

Eighth Grade



- **Guatemala's Changing Forest**
- **Protecting the Guatemalan Rainforest through Certification**

Lesson 1

Guatemala's Changing Forest

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Guatemala

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.

Introduction

Subjects

- Math
- Science
- Language Arts
- Social Studies

Concepts (from PLT Conceptual Framework)

- The Earth's atmosphere, water, soil, climate, and geology vary from region to region, thus creating a wide diversity of biological communities. (1.3)
- Governmental, social and cultural structures and actions affect the management of resources and environmental quality. (4.9)
- 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. (5.4)

Skills

- analyzing
- classifying and categorizing
- interpreting
- researching

Objectives

1. Students will identify criteria for classifying forests.
2. Students will graph and describe changes over time in a specific forest region.

Background

Not all forests are alike. A tropical forest is very different from 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.

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.

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For more information about the ecological zones, see FAO's report "Global Ecological Zoning for the Global Forest Resources Assessment, 2000," available at www.fao.org/docrep/006/ad652e/ad652e00.htm. For more information on the Maya Biosphere 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*)

Part A: Classifying Forests

Materials

- copies of student pages
- paper clips
- wall-size world map
- yard or meter stick
- large sheets of paper
- colored pencils, pens or markers
- overhead transparencies
- graph paper

Time Considerations

Preparation: 30 minutes

Doing the activity: 45 minutes, plus time for research and presentations

Getting Ready

1. 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.
2. 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.

Doing the Activity

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 temperature 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 farther 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.
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

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they find in a Venn diagram so that it shows similarities and differences between the two regions.

8. Assign one research topic to each group and give each a blank Venn diagram. 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.

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.

Part B: The Maya Biosphere Reserve

Materials

- copies of student pages
- paper clips
- wall-size world map
- yard or meter stick
- large sheets of paper
- colored pencils, pens or markers
- overhead transparencies
- graph paper

Time Considerations

45 minutes

Getting Ready

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

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. 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 of 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 should divide that number by three 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 Lake Petén-Itzá.

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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, 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 Resources

Online photo scrapbook of children living in the Maya Biosphere Reserve
www.rainforest-alliance.org/interactives/my-world

Student Resource Page: Sorting Out the Differences

Copy and cut cards apart.

<p>Tropical Rainforest</p> <p>Tropical rainforests can be found in Central and South America and other regions of the world that are warm and wet all year, with little seasonal change. These conditions are ideal for rapid and lush plant growth. Tropical rainforests have the widest variety of plants and animals of any forests in the world.</p>	<p>Tropical Dry Forest</p> <p>Tropical dry forests are found in areas of Mexico and other regions that are warm year-round, but have a long dry season each year. Trees must be able to survive these periods of low rain and moisture. Many tree species drop their leaves in the driest months, which reduces moisture loss.</p>	<p>Southern Pine Forest</p> <p>Pine forests of the southeastern United States thrive where the summers are long, hot and humid, and where most precipitation comes as summer rain. While an occasional winter storm may come through, snow seldom stays on the ground for more than a day or two.</p>
<p>Chaparral</p> <p>The California climate where chaparral grows is fairly warm for at least eight months of the year. Most of the rainfall comes during the moist, mild winters, while summers are hot and dry. Trees and shrubs often have thick bark and leathery evergreen leaves to conserve moisture during the dry season.</p>	<p>Temperate Rainforest</p> <p>The forests on the west side of the Olympic Peninsula in Washington state are drenched each year in more than 12 feet of rain coming off the Pacific Ocean. Winters can be snowy, but summers are generally dry. Here, giant cone-bearing trees tower over the landscape while ferns and moss cloak the trees and forest floor.</p>	<p>Hardwood Forest</p> <p>Much of the northeastern United States is home to oak, elm, sugar maple, aspen and other hardwood forests. Here, it is cold in the winter and warm in the summer. Snow is common in the winter, and summers can be humid with occasional thunderstorms.</p>
<p>Southwestern Desert</p> <p>The desert areas of the southwestern United States have low rainfall and hot summer temperatures. Winters can be quite cold and some of the yearly precipitation may come as snow. Plants here—like sagebrush—are adapted to living with little moisture and wide variations in temperature.</p>	<p>Taiga Forest</p> <p>Taiga forests are made up of evergreen, cone-bearing trees and grow where winters are long, snowy and very cold. Summers in the taiga are short and may see only 50 to 100 days without frost. In North America, the taiga forest stretches from Alaska and across Canada to Newfoundland.</p>	<p>Great Plains</p> <p>The Great Plains region of North America reaches from Canada down to Mexico. The weather here is wildly unpredictable—with possible blizzards in winter, flash floods in spring and tornadoes in summer. While not as dry as a desert, much of the region is too dry for trees. Grasses and shrubs are most common.</p>

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Student Resource Page: Classifying Ecological Zones



Domain	Mean Monthly Temperature	Annual Precipitation	Length of Dry Season	Other Characteristics	Zone
Tropical	more than 64° F (18° C) all year	at least 60 in (1500 mm), often more than 80 in (2000 mm)	0–3 months		tropical rainforest
		40–80 in (1000–2000 mm)	3–5 months		tropical moist deciduous forest
		20–60 in (500–1500 mm)	5–8 months		tropical dry forest
		8–20 in (200–500 mm)		rain evaporates quickly	tropical shrubland
		less than 8 in (200 mm)	12 months		tropical desert
Subtropical	more than 50° F (10° C) at least eight months of the year	more than 40 in (1000 mm)	0 months (humid)		subtropical humid forest
		16–36 in (400–900 mm)	summer		subtropical dry forest
		varies		rain evaporates quickly	subtropical steppe
		low rainfall	12 months		subtropical desert
Temperate	more than 50° F (10° C) four to eight months of the year	16–120 in (400–3000 mm)		coldest month is warmer than 32° F (0° C)	temperate oceanic forest
		varies		coldest month is warmer than 32° F (0° C)	temperate continental forest
		8–16 in (200–300 mm)		rain evaporates quickly	temperate steppe/prairie
		low rainfall	12 months		temperate desert
Boreal	more than 50° F (10° C) one to four months of the year	usually less than 20 in (500 mm)		mostly dense forest	boreal coniferous forest
		usually less than 20 in (500 mm)		mostly sparse forest and woodland	boreal tundra woodland
Polar	less than 50° F (10° C) all year				polar

Note: High elevations can affect temperature and plant types. Mountain forests, which are considered to be separate ecological zones, are not shown here. To learn about these, visit www.fao.org/docrep/006/ad652e/ad652e00.htm.

Student Resource Page: Maya Biosphere Reserve



Sweat rolls off your brow as you carefully make your way along a narrow path. The enormous trees towering about you form a dense canopy of shade, but it is still very humid. On either side of the path, a tangle of vines and other plants hum with insect life, while in the distance a howler monkey wards off danger with its startling roar. Suddenly, a flock of red-headed green parrots swoops by, causing you to almost trip on a tree root. An iguana catches your eye and scurries away. Everywhere you look is jungle—noisy, warm, and so very much alive.

