



# Land Use Conflict in the Amazon Rainforest

## 12.1 Introduction

Picture yourself in a hot, steamy forest. It has just stopped raining, and everything around you is green and moist. Green vines wind around the slender trunks of trees that reach more than 100 feet into the air. High overhead, a tangle of vines, branches, and leaves nearly blocks out the sun. Except for the buzzing of insects, the forest is practically silent. Then you hear a strange barking sound coming from the treetops. You look up and get your first glimpse of a red howler monkey.

Welcome to the Amazon rainforest, an enormous **tropical rainforest** in South America. The rainforest seems timeless, yet it is changing rapidly. For thousands of years, small groups of **indigenous peoples** have made their home here, making a living by hunting and gathering. In more recent times, other groups have come to the rainforest, including rubber tappers, farmers, cattle ranchers, and loggers. In addition, the rainforest is of great interest to environmental groups, which are organizations that work to protect the natural world.

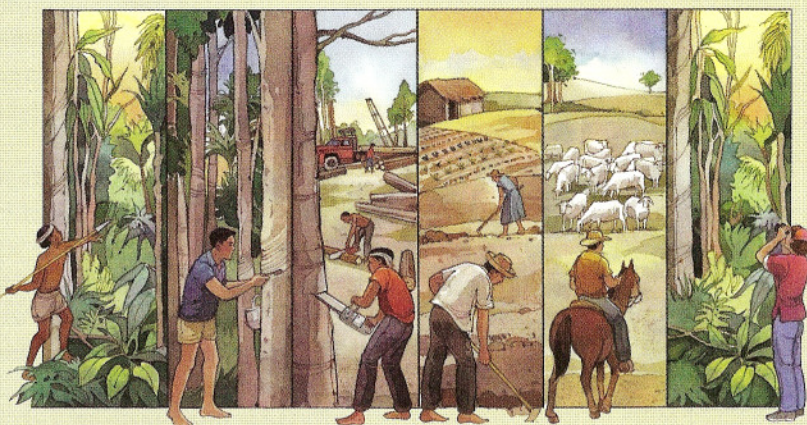
Each of these groups has its own ideas about the Amazon rainforest. The rubber tappers, farmers, cattle ranchers, and loggers want to use the rainforest to make a living. Indigenous peoples want to maintain their traditional way of life. Environmental groups want to preserve the rainforest in its natural state. These differences have led to **land use conflict**, or arguments about the best ways to use the land. In this chapter, you will learn what the various groups want and examine some possible solutions to land use conflict within the Amazon rainforest.

### Essential Question

**How should the resources of rainforests be used and preserved?**

This illustration shows six groups that are interested in the Amazon rainforest. Some want to use the resources of the rainforest to make a living. Others want to preserve the rainforest in its natural state. Keep the possible conflicts among these groups in mind as you try to answer the Essential Question.

### Graphic Organizer



Native Amazonians

Rubber Tappers

Loggers

Settlers

Cattle Ranchers

Environmentalists

## 12.2 The Geographic Setting

### The Amazon Basin



### The World's Largest Rainforest

The Amazon basin covers much of northern Brazil and several other countries in South America. It contains the world's largest rainforest. It receives 80 to 115 inches of rain a year. The Amazon rainforest is home to more types of plants and animals than any other place on Earth.

Tropical rainforests are a type of **broadleaf evergreen forest** found near the equator, where the **climate** is warm and wet all year. The Amazon rainforest is the largest tropical rainforest in the world, covering more than 2 million square miles. That is more than half the size of the United States. Most of this vast rainforest lies in Brazil. However, it also covers parts of Colombia, Ecuador, Peru, Bolivia, and Venezuela.

**A Many-Layered Ecosystem** A rainforest is a complex **ecosystem** that has several layers. The bottom, or ground, layer is called the **forest floor**. The thick layer consisting of overlapping tree branches at the very top of the forest is known as the **canopy**. Between the forest floor and the canopy are shrubs and smaller trees that form a layer known as the **lower story**.

An amazing variety of plants and animals live in the various layers of the rainforest. Rainforests cover only approximately 6 percent of Earth's surface, but they are home to about 50 percent of the world's living species.

Scientists use the term **biodiversity** to describe the variety of plant and animal species that live in a particular area. The great biodiversity of rainforests attracts scientists of different specialties who come to study the flora and fauna there.

Other groups of people have different reasons for coming to the rainforest. Some people come to clear land for farming and ranching, a process that results in **deforestation**, or the removal of trees from large areas. Other people are more interested in **sustainable development**, which means finding ways to use the resources of the rainforest without destroying it.

**The Lungs of the Earth** Many people around the world worry about the fate of the Amazon rainforest. A major reason for their concern is that tropical rainforests affect life far beyond their borders. The trees and other plants that grow in these dense forests have been called the "lungs of the Earth."

The nickname "lungs of the Earth" comes from the key role that rainforests play in Earth's **carbon-oxygen cycle**. The carbon-oxygen cycle consists of a series of events that turn a gas called *carbon dioxide*, or  $\text{CO}_2$ , into oxygen and then convert the oxygen back into  $\text{CO}_2$ . In this way, carbon and oxygen are "cycled" among the living things that need them to survive.

