



Eighth Grade - Guatemala

Lesson 1: Guatemala's Changing Forest

Overview

Students explore criteria for classifying forests and then compare a tropical rainforest to a local forest. They read about the Maya Biosphere Reserve in Guatemala, and analyze maps of the region to determine recent changes in forest cover.

Subjects

Science, Social Studies, Math, Language Arts

Concepts

From PLT Conceptual Framework:

1.3 The Earth's atmosphere, water, soil, climate, and geology vary from region to region, thus creating a wide diversity of biological communities.

4.9 Governmental, social, and cultural structures and actions affect the management of resources and environmental quality.

5.4 Ecosystems change over time through patterns of growth and succession. They are also affected by other phenomena such as disease, insects, fire, weather, climate, and human intervention.

Skills

Analyzing, Classifying and Categorizing, Interpreting, Researching

Objectives

Students will identify criteria for classifying forests.

Students will graph and describe changes over time in a specific forest region.

Additional Resources and Student Pages

- **Resource Index** - Check out this page at <http://www.rainforest-alliance.org/programs/education/teachers/curriculum/resources/index.html> for additional supplemental materials that complement these dynamic units and to access many of the resources listed below.
- **Slideshow** – The Learning Site provides a slideshow that will introduce students to the country of Guatemala, the wildlife and people of the country and the conservation issues they face. The slideshow can be downloaded for viewing in the classroom, printed out and read aloud or viewed online with the students.
- **Species Profiles** – The species profiles, available to view on screen or downloaded from the Resource Index, include photos, along with information on habitat, foraging behavior, group relationships, threats, and many more facts.

- **Student Resources Pages**

- Sorting Out the Differences
- Classifying Ecological Zones
- Maya Biosphere Reserve
- Square Dot Matrix
- Maya Biosphere Reserve Maps (Uaxactún)
- Maya Biosphere Reserve Maps (Buffer Zone)

- **Rainforest Poster** – Download and print out this colorful two-page poster, which is available for you to use in explaining the layers of the rainforest, its products and the environmental threats facing many rainforests around the world.

Inside the Canopy - Structure and species of the rainforest

Status Report - What is happening to the rainforest

- **Rainforest Products** – Visit <http://www.rainforest-alliance.org/resources/forest-facts/lives.html> for a summary of products that we use in our everyday lives that originate in the rainforests. Both teachers and students will find information on the products found in their homes and supermarkets that either originated in tropical forests or are currently produced there.
- **Profiles in Sustainability** – Visit <http://www.rainforest-alliance.org/programs/profiles/index.html> for case studies on companies who work closely with the Rainforest Alliance to ensure that their practices protect wildlife, workers and communities.
- **Certificate of Accomplishment** - Print out colorful rainforest certificates for your students to commemorate their completion of these units.

Materials

Copies of student pages, paper clips, wall-size world map, yard or meter stick, resource materials, large sheets of paper, marking pen, colored pencils or pens, overhead transparencies, graph paper

Time Considerations

Preparation: 30 minutes

Part A – 45 minutes, plus time for research and presentations

Part B – 45 minutes

Background

Not all forests are alike. A tropical forest is very different than a redwood forest or a birch forest; each has distinctive trees, shrubs, birds, and mammals. Because all plant species have specific requirements for sunlight, temperature, moisture, soil nutrients, and so on, environmental factors such as these determine which type of forest will thrive in a particular area.

Identifying the characteristics of a forest helps people understand what it needs to thrive, and helps us to compare forests' similarities and differences.

The Food and Agriculture Organization (FAO) of the United Nations uses a system for classifying forests that focuses on two main criteria: temperature and moisture. With this system, forests are first categorized into five main climate groups, called domains, according to temperature criteria. The five domains are tropical, subtropical, temperate, boreal, and polar. Then, within each domain, the forests are further classified into ecological zones according to the level of precipitation they receive, ranging from very wet (rainforest) to very dry (desert). There are 20 different ecological zones, including tropical rainforest, subtropical dry forest, and temperate oceanic forest.

