



Exploring the Tropical Rainforest
Grades 4 - 6
Teacher Packet

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For age-appropriate In-Zoo Activities, please visit:

<http://www.pittsburghzoo.com/zoo.asp?ContentID=228>



BACKGROUND INFORMATION

WHAT IS A TROPICAL RAINFOREST?

A tropical rainforest is a forest in the tropics with heavy rainfall, high humidity, and extremely diverse life. Many rainforest areas receive around 100 inches of rain a year and temperatures usually range from 75 to 85F.

WHY DO WE NEED TROPICAL RAINFORESTS?

The importance of this ecosystem cannot be underestimated. Tropical trees help to maintain worldwide oxygen levels, absorb carbon dioxide, and assist in cooling the Earth. It is believed that the recent rising temperatures contributing to global warming are caused in part by the decimation of tropical woodlands. These are areas of astounding diversity, home to about half of the world's known plant and animal species. In addition to their value ecologically, they are crucial to the world economy as producers of coffee, cocoa, rubber, rice, pineapple, and bananas.

TOWERING TREES

The highest zone is the emergent layer. Tops of the tallest trees sometimes reach up into the clouds, approaching heights of urban office buildings. Emergent treetops are alternately pounded by fast moving storm fronts and baked by the unrelenting sun. Few animals are found at this level because of these harsh conditions. Flimsy branches do not support the weight of many species. South American birds like toucans and macaws are among the few creatures that are found here. Their strong beaks are used to open tough fruits and nuts. Brightly hued butterflies float on the breeze, looking like multi-colored confetti against the sky.

WHO'S WHO IN THE CANOPY?

The second layer, the canopy, with its numerous, criss-crossing tree limbs sustains an endless flow of animal traffic. Huge leaves capitalize on the sunlight. A rich food supply supports the overwhelming majority of the rainforest's animal population. Gibbons swing through the canopy of southeast Asia, hand over hand in a motion called brachiation. They can be heard singing simple melodies to one another. Sloths spend their lives hanging upside down by their toenails. Their cardiovascular systems are designed so that blood is pumped from their hearts up to their feet. Howler monkeys can be heard three miles from their calling site. Adult males are brown or black, and females are blond. Infants are the same shade as moms to safely camouflage, hiding them from danger.



UNDERSTANDING THE UNDERSTORY

The understory is dim and still since rain, wind, and sunlight seldom penetrate the heavy foliage overhead. But it's not quiet. Birds gather here to find food and mates. Many insects, amphibians, and reptiles spend much of their time in this layer. Tree frogs move freely through the vegetation, laying eggs or depositing tadpoles in bromeliads, which are plants that grow on the trees and collect rainwater in their cup-like centers.

GROUND FLOOR TENANTS

The forest floor is cloaked in perpetual twilight, but is no less busy than the others. Soil quality is poor, and soil depth is shallow. Millipedes, cockroaches, and other decomposers constantly break down dead plants to enrich the soil. Tremendous amounts of vegetation require constant feeding, so huge trees and heavy-leafed shrubs continuously pull nutrition from the earth as fast as decomposition takes place. Pythons slither along the forest floor in search of prey. River dolphins will swim in shallow waters in areas flooded during extended periods of rainfall. Gorillas roam rainforest floors eating vegetation. The silverback, the mature male leader of the troop, may weigh over 500 pounds.

WHO IS CUTTING DOWN THE TREES? HOW CAN YOU HELP?

The growing human population is consuming the tropical rainforests at a staggering rate. Beyond the need for space for roads, railroads, houses, and farms, goods such as wood are being shipped worldwide from rainforest areas. Are there practical ways you can help? Yes! Since rainforests help to cool the Earth and are being cut down at a rapid rate, you can partially offset the loss by planting trees. You can also decide not to buy goods whose production causes rainforest destruction like mahogany furniture or beef from cows that were grazed on cleared rainforest land. Also avoid the purchase of most live wildlife such as tropical birds or primates taken from the rainforests for the pet trade, or products made from wildlife like fur coats or boots. One exception is the trade in some wild tropical ornamental fish, like cardinal tetras, whose collection and export is being managed under "Project Piaba," which is a plan to help indigenous people make a living while using a rainforest resource in a sustainable manner. You can also support organizations that are working to protect rainforest habitat and the wildlife that depend on it.



Vocabulary

Adaptation - behavioral or physical change that improves a plant or animal species' chance for survival.

Arboreal - a lifestyle adapted to living in trees; a tree dweller.

Biodiversity - the variety of life on our planet.

Camouflage - an organism's ability to hide or blend with its surroundings using color, pattern, or shape.

Carrying capacity - the maximum number of healthy individuals within a species that a habitat can sustain.

Conservation - the wise use of natural resources in order to ensure continued availability to future generations.