The path in front of you gradually widens and you notice slumping piles of stacked stones covered with creeping vines and ferns. As your eyes adjust to the light, you see that the stones are actually buildings and pyramids, and that many of them have intricate carvings all over their surfaces. These stunning structures are the ruins of an ancient Maya city abandoned hundreds of years ago and all but swallowed up by the jungle.

Welcome to the Petén! This rugged, densely forested region of northern Guatemala is home to an astounding diversity of plant and animal life, including 54 species of mammals, 333 species of birds and thousands of species of insects. The Petén is also the birthplace of the Maya civilization, which flourished for more than 1,000 years throughout what is now Central America. As an advanced civilization, the Maya developed a system of writing, had a deep understanding of mathematics and astronomy, erected massive stone pyramids and sculptures, and built impressive cities. Today, the region is mostly rural, and its residents make their living off the land—through agriculture and logging, and by collecting

and selling goods from the forest.

Although parts of it appear timeless, the Petén has changed a lot in the last 70 years. In 1941, there were only 11,000 people living in the region, most of them small farmers using traditional methods to grow their crops. Some of the people also worked for international companies that harvested forest products, including *chicle* (CHEE-cleh) for gum, rubber, and cedar and mahogany woods.

In the 1950s, the Guatemalan government began to encourage people to move to the Petén, hoping that more people would mean a more secure border with Mexico. New settlers were offered parcels of land for agriculture, raising cattle and logging. With this enticement, many people did move to the Petén from other parts of Guatemala, and by 1990, nearly 500,000 people lived there.

As you might imagine, this change in population—from 11,000 to almost half a million—also had a big impact on the land. People cut down trees to create ranch land and cornfields. They build roads into the jungle, making it possible for loggers to clear large areas of forest. They hunted wildlife for food and to sell as pets and fur.

As more and more of the forest and its resources disappeared, it became clear that steps needed to be taken to protect it. So in 1990, the Guatemalan government established the Maya Biosphere Reserve in the northern part of the Petén. The Reserve has special rules meant to keep people and companies from completely clearing the forest. And because so many people in the Petén

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Student Resource Page: Maya Biosphere Reserve



depend on the land, the Reserve also allows farming, ranching and logging in certain areas.

The Maya Biosphere Reserve is made up of three different zones to meet these different needs. The first zone is called the “national park zone,” and all human activities are illegal here except for research and some tourism. The second zone, the “multiple-use zone,” allows people to live and to harvest wood and other forest products, as long as they do so in a way that preserves the forest; farming and ranching are not allowed in this zone. The third zone, the “buffer zone,” allows individuals and companies to own land and to live, farm, have cattle or log on that land.

Creating the Maya Biosphere Reserve has slowed change to the Petén forest. But the Reserve covers a large area that is difficult to patrol; in some remote areas of the national park, people have cut the forest illegally. You may be surprised that the multiple-use zone has been the most successful part of the Reserve. Since local communities

must rely on the forest for survival, they have a strong reason to protect it.

One such community is Uaxactún (Wash-ahk-TUN), a small village of about 140 families located within the multiple-use zone. The villagers do not own the forest land they oversee, but have permission from the government to harvest products from it. They collect allspice and xate palm leaves (used by florists in the United States); cut vines and weave them into wicker furniture; and selectively log mahogany trees, selling the lumber and keeping the twigs and leaves to fertilize the forest floor. The Rainforest Alliance has helped the community to find sustainable products and markets for these products. The community is doing so well that it has been able to open a high school and start a new plant nursery.

When local people see value in the forest, they do everything in their power to protect it. With the Maya Biosphere Reserve, and help from local communities like Uaxactún, there is hope that the Petén forest will continue to thrive for future generations.

Sources

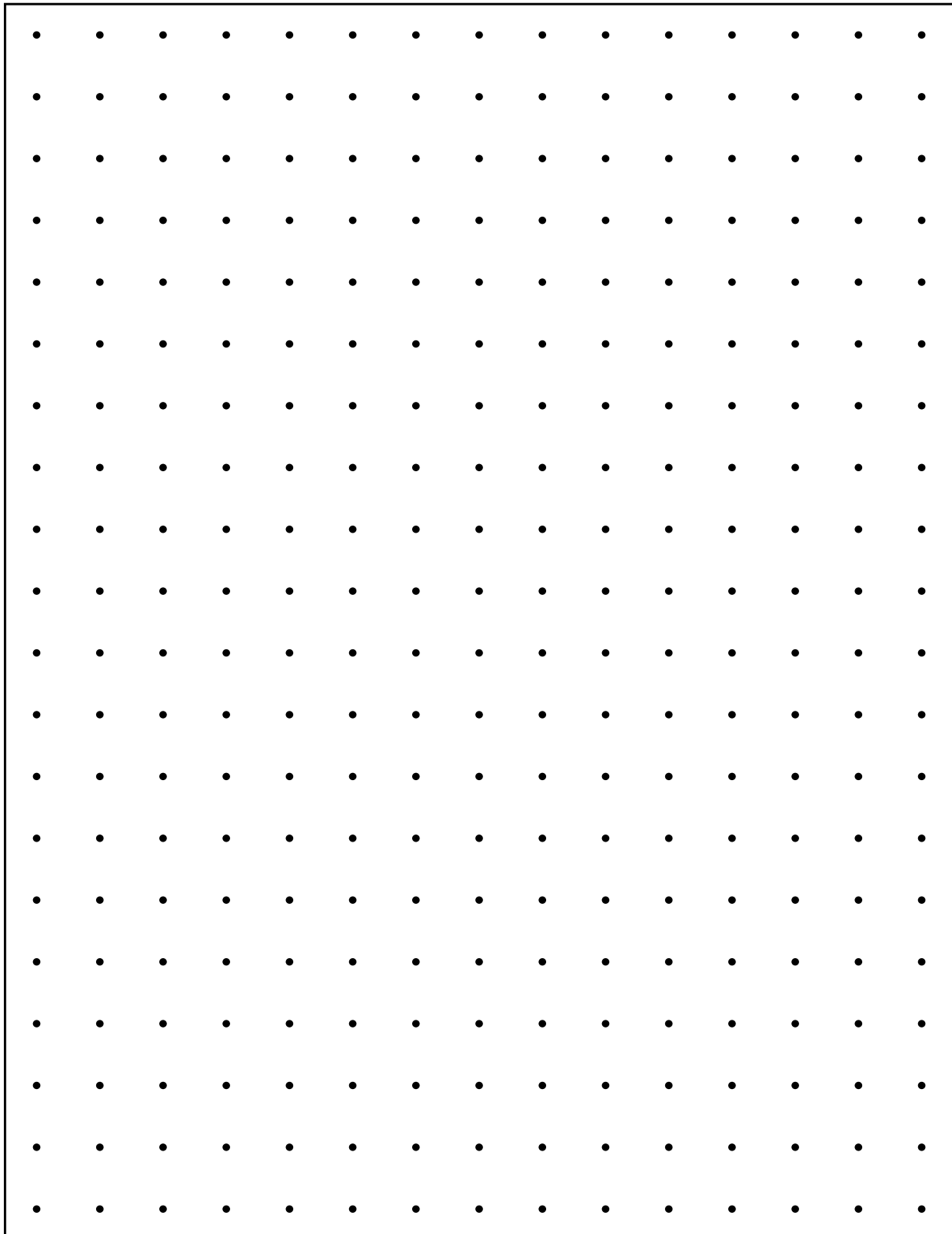
Call, Wendy. “Seeing the Forest, Not Just the Trees: A Guatemalan Village and Conservation.” Terrain.org: No. 14. www.terrain.org/articles/14/call.htm

