

Biomes: Forests and Seeds: Teacher's Guide

Grade Level: 6-8

Curriculum Focus: Ecology

Lesson Duration: Two class periods

Program Description

The forest is a wild environment that many students have seen and experienced. Yet, what do we really know about its science? In this beautifully filmed presentation, students get a new perspective on forests close to home – and far away. This program includes one feature segment and two short segments.

Onscreen Questions

- What are some of the different ways that plants disperse their seeds?
 - How do the inhabitants of the deciduous forest adapt to changes in the seasons?
 - How do macaques survive the harsh winters of the temperate forest?
 - How is the sap from a maple tree turned into syrup?
-

Lesson Plan

Student Objectives

- Discover that seasonal changes affect life in a temperate forest ecosystem.
- Learn how organisms in a temperate forest are dependent on one another for proper nutrition.

Materials

- Field guides, encyclopedias, and Internet resources about plant and animal life in temperate forests
- Index cards
- Card stock or poster board for seasonal displays
- Five skeins of yarn (different colors)

Procedures

1. In this activity, students will study organisms from an Asian temperate forest and create a food web. Begin the lesson by brainstorming the different kinds of life in a forest. Make a list on the board.

- Explain that three major types of organisms live in an ecosystem. Producers create their own food through photosynthesis. Consumers hunt or forage for nutrients. Decomposers obtain nutrients by breaking down parts of organisms into simple forms – for example, bacteria on a forest floor feed off the leaf tissue of fallen leaves, causing the leaves to decay. On the list, have students identify each organism as “P” (producer), “C” (consumer), or “D” (decomposer).
- Review the three types of consumers. Herbivores are animals that eat plant material – for example, caterpillars that eat leaves. Carnivores are animals that eat other animals – for example, forest ants that eat other insects. Omnivores are animals that eat plant material and other animals – for example, humans that eat vegetables and meat. Ask students to look at the list and decide with type each consumer is.
- Next, define a food web, which is a diagram showing how organisms in an ecosystem depend on one another to obtain nutrients and energy. Example: An oak tree food web shows that caterpillars eat the tree's leaves; beetles eat the bark; woodpeckers eat beetles; jays and squirrels eat the acorns; and the tree makes its own food with photosynthesis.
- Tell students that they will make food webs for the temperate forest ecosystem in northern Japan. Temperate climates have four distinct seasons, and the plants and animals there must adapt to the changing seasons to survive. Explain that deciduous trees, or trees that shed their leaves in the fall, dominate the plant life in Japanese and North American temperate forests.
- Divide the class into four groups, each representing a season. Using the following chart, assign each student one organism to research. Each group must include five or six animals and at least three plants.

Spring	Summer	Fall	Winter
Cherry tree	Cherry tree	Cherry tree	Cherry tree
Maple tree	Maple tree	Maple tree	Maple tree
Oak tree	Oak tree	Oak tree	Oak tree
Beech tree	Beech tree	Beech tree	Beech tree
Macaque	Macaque	Macaque	Macaque
Squirrel	Squirrel	Squirrel	Squirrel
Great spotted woodpecker	Great spotted woodpecker	Great spotted woodpecker	Great spotted woodpecker
Dogtooth violet	Dogtooth violet		
Hornet	Hornet	Hornet	
Horned beetle	Horned beetle	Horned beetle	Horned beetle
Ant	Ant	Ant	Ant
Dormouse	Dormouse	Dormouse	Dormouse
Caterpillar/ butterfly	Caterpillar/ butterfly	Caterpillar/ butterfly	Caterpillar/ butterfly
	Moth	Moth	
Jay	Jay	Jay	Jay
			Duck

7. Distribute copies of the chart below as homework. Students assigned to a plant must describe what nutrients it needs and how it changes seasonally. Students assigned an animal must research what it eats in each season.

Life in a Temperate Forest
Name of organism:
1. Describe the organism's appearance.
2. What does the organism eat, or how does it get nutrients?
3. How does this food source change during each season?
4. How does the organism react to seasonal changes?
5. What eats or preys on this organism?
6. Is this organism a producer or a consumer?
7. During which season is the organism most active? Why?

