

AMAZON connections

The People, the Forest and the River

Activity Guide for Grades 3-5

BY SHEDD AQUARIUM

Shedd Aquarium Activity Guide Series



Dear Fellow Educators,

This year, don't just teach a unit about rain forests—take your class for a swim in the Amazon! Inspire your students to look beyond the rain forest to see the connections among the river, the forest and the people.

To help guide learners through the unit, we created fictional 10-year-old Maxine Torres. Students will meet Maxine through her journal entries, which describe her journey with her family to the Amazon River basin in Peru. Maxine's first-hand accounts will help learners to imagine what it might be like to visit the Amazon. Also, the journal entries connect nine activity-filled lessons that help students explore many science concepts and skills. Students will discover that these concepts apply to the Amazon as well as to their own backyards. These concepts include

- seasonal changes and cycles
- river sedimentation
- water cycle and phase changes
- transpiration
- adaptations
- symbiotic relationships
- erosion
- conservation of natural resources
- consequences of pollution

Science skills students will develop include making and recording observations, creating models, using scientific method in experimentation, and organizing and presenting information.

Additionally, this interdisciplinary unit gives students opportunities to read in the content areas, write conservation-themed myths, participate in simulations and games, observe demonstrations, work cooperatively and synthesize concepts into an understanding of the importance of conservation.

The final lesson encourages students to apply new learning as they design and perform a social action related to local or global conservation issues.

We enjoyed creating this unit and we hope you have fun using it.

Amazon Activity Guide Writing Team

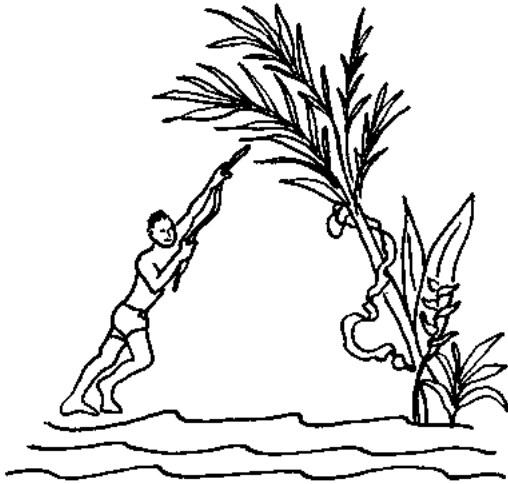


Table of Contents

Introduction	4
Lesson One: Start Packing!	6
<i>Meet Maxine and her journal</i>	
<i>Pack your bags for the Amazon</i>	
Lesson Two: Where Is the Amazon?	9
<i>Explore the location and seasons of the Amazon</i>	
<i>Design a travel brochure</i>	
Lesson Three: Market Day!	16
<i>Use your senses to make descriptive observations</i>	
<i>Create an Amazon market</i>	
Lesson Four: Rain, Rain Is Here to Stay—The Water Cycle	23
<i>Observe an evapotranspiration demonstration</i>	
<i>Create a cartoon strip of a water droplet’s journey</i>	
Lesson Five: Good for Me, Good for You	27
<i>Investigate symbiotic relationships</i>	
<i>Tambaqui seed dispersal simulation</i>	
Lesson Six: Celebrate Silt	32
<i>Explore sedimentation</i>	
<i>Construct a river jar</i>	
Lesson Seven: An Endless River of Fish?	36
<i>Examine impacts on fish populations</i>	
<i>Play the tambaqui survivor game</i>	
Lesson Eight: Myth-legends of the Amazon	43
<i>Hear the stories of Cobra Grande and Curupira</i>	
<i>Write a conservation myth</i>	
Lesson Nine: What Can I Do?	47
<i>Research a topic in depth</i>	
<i>Design and produce a social action project</i>	
Glossary	51
Learning Standards	54
Bibliography	56



Introduction



The river, the forest and the people who live in this region of the Amazon River are three sides of a triangle representing the interdependence that is examined in this activity guide. Knowledge of the geography, climate and geology will help explain some of the causes and effects within this system. This introduction will provide background information teachers can share with their students in ways that are appropriate for their needs.

Geography and Climate

The Amazon is powered by the solar engine of the tropics, a region near the equator that receives the sun's radiation most directly and consistently throughout the year. The Amazon rain forest is warm (typically 29°C, 85°F) and generally wet (near Iquitos, Peru, 103 inches of rain per year). About half the precipitation is carried by trade winds from the east where the sun vaporizes Atlantic seawater. The other half comes from transpiration (water given off by plants during photosynthesis) from the steamy forest itself. Rainfall varies seasonally. The ecological patterns of both plants and animals

respond to the seasonal changes. Trees flower during drier seasons when insects are present to pollinate. Many trees produce fruit during high-water season when water and fish can help disperse seeds. Nesting patterns, migration and diet all may be determined by seasonal changes.

Geology

Powerful forces of geology have caused the Amazon River to reverse its flow. More than 100 million years ago, when the Earth's landmass was consolidated in one large continent, the river flowed from east to west, emptying into what would become the Pacific Ocean. The Earth's surface pulled apart into plates carrying the separated continents in different directions. The South American plate broke away from Africa and moved westward. As plates collided, the tremendous forces caused the uplifting of the Andes Mountains. The flow of the Amazon River was blocked, and the resulting gigantic lake covered much of the interior of South America. Over a long period of time, the water broke through to the east. The Amazon now has its source high in the Andes in Peru and drains a land area almost the size of the contiguous United States as it flows eastward to its mouth at the Atlantic Ocean.

This geological history explains the differences in the types of rivers feeding into the Amazon. Where rivers drain young mountain systems such as the Andes, eroded, mineral-rich soil is carried great distances and eventually is deposited along the floodplains. Other rivers drain geologically ancient soils and carry almost no sediment .

Amazon River

The Amazon is a huge moving sea of fresh water. Although the Nile is longer, the Amazon is the widest river. Even 1,000 miles inland, the Amazon is often seven miles wide, swelling to 35 miles wide during high-water season. At its mouth, the Amazon is more than 200 miles wide. Marajo, a single island in its mouth, is as large as Denmark (roughly the size of Massachusetts, Connecticut and Rhode Island combined). For a good part of its length the Amazon averages 100 feet deep. Ocean-going vessels are able to navigate 2,300 miles upstream to Iquitos, Peru.

INTRODUCTION

The immensity of the Amazon is hard to imagine. Nearly one-fifth of all the river water in the world is flowing in the Amazon. This vast flood of water dwarfs any other river. The outflow of the Amazon is 16 times greater than the Nile's. The Amazon has over 1,100 tributaries, 17 of which are more than 1,000 miles long. Ten of these are larger than the Mississippi River. The Amazon pours more than four trillion gallons of water a day into the Atlantic Ocean. It could fill Lake Michigan in about two weeks.

Life abounds in this massive river. There are almost as many identified species of fish (around 5,000) in the Amazon River and its tributaries as there are in the entire Atlantic Ocean. An estimated 40 percent have yet to be discovered in this vast biological frontier.

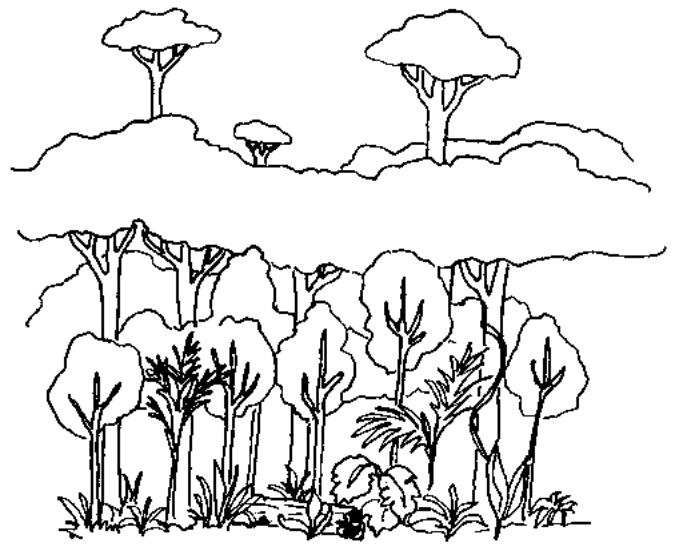
Rain Forest

The Amazon region is home to the world's largest rain forest, its most thriving—and its most threatened. Each acre of rain forest contains its own lush, complex system, marked by high plant and insect diversity, tall trees with buttress roots and relatively shallow, poor soils. Ecological descriptions section the rain forest into four vertical layers, each with its own role and niche in the system. On the forest floor, fallen leaves and vegetation decay quickly, and their nutrients are absorbed by the expanding tree roots. Small animals, insects and fungi also feed on the fallen debris. Little light reaches the forest floor.

In the understory, access to sunlight is limited. Shorter trees, such as some palms, compete for the resources there, and climbing plants wrap around tree trunks and cling between branches.

The canopy, the layer of the rain forest formed by the tops of the tall trees, provides the forest's most vibrant habitat. Up to 200 feet above the forest floor, bromeliads and epiphytes cling to light-bathed canopy branches and collect rainwater in their leaves. Frogs, snakes and insects use these micropools to survive. A huge diversity of animals, from spiders and lizards to birds and monkeys, make their homes in the canopy, where food, light and water are plentiful. Poking above the canopy, taller trees form the rain forest's emergent layer.

Millions of acres of rain forest thrive in the Amazon basin, including other types of specialized forests that



differ in significant ways from the upland rain forest most people associate with the Amazon. Flooded forests, making up about 3 percent of the Amazon rain forest, are particularly critical to the lives of animals (especially fish) and people. Flooded forests grow along the basin's rivers, streams and lakes. For as much as nine months a year, these forests are inundated with up to 30 feet of water. The trees are adapted to spending much of their lifespan under water. The diversity of trees in flooded forests supports many of the Amazon's fish populations with many food sources, from falling fruits and seeds to algae and insects. Fruits and various products are key to people's survival as well. Floodplain forest soils are richer than their upland counterparts, renewed each year with the layer of fertile silt the floodwaters leave behind.

People of the Region

Ribereños (ree-beh-REN-yohs) are among the diverse people who live in the Amazon. Most ribereño families have lived on the floodplain for many generations. They're descended from indigenous peoples and also claim European, African and Asian heritage.

The way ribereños farm, hunt and fish—their very way of life—has developed over generations in response to the rise and fall of Amazon floodwaters. As the seasons change, ribereños adapt, making the most of the resources the floodplain offers. What ribereños know about the floodplain could be key to conserving this complex environment.

Indigenous groups—native peoples whose cultures more closely reflect traditional Amazonian ways of life—generally live in remote, upland rain forests farther from the main river.

LESSON ONE: Start Packing!

April 14

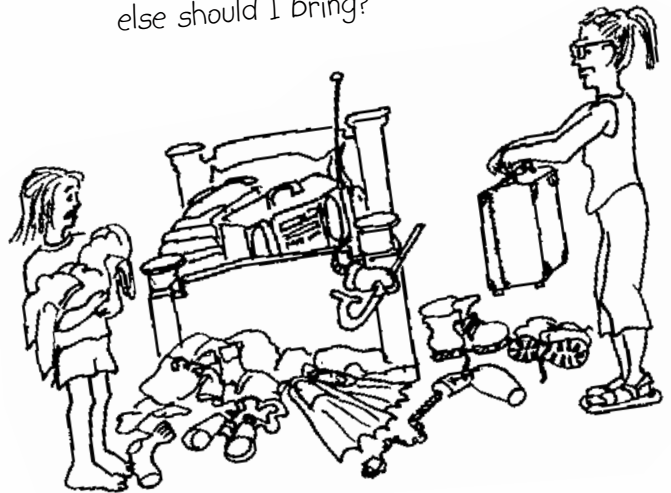
I can't believe it! Me, Maxine Torres! I am going to the Amazon! My parents are researchers and travel a lot. They decided that since I am older, I can go with them instead of staying with my grandma. You should have heard what my friends said when I told them where I was going. They couldn't believe it either! My aunt gave me this journal today. She says it's important to record your thoughts so you can remember your life. I guess when you get old you forget stuff. I'll write down everything about this trip. Guess what else! Tomorrow we have a field trip to Shedd Aquarium.