Herron, Scott. “The Economic Botany of Manilkara zapota (L.) Van Royen.” Ethnobotanical Leaflets International Web Journal. www.ethnoleaflets.com//leaflets/zapota.htm

“The Maya Biosphere Reserve.” Global Perspectives: A Remote Sensing and World Issues Web Site. www.cotf.edu/earthinfo/camerica/maya/MBtopic5.html

Student Resource Page: Square Dot Matrix

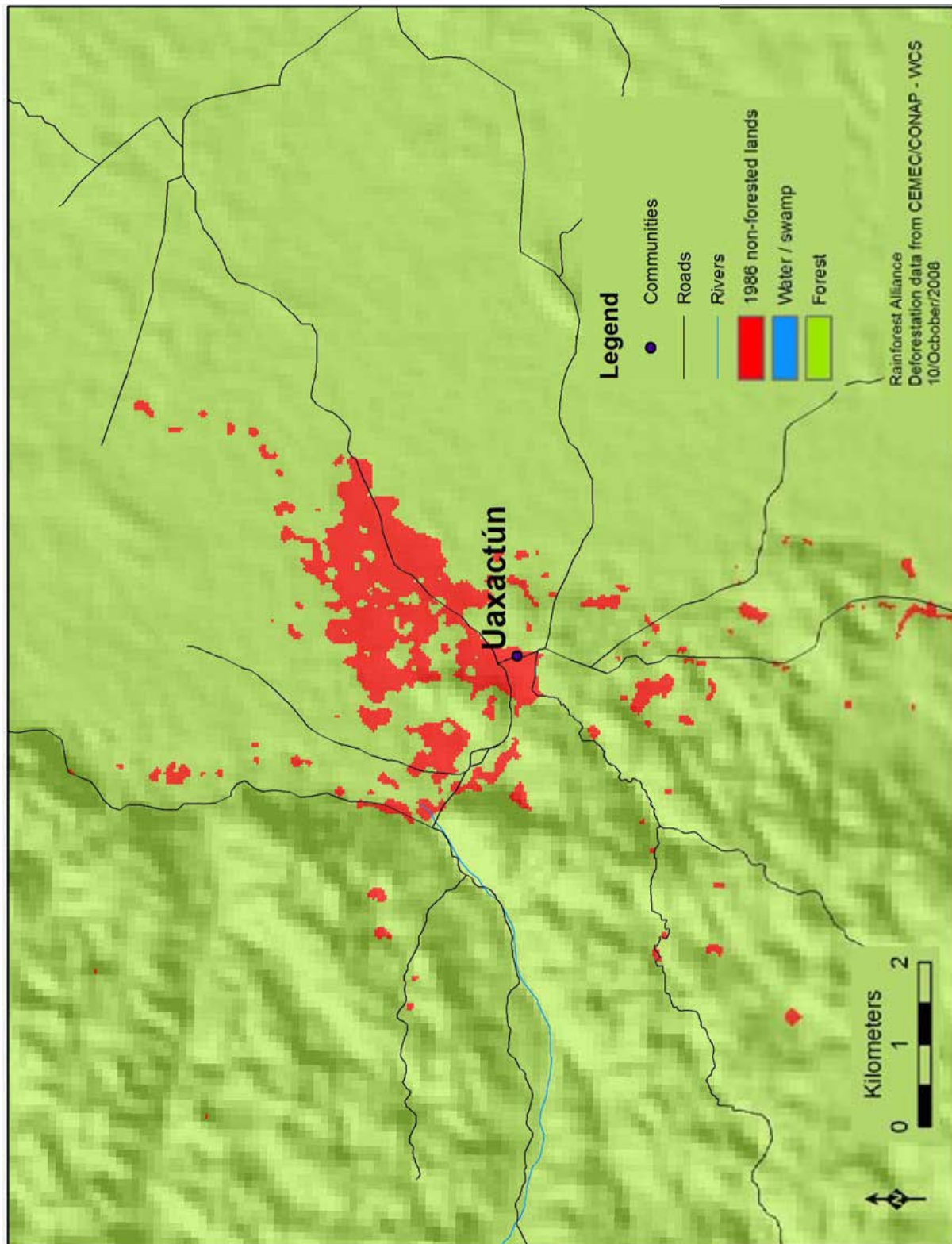
Note: This Square Dot Matrix should be the same size as the following maps.