Here is how the carbon-oxygen cycle works. When people and other animals breathe, their bodies take in oxygen and breathe out  $\text{CO}_2$ . Cars and factories also produce  $\text{CO}_2$  as a waste product when burning fuel. Trees and other plants absorb  $\text{CO}_2$  from the air, using the carbon for their growth. Plants then release the oxygen back into the air as a waste product. When people and other animals breathe in this oxygen, the cycle begins again.

Because rainforests are rich in plant life, they are a major part of the carbon-oxygen cycle throughout Earth. Scientists believe that the Amazon rainforest alone creates about one quarter of Earth's oxygen. A rainforest tree may have produced the oxygen that you are breathing right now.

## ► Geotermis

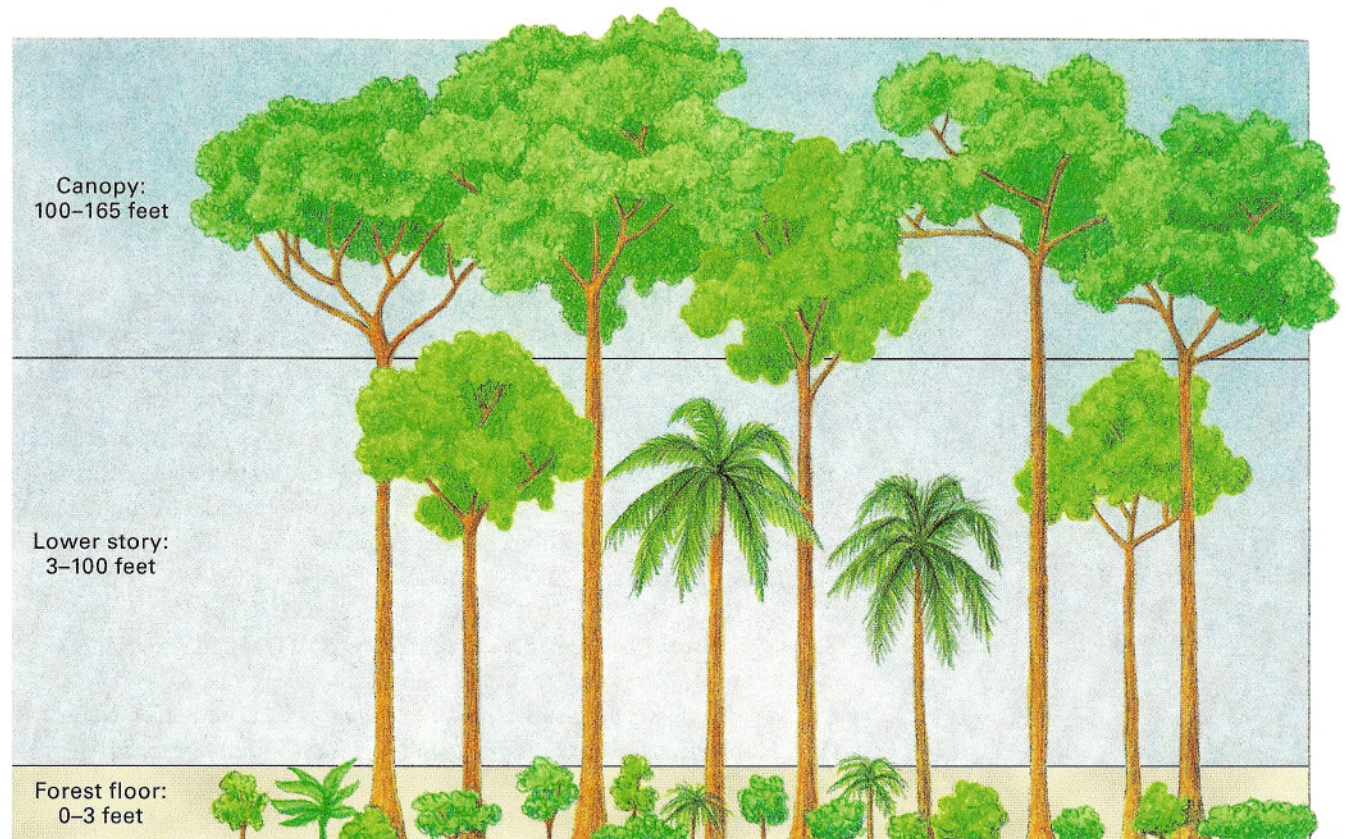
**biodiversity** the variety of plants and animals living in one area. The term can also mean the great variety of all living things on Earth.

**carbon-oxygen cycle** the process by which carbon and oxygen cycle among plants, people and animals, and the environment

**deforestation** removing or clearing away the trees from a forest. Deforestation is often done to clear land for farming or ranching.

**sustainable development** using resources in ways that meet the needs of people today without hurting the ability of future generations to meet their own needs. This means finding ways to use resources without using them up.

**tropical rainforest** a broadleaf evergreen forest found in wet and hot regions near the equator



### The Three Layers of a Rainforest

A tropical rainforest grows in three layers. Shade-loving mosses and ferns thrive on the dark forest floor. Small trees and vines fill in the lower story, or middle layer. Trees reaching for sunlight form a canopy of branches at the top of the forest. Some very tall trees even poke their heads above the canopy.