Ecology - the study of the interrelationships among organisms and their environment.

Ecosystem - an ecological community together with its environment, functioning as a unit.

Endangered - an animal at risk of becoming extinct unless conservation measures enable the populations to increase.

Extinction - the complete loss of a species.

Habitat loss - the depletion of natural settings due to human activity or natural disasters.

Indigenous - an organism that is native to an ecosystem; it naturally grows and lives there.

Poacher - one who hunts or fishes illegally.

Prehensile - a body part that is able to grasp.

Reintroduction - the release of a plant or animal into its natural range.

Tropical rainforest - a forest in the tropics with heavy rainfall, high humidity, and extremely diverse life.



Suggested Reading List

A Tiger for Malgudi by R.K. Naryan
Bushbaby by Adrienne Kennaway
Children Save the Rainforest by Dorothy Hinshaw Patent
Jeremy and the Gorillas by Lilian Bourd
Journey of the Red-Eyed Tree Frog by Martin and Tanis Jordan
Panther Dream by Bob and Wendy Weir
The Chimpanzee Kid by Ron Roy
The Jungle Book by Rudyard Kipling
The Leopard by Cecil Bodker
Travelers by Night by Vivien Alcock

Teacher Resources

Ecology, Usborne Science & Experiments by Richard Spurgeon (Usborne Publishing Ltd, 1988).
Endangered Animal Babies by Thane Maynard (Zoological Society of Cincinnati, Inc., 1993).
Every Day is Earth Day by Kathy Ross (Millbrook Press, 1995).
How the Environment Works by Preston Gralla (Ziff-Davis Press, 1994).
Ranger Rick's Nature Scope: Endangered Species: Wild & Rare edited by Judy Braus (National Wildlife Federation, 1989).

Internet Resources

www.ran.org
www.curriculumweb.org
www.rainforest-alliance.org
http://nb.wsd.wednet.edu/lmc/pathfinders/rainforest_ani_pathfinder.htm
<http://mbgnet.mobot.org/sets/rforest/animals/>
www.primate.org
www.rainforest.org
www.eelink.net



Where in the World is? Pre-Visit Activity

OBJECTIVES:

- The student will create an informational brochure about an animal of their choice from the tropical rainforest.
- The student will acquire information through Internet searches and resource materials

MATERIALS:

- Computers and printers
- If not using computers: magazines, construction paper, scissors, glue, markers, pens
- Animal resource materials (encyclopedias, animal books, Internet resources)
- Brochures to be used as examples
- Overhead projector or chalkboard

PROCEDURE:

Anticipatory Set:

Explain to the students that today they will get the opportunity to become eco-friendly, globe trotting, graphic artists. Their project will be to create an educational, tri-fold brochure about an animal from the tropical rainforest. To help them get the feel for creating a brochure, pass around a variety of brochures. Break the class into small cooperative groups, and have them evaluate and take notes on what they liked and disliked about the brochures (colors used, size of pictures, font, amount of information, etc.) Once the groups have finished looking at the brochures, have them share their likes and dislikes. You may want to write these on the overhead or chalkboard, as reminders to the class while they are working on their own brochures.

Development of Lesson:

The students will need to choose an animal from the tropical rainforest and gather information on it. For their project, each student's brochure must include the following items:

- The title of their brochure: *Where in the World is (their animal's name)?*
- A map highlighting where their chosen tropical rainforest animal lives.
- A brief description of what the weather is like where the animal lives.
- At least three pictures.



- A *Fun Facts!* section, which should include some amazing facts about their animal.
- A *What You Can Do!* section, which should include ideas on what individuals can do to protect their animal and its habitat.

SUMMARY:

Once all of the brochures have been created, have each student present their brochure to the class. You may wish to do this individually, or by holding a *Brochure Extravaganza*, where they display and explain their brochures to a visiting classroom.

EXTENSIONS:

- Have the students plan a trip to the animal's homeland. They can find the cost of flights, hotels, and car rentals.
- Create an infomercial about their tropical rainforest animal.



A Sticky Situation: Rainforest Oil Debate
Post-Visit Debate
Two Class Periods

OBJECTIVES:

- TSW identify five key groups that are involved in the dispute over rainforest oil in Columbia.
- TSW conduct group research on the position of one of these groups.
- TSW debate the position of one of these groups.

MATERIALS:

- Access to a computer and the internet and/or access to current periodicals
- Rules for Debate

PROCEDURE:

Anticipatory Set:

Ask the students what they need to survive. Elicit answers to list on a blackboard or transparency. Then ask students to consider what indigenous people living in the rainforest need to survive. Compare students' answers they gave about their needs at the beginning of this activity. Inform students that many people in the world consider land to be necessary for their survival, almost like shelter, especially if the land has been in their family for generations. Indigenous people who live in the rainforest consider it necessary for their survival as a cultural group.