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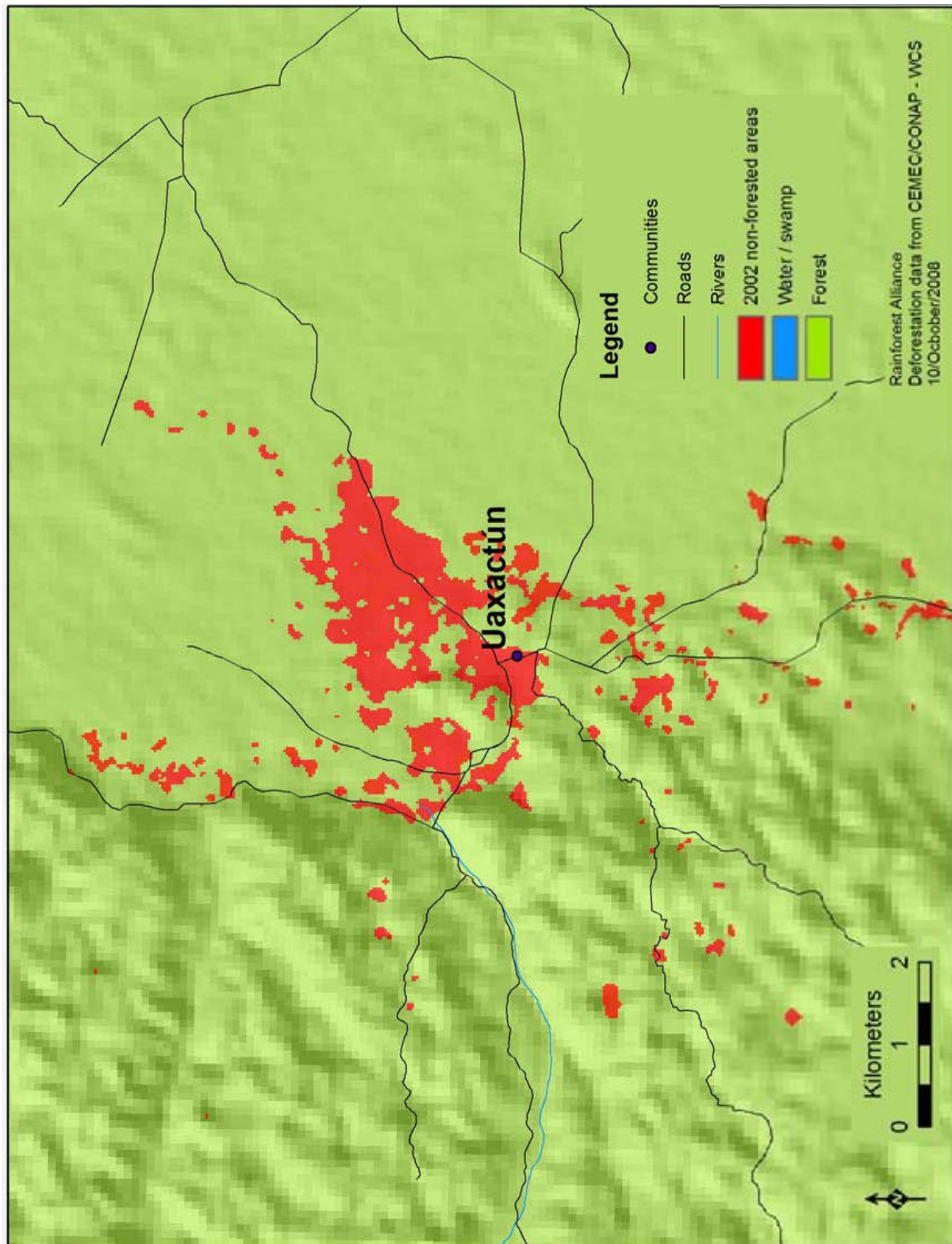
Student Resource Page: Forest Cover for Uaxactún (1986)



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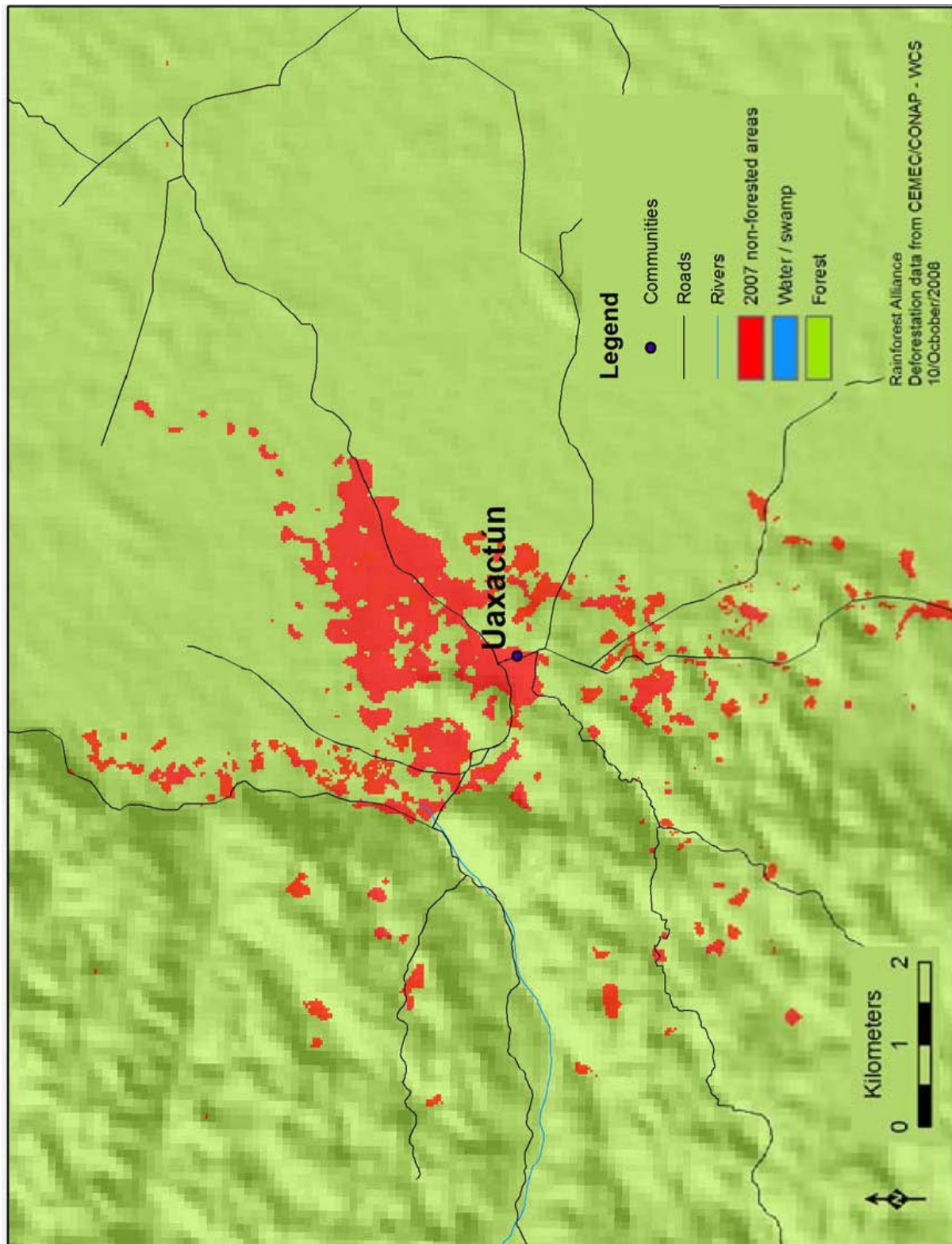
Student Resource Page: Forest Cover for Uaxactún (2002)



