

Discovering Our Temperate Rainforests

Activities to explore species adaptation and forestry issues in North America's coastal temperate rainforests

by Anne Lindsay

Subjects: ecology, social science

Key concepts: adaptation, habitat needs, environmental issues (forestry)

Skills: creativity, problem solving, role playing

Location: indoors

Home of giant conifers, some of them more than 90 meters (300 feet) tall and 1,000 years old, the temperate rainforests of the Pacific Northwest support the greatest diversity of wildlife on the North American continent. The study of these ancient forests provides students with an opportunity to examine the ways in which living things adapt to a specific habitat, and the environmental issues that arise from human activity in a complex ecosystem.

These activities are designed to introduce students to the temperate rainforests of North America and to the unique climatic conditions that produce an environment conducive to plant and animal species found nowhere else. For example, the threatened marbled murrelet is a small seabird that nests on the highest branches of old-growth trees, where the moss creates a thick pad. The nest site of this species, which spends most of its time on the Pacific Ocean, was not discovered until

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Coast redwoods of Northern California.

1901. Another bird, the Rhinoceros auklet, digs deep burrows in the root systems of large trees in remote coastal islands of the rainforest. To date, 80 species have been found to be dependent on this ancient ecosystem for their survival. The activities could form part of a more comprehensive unit of study of temperate rainforests, complement a classroom or school-wide study of rainforests or endangered species, be used as Earth Week activities, or form the basis of an independent study or research project. The Create a Creature activity could

also serve as a culminating task, for evaluation, at the end of a study of adaptations to habitats.

How old is ancient?

The largest western red cedar ever recorded was about 2,000 years old, and Douglas firs may be more than 1,000 years old. To help students grasp the age of some of the trees in the temperate rainforest, have them plot major events in history on a timeline that spans the lifetimes of these oldest trees. You could begin by asking students to bring to class the oldest object in their home. (Caution them to ask permission, and not to bring anything living, fragile, or valuable.) The age of these objects can be plotted on the timeline first. Other information for plotting could include students' birth dates, the date on which their town was founded, the birthdates of historical figures, the dates of inventions, or other dates of interest to the class.

Adaptations to Life in an Ancient Temperate Forest

Characteristics of the Forest	Adaptations
Large cone-bearing trees form a canopy over the forest. As a result, the plants on the forest floor and in the understory receive little or no sunlight.	<p>Animals:</p> <ul style="list-style-type: none"> • some eat bits of moss and lichen that fall from branches of large trees (e.g., Roosevelt elk) • some burrow under the extensive root systems of the large trees for nesting (e.g., Rhinoceros auklet) <p>Plants:</p> <ul style="list-style-type: none"> • plants on the forest floor have a higher than average concentration of chlorophyll • some plants have eliminated the need for roots and hang from the branches of large trees so that they can gain greater exposure to sunlight (e.g., lichens, mosses, and ferns)
Large standing snags or decaying trees	<p>Animals:</p> <ul style="list-style-type: none"> • some use snags as nesting sites, shelters, and as a food source (home of many insects) <p>Fungi:</p> <ul style="list-style-type: none"> • grow on decaying trees (e.g., bracket fungi)
Nurse logs (fallen logs on the forest floor)	<p>Animals:</p> <ul style="list-style-type: none"> • use nurse logs for shelter, as nesting sites, and as a food source <p>Plants:</p> <ul style="list-style-type: none"> • use nurse logs as a source of nutrients, moisture and warmth, especially for new seedling trees (hence the name “nurse log”)
Large logs lying in streams	<p>Animals:</p> <ul style="list-style-type: none"> • use slower water for protection (e.g., insects and young salmon)
Dry summers	<p>Plants:</p> <ul style="list-style-type: none"> • broom-like branches of large trees “sweep” moisture from the air
Cold wet winters	<p>Animals:</p> <ul style="list-style-type: none"> • warm coats of some mammals provide protection from cold (e.g., fox) <p>Plants:</p> <ul style="list-style-type: none"> • evergreen conifers carry out photosynthesis in the winter
Green lush environment	<p>Animals and Plants:</p> <ul style="list-style-type: none"> • camouflage (e.g., three-toed salamander)