April 15

What a mess! When we got home tonight, we discovered that our basement had flooded. Everything my parents had started gathering for our trip was down there. Now everything must be washed and disinfected. Floods sure cause a lot of problems. When I complained to my dad about having to clean up and what a pain the water was, he said I should really think about how we can't live without water and how useful it is every day. I guess it is useful—I use it for brushing my teeth and taking long baths. I like to swim in it, too. So it is important, but I am still glad that my journal was up here in my bedroom instead of in the basement.

Floods are weird. Just today at the aquarium we saw an exhibit about floods. It's called Amazon Rising. The exhibit shows the seasons along the river. The "Rising" part is about how the Amazon floods every year. It even had a part about the good things floods can bring—unlike at my house. I can't imagine anything good coming from a flood. I wonder what people do along the river. What is life like when you live or work along a river?

My mom is fussing about all the stuff that's lying around my room, but it's all the stuff I want to take on our trip. She just came in and gave me this tiny suitcase. My parents say that I can't bring my Gameboy, my CD player—not even my old Walkman!—because we can't pack a bunch of batteries. I thought this trip was going to be fun. Now I'm not so sure. They are letting me bring a camera so I can take my own pictures. What else should I bring?



LESSON ONE:

Start Packing!

Subjects:

Science

Objectives:

1. Examine daily water use
2. Construct a suitcase/mobile for preassessment purposes

National Science Education Standards:

K-4 Content Standards F

Illinois Standards:

Language arts 1, 3

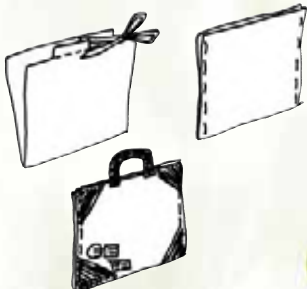
Materials:

For each student

- Maxine's journal entry no. 1
- File folder
- Construction paper (a few sheets of at least four pieces of different colors)
- Colored pencils
- Markers
- Scissors
- Pencil and paper
- Tape

Teacher Preparation:

Create a model "suitcase" and items that you would include for a trip to the Amazon. The items will be made from construction paper. Create the "suitcase" using a file folder. Cut off the tab and staple the sides together. Add a handle and decorate like a suitcase.



Time:

One 45- to 60-minute period

Vocabulary:

Flood

Background:

Rivers are an essential link in the water cycle. They are part of the circulation of water from the atmosphere to the land and back to the ocean where the process begins again. The flow of a river depends on the input and output of water. Rivers receive water from precipitation, overland runoff and groundwater seepages. Rivers lose water by seeping into permeable rock, gravel, or sand, by evaporation and by flowing into the ocean. In the case of the Amazon River, its flow and annual flooding depend in part on heavy seasonal rains and melting snow from the mountains. This regular flooding deposits fertile soil along the Amazon's banks.

After reading each journal entry, use the questions under "Finding the Connections" to emphasize the theme of the lesson.

Procedure:

1. Have students read the first journal entry and review the content with them. In this lesson, use the questions to help students see how the people who live near the Amazon are affected by the river.



FINDING THE CONNECTIONS

*Have you or someone you know ever experienced a flood?
How does water impact our lives?*

2. Discuss with students their connection with water. Say: Maxine's father mentioned that we can't live without water and that it is very useful. How do you use water every day? Listen to students' suggestions, and then guide the students to think about the many ways they use water every day. Use the table on page 8 in a discussion about students' water use.

Conclude the discussion by stating that the class, like Maxine, has realized that water is important. Explain that also like Maxine, they are going to prepare to go on a trip to the Amazon.

3. Assess the students' prior knowledge by completing an Amazon web. Write "Amazon" on the board and draw a circle around it. Ask students to tell you what they know about the Amazon. Write their ideas on the board.

4. Review the students' ideas. Ask them what kinds of things they need to pack for an imaginary trip to the Amazon, based on the web. For example, if a student says, "There are many mosquitoes in the Amazon," an item might be insect repellent.

LESSON ONE: Start Packing!

- As a concrete preassessment tool, students will construct and pack suitcases for a trip to the Amazon. (See the diagram in the teacher preparation section of this lesson.) Explain that their suitcases will contain items that they think they will need for this trip. Display your premade model suitcase for the students. Explain that students should make a list of at least six items to bring. Some of the items should be specific for this kind of trip as opposed to generic items like a toothbrush.
- Distribute the file folders, construction paper, colored pencils and markers for students to make the suitcase and the items they want to pack. Students will have an opportunity to revisit the suitcase and add or take away items based on knowledge of the Amazon that they develop through the unit.
- When students have completed their objects, they can write the name of the object on the back. Conclude the activity by letting students compare their suitcase items. Then ask students to write a paragraph explaining why they would bring the items they chose. This paragraph can be placed in the suitcase.

Extensions/Enrichment:

- Have students maintain their own daily water-use logs based on the table below. They can calculate the amount of water they use on a daily and weekly basis. Students could research reasons why conservation of water is important.
- In order for students to find out more about where the water they use goes, allow students to research their local water reclamation plant.

Average Water Use in the United States

Activity	Water Use
Shower	10 gallons per minute
Bath	40 gallons
Washing hands	3 gallons per minute
Brushing teeth (water running)	3 gallons per minute
Flushing toilet	5 gallons (older model) 1.6 gallons (low-flow model)
Washing dishes by hand	3 gallons per minute
Dishwasher	4-25 gallons
Washing machine	40-50 gallons per laundry load
Leaky faucet	15 gallons per day
Watering the lawn	10 gallons per minute
Average daily water use per person	100-150 gallons

LESSON TWO: Where Is the Amazon?

April 20

Found out more about our trip. It's true! My mom and dad are going to pull me out of the last couple weeks of school to visit the Amazon River basin! At first I was excited, because I thought that it meant a few weeks of no schoolwork... but then Mr. Johnson, my teacher, said that I have to complete several activities and share parts of my journal next fall.

Mr. Johnson said that my first assignment is to find out some information about where we're going. We will go to a city in Peru called Iquitos. The people there speak Spanish. But that's no problem because my family speaks Spanish, too. We will arrive in May, when the water in the river is high, and stay in a lodge that is next to the Amazon River — 50 miles from Iquitos. For this assignment I found Web sites with pictures, sounds and information about the Amazon. I am reading a real cool book about the kids there, called My Amazon River Day, by Kris Nesbitt.

Even though I haven't seen it yet, I think the Amazon River is awesome! I found out that it is the largest river in the world. It flows for 3,900 miles and has more than 1,100 tributaries. In some places, it is so wide that you can't see the other side, just

like Lake Michigan! It even holds 11 times more water than the Mississippi River. The river is located in South America, which is in the Southern Hemisphere. My best friend once visited a country south of the equator and told me that toilets flush in the opposite direction down there. I can't wait to try this out. I asked my dad about this. He laughed and said, "Just wait." I wonder what he means. He has a strange sense of humor.

Another cool thing I heard is that a long, long time ago, the Amazon flowed in the opposite direction and emptied into the Pacific Ocean. I think it had something to do with the Earth's crust shifting and the Andes Mountains forming. When this happened, the river was blocked and a huge lake formed. Finally the water began draining to the east — and it still does today.

Well, I have to plan what to pack. Since the Amazon is located close to the equator, I know that it is going to be hot. I wonder if the seasons will change. I guess I will look up that information another day.

LESSON TWO: Where Is the Amazon?

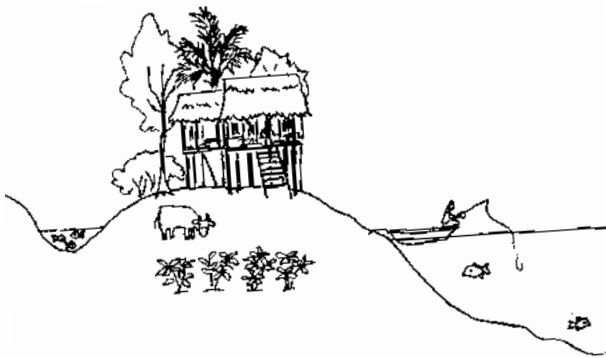
May 3

I have so much to do before we go. Schoolwork, housework, work, work, work! I am trying to finish packing, and I have to do a report for Mr. Johnson. I don't know what to pack. Is it cool there in May, or hot, or what? When I was at Shedd Aquarium I bought this book about their exhibit. It better help me do this report. I'll write my report first and think about my packing while I'm writing.



The Seasons of the Amazon
Report by Maxine Torres

It's true that seasons in the Southern Hemisphere are opposite from seasons in the Northern Hemisphere, but the area close to the equator has different seasons altogether. For example, Buenos Aires has its coldest season during the months we call summer and its warm weather during our winter season. In most of Peru, however, seasons are all generally hot and humid, with seasonal differences in rain and in the water level of the Amazon River.



Low-water Season

Low-water season takes place in July, August, September and October. There is a lot of sand, mud and clay left behind as the water level drops. The lakes start to dry up as the water runs back into the river. You can even find holes along the shore where catfish used to live. Now they are filled with spiders! In fact, during the low-

water season, you'll want to watch the forest floor for some of the world's biggest creepy-crawlies, like the goliath bird-eating spider, which grows to be about 7 inches long! The people who live along the river plant and harvest crops that grow fast, like watermelon, rice and manioc. People also hunt, gather fruits, collect plants for medicine, and fish. Fishing is easier because there is less water in the lakes, and the fish are forced to live closer together.



Rainy Season

The rainy season is in November, December, January and February. In Chicago, we usually have lots of snow during these months. In this part of the Amazon it rains for six or seven hours a day. The river grows from 3 miles wide to 40 miles wide in some places. The water rises as much as 30 feet because of rainfall and melting

snow from the Andes. That is almost as high as my house or five of my uncles standing on top of each other! All the rivers, lakes and streams become one humongous body of water. The trees can actually live through this. Some areas of the Amazon get 11 feet of rain a year, while Chicago only gets about 3 feet of rain and snow a year.

The rainy season in the Amazon is the season for moving. Some animals such as the yellow-footed tortoise move farther into the forest looking for high and dry ground. Spiders and insects move to the tops of trees. Fishes, turtles and other water animals move into the forest. The forest is flooded, so they swim along the lower branches where a few weeks ago birds and monkeys lived. I wonder where those animals go? Kids my age don't go to school during the rainy season. They are on vacation. The homes and schools are built on stilts to keep them from flooding. The farm animals have to be brought into the homes or put on nearby rafts to keep them from drowning.