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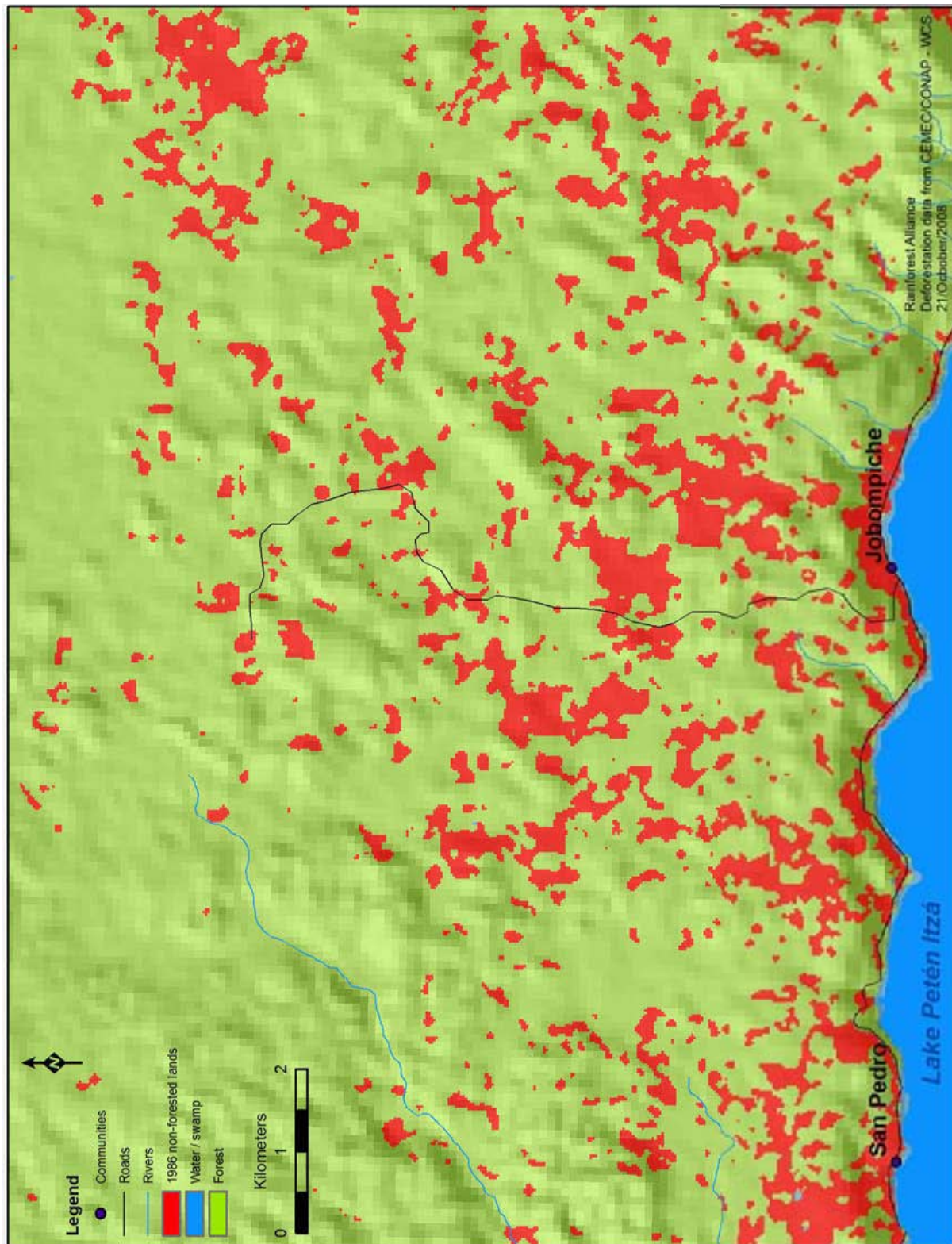
Student Resource Page: Forest Cover for Uaxactún (2007)



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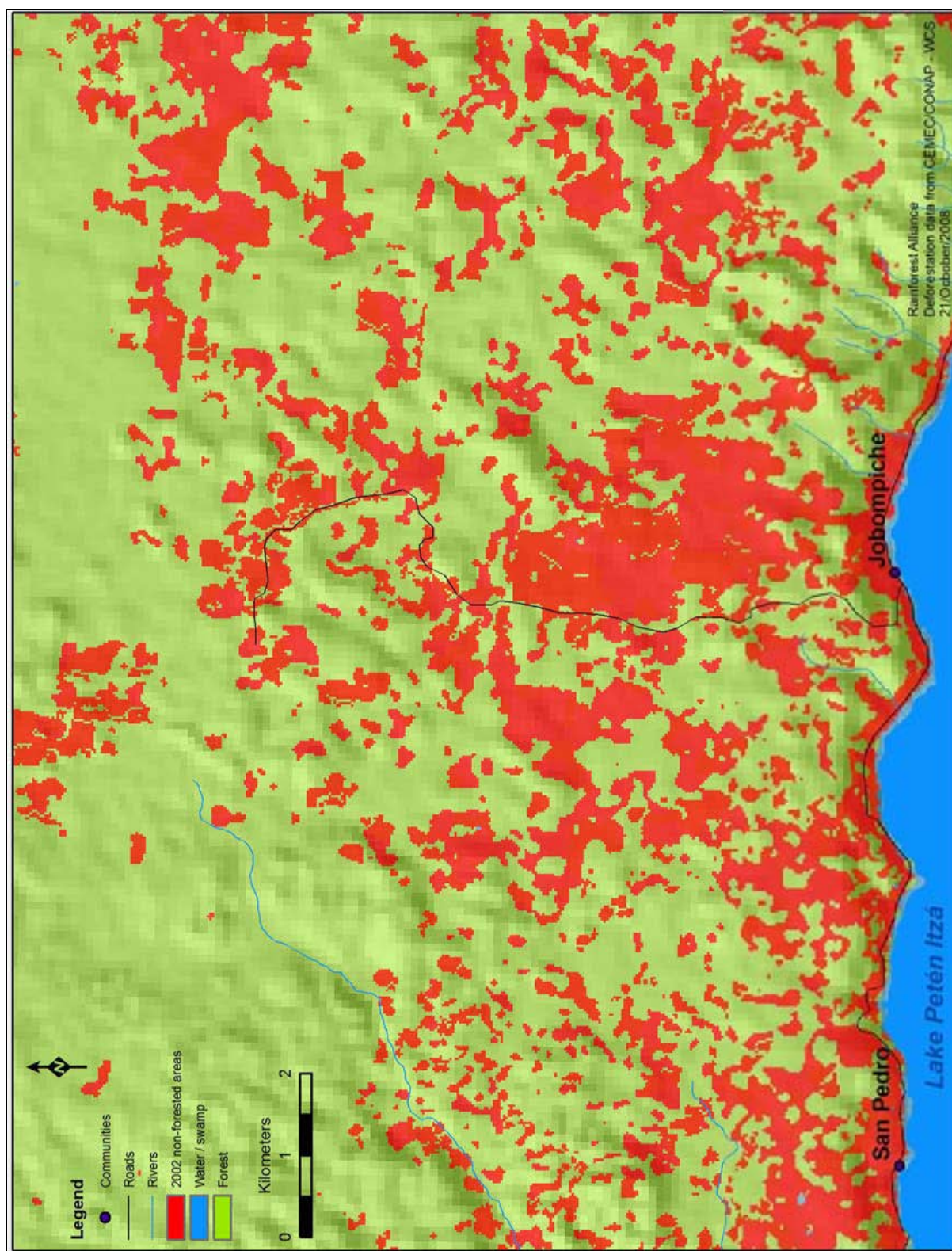
Student Resource Page: Buffer Zone Forest Cover (1986)