8. Have each group make a food web for its season. Students should write the name of their plants and animals on index cards and arrange the cards in a circle on poster board. Assign each group a different color yarn. Use the yarn to show the organisms' interdependency in each season. Example: In fall, the oak tree would have yarn leading to squirrels and jays, which eat acorns, and to macaques, which eat the leaves and bark.
9. Discuss how the organisms' dependency on each other changes with the season.

Assessment

Use the following three-point rubric to evaluate students' work during this lesson.

- **3 points:** Students' research was exceptionally well-done – accurate and detailed information on the assigned organism; complete answers to all activity sheet questions; clear understanding of seasonal food webs.
- **2 points:** Students' research was mostly completed – somewhat detailed information on the assigned organism; answers to most activity sheet questions; general understanding of seasonal food webs.
- **1 point:** Students' research was partially completed – hardly any detailed information on the assigned organism; answers to some activity sheet questions; little understanding of seasonal food webs.

Vocabulary

coniferous

Definition: Bearing cones and having needle-shaped leaves

Context: A small number of coniferous trees live in temperate forests.



deciduous

Definition: Shedding or losing foliage at the end of the growing season

Context: Deciduous trees are the dominant plant life in temperate forests.

dormant

Definition: In a condition of biological rest or inactivity

Context: During the winter, deciduous trees become dormant to survive the cold.

habitat

Definition: The place an animal or plant normally lives

Context: The temperate forest habitat is rich with plant and animal life.

hibernate

Definition: To pass the winter in an inactive or dormant state

Context: Small mammals lower their body temperatures when they hibernate.

Academic Standards

National Academy of Sciences

The National Science Education Standards provide guidelines for teaching science as well as a coherent vision of what it means to be scientifically literate for students in grades K-12. To view the standards, visit <http://books.nap.edu>.

This lesson plan addresses the following science standards:

- Life Science: Populations and ecosystems

Mid-continent Research for Education and Learning (McREL)

McREL's Content Knowledge: A Compendium of Standards and Benchmarks for K-12 Education addresses 14 content areas. To view the standards and benchmarks, visit <http://www.mcrel.org/>.

This lesson plan addresses the following national standards:

- Science – Life Sciences: Understands biological evolution and the diversity of life
- Language Arts – Writing: Gathers and uses information for research purposes

Support Materials

Develop custom worksheets, educational puzzles, online quizzes, and more with the free teaching tools offered on the Discoveryschool.com Web site. Create and print support materials, or save them to a Custom Classroom account for future use. To learn more, visit

- <http://school.discovery.com/teachingtools/teachingtools.html>
-



DVD Content

This program is available in an interactive DVD format. The following information and activities are specific to the DVD version.

How To Use the DVD

The DVD starting screen has the following options:

Play Video – This plays the video from start to finish. There are no programmed stops, except by using a remote control. With a computer, depending on the particular software player, a pause button is included with the other video controls.

Video Index – Here the video is divided into four parts (see below), indicated by video thumbnail icons. Watching all parts in sequence is similar to watching the video from start to finish. Brief descriptions and total running times are noted for each part. To play a particular segment, press Enter on the remote for TV playback; on a computer, click once to highlight a thumbnail and read the accompanying text description and click again to start the video.

Curriculum Units – These are specially edited video segments pulled from different sections of the video (see below). These nonlinear segments align with key ideas in the unit of instruction. They include onscreen pre- and post-viewing questions, reproduced below in this Teacher's Guide. Total running times for these segments are noted. To play a particular segment, press Enter on the TV remote or click once on the Curriculum Unit title on a computer.

Standards Link – Selecting this option displays a single screen that lists the national academic standards the video addresses.

Teacher Resources – This screen gives the technical support number and Web site address.

Video Index

I. Seed Starters (4 min.)

Witness the journey as seeds disperse, germinate, become seedlings, and mature into plants – that then start the process again.

II. Summer in the Forest (18 min.)

See how the animals and plants of Asia's temperate forests adapt and change as spring gives way to summer.

III. Winter Wonders (20 min.)

Winter in a temperate forest means short, cold days and less food. Discover how plants and animals survive the long Asian winter.

IV. From Heat to Treat (4 min.)

Trees provide food for many animals, including humans. Watch how the sap from a maple tree is turned into delicious maple syrup.



