give 5 different students a card from Set #1: trunk, roots, branches, bark or leaves. Have students with cards stand facing the class in a random order. Ask the students in the class to reorganize the cardholders to show how the parts of tree are connected or dependent upon another part, going left to right. Have the cardholders reorganize themselves and see if the class can indicate a different way that parts are connected or are interdependent. See background information for suggestions about ways elements in this ecosystem are interdependent. Have students return to their seats.

3 Ask the students what a tree needs to live. Add elements to the picture on the document camera as the students share them: soil, clouds/water, rock, bird, beetle, sun. Tell the students you are also going to add some English ivy, which is an invasive plant species. Invasive plants came to the United States from other countries. The tree doesn't need this ivy to live and in fact, the ivy is detrimental to the ecosystem. Tell the students that a healthy ecosystem has native plants, not invasive plants. Native plants are plants that have lived here a long time. Invasives steal water, nutrients and sun and are the thieves of the forest.

Ask students to distinguish between the living and non-living parts of the ecosystem. If appropriate, introduce the term "biotic" for living elements and "abiotic" for non-living elements. Once the picture is complete with a tree and all the other elements,

tell the students that they have created a picture called an ecosystem. Write the word "ecosystem" on the picture. An ecosystem is the interaction of living things with each other and with non-living things.

Emphasize that the tree is part of a larger ecosystem. Ecosystems can be small like a tree or large like a forest. A tree is a complete ecosystem in itself but a tree can also be viewed as a part of a larger ecosystem. The tree "nests" within a larger ecosystem.

4 Have students with Set #1 cards come back up to the front of the room. They should stand close together demonstrating that a tree is a whole ecosystem. Hand out Set #2 cards with air, English ivy, rock, sun, soil, water/clouds, bird on them. Have the students with Set #2 cards come up one by one to show and explain how they are connected to the tree or other parts of the ecosystem. Explain that everything in an ecosystem is connected and interdependent. Students should return to their seats.

5 Summarize the lesson by telling the students that the picture depicts an ecosystem. An ecosystem includes all the living and non-living parts of an environment AND their interdependence. Tell the students that a Mountains to Sound Greenway educator will be coming to the classroom to talk more about ecosystems, the Greenway and the field trip. When they go on the field trip they will walk in a Pacific Northwest forest ecosystem.

EXTENSION IDEAS

1) You may make a list on the board of the items the students list as living (biotic) and non-living (abiotic). Talk about what requirements living organisms have in order to survive. Discuss the flow of energy through ecosystems.

2) Discuss other ecosystems: desert, rainforest, alpine, your neighborhood, etc.

3) Ask your students what factors could impact this ecosystem? (Humans, weather changes, disease etc.)

4) What are some of the problems that could occur if one part of the ecosystem is eliminated? For example, what problems occur in ecosystems when most or all of the trees are cut down? (Erosion, loss of animal habitat, loss of beauty). Or if it didn't rain for 6 months?

5) Does it make sense to protect forest ecosystems? Why? If so, what actions can we take to help protect ecosystems? (Reduce, reuse, recycle, rethink).

VOCABULARY

System
Ecosystem
Interdependent
Biotic
Abiotic
Native plants
Invasive plants
Producers
Consumers
Decomposers
Photosynthesis