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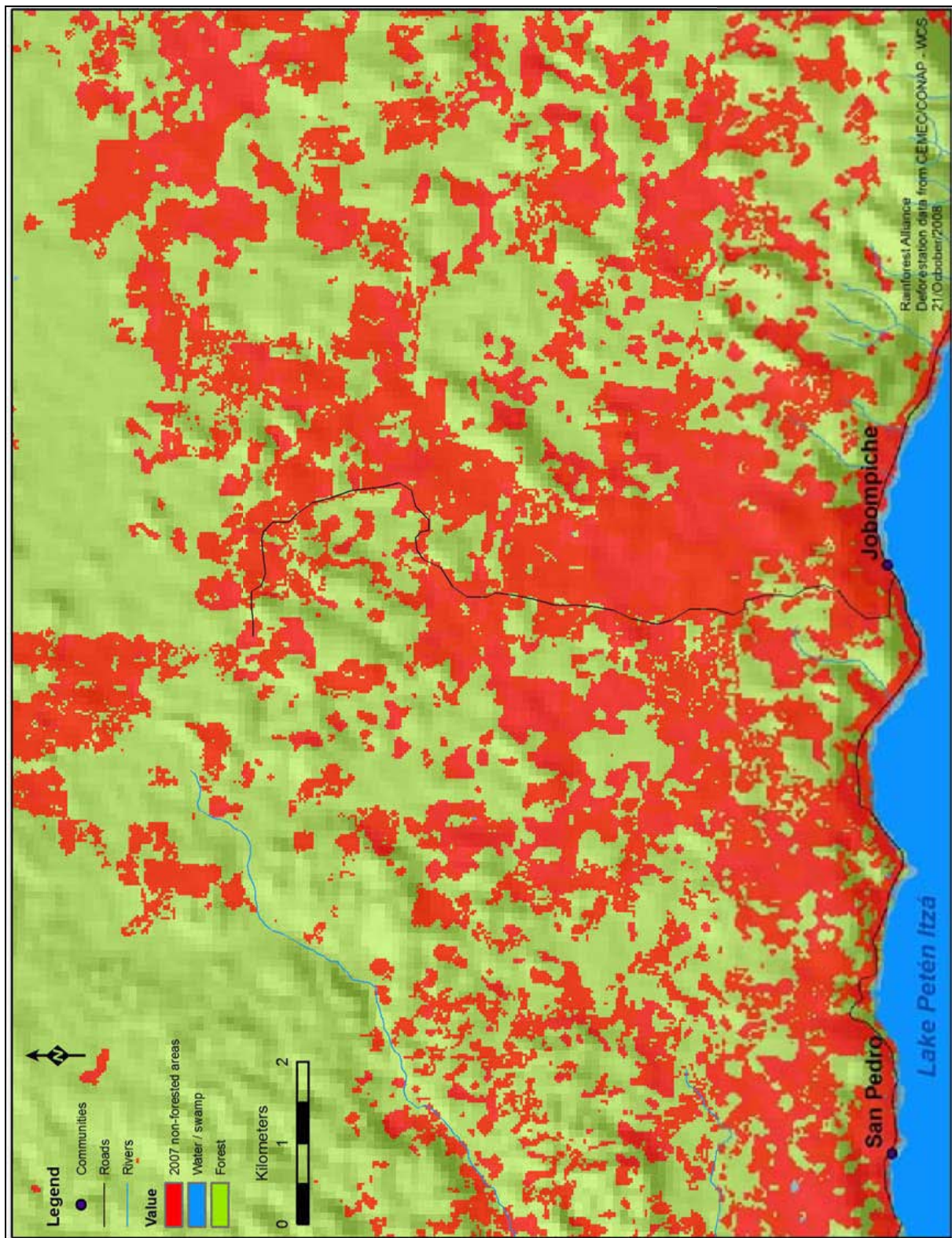
Student Resource Page: Buffer Zone Forest Cover (2002)



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Student Resource Page: Buffer Zone Forest Cover (2007)



Lesson 2

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Protecting the Guatemalan Rainforest through Certification

Guatemala

Overview

Students explore different criteria that may be involved in forest certification and consider the benefits of certification to the Guatemalan rainforest and rainforest communities. They then create a brochure to educate family, friends and other students about the benefits of buying certified forest products when they have the choice.

Introduction

Subjects

- Science
- Language Arts
- Social Studies

Concepts (from PLT Conceptual Framework)

- The standard of living of various peoples throughout the world is dependent on environmental quality; the availability, utilization and distribution of resources; the government and the culture of its inhabitants. (1.9)
- Human societies and cultures throughout the world interact with each other and affect natural systems upon which they depend. (2.8)
- The extracting, processing, transporting and marketing of natural resources provide employment opportunities for many people. (2.12)
- Consumers drive the marketplace with their demands for goods and services. Such demands shift with time and may have positive or negative effects on the resource base and environmental quality. (5.9)

Skills

- discussing
- classifying and categorizing
- interpreting
- synthesizing
- creating

Objectives

1. Students will describe what forest certification is.
2. Students will identify ways that certification can benefit the environment, the people who live in and near the forest and the consumer.



Background

Healthy rainforests are a critical part of the web of life. They release oxygen through their leaves, filter pollutants from the air, and help stabilize the global climate by absorbing carbon dioxide. They also provide us with valuable resources like wood, food and medicinal plants.

Forest certification is one approach to protecting rainforests and other forests from destructive practices. It is a way to inform consumers that a particular wood, paper or other forest product comes from a forest or a company that meets strict environmental and social standards. An independent organization evaluates the practices of the forest manager and identifies the certified product with a seal or other marking.

Consumer demand for certified products gives an incentive for retailers and manufacturers to look for certified forest suppliers. This in turn drives forest

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Protecting the Guatemalan Rainforest through Certification

managers to use environmentally and socially sound practices that will help to ensure the long-term sustainability of the forests and the communities that depend on them.

Related PLT Activities

- Tropical Treehouse (*PreK–8 Guide*)
- Understanding the Effects of Forest Uses (*Forests of the World*)

Part A: Forest Certification

Materials

- copies of student pages

Time Considerations

Preparation: 20 minutes

Doing the activity: 45 minutes

Getting Ready

Make copies of the “Forest Certification” student page.

Doing the Activity

1. Introduce the activity by having students imagine going to the store to buy a composition notebook for school. Ask, “Which notebook would you buy if you find two that are pretty much the same, but Notebook A costs \$2.49 and Notebook B costs \$1.99? What factors might you consider in deciding which to buy?” List these factors on the board and have students identify those that are the most important to them.
2. Ask students how it might influence their choice if you knew that Notebook A was made by a company that only uses paper fiber from recycled paper or from forests that are carefully maintained, while Notebook B was made by a company that uses the cheapest paper fiber it can get, no matter the source. What if they knew that Notebook A's company pays its employees a high enough wage to support their families, while Notebook B's pays only the absolute minimum allowed by law? Point out that these examples show that our consumer choices can affect much more than just our own wallets—they can affect the health of the forest and the lives of the workers, among other things. Ask, “What else might your choice of notebook affect? [list their ideas on the board] When you are

at the store, you can see the price of an item, but how would you know about these other aspects?”