### **A Native Amazonian Hunter**

Native peoples have lived in the rainforest for about 12,000 years. This man is using a traditional bow and arrow to hunt for game. In recent years, native Amazonians have lost much of their land to loggers, farmers, and ranchers.

## **12.3 What Native Amazonians Want**

Once there were as many as 10 million native people living in the Amazon rainforest, but today the number of native Amazonians is much smaller. Those who remain want one thing above all: to continue their traditional way of life.

**A Sustainable Way of Life** Native people have lived in the rainforest for about 12,000 years. Most live as they always have, by hunting, fishing, and growing crops on small plots of land that they have cleared in the forest. When a field is no longer fertile, they clear a new field somewhere else. Over time, new forest covers the old field. This is a sustainable way of life that is using the resources of the Amazon rainforest without causing long-term damage.

In the 1960s, the government of Brazil decided that it would open the Amazon basin to development. The government began by building a highway, which farmers, ranchers, and loggers followed into the Amazon region.

The arrival of so many newcomers has hurt native Amazonians. Many of the native people have been driven from their homelands in order to make room for farms and ranches. Some of them have died from diseases brought by newcomers. Other native people have been killed or injured in land use conflicts.

**Save the Forest to Save Us** Today native Amazonians are fighting to save parts of the rainforest from development, arguing that they have a right to preserve themselves and their way of life. As native leader Davi Kopenawa has said, "I want to live where I really belong, on my own land."

In their struggle to survive, native Amazonians have had to learn new skills. One of these new skills is how to speak Portuguese, which is the official language of Brazil. Another skill is how to work with Brazil's government and legal system. Native groups have called on the Brazilian government to make them the legal owners of their homelands. Only through legal ownership will they be able to keep others from destroying their rainforest home.

## 12.4 What Rubber Tappers Want

Rubber tappers have lived in the Amazon basin for many generations. These workers “tap,” or collect, the sap from rubber trees that grow in the rainforest. The sap is then dried to make rubber products such as erasers or tires for cars and bikes.

**Rubber Tapping Does Not Hurt the Forest** Rubber tappers first came to the Amazon region during the 1870s, when they were hired to work on rubber tree plantations in the rainforest. When the price of rubber dropped, most of the plantations were abandoned. However, some of the rubber tappers decided to stay in the region and continue making their living in the rainforest.

Rubber tappers remove sap from a rubber tree by making diagonal cuts in the bark and then collecting the sap in cups. Removing the sap in this way does not harm the tree, which makes rubber tapping a sustainable activity. Rubber tapping is one way to use the resources of the rainforest without harming the environment.

In the 1960s, the government of Brazil decided that there were better ways to use the rainforest. It encouraged people to clear the forest for farms and ranches. In the deforestation that followed, many rubber trees disappeared, leading to land use conflict between the rubber tappers and the newcomers.

**Let Us Continue Our Sustainable Way of Life** Since rubber tappers want to continue making a living from the rainforest, they need to stop the widespread clearing of trees. Therefore they have asked the government of Brazil to create protected **reserves** within the rainforest. These areas would be set aside for sustainable activities such as rubber tapping.

Rubber tappers believe that their right to the rainforest comes from having worked there for so long. They also argue that their way of life does not harm the rainforest. For this reason, they believe, the government should protect their activities.



### Scoring a Rubber Tree

Rubber tappers collect sap from rubber trees without hurting them. One tapper, Chico Mendes, became a leader in the fight to preserve the rainforest. Eventually, because of his activities, he was murdered. His death brought world attention to the rubber tappers' cause.

## 12.5 What Loggers Want

Logging companies began moving into the Amazon basin during the 1960s. Loggers harvest trees from forests for use in wood products, which range from paper to fine furniture.

**The Rainforest Is a Source of Valuable Hardwoods** A great variety of trees grow throughout the Amazon rainforest. The most valuable tree species are the hardwood trees, such as mahogany and rosewood. Furniture manufacturers all over the world appreciate the beautiful wood from these trees.

Unfortunately, these valuable trees are scattered throughout the rainforest, making it difficult to find and cut only the hardwoods. Instead, loggers **clear-cut** whole patches of rainforest, which means that they cut down all of the trees in an area. After all of the trees have been removed, the loggers move on to another patch.

The logging companies argue that clear-cutting is the only way they can make money, but clear-cutting is also a major cause of deforestation. The larger the area that is stripped of its trees, the longer it takes for the rainforest to grow back.