Development of Lesson:

1. Background information: Conflict about control of resources in the rainforest is played out every day all over the world. In November, 1999 in Seattle, Washington, environmentalists gathered outside the World Trade Organization meeting to protest oil drilling by Occidental Petroleum on ancestral land of the U'wa tribe in the South American country of Colombia. The U'wa tribe has requested that the Colombian Ministry of the Environment deny Occidental's request for a drilling permit. In this lesson, students will stage a mock court hearing about this issue. Inform students that there are many people in the world who are in danger of losing the right to live freely on the land they have inhabited for generations. One such people are the U'wa of the Colombian rainforest. On one hand, U'wa claim that they should be allowed to control how the land is used because their ancestors have lived there so long. On the other hand, oil companies and government officials argue that the oil reserves in the Colombian rainforest could generate a lot of money for Colombia, and are needed by consumers around the world.



Summary of Groups Involved:

- Occidental Petroleum - multinational oil company headquartered in California
- U'wa tribe - people indigenous to northeastern Colombia
- American consumers - individuals and corporations that use oil products (like gasoline) in their daily lives
- Environmental activists - international community of activists that advocate positive environmental change and development (such as Amazon Watch and Rainforest Action Network)
- Colombian Ministry - branch of the Colombian government that is responsible for issuing of the Environmental oil drilling permits on land within their country

Other Resources

- Marshall, Judy. "Ranger Rick's Nature Scope: Tropical Treasures". National Wildlife Federation, 1989, pg 46.
- Amazon Watch (<http://www.amazonwatch.org/> (see "Breaking News And Alerts" and "News Room")
- E-Wire: Colombia Urged to Reject Occidental License (<http://ens.lycos.com/e-wire/Sept99/09sept9902.html>)
- U'Wa: People Of the Andean Cloud Forest (<http://uwa.moles.org/>)
- English Version of U'Wa Statement, September 1999 (<http://www.amazonwatch.org/uwa/uwastatement0999.html>)
- Colombia: Petrochemical Industry (<http://tradeport.org/ts/countries/colombia/isa/isar0004.html>)
- Occidental Petroleum (<http://www.oxy.com/>)
- South America: Resources Encyclopedia Britannica (<http://www.britannica.com/bcom/eb/article/3/0,5716,117563+2,00.html>)
- CIA World Factbook: Colombia (<http://www.cia.gov/cia/publications/factbook/co.html>)
- Colombian Government Trade Bureau (<http://www.coltrade.org/>)

2. After introduction to the topic, distribute the rules for debate, assign students to one of the five groups, and have the students research their position.

3. In a second class period:

- Choose two spokespeople per team.
- Have the teams formulate their position statements.
- Arrange the classroom to facilitate the debates.
- Each team has two minutes to state their argument, after which there will be one minute of rebuttal time per team.

**SUMMARY:**

Conduct a brainstorming session to think of different conservation solutions that could help the indigenous peoples.

EXTENSION:

1. Write a position paper or speech agreeing or disagreeing with this statement, "The Colombian Minister of the Environment should grant drilling rights to Occidental Petroleum on U'wa land."
2. Ask students to do research on events that have happened regarding the U'wa tribe since September, 1999. Has drilling begun yet? Has there been any violence in the area? Has Occidental Petroleum issued any public press releases about this issue?
3. Ask students if they can think of any other indigenous peoples that have been displaced. How about in the United States? If so, what happened to them? What resources were in demand (oil, gold, etc.)? (Teachers may want to obtain a video from this online resource: <http://www.lib.berkeley.edu/MRC/IndigenousVid.html> and have students compare and contrast the U'wa and Native American experiences. Teachers may want to focus on an Indian tribe that has its history in the local area.

Adapted from: PBS Teacher Resources

http://www.pbs.org/journeytoamazonia/teacher_world.html



Rules For Debate

- State your position at the beginning and end of your presentation, and several times in the middle.
- Anticipate your opponent's arguments beforehand and point out the weaknesses.
- Use visual aids (blackboard, handouts, overhead projector etc.) to support your position.
- Conclude your argument by summarizing your major points.
- Leave personal views and experiences out of the presentation. Concentrate on arguments and think through your position. Present only the facts.
- Speak loudly and clearly, and address your remarks to the audience.
- Speak confidently; always sound as if you believe absolutely in what you are saying.
- Use notes; always prepare more notes than you think you will need. If you feel that you are running out of time, skip some of your notes and jump to the conclusion.
- Never agree with the other side or suggest compromise positions.
- If a team is proposing a plan of action, they must show supporting evidence or proof that the plan is needed. Facts presented in this manner must be accurate.
- No new arguments may be introduced during rebuttal of the opposing position.