3. Explain that forest certification is one way for consumers to know that a particular product comes from a forest that is managed with certain environmental and social considerations in mind. Forest certification is a process where an independent organization checks out the company's forestry practices, and then puts a label on the wood or other forest product to show that the company satisfies specific requirements.
4. Give students copies of the “Forest Certification Principles” student page. Read the 10 principles as a class. After making sure that students understand what each of the principles describes, have the class identify which principles emphasize the environment, which emphasize social and cultural aspects, and which emphasize businesses or economics. Point out that a particular principle may fall into more than one of these categories.
5. Ask students individually to put a star next to the five principles they think are most important. Then in small groups, have students discuss their choices and try to reach a group consensus about the top five. Ask several groups to share their top choices.
6. Lead a class discussion:
 - Which principles did most groups include in their top five?
 - Which of these are most important for the people who live in or near the forest?
 - Which are most important for consumers?
 - Which are most important for the business making or selling the product?
 - Which are most important for the forest environment?
 - How are all the principles related to each other?
 - What might happen if we only did what is best for the forest? For people?

Part B: Certified Products Brochure

Materials

- copies of student pages
- wall-size world map

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Protecting the Guatemalan Rainforest through Certification

- sample brochures (optional)
- paper, colored pencils

Time Considerations

Preparation: 20 minutes or more

Doing the activity: 45 minutes, plus time to make brochures

Getting Ready

Make copies of the “Certified Products from Guatemala” and “Brochure Format” student pages. Make a sample from the student page by cutting out the Side 1 and Side 2 illustrations, taping them back-to-back and then folding on the dotted lines. Optional: collect several brochures from your community for examples.

Doing the Activity

1. Ask students what they know or have heard about Guatemala. If they do not know where Guatemala is, help them find it on the world map.
2. Give students a copy of the “Certified Products from Guatemala” student page and have them read about how forest certification affects the Guatemalan rainforest and the people living within it. Discuss:
 - What products do the people of Uaxactún get from the forest?
 - How has certifying *xate* and wood helped the community of Uaxactún?
 - How has it helped to protect the rainforest around Uaxactún?
 - What are other benefits of certification? [begin a list of the benefits on the board]
 - What might be disadvantages of certification?
 - What can we do to teach our families and friends about the value of certified forest products?
3. Explain that students will make brochures to inform others about forest product certification and the benefits of buying certified forest products when they have a choice. Optional: show a few sample brochures and have students point some of the techniques used in them.
4. Give students copies of the “Brochure Format” student page. Show them the sample you made so that they can see how the different panels and spreads will work together when folded. Go over the suggested brochure format and encourage

students to think about the most effective text and illustrations to include in their brochures. Suggest that they include some of the benefits of certification listed in Step 2, and that they also address factors that influence what people buy (as explored in Part A).

5. Allow time for students to complete their brochures, and then have them present the brochures to family members and peers. Follow up by asking students how effective they thought their brochures were and how they might improve them.

Enrichment

Check with local florists or wholesale flower distributors to find out when and where *xate* (also known as jade palm or fishtail palm) is available in your area. Find out how much it costs and whether it is known to be forest certified. If possible, get some sample fronds for students to observe first-hand.

Invite a guest to speak with the class about certified forest products available in your community. Help students brainstorm a list of questions to ask your guest, such as:

- What certified products does your company offer?
- Where do the products come from?
- Who certifies the products?
- Do you prefer one certification program over another?
- How do certified products benefit the consumer or our community?
- Does certification have any downsides or shortcomings?

Assessment Opportunity

Use students' brochures to assess their learning about forest product certification and its benefits.

Additional Resources

Online photo scrapbook of children living in the Maya Biosphere Reserve
www.rainforest-alliance.org/interactives/my-world

Lesson 2

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Student Resource Page: Forest Certification Principles

1. Obey all relevant laws and international treaties.
2. Be able to show a legal right to use the land.
3. Recognize and respect indigenous people's rights.
4. Maintain or improve the long-term well-being of forest workers and local communities.
5. Encourage careful use of the forest and its products to best benefit businesses, people and the environment.
6. Minimize changes to the forest environment, including the plants, animals, water, soil and landscape.
7. Write, follow and update a plan for how the forest will be used and cared for.
8. Monitor the condition of the forest, the amount of forest products, and how people use and care for the forest to see how these activities affect people and the forest environment.
9. Maintain or improve forests that need special protection because they have rare or endangered species or other important natural, historical or cultural features.
10. Plan and use planted forests (called plantations) to help restore and preserve natural forests.

Sources

These are kid-friendly summaries of the 10 Forest Stewardship Council principles described in "The FSC Principles and Criteria for Responsible Forest Management," www.fsc.org/pc.html

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Student Resource Page: Certified Products from Guatemala



The Rainforest Alliance Certification frog seal ensures that the product was produced in a sustainable manner—that its impacts on the environment and local communities were minimized, and that the workers involved were paid good wages and provided with safe working and living conditions. Look for the frog seal on coffee, chocolate, bananas, and other products.

The village of Uaxactún (Wash-ahk-TUN) lies in the heart of the Maya Biosphere in the Guatemalan rainforest. Thick with trees and plants, this area is home to jaguars, pumas, monkeys, hundreds of species of birds and people. Though only a century old, Uaxactún is situated between two great ancient Maya cities, Tikal and Calakmul—evidence that people have been living in this area for thousands of years.

Tropical rainforests, like the forests surrounding Uaxactún, are important to humans and to the environment for many reasons. They cover only five percent of the land in the world, but contain at least half of the world's plant and animal species. They help stabilize the world's climate and protect against flood and drought. They give us products we use every day—like bananas, cocoa, lumber and coffee—and they bring income to the people who harvest and sell these products.

Even though they are important, people are impacting rainforests around the world by clearing them for farms and houses, and by harvesting wood and other products at a rate faster than the forest can recover. Many of these people do not mean to hurt the rainforest, but are struggling to earn a living. Meanwhile, some businesses and individuals try to increase their profits by making their workers work long hours with little pay and under dangerous conditions. All of these practices harm the rainforests and the communities that rely on these forests to support their families.

To help preserve rainforests and rainforest communities, the Rainforest Alliance and other organizations have developed certification programs. Certification is a process for finding businesses and farmers who harvest their products in ways that protect the rainforest, support the local community and treat workers fairly. A business that meets

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Student Resource Page: Certified Products from Guatemala



specific requirements can put a special seal on its products, letting consumers know that the product was produced in a way that did not damage the rainforest or local communities.

In Uaxactún, certification has helped both the local people and the environment. The community exports a number of different forest products, including *xate* (SHA-teh), allspice, *chicle* and mahogany. Because the entire community depends on the rainforest for its livelihood, everyone is committed to protecting it. That has meant better water quality, fewer fires and a healthier rainforest. Also, since certifying their products, the villagers' living situations have improved with insurance and higher wages. In addition, the community has been able to sell better products that earn better profits.