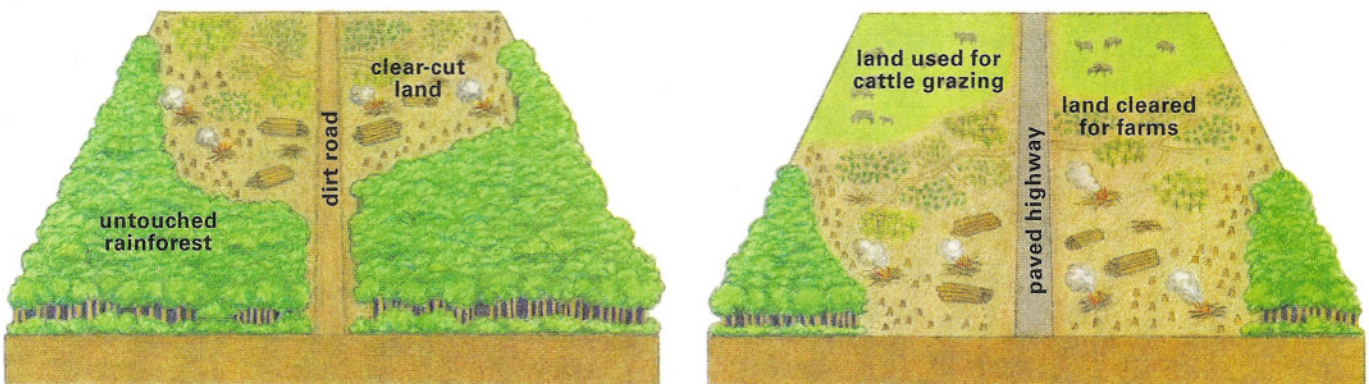
Logging also leads to other types of development. Logging companies build roads deep into the rainforest so that they can transport logs by truck. Meanwhile, settlers who are looking for land follow these logging roads into the forest. Once there, the settlers claim land for farming and ranching.

**We Need Trees to Help Brazil's Economy** Many groups oppose the clear-cutting of the rainforest. Loggers reply that they are helping Brazil's economy grow by creating jobs for people in the **forestry** industry. In addition, logging provides wood for Brazil's furniture factories and paper mills.

Lumber companies also argue that they have made forestry a valuable **economic activity** for Brazil. In 2004, Brazil exported more than \$5 billion worth of wood. The money earned from these sales is helping Brazil to pay off its debts to other countries and is improving the living conditions of many of its citizens.

### Loggers Lead the Way in Developing the Rainforest

In the 1960s, loggers began building dirt roads into the rainforest. Other groups began to develop land near these roads. In time, some logging roads became paved highways.





### Clearing Rainforest for Farming

Settlers who come to the rainforest clear the trees off their land to create farm fields. Farming in this environment is not easy. The constant rain washes away the soil's nutrients. Tropical insects also kill many crops.

## 12.6 What Settlers Want

Though Brazil has the eleventh largest economy in the world, almost one quarter of Brazilians are poor. In **rural** areas, an even greater proportion of the population is poor.

During the 1960s, the government of Brazil began to encourage poor people to move into the Amazon rainforest. These new settlers arrived in large numbers, looking for rainforest land to farm.

**A Lot of Land, but Not for the Poor** Brazil is a vast country, but it has limited areas of farmland. Furthermore, this farmland is not shared equally. A few wealthy families have long owned most of the best farmland, whereas millions of poor Brazilians own no land at all. For many families in Brazil, the prospect of owning a farm in the Amazon basin had seemed like a distant dream.

The Brazilian government did what it could to try to make this dream a reality. The government brought poor families to the rainforest, supplying them with money and free land to enable them to plant their first crops.

**We Need Land to Feed Our Families** Over time, however, the settlers' dream has become a nightmare for many farm families. As native Amazonians had learned long ago, farming in a rainforest is extremely difficult. The thin soil is surprisingly poor in **nutrients**, which are the substances that make a field fertile. Constant rainfall soon washes away whatever nutrients the soil once contained. As the soil loses its fertility, the amount of food it can produce shrinks. The native Amazonians solved this problem by clearing new fields every few years. Over time, their abandoned fields regained some fertility.

However, Brazilian settlers cannot relocate as easily as the native Amazonians. As more settlers have cleared land for farming, opposition to settlers has grown. Native Amazonians, rubber tappers, and ranchers all want the settlers to leave the rainforest. In response, the settlers argue that there is no land for them in other parts of Brazil. They say they must look to the rainforest for land to feed their families.





### **A Cattle Drive in the Rainforest**

Cattle like these are a common sight in the Amazon basin. Cattle ranching is now one of the main causes of deforestation in the rainforest. Ranchers say they are raising food for the world. And many countries are happy to buy Brazilian beef.

## **12.7 What Cattle Ranchers Want**

A rainforest may not seem like it could be cattle country, but since the 1960s parts of the Amazon basin have become just that. Although the Amazon cattle ranchers are a small group, they own large areas of rainforest land.

**Cattle Need Grasslands to Graze** Rainforest cattle graze primarily on grass. They consume the grass in an area all the way down to the dirt, and then they are moved to a new area with fresh grass to eat. Moving cattle from place to place gives grazed areas an opportunity to grow new grass, but this practice also uses up a lot of land.

Today cattle can be found grazing on vast areas of grassland throughout the Amazon basin. Loggers cleared some of this land, and farmers and ranchers cleared the rest. After large tracts of rainforest are cleared, the trees seldom grow back. Instead, the cleared areas become grasslands. This permanent deforestation upsets many people, but it is of great benefit to ranchers.