Fast Facts about North America’s Coastal Temperate Rainforest

- Coastal temperate rainforests comprise only two to three percent of the world’s rainforests. Half of the world’s temperate rainforests are in the Pacific Northwest; other major tracts are in Chile, New Zealand, and Australia.
- North America’s temperate rainforest once covered 25 million hectares (62 million acres) in a coastal strip running from California north to Alaska. About 55 percent of this original forest remains undeveloped; almost all of these old-growth sections are in northern British Columbia and Alaska.
- Temperate rainforests are defined not by their vegetation but rather by their unique climate. The conditions for temperate rainforests are created by high coastal mountains that trap moisture-laden clouds moving inland from the ocean. Abundant rainfall (as much as 200 centimeters / 80 inches per year) and mild temperatures year-round promote the rapid growth of vegetation. Fog and clouds provide moisture for the growth of lichens and mosses in the forest canopy.
- Constant moisture from rain and fog means that coastal rainforests are rarely disturbed by fire. Trees are long-lived and many grow to enormous sizes. Windfall trees create openings for new growth, and decaying logs and litter on the forest floor provide a diversity of habitats.
- The rainforest of the Pacific Northwest supports more than 30 tree species and 250 species of mammals and birds. Rainforest streams are the spawning grounds and nurseries of seven species of Pacific salmon and trout.
- The dominant tree species of the Pacific Northwest rainforest are conifers. They include the gigantic redwoods of California, western hemlock, western red cedar, Douglas fir, Sitka spruce, and mountain hemlock. Different species dominate at different latitudes.
- Coastal temperate rainforests store more organic matter than any other forest type, including tropical forests – from 500 to 2,000 metric tons of wood, foliage, leaf litter, moss, and soil per hectare.
- For more than 5,000 years, the rich resources of the Pacific Ocean and the inland rainforest watersheds supported one of the largest and most diverse populations of aboriginal peoples in North America. More than 65 languages were spoken, and an extensive trading network linked villages and cultures.

Source: Edward C. Wolf, Andrew P. Mitchell, and Peter K. Schoonmaker, *The Rain Forests of Home: An Atlas of People and Place*, Ecotrust, Pacific GIS, and Conservation International, 1995, <www.inforain.org/rainforestatlas/>.

Create a Creature

Time: two 45-minute periods

Materials: class chart of “Adaptations to Life in an Ancient Temperate Rainforest” (page 45); 1 large piece of paper (or Creature Information Sheet, below), modeling clay (optional) per student, student journals

In this activity, students create an imaginary plant or animal that is adapted for life in an ancient temperate rainforest.

Goals:

- to review the habitat needs of plants and animals and how these needs are met
- to reinforce, in a concrete way, the ways in which living things interact and adapt to their natural habitat
- to promote creativity and problem-solving skills
- to introduce the concept of food chains and food webs

Background: The wet winters, short dry summers, and dense coniferous canopy of the temperate rainforest create a unique environment found nowhere else in North America. The plants and animals that are indigenous to the rainforest have adapted to this environment, often in remarkable ways. The chart “Adaptations to Life in an Ancient Temperate Rainforest” outlines some of the physical characteristics and conditions

of a temperate rainforest and gives examples of how various species have adapted to each of these conditions. The first four characteristics are common to all ancient temperate rainforests of the Pacific Northwest. This summary chart can be used as a reference or can be produced as a class chart for students when you introduce this activity.

Procedure: Explain to students that they are to create a plant or animal that is adapted to living in an ancient

temperate rainforest. They are to include a colored drawing of the creature in its natural environment, and they are to complete the information sheet about the creature.



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Creature Information Sheet

1. Animal or plant? _____
2. Name of creature: _____
3. Drawing of creature:
4. Creature's source of water: _____
5. Creature's space or territory: _____
6. If creature is an animal:
 - (a) Food: _____
 - (b) Shelter: _____

7. If creature is a plant:
 - (a) Source of light: _____
 - (b) Soil type: _____
8. What species, if any, uses your creature as a food source?