One example of a successful certification program is *xate* collection. *Xate* are the dec-

orative leaves of palm plants that grow in the rainforest around Uaxactún and in other parts of Central America. Because they can last up to 45 days after being cut, these leaves are popular with florists in the United States who use them in floral arrangements and for Palm Sunday church services.

If the *xatero* (shah-TEH-ro), or *xate* collector, removes only a few leaves from a *xate* plant, the plant can regenerate new fronds. But as *xate* became more popular in the 1990s, the *xateros* in Uaxactún were taking more and more leaves from each plant. Since more of the leaves had defects, many of them were being thrown away before they even reached the florist. Not only were the plants being overharvested, but the *xateros* were also going farther into the forest to collect leaves, taking other leaves and seeds along the way.

Q. What's the connection between a rock concert and a Guatemalan rainforest?

A. The guitar.

Listen to your favorite band and see if you can make out the guitar line. Part of what gives a guitar its distinctive sound is the wood body that picks up the vibrations of the strings. Guitar makers use special woods called tonewoods that resonate well and respond to the player's touch. Many of the best tonewoods come from rainforests around the world. One of the leading makers of electric guitars, Gibson, uses only certified wood in its SmartWood guitars. The backs of many of these guitars are made of mahogany from Guatemala. The villagers of Uaxactún carefully select the trees to be used in the Gibson SmartWood guitars, cutting and sawing the trunk and branches, but leaving the twigs and leaves to fertilize the forest floor. They want to make sure that the forest will always have mahogany trees in the future. Since the first SmartWood guitars came out in 1996, Gibson has worked toward making its entire electric guitar division completely certified. As CEO Henry Juskiewicz explains, "Our goal is not just to promote certified wood guitars as something special, but to bring the industry to a point where the use of certified wood is a standard procedure."

Student Resource Page: Certified Products from Guatemala

The Rainforest Alliance worked with the people of Uaxactún and other communities to develop a *xate* certification program that encourages a more sustainable harvest. In Uaxactún, *xate* collectors now cut only the best-quality fronds, leaving more fronds on the palm and allowing the plant to grow new fronds more quickly. With more sustainable practices such as this and by selling their fronds directly to a distributor in the United States, *xateros* sell their leaves for

twice as much as they did previously. This has meant better living standards for local families and better protection of the forest.

By choosing certified products like *xate* and others, consumers have the opportunity to vote with their dollars, encouraging other producers to also become certified. And as we see in Uaxactún, certification helps to protect the rainforest and rainforest communities.

Something to chew on

Have you ever wondered where your chewing gum comes from? Most gums today are made from synthetic vinyl resins. But chewing gums all used to be made from *chicle* (CHEE-cleh), the sap of a tree grown in the Central American rainforest. The villagers of Uaxactún used to make their living selling only *chicle*. In fact, what is now the town square was once an airstrip built a century ago by the Wrigley Company for exporting *chicle*. To get *chicle*, the harvesters carefully make zigzag cuts in the trunk of the *sapodilla* (sap-oh-DEE-yah) tree. They must take care to cut only deep enough to allow the white sap to seep out, but not so deep to expose the tree to insects or infection. The sap follows the network of cuts down to the base of the tree, where it is collected in containers, and then boiled and molded into blocks. Trees must heal from this process, so harvesters must allow several years between harvests from a single tree. Due to past overuse all over Central America, *sapodilla* trees are now pretty rare. But *chicle* is still harvested on a small scale in places like Uaxactún, and continues to be used in some old-fashioned chewing gums like Glee Gum. Look for some *chicle*-based gum in your local store and get a taste of the Guatemalan rainforest!

Sources

Call, Wendy. "Seeing the Forest, Not Just the Trees: A Guatemalan Village and Conservation."

Terrain.org: No. 14. www.terrain.org/articles/14/call.htm

Herron, Scott. "The Economic Botany of *Manilkara zapota* (L.) Van Royen." Ethnobotanical

Leaflets International Web Journal. www.ethnoleaflets.com//leaflets/zapota.htm

"SmartWood's Smart Song: Gibson Partners with Rainforest Alliance to Sustainably Harvest

Wood for Guitars," Terrain.org: No. 19. www.terrain.org/articles/19/smartwood.htm

Lesson 2

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Student Resource Page: Brochure Format

Many brochures use the following format to structure their message. The illustrations show two sides of a piece of paper that is folded in thirds.

Side 1

Middle Panel	Back Panel	Front Panel
<p>This is the first panel readers will see after they open the brochure.</p> <p>Begin giving information and continue to draw readers in.</p>	<p>Tell readers what actions to take.</p> <p>Tell readers who to contact for more information.</p>	<p>Open with a catchy headline in large type to get readers' attention.</p> <p>Use interest-grabbing pictures to draw in readers.</p>

Side 2

Inside Spread
<p>Focus on one idea in each paragraph or section.</p> <p>Label each section with a title that helps readers get the information quickly.</p> <p>Use facts and examples.</p> <p>Use illustrations, photos and charts to help make your points.</p>

Source

Adapted from "Writer's Guide: Persuasive Brochure." *Elements of Language*. Holt, Rinehart, and Winston. go.hrw.com/eolang/modbank/mguide/mg10-8.htm

Eighth Grade



Supplementary Materials

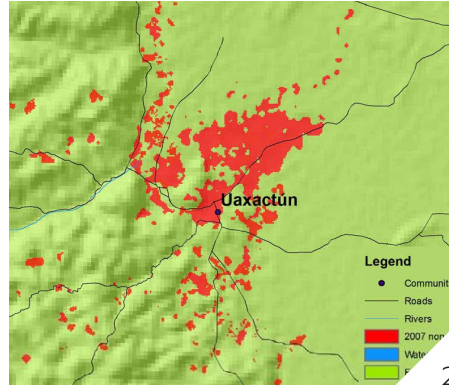
— Resources



**Rainforest
Alliance**



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2



3

Resource Index

Check out this page for additional supplemental materials that complement these dynamic units and to access many of the resources listed below.

www.rainforest-alliance.org/curricula/resources

Slideshow (1)

The Curriculum 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 download for viewing in the classroom, printed out and read as a story, or viewed online with the students.

www.rainforest-alliance.org/pictures/guatemala-kids

Species Profiles

The species profiles include photos, habitat, foraging behavior, group relationships, threats and many more facts.

www.rainforest-alliance.org/species

Student Resource Pages (2)

- Sorting Out the Differences
- Classifying Ecological Zones
- Maya Biosphere Reserve
- Square Dot Matrix
- Maya Biosphere Reserve Maps (Uaxactún)
- Maya Biosphere Reserve Maps (Buffer Zone)
- Forest Certification Principles
- Certified Products from Guatemala
- Brochure Format

Rainforest Poster (3)

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

www.rainforest-alliance.org/publications/inside-the-rainforest-canopy

Rainforest Products

Check out 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.

www.rainforest-alliance.org/articles/tropical-forests-in-our-daily-lives

Certificate of Accomplishment

Print out colorful rainforest certificates for your students to commemorate their completion of these units.

www.rainforest-alliance.org/curricula/certificate-of-participation