



Exploring Rainforests

Rainforests can capture the imagination like no other environment on earth. Learning about tropical rainforests can be a great way to generate interest and excitement about natural ecosystems globally and locally and is a good starting point for studying a variety of biological concepts. By getting involved in the protection and preservation of rainforest habitat, students will realize that an individual can make a difference.

Objectives: To learn about rainforests and what you can do to help preserve them. To learn about ecosystems and biodiversity locally and globally.

Ages: Primary, Intermediate & Advanced

Materials: Additional teacher guides - *Backyard Biodiversity*, *Ecosystems and Insects*, *Recycled Paper Making*, and *Rainforest Resources* available from CES.

Subjects: Science, Geography, Language

Where are Rainforests?

Tropical rainforests can be found near the equator in Central and South America, central Africa, southern Asia, Hawaii and in northeastern Australia. Rainforests are the most prevalent forest type in the tropics, covering almost 714 million hectares in 1990.

Species Diversity

Just two hundred years ago, tropical rainforests covered about 20 percent of the earth, circling the planet in a green belt. Rainforests now cover only 7% of the earth's land surface, but they contain more than half of the species on earth. There are often 40 species of trees or more per hectare, four or five times as many as are typical in **temperate** forests.

In a single square mile of tropical forest in Peru or Brazil, there may be 1500 or more species of butterflies - twice the total number found in the United States and Canada combined. In a single leguminous tree (a relative to beans and peas) in Peru, 43 species of ants belonging to 26 genera can be found, about equal to the entire ant fauna of the British Isles.

Plants and animals are not the only inhabitants of the forests. There are in fact over 140 million people living in the world's rainforests from more than 1000 tribes.

Why are Rainforests So Diverse?

Tropical rain forests have existed, and evolved, for tens of millions of years. Neither water or temperature are limiting factors, so that a rich and diverse assemblage of plants and animals are able to thrive there. So many species are able to occur together because of a high degree of specialization, allowing a single species to fit into a small ecological niche. This specialization is possible because of the complexity of the forest. Different types of organisms are able to exist at different levels - on the forest floor, on tree trunks, and in the canopy.

What Makes a Rainforest?

Rainforests get at least 80 inches of rain per year. Some areas regularly get more than 200 inches and a few get more than 400! The **humidity** in a rain forest is about 70 to 90 percent. In the rainforests of South America, as much as 250 billion tons of water vapor can be suspended in the air at any one time.

There are many types of tropical forest. Cloud rainforests are usually at higher altitudes and thus cloudy and cool; dry lowland tropical forests have more pronounced wet and dry seasons while moist tropical rainforests are wet and warm year round.

In a rainforest, branches of tall trees meet to form a **canopy** 65 feet or more above the forest floor. **Epiphytes**, including many beautiful orchids, grow on the branches of these trees. The canopy lets only 2% of the sunlight through to the forest floor and few plants grow in the thin, infertile soil, so that it is easy to walk amongst the trees.

Tropical forests exist mainly on infertile soils. Most of the **nutrients** are held within the plants themselves and are rapidly **recycled** when the plants die or when parts, such as leaves, are lost.

Human Impact

The human populations of the tropics and subtropics now constitute more than half of the world total. Logging, mining and slash-and-burn agricultural methods are largely responsible for the destruction of the rainforests. When wide areas are cleared, the thin soils erode and minerals are carried away.

About 0.6 percent of the world's rainforests - 4.6 million hectares - are lost annually. Indonesia and Brazil account for approximately 45 percent of the world's total loss of rainforest. Between 1960 and 1990 the world lost 450 million hectares of its tropical forest cover.

The Future

If current rates of deforestation persist, it is estimated that 50 percent of tropical rainforest species will become extinct by the year 2013.

Why Should We Care?

Rainforests are home to more species of plants and animals than anywhere else on earth. Many species of North American birds we enjoy in our backyards depend on spending the winter months in tropical rainforests.

We rely on rainforests, and other natural ecosystems, in ways that we are only beginning to understand. Natural elements and species from rainforests are the basis of countless medicinal, consumer, industrial and agricultural products. Rubber, chocolate, coffee, vanilla, cinnamon, cashews and brazil nuts all come from the rainforest.

Rainforests play a significant role in the maintenance of weather patterns and the supply of fresh air and water. If we destroy the rainforests, the climate could change all over the world which would in turn effect the quality of life on earth.

