

16. Describe specific animal adaptations of creatures in the coniferous forest and why they are helpful in this environment.
17. Why do animals migrate?
18. What is an "old-growth" forest? Why are there so few of them around?
19. In what ways do humans threaten the coniferous forest biome?
20. In what ways are humans working to protect this biome?

Follow-up Discussion

Research indicates that students will retain their previous misconceptions about a topic, in preference to new information, until they actively recognize and correct their own errors. Therefore, it is important to have your students re-examine the facts/beliefs they put on their "Everything We Think We Know About..." list. It might also be helpful to review the list by marking each entry with a "+" or "-" to show which facts were correct and which were incorrect.

Thought-provoking discussions provide a good way to assess the overall depth of student understanding. The following are some suggested discussion topics.

- What are some problems facing coniferous forests around the world?

Follow-up Activities

- If possible in your location, have students evaluate a nearby timber stand using information from *Forests: Investigating Your Environment*, an interdisciplinary lesson unit developed by the US Forestry Service for use in grades 6-12. This online curriculum can be downloaded at the following Web address: www.na.fs.fed.us/spfo/ce/iy/basic/chforest.pdf.
- Collect samples of cones and needles from different types of conifers (white pine, blue spruce, balsam, fir, hemlock...). Have students observe these samples closely and create a schema for identifying tree species by their differences (by shape, length and color of the needle, and by size and shape of the cone).
- Have students dissect and illustrate the cones of conifers, describing how they are formed and what the seeds look like. Have students identify male and female cones.
- Have students research the different types of world forests, drawing specific comparisons among them (i.e., climate, diversity of both plant and animal species, soil conditions, extremes in conditions, adaptations required for living in each type of forest).

Suggested Internet Resources

Periodically, Internet Resources are updated on our Web site at www.LibraryVideo.com

- www.aliexplorer.com/ecology/e70.html
"Aliens Explore Earth" contains an ecology dictionary as well as numerous articles on biomes, including coniferous forests.
- mbgnet.mobot.org/sets/taiga/index.htm
The Evergreen Project "What's It Like Where You Live?" Web site describes the people, plants and animals that live in the taiga.
- curriculum.calstatela.edu/courses/builders/lessons/less/biomes/conifers/conifweb.html
This page from the "Introduction to Biomes" Web site shows a typical food web in a coniferous forest.

Suggested Print Resources

- Breining, Greg. *The Northern Forest*. Benchmark Books, Tarrytown, NY; 2000.
- Cornell, Joseph. *John Muir: My Life with Nature*. Dawn Publications, Nevada City, CA; 2000.
- Hinshaw Patent, Dorothy. *Fire: Friend or Foe*. Clarion Books, New York, NY; 1998.

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Coniferous Forests

Grades 5–8

Students in grade 5-8 classrooms possess a wide range of background knowledge. Student response to this video program is sure to be varied, so the teachers at these grades need all the help they can get! This guide has been designed to help the 5-8 science teacher by providing a brief synopsis of the program, preview and follow-up questions, activities, vocabulary and additional resources.

Before Viewing: Extensive research tells how important it is for the teacher to discover what the students know — or think they know — about a topic, before actually starting a new unit. Therefore, after prompting discussion with the pre-viewing questions, lead your class to create an "Everything We Think We Know About..." list. You may also wish to preview key vocabulary words, and have students raise additional questions they hope will be answered.

After Viewing: Have your students share video excerpts that fascinated or surprised them, then challenge your students to prove or disprove the accuracy of the facts they put on their "Everything We Think We Know About..." list. Discuss what else they learned and use the follow-up questions and activities to inspire further discussion. Encourage students to research the topic further with the Internet and reading resources provided.

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Program Summary

Coniferous forests are one of the Earth's major biomes. Biomes are "life zones" — large regions of the world that have similar characteristics, and are usually named for the dominant plant life in that area. Climate and elevation are determining factors in biomes. Each biome is made of many distinct ecosystems, which are communities of plants and animals and the nonliving environment that surrounds them. In every ecosystem there are many abiotic, or non-living factors, including water, air, sunlight, minerals, soil quality and temperature. Living components of an ecosystem, like plants and animals, are called biotic factors. There is constant interaction between the abiotic and biotic factors of an ecosystem, resulting in organisms that are uniquely adapted to survive in their particular environment.

Cone-bearing evergreen trees, such as pines, firs, spruce and hemlocks dominate the landscape of the coniferous forest biome, but a large variety of other plants and animals live in this biome as well. Coniferous forests exist in northern temperate regions, where they receive between 50 and 125 cm (20-50 in.) of precipitation annually. Also called "taiga" (the Russian word for "swamp forest") and "boreal" forests (the Greek word for "north"), almost all coniferous forests are found in the Northern Hemisphere. Some are found on the world's highest mountains, including the Himalayas of Asia, the Alps and Carpathians of Europe, and the North American Rockies.