For more information about the ecological zones, see FAO's report *Global Ecological Zoning for the Global Forest Resources Assessment, 2000* (available at <http://www.fao.org/docrep/006/ad652e/ad652e00.htm>).

Note that while the Maya Biosphere Reserve of Guatemala explored in this activity also includes some areas of tropical mountain forest and tropical moist deciduous forest, for simplicity we refer to the whole region as tropical rainforest. For more information on the Reserve, see the Maya Biosphere Reserve student page.

Related PLT Activities

Tropical Treehouse (*PreK-8 Guide*), Rain Reasons (*PreK-8 Guide*), Mapping the World's Forests (*Forests of the World*), Analyzing Patterns of Forest Change (*Forests of the World*)

Getting Ready

For Part A, make one copy of the "Sorting out the Differences" and "Classifying Ecological Zones" student pages for each group. Cut apart the "Sorting out the Differences" cards, and paper clip each set together.

On large sheets of paper, make a blank Venn diagram (two overlapping circles) for each group. Bring in resources or arrange for Internet use for researching and comparing the Guatemalan rainforest and your local forest.

For Part B, make copies of the "Maya Biosphere Reserve" and "Guatemalan Rainforest Maps" student pages. Copy the "Square Dot Matrix" student page onto overhead transparencies.

Doing the Activity

Part A – Classifying Forests

1. Introduce the activity by asking students what they know or have heard about Guatemala. Help students find Guatemala on the world map.
2. Lead a discussion about whether students think the vegetation or plants that grow naturally in Guatemala would be similar to the vegetation in your area. Why might the vegetation be the same or different? List their ideas on the board.
3. Divide the class into small groups and give each a set of "Sorting out the Differences" cards. Have groups read the information on the cards and then use that information to sort the cards into two or more sets, with the cards in a set alike in some way. (Students may come up with criteria like having trees or no

trees, having dry or rainy summers, being in a northern or southern location, and so on.) Each group should try sorting their cards two or three different ways. Ask groups to share some of the criteria they used for sorting.

4. Point out that scientists classify different ecological zones of the world in the same way that the students did. The first broad category they use is the average monthly temperatures in an area over the course of a year. Explain that scientists have created five different groupings (or domains) using temperature as the criterion: tropical, subtropical, temperate, boreal, and polar. The tropical domain is warm all months of the year and is generally around the equator; the other domains are progressively cooler and also further from the equator, with the polar domain roughly around the North and South poles. (You may want to remind students of the reason for these climate differences—the tilt of the Earth's axis in relation to its orbit around the sun.) Give students copies of the "Classifying Ecological Zones" student page and have them read the temperature description of each domain.

Using the chart, explain that scientists classify the ecological zones even further using information about an area's moisture (or precipitation), length of any dry season, and other related criteria. Point out how this is similar to the classifications that students used when they were sorting the cards.

5. Explain that much of Guatemala lies in the tropical rainforest ecological zone. Have students read the criteria for that zone and compare them to the criteria for your local ecological zone. Help students to visualize the temperature criteria using examples from your local weather such as, "Remember how warm it was on Friday? That is about the average temperature in the tropical rainforest all year." Use a yard or meter stick to measure out the precipitation levels for each zone.
6. Referring back to the list you started in step 2, ask students if there is anything that they would add to the list.
7. Explain that each group will be researching the rainforest in Guatemala and your local forest (or other region) to learn more. They will record what they find in a Venn diagram so that it shows similarities and differences between the two regions.
8. Assign one research topic (see below for possible topics) to each group and give each group a blank Venn diagram (see Getting Ready). Allow time for students to first plan and then conduct their research.

Possible Research Topics:

- Average temperature for each month of the year, average yearly precipitation, latitude, and longitude for each forest
- Common plants in each forest
- Common animals in each forest
- Foods people eat from each forest
- Things people use from each forest (besides food)
- Things that threaten each forest

9. Have groups share their Venn diagrams. Lead a discussion about ways that the two forests are similar and ways that they differ.