9. How does your creature protect itself?

10. Name three ways your creature is adapted to life in a temperate rainforest.

Rainforest debate

Time: two 30-minute periods

Materials: role-playing cards (provided: 1 per student), outline of debate format (on chart paper), costumes and props (optional), student journals

This activity encourages students to consider issues raised by human activity, particularly logging, in an ancient temperate rainforest. Students assume the roles of a variety of people who would be affected in different ways by plans to log an area of forest. By considering many perspectives, they can begin to understand the need for cooperative resolutions to environmental problems. The activity requires two days to complete (one to prepare, and one for the debate).

Goals:

- to introduce current issues relating to ancient temperate rainforests of the Pacific Northwest
- to encourage students to consider the various needs of different groups when discussing an environmental issue
- to provide a forum for presenting ideas and opinions
- to encourage cooperative group work
- to involve students in considering how natural resources can be used in a sustainable way

Procedure:

1. Read to students the following scenario:
“TreeCut Company has placed a proposal before government seeking permission to harvest an area of ancient temperate rainforest called Orca Sound. Many people, as well as the forest itself, are likely to be affected by the government’s decision to permit or turn down the proposal. Some of them have asked the government committee for an opportunity to present their views about the logging proposal in a debate. The people can also make suggestions about guidelines that TreeCut Company will have to follow if logging is allowed. At the end of the debate, the government committee will vote to recommend that the legislature either refuse the logging plan or approve it with guidelines.”
2. Inform students that they are to play the roles of the people in the debate. They will tell the government committee what they think about the logging proposal and why. It is important to explain that they are role-playing a point of view with which they may not agree, and that the purpose is to present and consider all points of view involved in deciding how an ancient temperate rainforest should be used.
3. Divide the class into nine groups. Give each group a role-playing card and give the students time to prepare their group’s positions. At this point, you may wish to allow time for students to research the issue in greater depth, perhaps by learning about perspectives

presented in real-life logging controversies that have occurred in such areas as British Columbia’s Great Bear Rainforest, Clayoquot Sound, and Stoltmann Wilderness, and the Tongass National Forest in Alaska. The group playing animals and plants may wish to research the needs of particular species that can survive only in old-growth forests. All groups should consider a range of options and compromises: clearcutting, sustainable logging, no logging of old-growth trees, no logging in protected areas, or no logging at all. The group playing the government committee representatives can write the names of the participants in the debate and discuss what position they think each will present on the logging plans, as well as one argument each might make to support that position. Ask each group to choose one representative to be the speaker at the debate.

Note: Students may wish to dress for the parts they are playing.

4. For the debate, have the groups make their presentations one after the other in an order determined by you. Each group has 1 to 3 minutes to state its position on the logging proposal and to explain why. Then hold an open question period of 10 to 15 minutes in which members of any group may ask a question of any other group. Finally, allow each group to give a brief summary statement (30 seconds each).
5. Have the government committee members discuss the debate and make their decision either to refuse the logging plan or to approve it with guidelines. If they vote for approval, they should present the guideline that TreeCut should follow.

While the government is making its decision, ask the other students to write individual journal entries to answer these questions:

- Why do you think that we had this debate?
- Before the debate, what was your view on the logging proposal? Has your view changed since the debate? Explain why.
- Did you agree with the position that your group had to present? Explain why. If you didn’t agree with your group’s position, how did you feel about preparing it?
- Explain the importance of considering the views of others, even if we don’t agree with them.

Wrap-up: After reviewing all of the reasons given for and against logging in the ancient temperate rainforest, invite students to vote again, but this time giving their personal opinions. Ask the students whether they changed their minds during the debate and, if so, which facts, arguments, or opinions influenced their decision.

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Rainforest Debate Role-Playing Cards

Animals and Plants of Orca Sound:

You wish to remain in the ancient temperate rainforest, which is one of the few places where you can find your natural habitat. You believe that you have the right to shelter, food, clean water, and space. You know that logging – particularly clearcut logging (a method that removes all the trees in an area) – will destroy your habitat and you will probably die.