Conifers, also called gymnosperms, are well adapted to their extreme conditions. Both the conical shape of the trees and the shape of their leaves are adaptations that help conifers to shed snow and ice. Their needle-like leaves also remain throughout the year to capture available sunlight, and their dark color allows them to absorb more heat from the sun. The seeds of conifers are well protected within cones, some of which only open after a forest fire has occurred.

Ecologists are scientists who study plants and animals and their interaction with the environment. Some ecologists study the process called succession in coniferous forests. Areas that were once forests but whose trees were removed by activities such as fires, storms or logging, follow a slow progression of stages from grasses to small shrubs and trees, and finally back again to forests.

Animal species living in the coniferous forests include large mammals like deer, moose, bears, wolves and beaver. Birds like hawks and owls are common yearlong inhabitants of coniferous forests, while many other species of birds come to nest and feed in the warmer seasons, attracted by the insects and fish found in large numbers in the lakes, swamps and bogs. Human activities such as logging and hunting continue to threaten the coniferous forest biome. Today, governments provide some protections for these forests, limiting the amount of logging and hunting, and many people are recycling, thereby protecting the wasteful harvesting of the valuable trees that give this biome its name.

Vocabulary

The following words are included for teacher reference or for use with students. They are listed in the order in which they appear in the video.

biomes — Large regions of the world that have similar characteristics, usually named for the dominant plant life in the area. Biomes contain specific kinds of plants and animals.

ecosystem — A place where communities of living things interact with each other and with nonliving components, such as soil and water.

coniferous forest — Also known as taiga or boreal forest, a biome marked by evergreen trees called conifers; primarily located in the cool northernmost regions of temperate climate zones and in mountains. Coniferous forests receive between 50 and 125 cm (20-50 in.) of annual precipitation.

climate — An environment's average weather conditions including temperature and rainfall. Climate is the most important element in determining what kinds of organisms can live in an area.

polar zone — The frigid areas found in bands around the North and South poles, characterized by freezing conditions, minimal sunlight and low diversity of plant and animal life.

tropical zone — The geographic area found in a broad band around the equator, characterized by the greatest amount of sunlight and annual rainfall and the greatest diversity in plant and animal life.

temperate zone — Large areas located in the bands between the polar and tropical zones; characterized by a climate consisting of a warm season and a cold season with equal lengths.

ecologist — A scientist who studies the relationships among plants, animals and other organisms and their interaction with all aspects of their natural environment.

succession — The change in a plant community, usually as a result of a disturbance (e.g. fire, drought, storm). After the destruction of a forest, grasses and small shrubs and trees grow in the clearing; in a slow succession of stages, the land may return to being a forest.

global warming — An increase in the average temperature on Earth, first detected in the 1980s. This is thought to be a result of an increase in the amount of carbon dioxide in the atmosphere caused by forest fires and other air pollution.

calcium hydroxide — A chemical that is used as an indicator for the presence of carbon dioxide.

adaptations — Inherited physical features or behaviors that enable an organism to survive in its environment.

gymnosperm — (Greek: "naked seed") A plant such as the pine, spruce or hemlock that produces seeds that are not encased in fruit. Gymnosperms were the first plants to evolve seeds.

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conifer — The most common living gymnosperms, all with needle-shaped leaves and seeds produced in cones.

migration — The movement of an animal or group of animals in search of better environmental conditions. Migration is an inherited genetic behavior in many animals.

old-growth forests — Forests that have not been disturbed by human activities.

Pre-viewing Discussion

Before students generate their list of "Everything We Think We Know About..." for this topic, stimulate and focus their thinking by raising these questions so that their list will better reflect the key ideas in this show:

- What is the largest land biome?
- What plants and animals can be found in coniferous forests?
- Where are coniferous forests located?

After the class has completed their "Everything We Think We Know About..." list, ask them what other questions they have that they hope will be answered during this program. Have students listen closely to learn if everything on their class list is accurate and to hear if any of their own questions are answered.

Focus Questions

1. What is a biome? What factors define a biome?
2. What is an ecosystem?
3. Describe the coniferous forest biome.
4. In which climate zone are coniferous forests found? Why is that so?
5. Why are coniferous forests also known as the taiga?
6. What does boreal mean? Why are coniferous forests called boreal?
7. What is the dominant life form in coniferous forests?
8. How does the process of forest succession occur?
9. How can forest fires have a positive effect on a coniferous forest?
10. Explain the experiment with the simulated forest fire and the lime water indicator.
11. What is "global warming"?
12. What are some adaptations that conifers possess that permit them to thrive in sometimes inhospitable conditions?
13. What are gymnosperms? How are they different from other plants?
14. How would you describe the soil in a coniferous forest? Why does the soil have the characteristics it does?
15. How does the soil influence the plants and animals in this ecosystem?

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