Part B – The Maya Biosphere Reserve

1. Ask students whether they have heard the expression, “You can’t have your cake and eat it, too.” What might this expression mean? Do they agree with it? Ask students whether they think it would be possible to preserve and protect a tropical rainforest (that is, “have it”) and at the same time extract food, wood, and other products from the forest (that is, “eat it”). How might people do both? What might be the challenges to doing both?
2. Explain that in 1990, the government of Guatemala created the Maya Biosphere Reserve in the northern Petén region to preserve and protect the tropical rainforest region for future generations, and yet allow for agriculture and the removal of wood and forest products. Have students read the “Maya Biosphere Reserve” student page to learn about this region.
3. Ask students how people would know whether their efforts to preserve and protect a forest are successful. Point out that one way is by monitoring the amount of land that is still forest and the amount that has been converted to agriculture and other uses.
4. Explain to students that they will take a look at maps of two different sections within the Reserve covering the time from 1986 to 2007. One section is the area around the community of Uaxactún (Wash-ahk-TUN) and the other section is the land north of Lake Petén-Itzá.
5. Divide the class into groups, and give each group a set of maps and a square dot matrix transparency (see Getting Ready). Point out that the green on the maps shows forested areas and the red shows nonforested areas. Using the dot matrix and the maps, students will see whether the amount of forest in each section changed from the period 1986 to 2007.
6. To estimate the percentage of forested area on each map, students should place the square dot matrix over the map and count the number of dots that fall within the green forested areas. No part of the dot should touch a red nonforested area. They then should divide that number by 3 to calculate the percentage. (Each dot represents 1/3 of a percent of the entire area shown on the map.)
7. Have students repeat this procedure for each map, recording their findings on a piece of scratch paper. To check their work, they should then count the dots that fall within the red nonforested areas on each map and calculate the percentage of nonforested area. (The two percentages for a given map should add up to close to 100 percent.)
8. Give students graph paper, and have each group make a graph showing the change in forested area over time around Uaxactún and around Lake Petén-Itzá.
9. Ask students to compare and contrast the maps for each area. Is more forest being lost in one area than in another? What do you think might be going on?

10. Remind students that the Maya Biosphere Reserve is split into different zones (described in the student page), in which the Guatemalan government allows different types of activities. The community and surrounding area of Uaxactún is in the “multiple use zone,” so the community has permission to harvest wood and other products, but only if the harvesting is done sustainably. The Rainforest Alliance is working with the people of Uaxactún to harvest wood and other forest products in a sustainable way. The land surrounding Lake Petén-Itzá is located in the “buffer zone,” a 15-km wide zone at the southern limits of the Reserve, where the land is privately owned and agriculture is allowed. How does this information help students understand what is shown on the maps? What else would students want to know in order to understand how successful the Maya Biosphere Reserve is in protecting the rainforest?

Enrichment

Read books about different North American biomes to find out how they differ in terms of temperature and moisture, typical weather patterns, and plants and animals. For example, The Biomes of North America series published by Carolrhoda books includes *A Walk in the Boreal Forest*, *A Walk in the Deciduous Forest*, and *A Walk in the Rain Forest* all by Rebecca L. Johnson.

Help students compare the Maya civilization to another ancient civilization, focusing on each’s environmental conditions and ways each culture reflected these conditions.

Make *liquados*, a traditional Guatemalan drink. Use thawed frozen mango, pineapple, or other tropical fruit and blend with enough whole milk or water to make a drinkable consistency. Research other Guatemalan foods and customs to try.

Assessment Opportunity

For Part A, ask students to write a paragraph describing the characteristics that make the Guatemalan rainforest and the local forest different from each other.

For Part B, have students list three conclusions they can draw from the graphs of forest change they created in the activity.

Additional Resource

Slide show about Guatemala developed by the Rainforest Alliance

Online photo scrapbook of children living in the Maya Biosphere Reserve:
<http://www.rainforest-alliance.org/education/treehouse/myworld/index.html>

Report - Impact of FSC Certification on Deforestation and the Incidence of Wildfires in the Maya Biosphere Reserve by David Hughell and Rebecca Butterfield (2008) available at http://www.rainforest-alliance.org/forestry/documents/peten_study.pdf.