Definitions

canopy - the "roof of the rainforest" formed by the branches of tall trees which meet to shade the forest floor.

ecosystem - A grouping of plants, animals, and other organisms interacting with each other and with their environment in such a way as to perpetuate the grouping more or less indefinitely. Ecosystems have characteristic forms such as deserts, grasslands, tundra, deciduous forests, and tropical rainforests

epiphyte - a plant that grows on another organism but is not parasitic on it.

hectare - one hectare equals 2.47 acres.

humidity - degree of wetness of the atmosphere

niche - the role played by a particular species in its environment.

nutrients - in this case, refers to the various minerals and decaying organic matter in the soil.

recycled - returned to an original condition so that it can be used again. (For instance, organisms in the soil break down dead organic matter into nutrients essential for plants to grow.)

slash-and-burn agriculture - the larger trees in an area are cut down and the area is burned so that crops can be grown. Many nutrients enter the soil from the burned material, but in several years the crops will use up these nutrients so that the farmer must move to another area.

specialization - the structural adaptation of an organism for life in a particular environment or niche.

temperate - a moderate climate. The temperate zones exists between the tropic of Cancer and the Arctic circle and between the tropic of Capricorn and the Antarctic circle

Rainforest Activities

1. Look on a map to see where the rainforests of the world are. (They can be found between the tropic of Cancer and the tropic of Capricorn.)

List all the countries where jaguars are found.

List the countries where orangutans are found.

2. The following bird species which are common to North America, spend our winter months in the tropics. With the help of a guide book, see how many of these birds you can spot in the school yard or in a local park. How far do these birds fly during their migration?

Purple Martin	Tree Swallow
Barn Swallow*	Cliff Swallow*
Red Eyed Vireo	Swainson's Thrush*
Tennessee Warbler	Yellow Warbler*
Chestnut-sided Warbler	American Redstart
Blackburnian Warbler	Kentucky Warbler
Common Yellowthroat*	Scarlet Tanager*
Bobolink	Snowy Plover
Northern Oriole*	Rose-breasted Grosbeak
Swainson's Hawk*	Black-bellied Plover
Greater Yellowlegs	Red-necked Phalarope
Pectoral Sandpiper	Dusky Flycatcher
Ruby Throated Humminbird	Calliope Hummingbird
Black Chinned Hummingbird	Rufous Hummingbird*

Note: this is only a partial list.

* These birds are very common or more easily spotted than the others.

3. Use the listings in the weather section of a local newspaper to keep track of the daily rainfall and temperature in your area. Compare this to the rainfall and temperatures in a tropical area of Central or South America.

4. Use insects to help your students understand biodiversity and ecosystems. Take soil samples in several different habitat types and collect the insects. Compare the diversity of the different ecosystems. How does the number of insect types you found compare to the numbers in a rainforest? (see "Ecosystems and Insects" teacher guide)

5. Create an ecosystem in the school yard. Plant a Butterfly and Hummingbird garden using native plants. (see "Backyard Biodiversity" teacher guide)

6. Create a rainforest in your classroom. Paint or color murals of rainforest plants and animals on large sheets of paper. Use streamers to make vines.

7. Recycle! Make recycled paper to help your students understand the recycling of nutrients that occurs in the soil. Most paper is made from wood pulp which in turn comes from trees from forests all over the world. Recycling paper is an important every day thing that anyone can do to decrease their impact on the earth. (see "Recycled Paper Making" activity guide)

8. Hold a fun fundraiser to **Adopt An Acre®** of rainforest in Costa Rica, Brazil or Bolivia. (see "Heroes For the Earth - Turning Ideas Into Action")

9. Learn more about rainforests and what you can do to help protect them. (see "Rainforest Resources" - a resource guide for teachers and students.)

References:

Biodiversity. E.O. Wilson, Editor. National Academy Press, Washington, DC. 1988.

Biology. Peter H. Raven and George B. Johnson. Times Mirror/Mosby College Publishing, St. Louis, MO. 1989.

Insect Biology: 49 Science Fair Projects. H. Steven Dashefsky. TAB Books, McGraw Hill, Inc. New York, NY. 1992.

Rainforests: Tropical Treasures. Ranger Rick's Nature Scope. Judy Braus, Editor. National Wildlife Federation, Washington, DC. 1989.

World Resources 1994-95. World Resources Institute. Oxford University Press, Oxford. 1994.

World Resources 1996-97. World Resources Institute. Oxford University Press, Oxford. 1996.