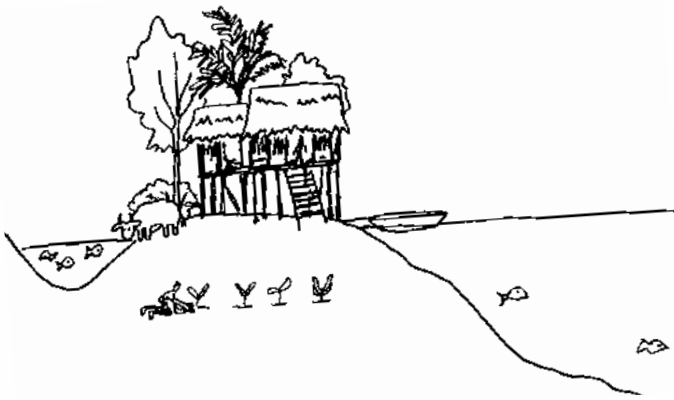


High-water Season

February, March, April and May are the months with the highest water levels in this area, which is why it is called the high-water season. You might notice that months can be listed under more than one season. These are months when the seasons are changing. Trees produce

LESSON TWO: Where Is the Amazon?

flowers and fruit. Floating meadows appear as plants grow quickly in order to stay above the rising water. It is feasting time for many animals. The fruits are within easy reach on the lower branches of the trees. During the high-water season, the young animals have plenty of fruits, insects, fish larvae and other foods to eat. Since many fish eat seeds, the trees depend on them to scatter their seeds as they swim.



part of the mud and silt the floods have left behind. People will often celebrate the fortune of the floods. It is time to plant again.

The seasons in the Amazon are very different from the seasons we have in the northern part of the United States. For us, temperature is an important characteristic of our seasons. In the Amazon, rain and river level determine the seasons. In both places, though, seasons have an impact on the plants, animals and people that live there.

I should stop writing and do the activity Mr. Johnson gave me comparing the seasons of Chicago with the seasons of the Amazon River basin. Well, at least now I know what else I need to pack!

LESSON TWO:

Where Is the Amazon?

Subjects:

Social science, science

Objectives:

1. Use map skills to investigate geographic features of North and South America and the Amazon River
2. Create charts that compare local seasons with the Amazon's seasons
3. Create a travel brochure

National Science

Education Standards:

K-4 Content Standards D

5-8 Content Standards D

Illinois Standards:

Language arts 1, 3

Science 12

Social science 17

Materials:

For each student

- Maxine's journal entry no. 2

For each group

- Globes and/or world maps (physical and political maps found in social studies texts are sufficient)
- Amazon season chart (premade)
- Markers

Time:

Two 45-minute periods or one 45-minute period with an outside-class assignment

Vocabulary:

Equator, river mouth, source, tributary

Teacher Preparation:

NOTE: If you have high-ability students, you may want to skip the Amazon season chart and proceed directly from the journal to step 9.

1. Prepare one Amazon season chart for a group of four students. Create the season charts based on the model below.
2. Bring in several travel brochures from various vacation spots for the students to use as models.

Comparing Seasons Here and in the Amazon		
	Seasons Where We Live Summer to Early Fall	Seasons at the Amazon Camp Low-water Season
Physical Conditions		
Animals		
People		

NOTE: Create additional charts for the other seasons. Use the following pairs of corresponding season descriptions as headings for the charts' columns:

- Fall to Winter Rainy Season
- Spring High-water Season
- Summer Receding Water

Background:

The Amazon River system is the world's largest, covering a landmass almost as big as the continental United States. This immense river basin spans much of the northern section of South America, near the equator. The Amazon River flows from its source in the Andes Mountains across the continent to its mouth at the Atlantic Ocean.

The Amazon River is the center of a vast river basin that includes more than 1,100 tributaries. Ten of these tributaries are larger than the Mississippi River. Lakes, upland rain forest, flooded forests and floating

LESSON TWO: Where Is the Amazon?

meadows are some of the habitats included in the basin. This complex river system and its habitats support the world's most remarkable and diverse plants and animals.

Because the Amazon is so close to the equator, its seasons are different from what the Northern and Southern Hemispheres experience. The temperature varies little throughout the year, and the basin receives a lot of rainfall.

Procedure:

1. After students have read Maxine's journal entry no. 2, review the content with them. Then ask the following questions to help the students see how the people who live near the Amazon are affected by the seasons of the river.



FINDING THE CONNECTIONS

How do the seasons where you live affect your life?

How do the different seasons affect the activities of the people and animals living along the Amazon?

2. Using a physical or political map, review some basic facts about Amazon geography. Ask students to locate the following: South America, the Amazon River, the Andes Mountains and Iquitos, Peru.

3. Ask students to make some comparisons about South America and North America. For example, a student may note that the Amazon is longer than the Mississippi.

4. Ask a volunteer to locate the Andes Mountains. Explain that the source of the Amazon is in the Andes Mountains about 100 miles from the Pacific Ocean. Then have a volunteer locate its mouth.

5. Ask students to think about the Amazon's seasons as described by Maxine. Are the seasons Maxine told you about alike or different from our seasons? When students have acknowledged that they are indeed different, point to the equator. Explain to students that the Amazon's proximity to the equator means it receives more sun. It also receives more rainfall during the year than Chicago does.

6. Tell students that they are going to work in groups to complete a chart that compares the Amazon seasons with the seasons they know.

7. Divide the students into four groups and distribute the premade charts and markers. Allow students to read through their journal entries as they complete their charts.

8. When groups have completed their charts, ask each group to discuss and write a response to the prompt: If I went to the Amazon during this season, what would I need? Why? Have one member of each group read his or her group's response to the class. Students may note that they have packed similar things. Connect this fact back to how the proximity to the equator dictates the Amazon's seasons.

9. Students then choose one of the Amazon's seasons and create a travel brochure for the particular season they have investigated in their charts. Explain that the brochure must include: the name of the season, what a visitor would see during that season and what a visitor could do during that season. The brochure should include text and pictures. The brochure can provide a technology opportunity if the students have access to desktop publishing software.

Extension/Enrichment:

Write a persuasive paragraph or essay convincing someone to visit the Amazon during a given season.



North
America

Caribbean Sea

South
America

0 500 1,000 2,000 3,000 Kilometers
0 500 1,000 1,500 2,000 Miles

May 15

I was excited about our trip, but I had no idea that traveling was so tiring. Long plane rides are not always fun.

After stopping in Miami and Lima, we finally arrived in Iquitos. It was hot and so sunny that I could barely see. Ricardo met us at the airport. He will be working with my parents as a guide and helping them with their project.

Iquitos was crowded with animals, people, buses and things called mototaxis. They are three-wheeled motorcycles with roofs and benches across the back for passengers. I couldn't wait to ride on one. Ricardo told us we had time to visit the market and gave my parents directions to meet him later while he took our bags to the boat.

We took a mototaxi to the market. Along the way, I saw shops, palm trees, lots of people walking and tons of buses and mototaxis.

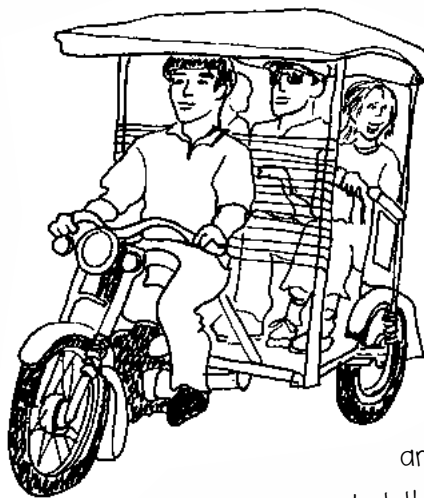
I loved the bright colors of the buildings in Iquitos. The buildings are not as tall as the ones I'm used to seeing in Chicago. Some of the buildings are old. They have chipped paint and

broken tiles, but you could see that they must have been very beautiful once. My dad said that some of the older buildings were built when people became rich from selling rubber. The rubber comes from rubber trees in the rain forest. Later, people stopped making as much money from trees here, and business suffered. Anyway, that was a long time ago.

The market certainly was different from home. It was like a flea market outside with wooden stalls. Some of the stalls were out in the sun, but others had plastic tarps or corrugated metal roofs over them. The shade felt so good. It was very crowded in the market. As we walked by stalls, people called out to us to stop and

buy their products. I saw things like we have at home—shampoo, clothes, shoes and toothpaste. Then I saw things that were different from home. I walked up to look at a fish that was for sale. It was not wrapped in plastic or on a tray. It was just lying there on a cloth,

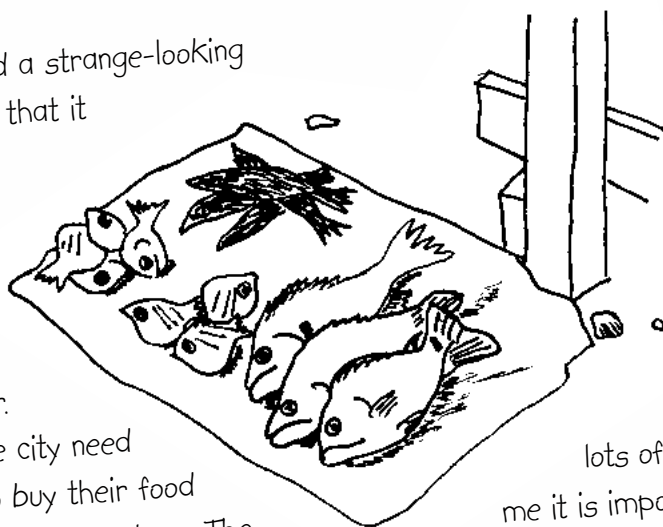
and it was looking at me. It was dead, but the eyes were still there. The fish was whole—head, tail, teeth and all. I saw people selling chickens, too. Here they sell chicken heads and feet along with the parts we usually buy. Then I saw people



buying bags of rice and a strange-looking potato. Mom told me that it is manioc.

My dad explained that the market is open every day of the year. People who live in the city need to shop every day to buy their food since they don't have refrigerators. The people who live farther out on the river raise their own food, hunt and catch fish. They don't come to Iquitos as often, so they have to get enough of what they need to last for a while. They might buy kerosene, machetes, clothes and supplies that don't need refrigeration.

I looked into another stall and saw tiny orange fruits floating in water. They looked like kiwi, but they were orange. I wanted to try one because I love kiwi. My mom said I had to wait until we got to the camp where we'll be staying. She said that every place in the world has bacteria, but the bacteria in each place may be different. Our bodies are not used to the bacteria here yet, so it might make me feel sick. When people travel to other places and get sick, it is because the bacteria are different. My dad was looking at a stall that was full of bottles and pieces of plants. All the bottles had labels on them. It was a medicine stall.



Many of the medicines were made from plants from the forest. My mom and dad started looking over all these bottles. They were interested and asked the owner lots of questions. They told me it is important for scientists to learn how people here use the chemicals from plants as medicine.

I heard Spanish voices all around me. The sounds of Latin music were coming from a radio. As I looked around the market, it struck me. I was really in the Amazon. It sure did not look or smell like home. The smells of different foods, fruits and animals mixed in the air along with gas fumes from the traffic and the riverboats nearby. It smelled like all the sections of the grocery store mixed together. It is so hot here it must be hard to keep things from spoiling.

We met Ricardo at the boat. The boat took us to the camp where we would live. The river was so wide and the boat went so fast that I could hardly see anything up close on land. The things I did see looked very small. Once we were out of Iquitos, I recognized some schools. Schools are easy to spot here because

LESSON THREE: Market Day!

they are made of concrete blocks. Everything else I saw was made of wood with palm-thatched roofs. Next to the schools are soccer fields. I wanted to join the kids playing soccer.

From the motorboat I saw a few large, narrow blue boats. Ricardo said they were river taxis.

I found out taxis carry everything for people.

I saw chickens, water buffalo, fruits and vegetables in one taxi. Ricardo explained that the people carry the crops and animals to Iquitos to sell. The river is how you get to places because there is no road out here. It took us about one and a half hours to reach the lodge in our boat. That same trip can take about 10 hours in a river taxi. Can you imagine 10 hours in a boat with chickens and water buffaloes? What a trip!