**We Need Land to Feed the World** Many people argue that cattle don't belong in a rainforest. Cattle ranchers strongly disagree, arguing that they are making good use of rainforest land by raising food for the world and earning income for Brazil.

Many countries import beef from Brazil. In fact, the United States is one of the biggest buyers of Brazilian beef. Some environmental groups are dissatisfied with this trade. They estimate that 55 square feet of rainforest have to be cleared for every hamburger that is sold in the United States.

Like logging, cattle ranching has become an important economic activity in Brazil. In 2003, the value of beef exported to other countries was in excess of \$1.5 billion. The government of Brazil can use the money that is earned from beef sales to help pay its debts and to care for its citizens.

## 12.8 What Environmental Groups Want

Not all Brazilians want to see the Amazon basin developed. For example, environmental groups have worked for many years to attempt to slow the clearing of the rainforest. Their ideas have led to conflict with many other groups.

**Protecting the Biodiversity of the Rainforest** Scientists and **environmentalists** began coming to the rainforest in the 1970s. Some came to study rainforest plants, hoping to find plants that could cure diseases. Others came to study rainforest animals. Still others came to work with native peoples.

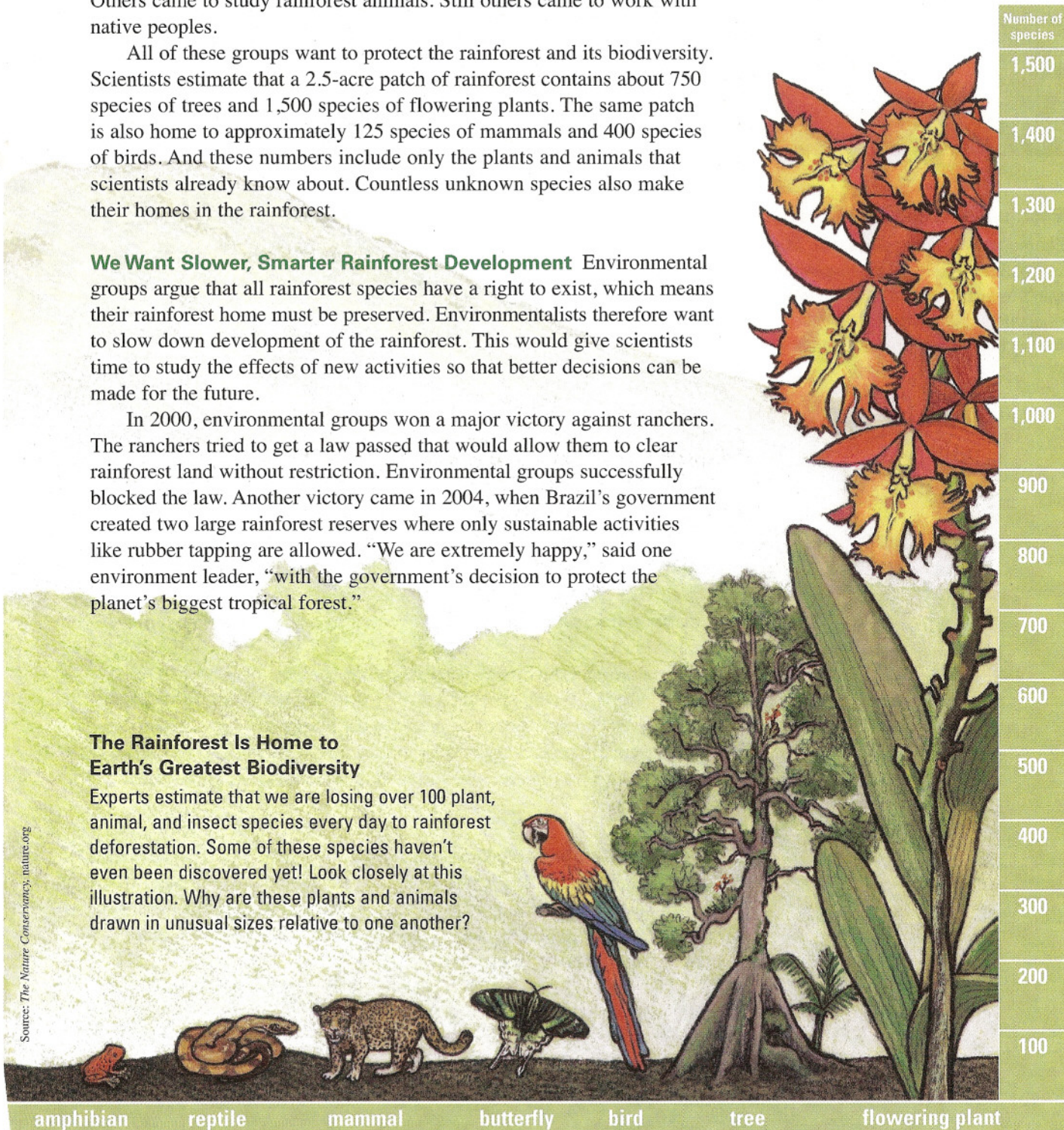
All of these groups want to protect the rainforest and its biodiversity. Scientists estimate that a 2.5-acre patch of rainforest contains about 750 species of trees and 1,500 species of flowering plants. The same patch is also home to approximately 125 species of mammals and 400 species of birds. And these numbers include only the plants and animals that scientists already know about. Countless unknown species also make their homes in the rainforest.

