



NEXT GENERATION STEWARDS

IN-CLASS LESSON

OVERVIEW:

The purpose of this In-Class Lesson is to build upon the Introductory Lesson and prepare students for the Field Study Trip. After this lesson, students should be familiar with producers, consumers, decomposers, and photosynthesis. They should be able to create a model to illustrate how energy moves through an ecosystem.

NEXT GENERATION SCIENCE STANDARDS:

4-LS1-2

Construct an argument that plants and animals have internal and external structures that function to support survival, growth and reproduction.

5-PS3-1

Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.

5-LS1-1

Support an argument that plants get the materials they need for growth chiefly from air and water.

5-LS2-1

Develop a model to describe the movement of matter among plants, animals, and their environment.

SUGGESTED GRADES: 4th - 5th

TIME: 60 minutes

MATERIALS:

Items provided by Greenway Trust:

- **Next Generation Stewards science journals**
- **Forest Ecosystems In-Class Power Point Presentation**
- **Map of the Greenway**
- **Poster of Pacific NW forest ecosystem cut into 6 puzzle pieces and mounted with Velcro strips on a poster board**
- **8.5 x 11 paper and colored pens**

SCIENCE JOURNAL:

This In-Class Lesson is paired with Pages 5-8 in the Next Generation Stewards Science Journal, and with a Power Point presentation.

In-Class Lesson Procedure	Science Journal Page(s)	Power Point Presentation Slide(s)
1	n/a	1 (title)
2	2-3	2
3	5-6	n/a
4	7	3, 4
5	7	5
6	7	6-15
7	7-8	16-21
8	n/a	22
9	n/a	n/a
10	n/a	n/a
11	n/a	n/a
12	n/a	n/a

PROCEDURE:

This lesson is taught by a Greenway Educator. It assumes that the Introductory Lesson taught by the classroom teacher included the following concepts:

- Definition of an ecosystem
- Ecosystems have distinct living and non-living parts
- Connectedness of parts of an ecosystem

1 The Forest Ecosystems In-Class Power Point Presentation should be on the title slide. Introduce yourself and review what a greenway is and how the Mountains to Sound Greenway was created. *The Greenway Trust has 3 major focuses:*

The Greenway Trust works at all levels of government to build strong collaboration among people and organizations.

Our Education Program teaches and inspires the next generation of environmental stewards and conservation leaders. (That's you!)

Our Stewardship and Volunteer Programs builds and maintains trails, removes invasive weeds, and plants native trees throughout the Greenway.

Thank the students and teacher for committing to become Next Generation Stewards of the Mountains to Sound Greenway. Ask the students to retrieve their science journals.

2 Direct the students to pages 2-3 in their science journal. Review what the students learned from the Introductory Lesson by asking them to describe what it means to be a steward of nature and to describe the impact of reintroducing wolves to Yellowstone National Park. Elicit answers related to Yellowstone as an ecosystem and the interconnectedness of its parts.

3 Direct the students to pages 5-6 in their science journal. Ask them to find their city on the map and draw a star. Then,

ask them to find Tiger Mountain and trace the route they might take from their city to Tiger Mountain.

Explain that what they do in the classroom today will help them learn about ecosystems and will prepare them for their field study trip at Tiger Mountain.

4 Direct the students to page 7 in their science journal. Invite them to fill in the blanks while you give an introduction to ecosystems and their parts.

Define an ecosystem as **a collection of living and non-living elements (or parts) in an area and how they are connected.** Ecosystems can be very large or very small. Emphasize that the Yellowstone is a system within a larger system of the National Park Service, and that it is a collection of smaller systems.

5 The living (**biotic**) and non-living (**abiotic**) parts of a healthy ecosystem are diverse, meaning that there are a lot of different kinds.

6 Show pictures of different types of ecosystems, both small and big.

7 Ask if they know what it means "to produce," "to consume," or "to decompose." The biotic parts can be put into three categories: producers, consumers and decomposers. Have students name a few of each category.

Producers make their own food using light energy from the sun, carbon dioxide from the air, and water from the soil. This process is called photosynthesis. All green plants are producers.