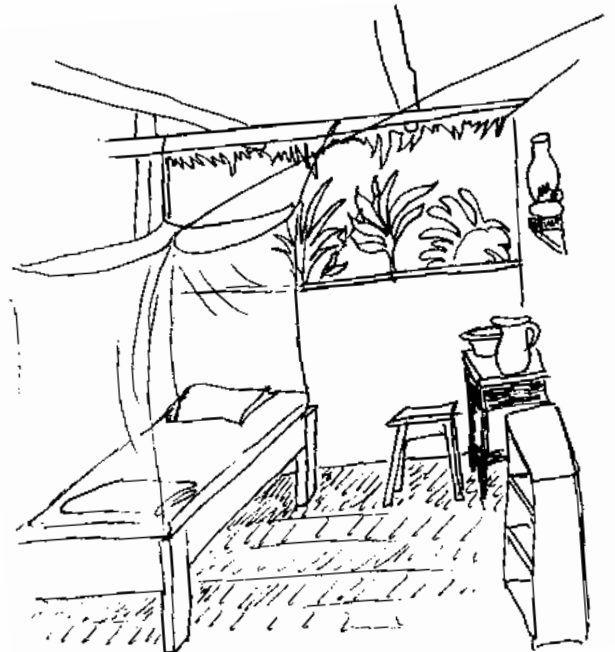
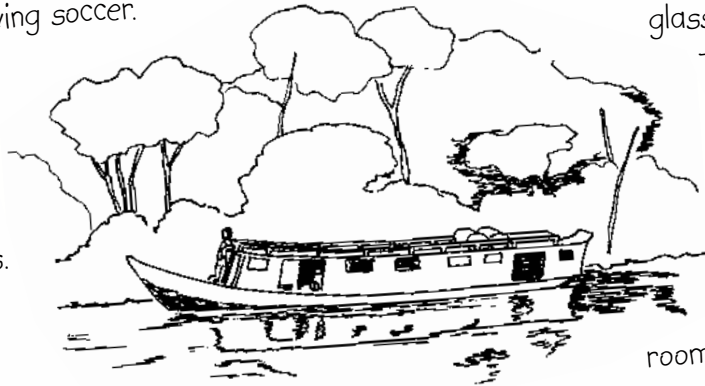
When we got to the lodge, the first things I noticed were the houses. The water was so high that the houses looked like they were floating. Ricardo said that soon the water would go down because we arrived at the end of the high-water season. That's what I read in my book.

I hope they were right. I don't want water in my bedroom. I checked out my room in the lodge. The back wall only comes up halfway. Above that is a window, but it doesn't have any glass. It's just open.

That's why we have mosquito netting over our beds.

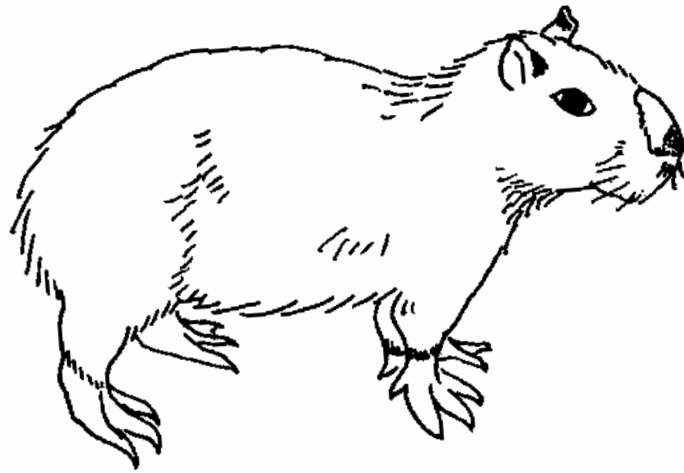
I dumped my stuff on the floor in my room and went off to

check out the rest of the camp. I found our latrine and showers. My mom says the water for the showers comes directly from the river. It's held in a big tank. She told me the water is going to feel very refreshing. She means that the water isn't heated like at home.



I went down to the dock and looked in the water. I'd read that pink dolphins live here. I wondered if I would be able to see one in this muddy river. Then I noticed something in the water. It was swimming toward the dock and me. I had no idea what it was. It looked like a huge wet guinea pig. I started backing up toward the lodge as the creature climbed onto the bank. It was about the size of a big dog. I wanted to run because it was headed toward me, but I also wanted to see what it was going to do. I must have still been backing up because I suddenly bumped into someone behind me. I looked around and saw Ricardo.

He had a smile on his face. "How do you like Charlie?" he asked. I said, "Charlie?" By then the creature was closer to us. I was ready to run, but Ricardo called, "Hey, Charlie!" and the creature came to him. Charlie made a soft purring sound. Charlie is a capybara, the world's largest rodent. I had never heard of rodents that can swim. Most capybaras are not tame, but Charlie has been around the lodge for a long time and is used to people. Ricardo showed me how to pet him. His fur was wiry. I went in to tell my parents about Charlie. I've seen things today that I've never seen before in my life!



LESSON THREE:

Market Day!

Subjects:

Science
Social science/geography
Language arts

Objectives:

1. Read for information
2. Make and record observations

National Science

Education Standards:

K-4 Content Standards C, F

Illinois Standards:

Language arts 1
Social science 17

Materials:

For each student

- Maxine's journal entry no. 3
- Two copies of sensory observations chart (page 22)

For the class

As many of the following market items the teacher wishes to include in the activity:

avocados, Brazil nuts, bananas, cashews, chili peppers, cocoa, figs, mangoes, manioc/yuca, palm fruits, papayas, passion fruits, plantains, pineapples, tapioca

Teacher Preparation:

Obtain and prepare market items. (Note that manioc/yuca, plantains and tapioca need to be cooked.)

Time:

Two 45-minute periods

Vocabulary:

Capýbara

Background:

The market in Iquitos is the perfect setting for Maxine to practice her observational skills. It is like a flea market or large outdoor department store with a surprising variety of items. People are able to buy everything from food, medicine, clothing and furniture to delicacies such as palm grubs. The market is divided into sections where vendors sell their products from cloths spread on the ground, tables, or wooden carts and stalls.

For many visitors, the medicinal plant stands and the fruit and fish sections of the market are of particular interest. Herbal remedies may be found in their natural state or as solutions in bottles. These rain forest "pharmacies" sell herbs and the flowers, roots, bark, leaves and stems of healing plants. Tropical fruits and foodstuffs make up a major portion of the market. The abundance and variety of local fruit is staggering. This section, with its beautiful colors and exotic aromas, is a feast for the senses. The fish section holds fascinating and unfamiliar fish species for sale, but in the equatorial heat, it can test the senses in other ways!

Procedure (Day One):

1. Have students read Maxine's journal entry, then review the content with students. Ask the following question to help the students see the connections among the people, the forest and the river.



FINDING THE CONNECTIONS

What examples can you find of how people in the Amazon depend on the river and the rain forest?

2. Review the five senses with the students. Explain that students will reread the journal, but this time they will look for specific details that have to do with the five senses. Students will then record the details on the sensory observation chart (page 22).

3. Distribute the chart.

4. When students have completed the charts, ask them to share some of the details they recorded. One sense was deliberately left out of the journal—taste. Ask students what sense is missing and why. Explain that the second day of the lesson will let them sample some of the tastes of the Amazon.

LESSON THREE: Market Day!

Procedure (Day Two):

1. Using the market items you have prepared, set up a classroom market as Maxine described in her journal.

Students may assume the roles of shopkeepers or customers and use imaginary money to purchase goods from the market or barter with imaginary items. If time permits, students may create stalls as Maxine described in her journal.

2. Encourage students to explore the market using their senses. Allow students to sample the foods. Explain that they should not only think about how to describe how something tastes, but also how it feels and looks and how the market sounds.

3. After students have visited the market, distribute the second copy of the sensory observation chart. Students can then record their own market observations.

4. Discuss the observations that the students recorded. Ask students to compare the market Maxine visited and their classroom market with local markets they are familiar with.

If time permits, students may create stalls. If market items are not available, have students create those items using art supplies. This may include the fruit listed above or other items that Maxine saw such as fish, toothpaste and shampoo. You may choose to play Latin music in the classroom during this activity.



Sensory Observations of the Amazon

Sight

Sound

Taste

Touch

Smell

LESSON FOUR: Rain, Rain Is Here to Stay—The Water Cycle

May 17

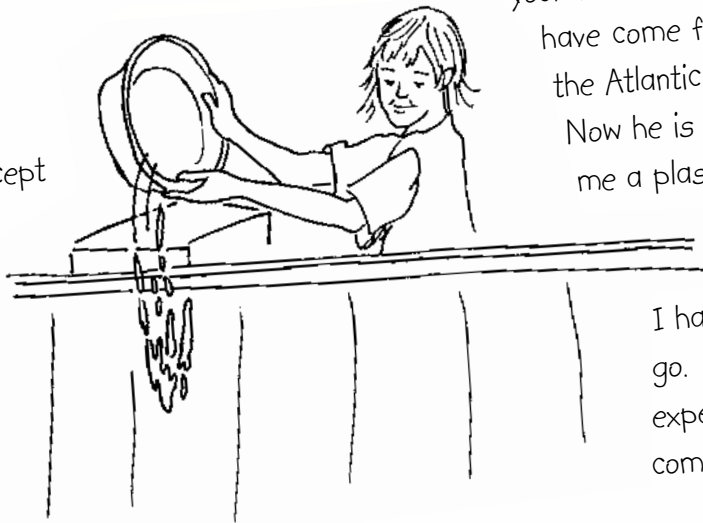
Last night we listened to the radio before we went to sleep. No one seems to have a TV around here. I don't miss it much, though. Everything is pretty interesting here. When we went to bed we had to wash using a basin (which is like a bowl of water), washcloth and soap. The fun part is tossing the water out the window when you're through.

There is no running water except for the gravity-fed showers. This means that they also have latrines. They are different from toilets because they don't flush. It reminds me of the part of camping I don't like.

It's so humid! My hair is sticking to my forehead because I am sweating so much. It feels like I am walking through the greenhouse at the botanical gardens. I think it is going to rain again soon.

It rained yesterday while we were hiking through the forest. My clothes were soaked before I could put on my poncho. Before we went to sleep, we hung our clothes out to dry. When I woke up, they were still wet. Why is it so humid and wet here? My dad overheard me and said, "Quit complaining, kid. That sweat on

your forehead could have come from the Atlantic Ocean." Now he is handing me a plastic bag.



I had better go. I feel an experiment coming on!

LESSON FOUR:

Rain, Rain Is Here to Stay—The Water Cycle

Subjects:

Science

Objectives:

1. Observe evapotranspiration from plant leaves
2. Describe the water cycle in the Amazon

National Science

Education Standards:

K-4 Content Standards A,B, D
5-8 Content Standards A, D

Illinois Standards:

Language arts 1, 3

Materials:

For each student

- Maxine's journal entry no. 4

For the class

- One leafy tropical houseplant such as dieffenbachia or philodendron
- At least two clear plastic bags such as grocery store produce bags
- Cellophane tape or at least two twist ties

Teacher Preparation:

Obtain materials.

Time:

Two 45- to 60-minute periods, then ongoing periodic observations

Vocabulary:

Condensation, evaporation, humid, precipitation, evapotranspiration

Background:

The water cycle is a closed system in which water is recycled. This means that the amount of water on Earth is constant and is not lost or created. Water goes through phase changes as it passes through the various stages of the water cycle.

The sun fuels the water cycle. The heat of the sun warms water at the surface of ponds, lakes, oceans, streams and rivers. As the sun heats the water, some water molecules begin to move so fast that they change from the liquid phase to the gaseous phase and evaporate into the air as water vapor. (While sunlight is the main cause of evaporation, wind blowing across water can create enough energy to cause liquid water to change to water vapor. In the Amazon basin, the energy from the sun is the principal fuel of the water cycle.)