**We Want Slower, Smarter Rainforest Development** Environmental groups argue that all rainforest species have a right to exist, which means their rainforest home must be preserved. Environmentalists therefore want to slow down development of the rainforest. This would give scientists time to study the effects of new activities so that better decisions can be made for the future.

In 2000, environmental groups won a major victory against ranchers. The ranchers tried to get a law passed that would allow them to clear rainforest land without restriction. Environmental groups successfully blocked the law. Another victory came in 2004, when Brazil's government created two large rainforest reserves where only sustainable activities like rubber tapping are allowed. "We are extremely happy," said one environment leader, "with the government's decision to protect the planet's biggest tropical forest."

### The Rainforest Is Home to Earth's Greatest Biodiversity

Experts estimate that we are losing over 100 plant, animal, and insect species every day to rainforest deforestation. Some of these species haven't even been discovered yet! Look closely at this illustration. Why are these plants and animals drawn in unusual sizes relative to one another?



Source: The Nature Conservancy, nature.org



### Ecotourism in the Rainforest

Ecotourism attracts people who like being close to nature. Visitors to the rainforest learn about its great variety of plants and animals. Meanwhile, the money they spend creates jobs.

## 12.9 Ideas for Reducing Land Use Conflict

Each of the groups that you have read about in this chapter has its own ideas for how best to use or preserve the resources of the Amazon rainforest. Often these differences have led to land use conflict. A few groups, however, are looking at ways to balance preservation and development. In this way, they hope to meet the needs of people while also reducing harm to the rainforest. Here are some of their ideas.

**Promote Ecotourism** Most countries encourage **tourism**, which is the business of organizing travel for pleasure. Attracting tourists supports a country's economy because tourists spend money on hotels, meals, services, and souvenirs.

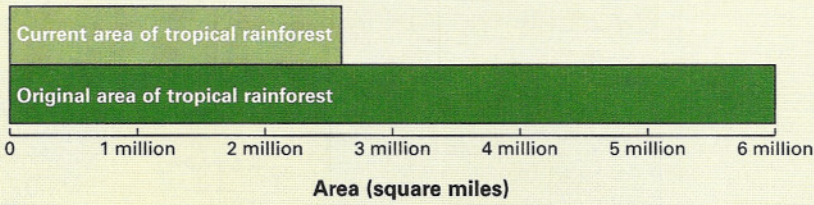
Some tour companies are promoting a new type of tourism that is known as **ecotourism**. This kind of travel attracts people who would like to visit unique ecosystems, such as a rainforest. Boat tours of the Amazon rainforest are popular with ecotourists, who come from all over the world.

Ecotourism offers many benefits. It creates jobs for people in the tourist industry. It helps the economy by bringing in money. Most important, it gives people a reason to preserve the places that ecotourists come to experience. The great danger of ecotourism is overuse. If too many tourists visit a fragile area, they may help to destroy what they have come to see.

**Encourage Sustainable Development** Another way to balance development and preservation is to encourage sustainable development. In Brazil, sustainable development means finding ways to use the rainforest without destroying it. One way is by growing crops that don't require large areas of land to be cleared.

An example of such a crop is shade-grown coffee, a method of growing coffee that makes good use of rainforest trees. The coffee bushes are planted under a canopy of trees, a location that keeps the bushes from getting too much sun. Leaves from the coffee bushes enrich the soil. Meanwhile, the coffee bushes also provide **habitat** for birds, which in

## Loss of Tropical Rainforest Worldwide



turn eat insects that attack coffee plants. This type of farming requires the use of few or no chemicals, which is good not only for the coffee planters but also for coffee drinkers.

Another less harmful way of using the rainforest is strip logging. Instead of clear-cutting large areas, strip loggers clear long, narrow strips of forest. The forest grows back in these strips far more quickly than in large clear-cut areas.

**Buy Products that Protect the Rainforest** Consumers can help protect the rainforest by buying products that support sustainable development. Examples include ice creams and cereals made with Brazil nuts. The companies that make these products buy the nuts from native Amazonians, thereby helping native peoples make a living without damage to the rainforest.

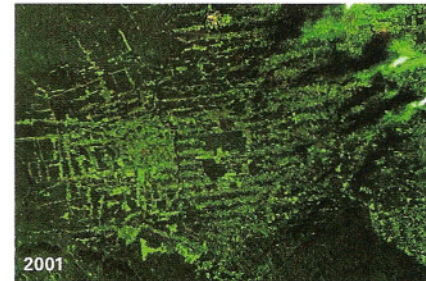
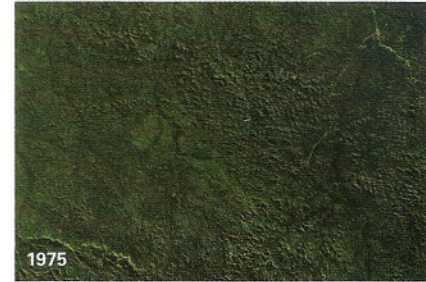
Another step that consumers can take is to buy products made from wood that is harvested in a sustainable manner. Not all wood is harvested in the same way. Some wood is logged in ways that can destroy a forest, whereas other wood is harvested with care and respect for the forest.