Consumers are all the animals. They cannot make their own food like plants, so they get their energy by consuming (eating) plants and/or other animals.

Decomposers are the nutrient recyclers

of the ecosystem. They get their energy from breaking down the tissues of dead or decaying plants and animals. Fungi, bacteria, and invertebrates (e.g. earthworms, slugs and yellow-spotted millipedes) are all decomposers. When they break down plants and animals, they release those nutrients back into the soil, where they can be used by plants.

The abiotic parts include the sun (light), air, water, and soil. You can easily remember these four parts using the acronym LAWS. Something is abiotic if it has never been alive. Ultimately, everything depends on the sun because it is a key ingredient in photosynthesis.

8 Now we are going to look at a Pacific NW forest ecosystem to understand its parts and their connections. Explain that they will be working in small groups, and that each group will receive a piece of blank paper, a marker, and a picture of a forest. Each group will:

1. Create a word map on their piece of paper,
2. Label the biotic and abiotic parts by writing and circling the letter P, C or D next to the name each plant or animal,
3. Draw arrows to show energy connections*, and
4. Present their word map to the class.

*For example:

Sun --> Tree --> Squirrel --> Eagle

9 Divide the class into 5 or 6 groups. Help the groups create and build upon their word maps. Encourage them to use the whole piece of paper, and to write the names of the parts in the approximate place they are located in the picture. Ask them to include at least 3 abiotic parts, 5 biotic parts, and 5 labeled connections. The arrows that

they draw should point in one direction to show where the energy is moving in the ecosystem.

10 The Greenway educator can choose to have one representative from each group present to the class or a couple of 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.

11 When the puzzle is complete ask them questions about natural changes and human-cause changes. For example:

- What could change this ecosystem?
- What would happen to this ecosystem if one element were removed?
- What would happen if a new element were introduced into this forest ecosystem?
- Why are biologists and ecologists concerned about invasive species?
- What are some positive changes that humans can have on forest ecosystems?

12 In the conclusion be sure to remind the students about their upcoming field 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, food, and their science journal.

EXTENSION IDEAS:

1. 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.
2. Discuss the many different types of ecosystems in the world. Can the students describe some of the different ecosystems in Washington State and other parts of the world? How are they different or similar?
3. Learn about the seven Leave No Trace principals, which guide minimum-impact experience in nature, at www.LNT.org.

RECOMMENDED VIDEOS:

"What Is a Greeway?" (15:26 minutes)

Source: Mountains to Sound Greenway Trust

Link: mtsgreenway.org/education/for-kids.

"Photosynthesis Song" (1:51 minutes)

Source: Easy Science for Kids

Link: www.easyscienceforkids.com/all-about-photosynthesis

"Decomposers" (3:04 minutes)

Source: NOVA

Link: www.pbslearningmedia.org/resource/tdc02.sci.life.oate.decompose/decomposers/

RECOMMENDED BOOKS:

Who Eats What?

Author: Patricia Lauber

Pass the Energy, Please!

Author: Barbara Shaw McKinney

VOCABULARY:

System: A combination of things or parts forming a complex whole.

Ecosystem: A system of interconnected parts that are living (biotic) and non-living (abiotic).

Biotic: Living things.

Abiotic: Non-living things (specifically, things that have never been alive, such as light, air, water and soil).

Invasive species: A species of plant or animal whose introduction to an ecosystem does economic and/or environmental damage.

Native species: A species of plant or animal that is either endemic (found only within a particular region) or indigenous (found both within the region and elsewhere).

Biodiversity: Variety of life.

Producer: Autotrophic organisms that produce their own energy by photosynthesizing. Green plants are producers.

Consumer: Organisms that receive energy by consuming other organism. Animals are consumers.

Decomposer: Organisms that break down dead or decaying organisms, and in doing so carry out the natural process of decomposition. Some fungus, bacteria, and invertebrates are decomposers.

Photosynthesis: The process by which green plants use sunlight to synthesize simple carbohydrates from carbon dioxide and water.

Nutrient: A substance that provides nourishment essential for growth and the maintenance of life.