Water vapor rises until it reaches the colder upper atmosphere, where it condenses back into a liquid and forms clouds. A similar situation can occur when you take a hot shower: Warm, vapor-filled air hits a cold surface such as a window or mirror and condenses into water droplets.

Eventually, as more water vapor condenses, the clouds become heavy and saturated with water. When the air's capacity to hold water is exceeded, water falls back to the land as precipitation. The temperature of the air through which the precipitation passes determines whether it falls as rain, snow, or sleet. The cycle begins again when the water now collected on the Earth's surface is warmed by the sun and evaporates.

In the Amazon, the humidity of the air is caused both by the abundance of rainfall and the additional moisture from a process called evapotranspiration, or sometimes simply transpiration. Transpiration occurs as plants give off moisture from the underside of their leaves through tiny pores called stomata. Rainfall plus transpiration from this vast area of vegetation keeps humidity levels in the Amazon basin in the 90 percent-and-above range.

Procedure (Day One):

1. Have students read Maxine's journal entry, then review the content with students. Ask the following question to help the students see the connections among the people, the forest and the river.



FINDING THE CONNECTIONS

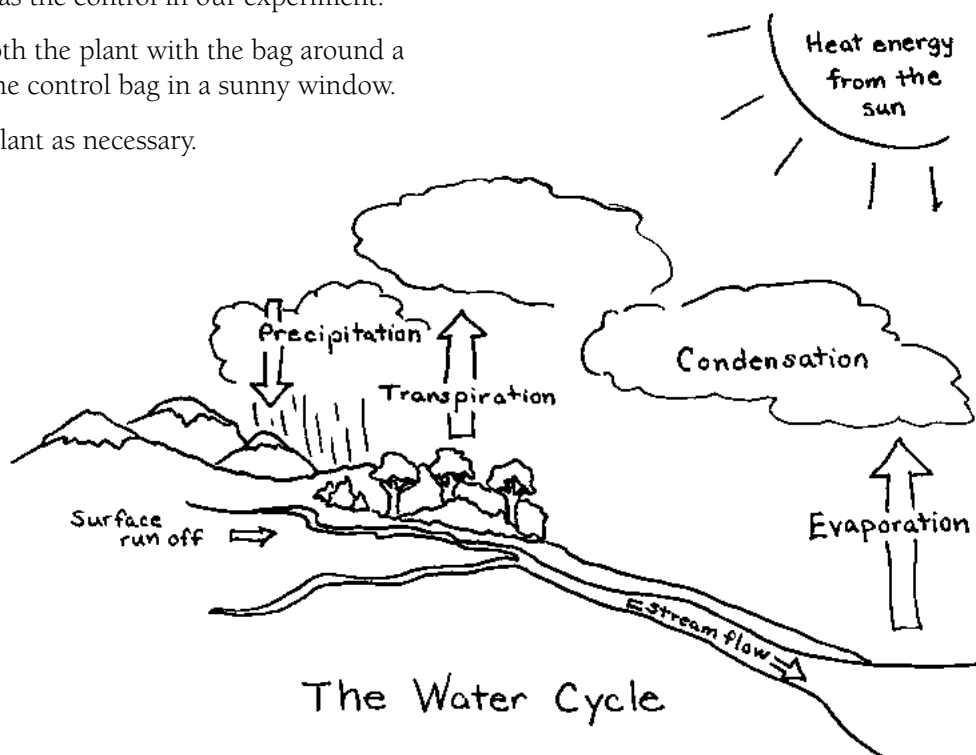
How does the excessive moisture affect the people who live in the Amazon?

LESSON FOUR: Rain, Rain Is Here to Stay—The Water Cycle

2. To review the water cycle with students, draw a water cycle on the board or on chart paper.
3. Ask students to discuss how water is cycled. If students are familiar with the states of matter, they can use the terms liquid and vapor to describe the water cycle.
4. Ask students to summarize what details Maxine included in her journal about the humidity in the Amazon—her hair was sticky, the air feels like a greenhouse. Explain that students are going to observe why the Amazon is so humid using a houseplant and two plastic bags.
5. Directions for the demonstration:

- a) Using a clean plastic bag such as a produce bag from the grocery store, select a plant stem with several leaves, cover it with the bag and secure the bag with tape or a twist tie around the stem. If it is difficult to get the bag around the leaves and stem, inflate the bag by blowing air into it. The bag should be closed tightly around the stem so air and water gases do not escape.
- b) Inflate another produce bag equal in size to the first and tie or tape it shut so air does not escape. This bag does not contain any leaves and serves as the control in our experiment.
- c) Place both the plant with the bag around a stem and the control bag in a sunny window.
- d) Water plant as necessary.

6. After demonstration is set up, have students observe the plant and the bags and record their observations with notes and/or drawings. These notes and drawings should be labeled Day 1.



LESSON FOUR: Rain, Rain Is Here to Stay—The Water Cycle

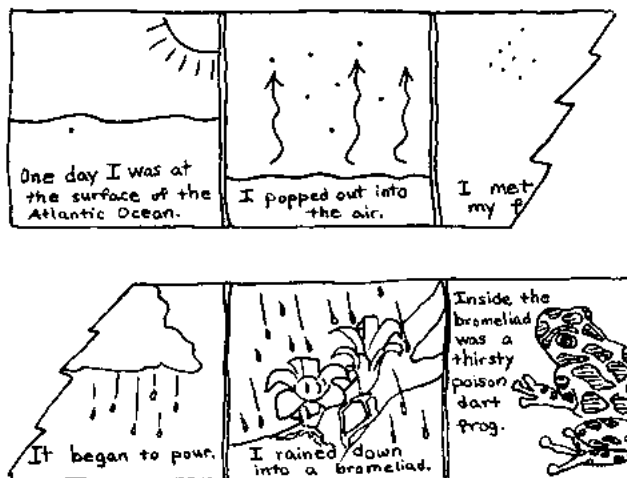
Procedure (Day Two):

1. Have students make observations in writing and/or with drawings of the bag over the plant and the control bag for several days. Note: If you do not see water droplets, move the plant bag and the control bag into a cool place for a short time.

2. Have students share their observations. Students will probably notice that water droplets have begun to build up on the inner surface of the bag near the leaves. Ask students why this is happening. Students should note that the droplets are forming because the plant is giving off moisture. Explain that this process is called evapotranspiration. First the plant transpires moisture, then the moisture evaporates. Connect this fact back to the Amazon. Explain that humidity in the Amazon is always high for several reasons: the Amazon is near the equator, where the sun is constant (the sun fuels the water cycle); there is a lot of vegetation that emits moisture into the air; and there is a lot of rainfall. Remind students that these three factors are connected.

3. To check for understanding, explain that students are going to draw a cartoon strip that tells the story of a raindrop in the Amazon. Write the following terms on the board or chart paper and explain that their cartoon must include the following:

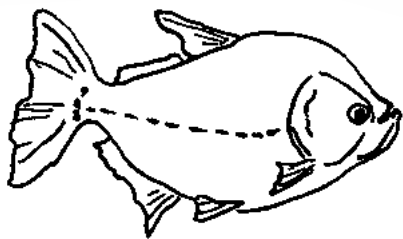
- evapotranspiration
- evaporation
- condensation
- precipitation
- water
- river
- vegetation



Ask students to begin the droplet's journey in the Atlantic Ocean. From that point, students' choices may vary. Encourage students to include many steps in this droplet's path through the Amazon. For example, a droplet starting in the Atlantic Ocean may evaporate and be carried west over the rain forest by prevailing winds. It becomes part of a cloud and rains on the forest. It may spend several days high in the canopy of the forest trapped in the center of a bromeliad. Here it shares space with poison dart frog tadpoles. Next, a storm could break this branch and send the water droplet tumbling to the forest floor where it is absorbed by a fig tree. The droplet is then given back to the atmosphere through evapotranspiration. The journey of the water droplet can continue as students see the many possible paths through the water cycle.

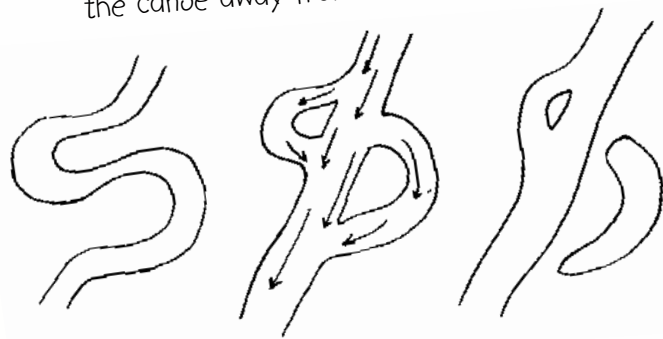
May 26

I am making new friends here. A few days ago, I met a boy about my age named Raul, who lives in the village near our camp. Raul and his dad, Mr. Arjona, asked me if I wanted to go fishing with them. At first, I was a little scared, because I had heard of the meat-eating fish called piranha. I was afraid that the piranhas might decide to eat ME if I accidentally fell into the river. But Raul just laughed. He told me that he had never heard of anyone becoming food for piranhas. In fact, he said that some piranhas eat fruit and seeds that fall from the trees in the forest, while other piranhas act as vultures and feed on sick or weak animals. They help to keep the river clean. Raul said that they are tasty, but you have to watch out for the bones!



We got into Mr. Arjona's dugout canoe (made from a tree in the rain forest) and paddled to a floodplain lake. We had to cut through an area of flooded forest. Mr. Arjona stood up at the front of the canoe in order to help steer us away from the trees. We had to dodge hanging vines and branches. One accidentally snapped

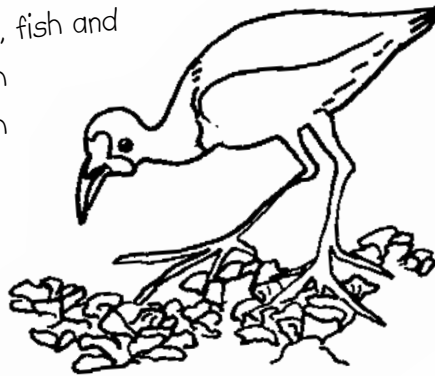
back into my face after Raul tried to bend it away from the canoe! To make matters worse, we had to move the canoe backwards when we came to a spot we could not pass through, and we brushed against a tree trunk covered with ants. Suddenly dozens of ants swarmed onto my back! Mr. Arjona quickly swatted them off as Raul paddled the canoe away from the tree!



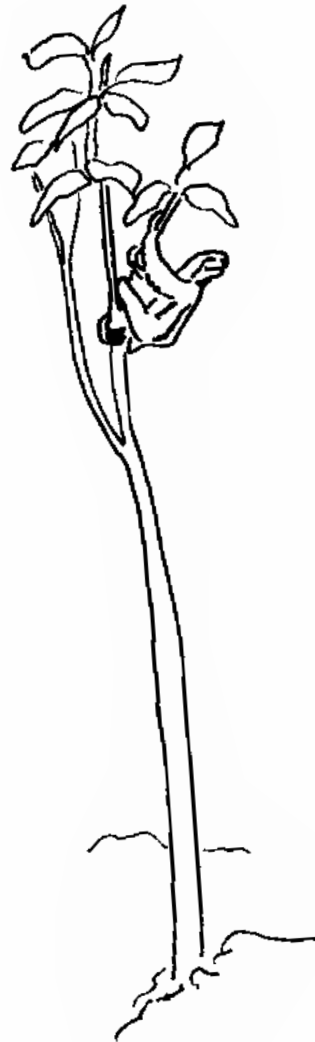
We found another opening and made our way onto the oxbow lake. It's an oxbow lake because the river once snaked through here, but as it changed course, this section was cut off, leaving a lake. Some parts of the lake were covered in floating meadows. I never thought of a meadow floating on a lake! I had seen small patches of meadow along the rivers by our camp, but here the plants were so thick in the lake that I didn't think our canoe could get through. Tiny plants called water lettuce made a tight mat along with giant water lilies, grasses, hyacinths and other plants. Raul pulled up a water lettuce plant so

LESSON FIVE: Good for Me, Good for You

I could see its tiny roots, which dangle in the water. Many species of fish use the floating meadows as a place to live or to lay eggs. I could see why this must be a good place to hide if you are a baby fish. Spiders love the floating meadows, too, because there are all kinds of insects to eat. I saw a bird called a jacana walk over the water lettuce with a group of four chicks. I saw so many animals including birds, tadpoles, fish and even a three-toed sloth clinging to a branch high in the trees!



