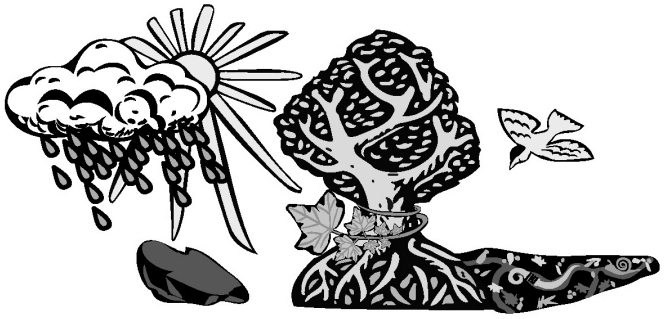

# FOREST ECOSYSTEMS

## IN-CLASS LESSON

**OUTCOMES:**

1) Students will broaden their understanding of ecosystems and Pacific Northwest forests.
2) Students will understand the difference between biotic and abiotic elements of an ecosystem.
3) Students will understand interdependence of elements in an ecosystem and the role of producers, consumers and decomposers.
4) Students will begin to understand photosynthesis and its key role in ecosystems.
5) Students will begin to understand human and natural changes to ecosystems.

**GRADE LEVEL:** 4th - 7th

**TIME:** One hour

**MATERIALS:**

- ❑ **Tree graphic**
- ❑ **Tree graphic with added elements e.g. human, insect, squirrel, water/clouds, rock, soil, bird, English ivy, sun**
- ❑ **Poster of Forest Ecosystem cut into 6 pieces with Velcro**
- ❑ **Electronic image of one puzzle piece sent to teachers before lesson or educator takes hardcopy to school**
- ❑ **Poster board to put puzzle pieces on with Velcro strips**
- ❑ **8.5 x 11 paper and colored pens**
- ❑ **Tripod**

**PROCEDURE:**

**1** This lesson assumes that the Introductory Lesson taught by the clasroom teacher included the following concepts:

- Mountains to Sound Greenway
- Definition of an ecosystem
- How ecosystems have distinct living, previously living and non-living parts
- Interdependence of parts of an ecosystem

**2** Introduce yourself and review what a greenway is and how the Mountains to Sound Greenway was created. Tell the class that you are going to do some activities today that will help them learn about ecosystems. This will prepare them for their field trip to Tiger Mountain.

Begin with the same tree graphic that was used in the Introductory Lesson. After placing the tree graphic on the document camera, ask students to list other biotic/abiotic elements that might be in a forest. Add parts or elements to the picture as the students report them. Be sure to include rotting logs and the often unseen parts (air, sunlight, small insects etc.) of ecosystems. Once the picture is complete tell the students that they have created a picture of an ecosystem. **An ecosystem is the collection of elements in a given area and the interaction of the living elements with each other and with the non-living elements.** Emphasize that the tree is a smaller part of a larger ecosystem, the forest. Ecosystems can be very large or very small. Thus a tree is a complete ecosystem in itself but a tree can also be viewed as a part of a larger ecosystem (in this case, the forest). Review dependence/interdependence/

connectedness. Have students discuss how the different parts of the tree ecosystem are connected.

**3** Move from talking about connectedness to the importance of the sun as the element that provides energy for our world. Explain photosynthesis and its crucial role for primary food production in a forest ecosystem. Review biotic vs. abiotic elements and explain producers, consumers and decomposers. Have the students identify a few of each of these in the ecosystem they created on the document camera.

**4** Now we are going to look at a Pacific NW ecosystem to understand its parts and their connections. Demonstrate with one piece of the puzzle by either using the document camera, a thumb drive or the electronic image previously emailed to the teacher. Help the students identify elements in the puzzle piece and the multiple connections between elements. When the students identify the elements make a sketch on the board that models what they will be doing in their small groups. Write the names of the elements and draw the connections as the students name them. Include and distinguish abiotic and biotic elements. Show them how to use the whole paper, and place the elements in the approximate places they are located on the puzzle piece. If you don't do this, they squeeze their drawings into one corner and don't have room to draw arrows and label elements. Label the elements as producers, consumers or decomposers using different colored markers. Review the definition and role of producers, consumers and decomposers.

**5** Break the class into 5 groups. Directions: *Each group will receive a "puzzle piece" that is part of a picture of a forest ecosystem. The **first job** of the group is to identify the biotic and abiotic elements in their puzzle piece. As they identify the elements they write the names on the paper in roughly the same space that they appear on the puzzle piece. The **second job** is to draw lines between the elements that the group thinks are connected or dependent on each other. You can draw as many lines as you want. The **third job** is to write on the line what the connection is. For example: does one element eat another, use it for shelter, food, etc? Take turns labeling and drawing lines so everyone has a chance to contribute.*

*Ask them to include 3 abiotic elements, 5 biotic elements and 5 labeled connections. It is important to list abiotic elements they can't see but know are there such as air, water or soil.*

**6** The Greenway educator can choose to have one representative from each group present to the class or just one or two groups do a more thorough presentation. What connections did they identify? Students frequently will just connect two elements and will not elaborate on how there are many complicated interdependencies in a forest. For example, they will draw a line connecting a bear with berries, but will not connect the berries to the sun or to birds. Have each group put their puzzle piece on the poster board to complete a single picture of a complex forest ecosystem.

**7** When the puzzle is complete ask: What could change this ecosystem? Emphasize natural changes and those made by humans. Again, what would happen to this ecosystem if one element were removed, e.g. if it stops raining, if the birds all die, development occurs, logging? Remind them about invasive species and native species. What would happen if Himalayan blackberries, English holly or ivy were introduced into this forest ecosystem? What might the effects be? Why are biologists and ecologists concerned about invasive species?

What are some positive changes that humans can have on forest ecosystems? (removing invasive species, planting natives, reducing pollution, reducing the need to harvest trees, establishing and protecting connected forest areas for wildlife habitat)

**8** In the conclusion be sure to remind the students about their upcoming trip to the Greenway and the great opportunity to enjoy and investigate a rich forest ecosystem! Remind the students to dress warmly and to bring a backpack with water and food.

## EXTENSION IDEA:

Discuss the ecosystems that we live in day-to-day as urban or suburban residents; name some of their parts and how we are connected to them (our houses, plants near and in our houses, the air, sun, technology, stores, farms, etc). Note how far-reaching this ecosystem is, especially if we include food and other items that we depend on that come from far away.

Discuss the many different types of ecosystems in the world. Can the students describe some of the different ecosystems in Washington State and in other parts of the world? How are they different from or similar to the forest ecosystem of Western Washington represented by the puzzle?

## VOCABULARY:

System
Ecosystem
Biotic
Abiotic
Interdependence
Invasive species
Non-native
Native species
Biodiversity
Producers
Consumers
Decomposers
Photosynthesis