Until recently, there was no way for people to know whether they were buying “good wood.” Then, in the 1990s, logging companies and environmental groups created certification programs to help wood buyers. Under these programs, products from well-managed forests are certified, or labeled. The label tells a buyer that the product comes from “good wood.” Consumers today can buy many certified “good wood” products from forests in Brazil, including lumber, charcoal, pencils, furniture, and musical instruments.

## 12.10 Beginning to Think Globally

In this chapter, you read about land use conflict in the Amazon rainforest. You learned that the rainforest is an important part of the carbon-oxygen cycle. The rainforest is also rich in biodiversity. However, since the 1960s, loggers, settlers, and ranchers have cleared large parts of the rainforest. Native Amazonians, rubber tappers, and environmental groups continue to oppose this deforestation. Still, the rainforest is shrinking year by year.

Not all countries are losing forests as rapidly as Brazil. Some are even gaining forests, a process that is known as **reforestation**. In some places, the process of reforestation is happening naturally. For example, forests in the eastern United States have taken over abandoned farm fields. In other parts of the world, people are planting trees to create new forests. In the next section, you will examine rates of deforestation and reforestation around the world.



### Shrinking Rainforests

These satellite images show the same part of the Amazon rainforest in 1975 and 2001. The light green patches are areas of deforestation. Rainforests are shrinking worldwide. A few thousand years ago, they covered 12 percent of Earth's surface. Today only 5 percent of Earth is covered with rainforests.

## 12.11 Global Connections

The map shows deforestation and reforestation in countries around the world. Notice that some countries have experienced little forest loss during the 10-year period. This may be because these countries are doing a good job of protecting their forests. Or it may be because they have no remaining forest to lose.

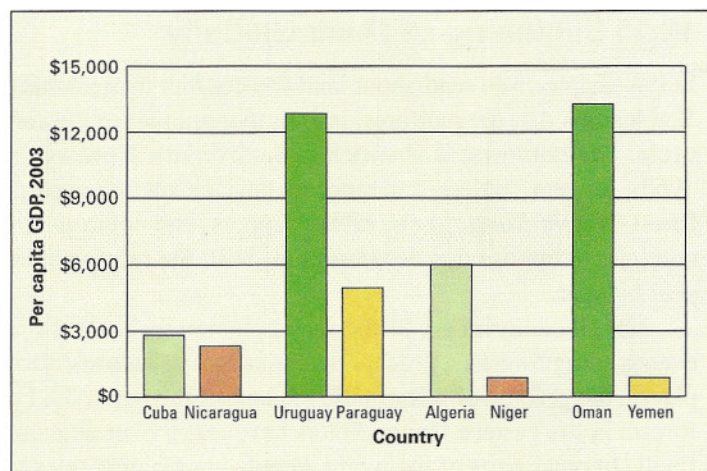
**What factors contribute to the loss of forest worldwide?** There are many reasons why people cut down forests. One reason is population growth. As the number of people in the world increases, so does people's demand for farmland and wood products. Another reason is poverty. Poor people in many countries depend on wood for cooking fuel, heating, and building materials. To meet these basic needs, they cut down trees.