As we paddled farther into the lake, we listened to the sounds of nearby howler monkeys and saw lily pads larger than the size of car tires! We finally found a good fishing spot, and Mr. Arjona gave me a bit of meat to put onto a hook. Our fishing pole consisted of a simple wooden pole, fishing line and a hook. As soon as I placed the hook and bait in the water, the piranhas started biting! We caught several fish for our meal.



Later...

I still have more to write about our fishing trip. As we started back, Mr. Arjona saw a friend of his fishing. His friend caught several tambaqui. Mr. Arjona was really excited when his friend gave him one. Tambaqui are liked for their mild taste, so many people catch them and sell them for money.

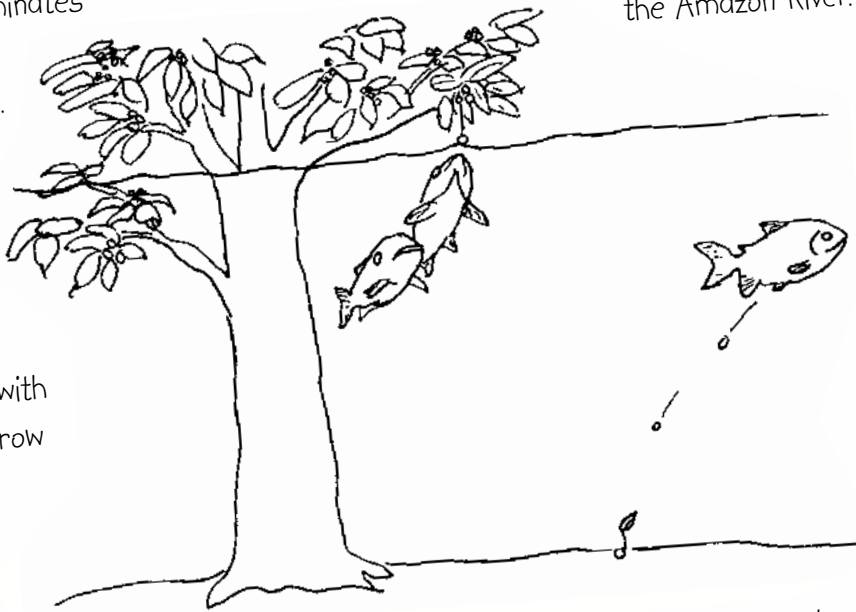
Mr. Arjona showed me the tambaqui's mouth. What funny teeth it had—just like a nutcracker. Mr. Arjona told me that these teeth help the tambaqui crush the hard seeds of the fruit it eats. Not all the seeds are crushed, though. Sometimes when a tambaqui eats a seed it passes through the tambaqui's digestive system whole. The seed comes out the other end! It germinates and makes a new tree far away from the parent tree.

Here are the facts I learned about the tambaqui. They are born in river channels and then move into the floodplain with the floodwaters. They grow bigger in the floating meadows, eating grass seeds. In low-water season, they stay in floodplain lakes, where they eat teeny-tiny microscopic plants. When they are 4 or 5 years old, they move into the river channels and spawn, or have babies when the flooding starts.

Later that day, we gave the fish to Raul's mom, who prepared it for our meal. When she cut the tambaqui open, we saw that its belly was full of seeds!

She cooked the fish along with bananas. The fish tasted sweet—like fruit! Now I know why people like to eat them.

Mr. Arjona says that fishing is important to the families along the river. Many will fish to feed their families, while others sell fish in order to earn some money. Dad says that there are problems with fishing in some areas of the Amazon River.



In several of the floodplain lakes, too, much fishing has caused the number of fish to decrease. The fish are also affected when logging, cattle ranching and farming destroy their homes and places to lay eggs. Before I went to sleep, my dad mentioned that the tambaqui and trees help each other. I wonder what he meant by that?

LESSON FIVE:

Good for Me, Good for You

Subjects:

Science

Objectives:

1. Simulate how the tambaqui and rubber trees are dependent upon one another
2. Predict outcomes in the population of the tambaqui or trees

National Science

Education Standards:

K-4 Content Standards C
5-8 Content Standards C, F

Illinois Standards:

Language arts 1
Science 12

Materials:

For each student

- Maxine's journal entry no. 5
- Brown paper lunch bag
- Colored construction paper (a few sheets of at least two different colors)
- Markers or crayons
- Tape or glue

For the class

- Walnuts in their shells (about 150)

Teacher Preparation:

Color 30 walnuts with a red marker. Prepare half of the bags (for the "fish" students). Cut a quarter-size hole in the bottom corner of each bag. Prepare a sample of a "fish" bag and a "tree" bag. See the figure to the right.

Time:

One 45- to 60-minute period

Vocabulary:

Floodplain lake, germinate, interdependence, receding waters, seed dispersal, symbiotic relationship, tambaqui

Background:

Several species of trees depend on the river and animals (such as the tambaqui) for seed dispersal. The symbiotic relationship between the animals and trees becomes evident. The forest feeds the tambaqui. In return, the tambaqui will pass undigested seeds through their bodies, helping to disperse seeds for new trees. As the water recedes, the seeds germinate in the nutrient-rich sediment left behind by the floodwaters. These seeds (along with other uneaten seeds carried by the floods) have traveled a long distance and have a better chance of survival away from the parent tree. In addition to removing competition for nutrients, distance between same-species trees blocks the spread of disease.

Procedure:

1. Have students read Maxine's journal entry, then review the content with students. Ask the following questions to help the students see the connections among the people, the forest and the river.



FINDING THE CONNECTIONS

How does the tambaqui help the forest?

How does the forest help the tambaqui?

2. Discuss examples of familiar symbiotic relationships with your students. One example could be the relationship of bees, flowers and pollination. Tell students that sometimes they will see a plant, for example a berry bush, growing where there are no others around. Explain that this is an example of a symbiotic relationship similar to that between the tambaqui and rubber trees. A bird ate some berries and excreted the seeds far from the parent bush.

3. Explain that the students are going to act out the symbiotic relationship between the forest and the tambaqui.

4. To prepare for the simulation, divide the class into two equal groups: tambaqui fish and rubber trees.

NOTE: This simulation requires some open space. It is suggested that students move desks aside after decorating their paper bags (step 5) or move to a hall or other open area for this simulation.



Sample of "fish" bag and "tree" bag

LESSON FIVE: Good for Me, Good for You

5. Distribute the bags with the cutout holes to the fish group. Allow both groups to decorate and label their bags to represent trees or fish. The fish group should be instructed to draw a fish the size of the bag. The mouth of the fish should be by the opening of the bag, and the tail of the fish should be by the base of the bag. Show students the sample bags.

6. The steps for the simulation are as follows:

a) Give each “tree person” a bag of five walnuts (four plain and one red). Explain that the red walnut represents a rubber tree seed that will pass through the tambaqui without being digested and will later germinate.

b) Have the tree group and the fish group line up on opposite sides of the room. Explain that the space between the tambaqui group and the rubber tree group represents the flooded forest.

c) The first student in the line of trees will be the “parent tree.” This tree should move to the center of the simulated flooded forest. The tree sets its bag on the ground, reaches into the bag, takes out the “seeds” (walnuts) and holds the seeds in his or her outstretched hands. The teacher should explain to students that this represents a tree that is bearing fruits that contain seeds.

d) The first student from the fish line moves next to this tree and takes all of the seeds from the parent tree. This student simulates the fish eating the seeds. The seeds are placed inside the fish bag. (The student can cover the bottom hole if seeds start to fall out.) Once the student has received the seeds from the tree, he or she will swim away shaking the bag to distribute the seeds. (Seeds should fall out of the hole in the bag’s base.) These seeds fall to the flooded forest floor where a new rubber tree will grow.

e) The student representing the next tree in line should enter the simulation and stand where the red seed has fallen. The next fish in line enters the simulation and receives seeds from that tree in a similar way (steps c and d). Trees that have already participated in the simulation should remain standing, and fish that have already shaken out their seeds should sit down next to the tree. Students from the fish and tree lines continue to enter the simulation as the process is repeated.

7. Lead the students in a discussion of the simulation. Explain that in real life, trees continue to give fruit and fish continue to eat. When there are more trees and food, does the population of fish increase, remain the same, or decrease? Ask the students: What might happen to the tree population if the river and the fish were unable to disperse the seeds?

8. Transfer this knowledge to other habitats. Ask the students to provide an example of what might happen if you remove important animals or plants in an ecosystem near you.

9. To check for understanding, ask students to draw a diagram of the simulation and label the interdependence of the tambaqui and rain forest trees. Important concepts to look for would be: fish feeding on seeds, seed dispersal, tree growth and the development of seeds.

Extensions/Enrichment:

1. Make a classroom book depicting examples of symbiotic relationships in nature.

2. The tambaqui have mouths suitable for crushing seeds. Use pictures to illustrate differences in the shapes of fishes’ mouths. Ask students to compare the shapes of a fish’s mouth with the food it typically eats.

June 6

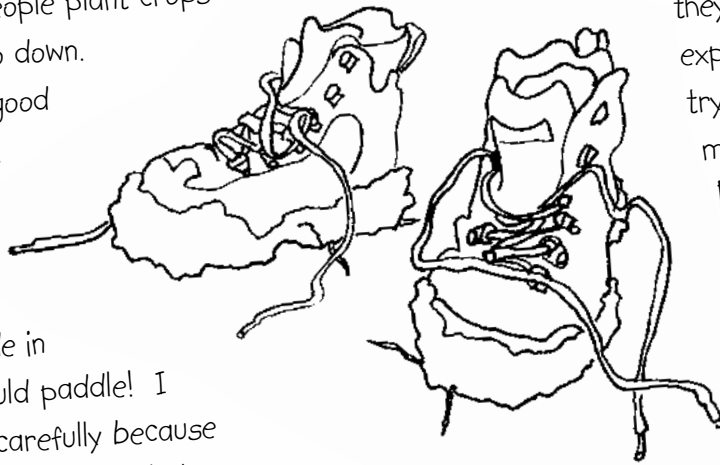
Today Raul and I took a walk along the river. He told me that I should wear my boots. We walked near the river for half an hour. It was really hard to walk through all that mud. I looked down and saw that my boots were caked in globs of mud. How gross! I wonder where all this mud comes from? Raul was laughing and said that it is usually very muddy by the river where the water recedes, or goes down. He explained that there is lots of sediment in the floodwaters. The sediment settles on the forest floor. When the floodwaters go down, the sediment is still there. Raul says that people plant crops after the floodwaters go down. The sediment contains good nutrients for the plants.

When we came to his house, Raul asked if I wanted a ride in his boat. He said I could paddle! I climbed into his boat carefully because these canoes are very tippy. Well, they are tippy for me, but the people who live in the villages along the river don't seem to have any trouble with their balance in these canoes. It was a relief to finally sit down. I was tired from walking in the mud. At first, it was fun to paddle, but soon my arms got tired and Raul paddled.