Aboriginal Elder:

You are Nuu-chah-nulth and your people have lived in the Orca Sound area for thousands of years. You believe that your people should have the final decision about what happens to the forest in your ancestral homeland. Your people have used the forest respectfully, but you would consider some logging if the profits help to improve life for your people.

TreeCut Company President:

You have been in the forestry business for more than 50 years, providing jobs for thousands of people. You admit that some of the logging practices used in the past were irresponsible and you are taking steps to improve them. If the government does not allow logging in Orca Sound, your company will start to lose money and might have to lay off some long-time workers in several towns.

Tourist:

You are planning a trip to the Orca Sound area next summer for sea kayaking, and hiking and photography in the forest.

You will spend a lot of money to hire a guide and to fly yourself and your equipment to Orca Sound. You are against the plans for logging, as it would ruin your chance to experience the beauty of an ancient temperate rainforest.

Business Owner in Logging Town:

You own a restaurant near a TreeCut Company mill, the biggest business in town. People who work there and their families enjoy meals at your restaurant. If TreeCut's proposal to log the Orca Sound area is not allowed, many of the people in your town might lose their jobs and have to move to find work. Without their business, your restaurant might have to close.

Environmentalist:

You are an environmentalist who has lobbied government for a long time to protect ancient temperate rainforests in Orca Sound from all industry, including logging. Already, large areas of the forest have been destroyed by clearcutting. You believe that replanting trees only provides another crop of trees for the logging company to cut; it can never replicate the complex ecosystem of a true ancient temperate rainforest or replace the habitats that will be lost.

Logger:

You are the third generation of loggers in your family who have worked for TreeCut Company and you have three children to support. You are not trained for any other type of work and other jobs are hard to find in your community. If TreeCut is not allowed to log the Orca Sound area, you might lose your job. You understand that saving the old-growth trees is a good thing, but you have to make a living for your family to survive.

Inn Owner near Rainforest:

You own a small hotel that is often used by sea kayakers and people who hike in the ancient temperate rainforest. You have stayed in the Orca Sound area where you grew up so that you can spend your free time enjoying the forest. If the rainforest is logged, tourists may no longer have a reason to visit the area and stay in your inn. You may have to close your business and leave the area.

Government Representatives:

You are newly elected and depend on everyone's support to stay in office. You must recommend to the legislature either to refuse or to approve (with guidelines) the logging proposal. Environmentalists want you to pressure the legislature to preserve what remains of your area's ancient temperate rainforest. Loggers and others fear that they will lose their jobs and businesses if logging is not allowed in Orca Sound's rainforests.

RESOURCES

Books

- Parkin, Tom. *Green Giants: Rainforests of the Pacific Northwest*. Douglas & McIntyre, 1992.
- Wilson, Eric. *Spirit in the Rainforest*. Harper Collins, 1985. (fiction)
- Wolf, Edward C., Andrew P. Mitchell and Peter K. Schoonmaker. *The Rain Forests of Home: An Atlas of People and Place*. Ecotrust, Pacific GIS, and Conservation International, 1995.
<www.inforain.org/rainforestatlas/>.
- Zuckerman, Seth, *Saving our Ancient Forests*. Living Planet Press, 1991.

Websites

- <www.cotf.edu/ete/modules/temprain/temprain.html> This NASA-sponsored features a series of interdisciplinary learning modules on temperate rainforests and other environments.
- <www.cofi.org> The site of the Council of Forest Industries gives the point of view of the forestry industry in British Columbia.
- <www.focs.ca> The Friends of Clayoquot Sound site has basic background information on temperate rainforests, and photos of rainforest plants and animals as well as logging practices and protests.
- <www.wildernesscommittee.org> The Western Canada Wilderness Committee site has news and articles on current issues related to temperate rainforests of the Pacific Northwest.
- <www.eco-portal.com/Land/Forests/Types/RainLand/Forests/Temperate_Rainforests/welcome.asp> This “Eco-Portal” site has links to environmental groups working on issues related to temperate rainforests in North America.



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Clearcutting on the road to Carmanah Valley on Vancouver Island.