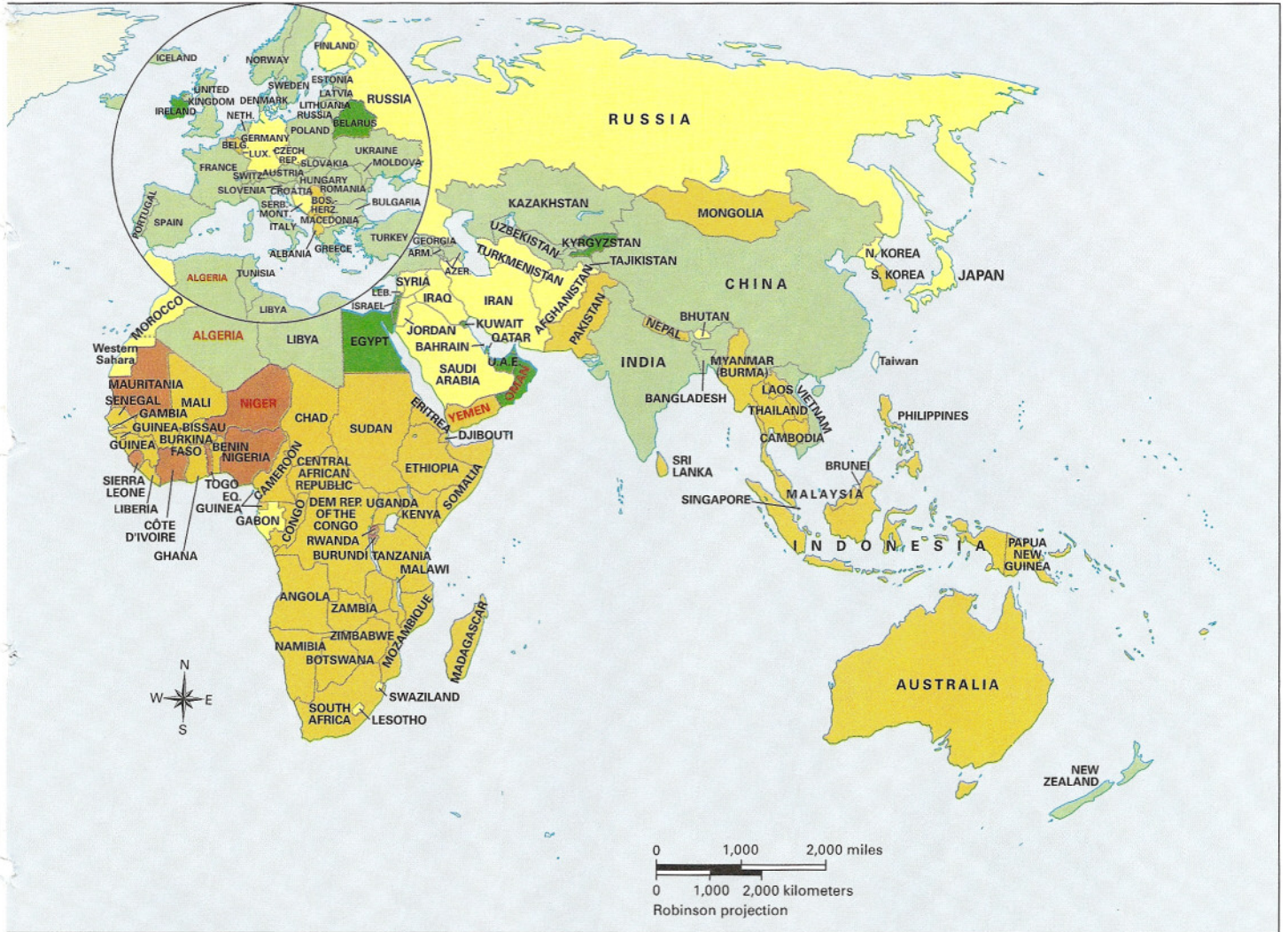
**Can deforestation be slowed or reversed?** Some countries have been able to slow deforestation. Other countries, such as Ireland, have begun reforestation. For thousands of years, the Irish stripped their land of trees to create farmland. By 1900, less than 1 percent of Ireland remained forested. Since the 1950s, the government of Ireland has supported tree planting. The government has also educated people about the importance of forests. Today about 8 percent of Ireland is forested.

**What is the best way to use and preserve the world's forests?** Each country has to find its own answer to this question. In recent years, deforestation has slowed worldwide. This slowing trend suggests that some countries are doing more to preserve their forests. Still, both rich and poor countries are continuing to lose forests, and some of these forests may be gone forever.



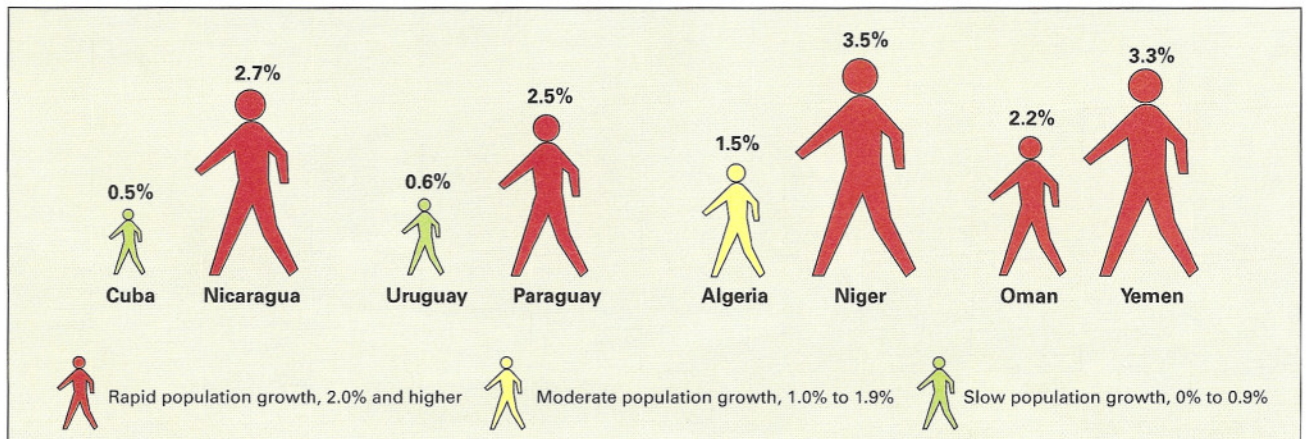
**Per Capita GDP of Neighboring Countries with Different Rates of Forest Loss or Gain**





Source: Penguin State of the World Atlas, 7th ed., by Dan Smith, New York: Penguin Group, 2003.

### Population Growth of Neighboring Countries with Different Rates of Forest Loss or Gain



These two graphs show neighboring countries that have different rates of forest loss or gain. The color of each country on the bar graph matches its color on the map. What connections do you see between deforestation, poverty, and population growth?