His arms must be used to all this paddling. I noticed again how muddy and dark the water looked, just like Raul said. I wonder where all this sediment comes from. Soon, I was back at camp and said goodbye to Raul.

I told my parents about my muddy walk. I asked them whether the mud is always in the water. My mom answered that the forest feeds the river and the river feeds the forest. What does she mean by that, and what does that have to do with the muddy water? My folks reminded me that I have assignments to do for Mr.

Johnson's class. Then they gave me an experiment to try to answer my questions. Parents!



LESSON SIX:

Celebrate Silt

Subjects:

Science

Objectives:

1. Create a model of river sedimentation
2. Make and record observations of the changes in the model
3. Explain the purpose of models in scientific investigation and exploration

National Science

Education Standards:

K-4 Content Standards A, D

5-8 Content Standards D

Illinois Standards:

Language arts 1

Science 11, 12

Materials:

For each student

- Maxine's journal entry no. 6
- Copy of the student page (page 35)

For each group

- One 24-ounce glass jar with lid
- 1/3 cup of aquarium gravel
- 1/3 cup of sand
- 1/3 cup of potting soil

Teacher Preparation:

Gather 24-ounce glass jars—one for each group

Time:

One 45- to 60-minute period with additional observations in the following few days

Vocabulary:

Erosion, recede, silt, sediment, suspension, substrate, turbid

Background:

The source of the Amazon River is high in the Andes Mountains. Compared to other highlands in South America, the Andes are relatively young and full of soil particles that can be eroded. Water that washes down the Andes carries soil particles that end up as silt and sediment in the Amazon River. At the mouth of the Amazon, 900 million tons of sediment are discharged into the Atlantic Ocean every year. This silt and sediment have a profound effect on the life in the river and on the surrounding floodplain.

Silt causes a river to become turbid, or muddy, restricting the amount of sunlight that can pass through the water, thereby reducing the river's capacity to support photosynthesizing plants. Despite the low light levels, the river's organisms are still able to feed well. Leaves and vegetation from the forest fall into the river and become food for microorganisms that break down the organic matter. This organic matter is food energy that is passed along the food web to larger species.

In the rain forest, the heavy rainfall leaches nutrients from the soil. Floodplain soils are rejuvenated yearly with the rise and fall of the floodwaters. During high-water season, the Amazon spills over its banks into the floodplain forest. In receding-water season, sediments are left behind on the floodplain. These sediments are nutrients for the plants and trees. Ribereños take advantage of this new layer of nutrients by planting crops in these areas during the low-water season.

The river provides nutrients to the forest through its yearly deposits of sediment. The forest, in return, provides food to the river food web through organic matter. This interdependence supports diversity and productivity.

Procedure:

1. Have students read Maxine’s journal entry, then review the content with students. Ask the following questions to help the students see the connections among the people, the forest and the river.



FINDING THE CONNECTIONS

*How do the people who live along the river benefit from the sediment?
How are the river and forest connected?*

2. Explain that students will be in charge of making “river jars” in which they can see how sediment settles in rivers. Review the student page with students.
3. Divide students into small groups and distribute the materials for the river jars. Groups should follow procedure on the student page.
4. When students have completed the simulation, discuss their observations. Ask them to compare their findings with other groups.
5. Connect student findings back to the Amazon. Ask students why they think the water has a muddy appearance. Students will probably note that the water in their river jars appeared muddier when the water was moving. Moving water can carry more sediment.
6. Ask students to clarify Maxine’s mother’s statement about the forest feeding the river and the river feeding the forest. Students should note that the floodwaters bring sediment and nutrients to the river, and when the water recedes, the people and plants benefit from the fresh layer of nutrients.

Extension/Enrichment:

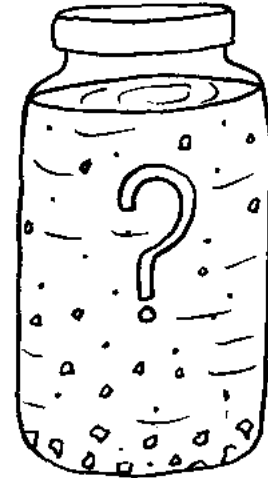
Allow children to experiment with other soil combinations. Try a river jar with just gravel and sand in the water. Does this water appear as turbid (muddy) as our original river jars? Students can research the connection between geology of the region and the turbidity of its streams.

Celebrate Silt—River Jar

As a group, choose students for the following jobs:
soil manager, water manager, reporter

Procedure:

- 1. Soil manager:** Measure, then pour, about 1/3 cup of soil and sand into the jar. Pour about 1/3 cup of aquarium gravel into the jar.
- 2. Water manager:** Measure, then pour, about two cups of water into the jar that contains the soil, sand and pebbles. Screw the lid on tight.
- 3. All members take turns:** Swirl, but don't shake, the jar for five seconds. When your whole group has taken a turn swirling the jar, put the jar down where it can be observed.



Answer the questions:

1. Which substance settled first?

2. Why do you think it settled?

3. When sediment doesn't settle, you can say it is suspended. Which substance was suspended in your river jar?

4. Why do you think it remained suspended?

5. How are your river jar and a real river alike or different?

6. What can you learn from this model of river sedimentation?

LESSON SEVEN: An Endless River of Fish?

June 18

I can't wait to eat dinner tonight. Last night I asked my parents if I could go fishing with Raul again. This morning we paddled to a floodplain lake about 30 minutes from camp. My paddling has improved. My biceps must be getting really big.

This time Raul showed me how to cast a net. He stood up in the front of the canoe and carefully arranged the net. Part of it went over his shoulder. Part of it was in his hands. He even held a part in his teeth. Then he looped a small rope connected to the net around one of his wrists. That keeps you from losing the net. The trick is to throw the net so that it spreads in a wide circle. The bottom of the net is weighted with many small lead weights. After the net sinks in the water, you pull up on the rope, trapping fish in the net.

Next it was my turn. The scariest part is just trying to stand up in the boat without falling overboard. Raul laughed a lot! He sat down low to steady the boat while he told me what to do. At first I couldn't throw it very far because I didn't have good balance. The boat wobbled back and forth. Raul told me where to put my feet so I would be steadier. Once I almost fell in, but I landed with my bottom in the boat. Raul said that he'd never had so much fun. We took a break because our stomachs hurt from laughing.



On the other side of the lake I noticed men in a larger boat. They were using big nets and seemed to be catching a lot of fish. Raul explained that the men work for a commercial fishery. They catch fish that are sold in markets in Iquitos and other big cities. Raul thought that they might be catching tambaqui. I said it is nice that more people can eat these great fish. Raul agreed that it was nice, but he told me about a problem. The commercial fisheries sometimes catch too many fish and sometimes they take the juveniles, and that upsets the whole fish population.

We went back to our fishing. First Raul would take a turn, then I would try again. Finally we caught a catfish. Well, Raul caught it, but I helped take it out of the net. When we got back to camp I told my mom that I felt bad about upsetting the population of fish. She explained that catching one adult catfish that has already been a parent wouldn't do that. I hope not. She also said that there are ways to do commercial fishing that won't upset the population of fish, but not many companies are fishing that way yet. Well, the cook is preparing my catfish for dinner. I wonder if it will taste like the catfish I have had at home.

LESSON SEVEN:

An Endless River of Fish?

Subjects:

Science and math

Objectives:

1. Identify the difference between commercial fishing and subsistence fishing
2. Explore why fish populations stay constant or decline

National Science

Education Standards:

K-4 Content Standards C, F
5-8 Content Standards C, F

Illinois Standards:

Language arts 1

Math 6, 10

Science 12, 13

Social science 17

Materials:

For each student

- Maxine's journal entry no. 7
- Glue
- Colored construction paper
- Markers

For each group

- Game board
- Tambaqui playing pieces
- Number cards
- Scrap paper for calculations
- Fish reporting sheets for groups
- Fish crackers

Time:

One 60- to 90-minute period

Vocabulary:

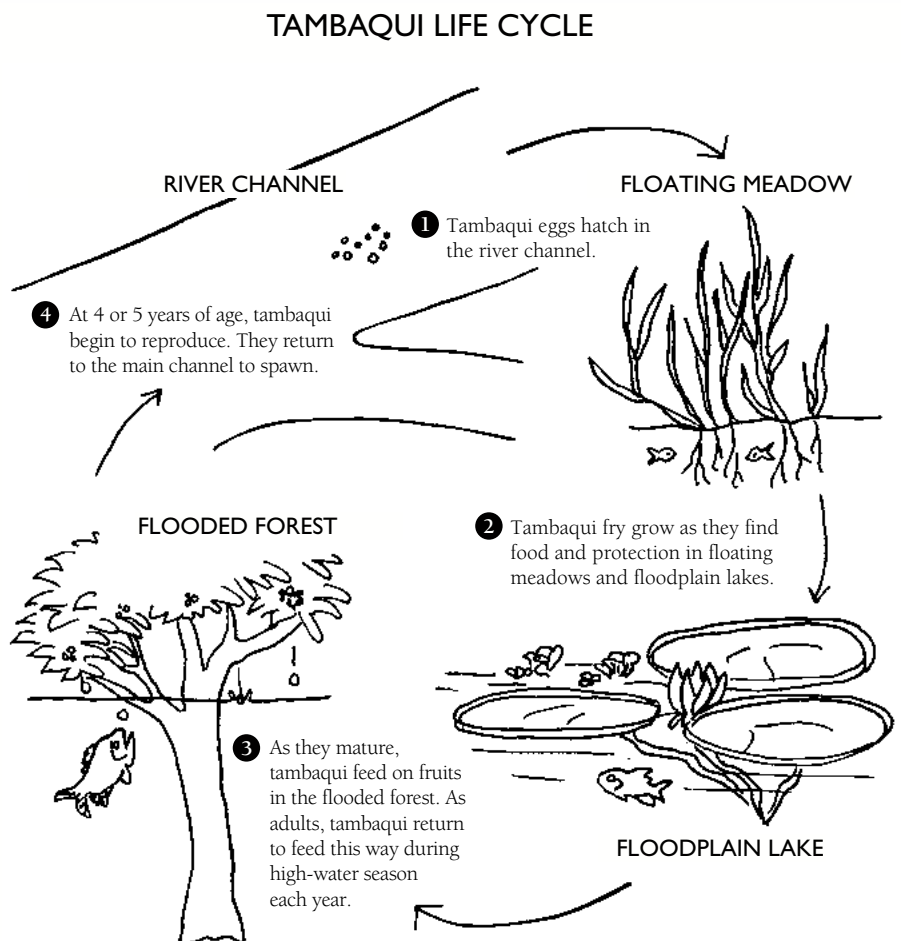
Juvenile, subsistence fishing, commercial fishing, floating meadows, predators, hydroelectric dam, migration

Teacher Preparation:

- Make copies of the fish game rules sheet/fish reporting sheet (see page 42).
- Make copies of the game boards (one for each group of four students).
- Copy and cut out fish game pieces (one for each student) (see page 39).
- Cut out about 30 number cards for each group and label with numbers 1-3 (10 of each number).
- Obtain scrap paper or calculators for students' scorekeeping.
- Prepare one sample pictograph using fish crackers to represent 10 fish each for each stage of the life cycle in this game. (See no. 7 in the following procedure and the pictograph.)

Background:

The tambaqui's life cycle follows the cycle of the floods as depicted in the diagram below. (More information about the tambaqui can be found in Maxine's journal in Lesson Five.)



LESSON SEVEN: An Endless River of Fish?