Curriculum Units

1. Waiting to Bloom

Pre-viewing question

Q: Why do seeds have a protective coat?

A: Answers will vary.

Post-viewing question

Q: What do all seeds have?

A: Along with a protective coat, all seeds have an embryo and stored food.

2. Dispersal and Germination

Pre-viewing question

Q: What environment is best for seedlings?

A: Answers will vary.

Post-viewing question

Q: What environmental conditions do seeds need to germinate?

A: They need an environment with water, oxygen, and the right temperature to germinate. Sunlight is not always necessary.

3. Temperate Forests

Pre-viewing question

Q: What are some types of forests?

A: Answers will vary.

Post-viewing question

Q: What is a temperate forest?

A: It's an area where the climate changes a lot between the summer and winter and there is enough annual rainfall for a large number of plants to flourish. Everything that lives in a temperate forest is ruled by the changing seasons.

4. Macaque Society

Pre-viewing question

Q: How do animals in your area adapt to the changing seasons?

A: Answers will vary.

Post-viewing question

Q: What makes Japanese macaques so unusual?

A: Not only are they less likely to squabble than their tropical forest cousins, but there is a high degree of tolerance between male macaques. Several males may live together in harmony within the same troop, and young males may change troops several times without trouble.



5. Changing With the Sun

Pre-viewing question

Q: How do spring and summer differ in your area?

A: Answers will vary.

Post-viewing question

Q: What changes occur in the temperate forest as spring turns to summer?

A: The days are longer and warmer during the summer, and food is more abundant for many forest animals.

6. The Period of Plenty

Pre-viewing question

Q: Why do animals hibernate?

A: Answers will vary.

Post-viewing question

Q: Which is better suited to winter, the macaque or squirrel?

A: Answers will vary.

7. Shifting Into Winter

Pre-viewing question

Q: How do animals know winter is approaching?

A: Answers will vary.

Post-viewing question

Q: Why do the leaves on deciduous trees change color in the fall?

A: Because there isn't enough light or water during the winter for photosynthesis, deciduous trees are dormant in winter. Chlorophyll – the substance that gives leaves their green color and helps carry out photosynthesis – begins to break down, allowing other chemicals to show through. The varied chemical makeup of trees is responsible for the different colors, red maples leaves and yellow and brown birch leaves, for example.

8. Snow Monkeys

Pre-viewing question

Q: How does winter affect forest animals?

A: Answers will vary.

Post-viewing question

Q: Why is timing crucial in the macaque mating season?

A: It is important that macaque babies do not arrive in early spring (when it is still cold and there is little food) or in late summer (when they won't mature enough to survive the next winter).



9. Animals of Winter

Pre-viewing question

Q: Why are some animals easier to spot during winter?

A: Answers will vary.

Post-viewing question

Q: How do macaques survive the winter?

A: They typically move daily to a new location to search for food. However, when the temperature drops below freezing, macaques move as little as possible, remaining in the trees to avoid the clinging snow that sticks to their feet and drains their body heat.

10. Birds, Squirrels, and New Shoots

Pre-viewing question

Q: How do birds and squirrels prepare for winter?

A: They collect nuts through the autumn, storing them in safe spots within their territory. In the winter, they will use memory and smell to find them.

Post-viewing question

Q: Why is early spring a dangerous time for trees?

A: Soft new shoots, which are moist and vulnerable, appear on the trees. An icy frost or dip in temperatures could kill them and the energy the trees have used to prepare for spring would be wasted.

11. Waking to Spring

Pre-viewing question

Q: What do you think it is like to wake after a long hibernation?

A: Answers will vary.

Post-viewing question

Q: Why did the Japanese name this butterfly "The Goddess of Spring"?

A: Unlike summer butterflies, it feasts on nectar, distributing pollen as it flies from one flower to the next.

12. A Sticky Business

Pre-viewing question

Q: In what ways do we use maple syrup?

A: Most students will say as a pancake topping; some might know that it is used as a sweetener in food.

Post-viewing question

Q: How is maple syrup categorized?

A: It's divided into different grades according to color. Generally, the lighter grades of maple syrup are made from sap collected at the start of the season, and the darker grades from sap collected towards the season's end.