Tambaqui are important to the people living along the river. Subsistence fishing is the principal source of protein for rural communities in the lowlands of the Amazon. Until 1960, Amazonian fisheries were changed little by humans. During the '60s and '70s, a myth prevailed that the Amazon had a superabundance of fish. In the 1960s, the Brazilian government encouraged occupation in the Amazon valley by aiding economic development there. The government's effort plus the advances in fishing technology accounted for an increase of fishing in the Amazon.

The tambaqui is one of the most important commercial fish species in this area, but unsustainable fishing practices have caused populations to plummet. Juveniles—which haven't had a chance to breed yet—are heavily fished in floodplain lakes. Furthermore, drastic environmental changes that people have made to the flooded forest—through logging, clearing for agriculture or ranching, and damming—have in many areas destroyed the habitats essential to the tambaqui's life cycle.

The forest, the people and the life-giving waters are interconnected. Playing the following game will help students learn about the difference between subsistence fishing and commercial fishing, and show students how stresses impact a sustainable population.

Procedure:

1. Have students read Maxine's journal entry, then review the content with students. Ask the following question to help the students see the connections among the people, the forest and the river.



FINDING THE CONNECTIONS

How can people impact the river?

2. Draw the tambaqui life cycle on the board or copy to an overhead transparency. Review the life cycle with the students. Say: Remember the simulation from Lesson Five in which we saw that the tambaqui disperses the seeds of many trees? It is also an important fish for people. People who only take enough fish to feed their own families are called subsistence fishers. Commercial fishers make their living by catching large quantities of fish to sell.

People living in urban areas depend on commercial fishers to provide fish that they can buy to feed their families.

3. Explain that students will play a game that further explores factors that impact the tambaqui population.

4. Divide students into groups of four, distribute the fish game rules sheet and review the rules.

5. Distribute the game boards. Say: Notice that the board is divided into five sections for the five years that it takes a tambaqui to reach maturity and reproduce. On the outside of the squares you can see what the real numbers of fish might be during each year. For ease of playing this game, everyone will start with 100 baby tambaqui fish. This may sound like a lot of fish, but in real life, about 100,000 eggs may hatch from one set of parents.

6. Distribute the playing pieces, number cards, scrap paper and fish reporting sheets, then allow students to play the fish game.

7. After students finish playing the game, show them a sample pictograph. Explain that each fish cracker represents 10 tambaqui fish. Tell the students to construct a pictograph of their fish at each year of development. Students should list the dangers encountered by their fish on the reverse side of their pictographs before they glue down the fish crackers.

8. After the students have completed their pictographs, lead a discussion about fish populations.

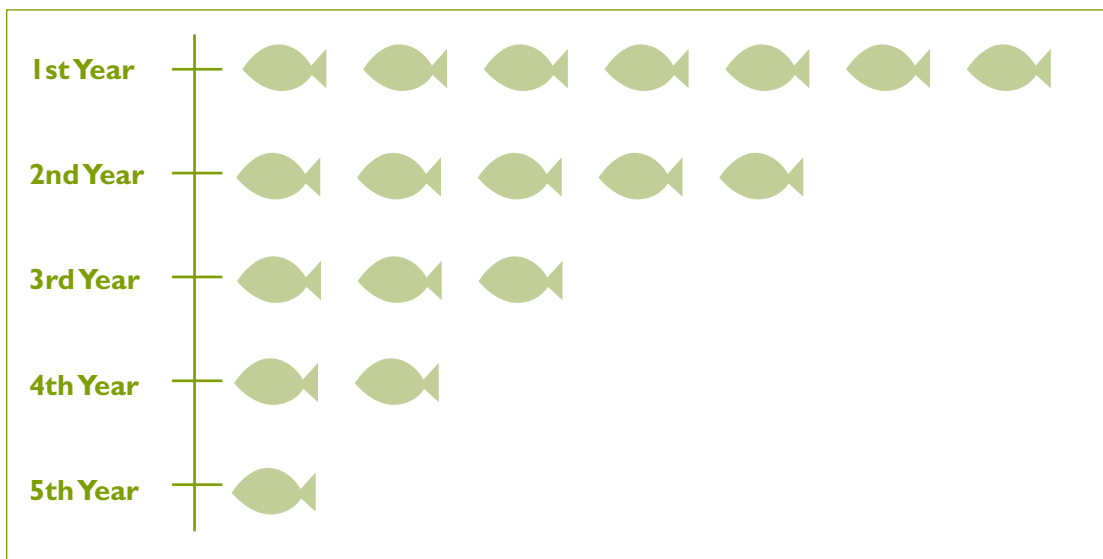
- How many fish are needed to sustain a population? (For each of these groups of fish, two adult fish are needed to replace the original parents.)
- Did any of the students reach the finish with the same number of fish they started with or with no fish at all?
- What threats did your fish encounter during the game? How many were natural and how many were human-made?
- What would happen if commercial fishing increased?

Conclude the discussion by telling students that in real life, out of 100,000 hatched eggs, perhaps one or two fish will reach maturity.

LESSON SEVEN: An Endless River of Fish?

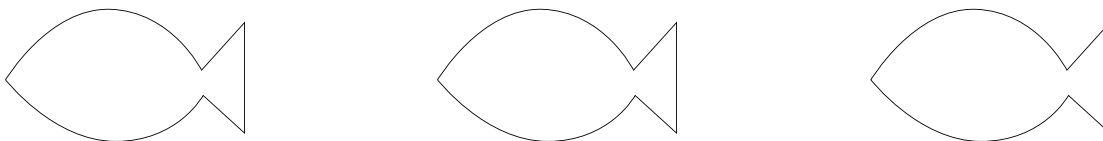
Extension/Enrichment:

Students may replay the game. Diagonal-lined spaces represent commercial fishing, taking away 10 fish each. Ask students to determine how many commercial fishing spaces they could add before depleting the population.



Sample Pictograph
One fish cracker = 10 tambaqui

Fish game pieces



Tambaqui Survival Game

NUMBERS MAY DROP FROM 100,000 TO 10,000 DURING THE FIRST YEAR.

FIRST YEAR

START
Thousands of fish eggs hatch. Start this game with 100 fish.

What's for lunch?
You are!
Predators eat 5 fish.

Move ahead 2 spaces.

Bigger fish eat smaller fish.
Lose 5 fish.

Draw another card and move ahead!

Move to floating high water season. Hide from predators. Lose no fish.



FLOATING MEADOW

FINISH

You have found a mate and reproduced. Life begins again.

Commercial fishing kills all but 2 of your fish.

FIFTH YEAR

Subsistence fishing takes 1 fish.

Commercial fishing takes 10 fish.

People build a hydroelectric dam on the river. All your fish die!

STOP!
Record your fish

During high water, swim to palm trees and feast on seeds.

Move ahead 3 spaces.

Mercury and other toxic chemicals from gold mining kill 15 fish.

10-1

10,000 - 1,000

STOP!
Record
your fish

Happy Birthday!
Eat grass seeds
in the
floating meadow
and move ahead.

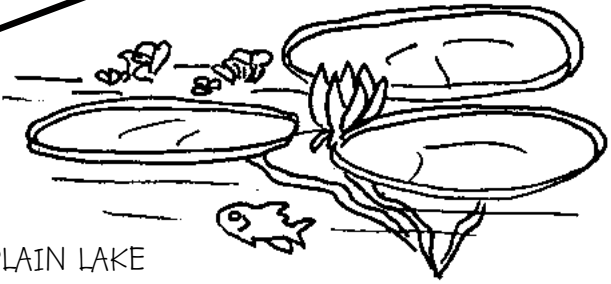
Ranchers let water
buffalo graze
in the floating
meadow. This
destroys habitat.
Lose 15 fish.

Predators eat 5 fish.

Eat fruit and seeds
from rubber trees.
Move ahead 2 spaces.

Deforestation removes
fruit-bearing trees.
I'm hungry!
Lose 10 fish.

SECOND YEAR



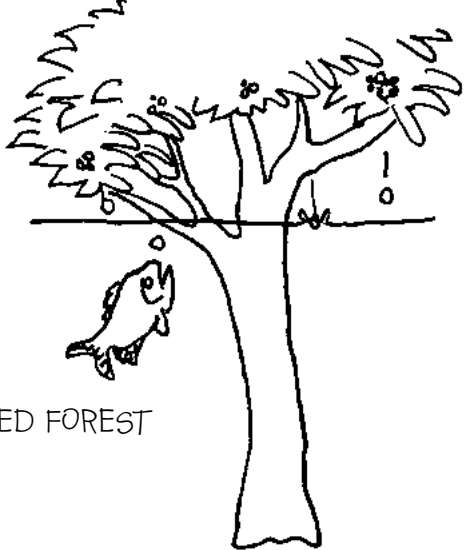
FLOODPLAIN LAKE

STOP!
Record
your fish

Happy Birthday!

Subsistence fishing.
Lose 1 fish.

Over fishing by
commercial fishers.
Lose 25 fish.



FLOODED FOREST

THIRD YEAR

Lose 1 fish
to subsistence fishing.

Happy Birthday!

Commercial fishing
takes 15 fish.

Eat your favorite
meal of seeds from the
rubber tree. Yummy!
Move ahead 3 spaces.

Move ahead 4 spaces.

1,000 - 100

STOP!
Record
your fish

FISH GAME RULES SHEET

1. Select a game piece and mark it with your initials.
2. Place your fish in the square marked “Start.”
3. Choose a number card from the pile and move your game piece the number of spaces indicated on the card. “Happy Birthday” signs and spaces with diagonal lines do not count as spaces. If your game piece lands on a space with another player, you can send this player to any other empty space in that year’s section.
4. Follow the directions when you land on a square. Use your scrap paper or calculator to determine the number of fish you now have. If you lose all of your fish, turn your playing piece upside down. Other players who land on that spot will treat it as a blank space.
5. When you pass a “Happy Birthday” sign, record the number of fish you have on your fish reporting sheet.
6. When you reach the last square, record how many fish you have. The player with the most remaining fish at the end of the game wins.

FISH REPORTING SHEET

Names	Eggs	1st Year	2nd Year	3rd Year	4th Year	5th Year	Threats
Total							

June 25

I am really beginning to like the way they do things here. Last night I visited Raul's house. After dinner we sat on a log near his house and watched the sky get dark. It was kind of like sitting on the front porch at home except that the sounds here are so different. You don't hear traffic or jets coming into O'Hare. You hear crickets and other insects and frogs that yelp like howling dogs. I heard Raul's older sister and mother laughing from the house. They were cleaning up after dinner and taking care of Raul's baby brothers. Mr. Arjona came out and joined us as we looked up at all the stars. He asked me if I could point out the Southern Cross and I could. I knew where Mars was, too. Raul asked his father to tell us some stories. He looked down, smiled and rubbed his knees. Raul and I got comfortable as his father started with the first story. The stories he told us weren't in a book. They were in his memory. The sounds of the frogs and Mr. Arjona's deep voice that night telling us stories under all those stars made me wish I could stay here forever.

Later my dad told me that I'd had a very special experience because I'd actually heard oral history. Whatever that is, I liked hearing the stories. The stories he told kind of reminded me of Johnny Appleseed or Hercules except that they

were about the Amazon. In one story, the river floods because a stork chief forgot that he put his Kettle on the sun to boil and it overflowed. Another story tells how the mother of rubber trees taught a rubber tapper to stop cutting the trees so deeply so that they would not die. My favorite stories are about Curupira, the Father of Game. He is a creature that comes in many forms to stop hunters from taking too much game.

Here are two of the stories I heard that night.

Cobra Grande

I've been fishing in the river and lakes near here since I was a boy. My father taught me all the best ways to fish when water is low and when the floods come. I've seen a lot out here fishing every day. But I've never seen a sight as scary as the time I saw

Cobra Grande.



LESSON EIGHT: Myth-legends of the Amazon

It happened about six years ago, during the driest part of the year. The lakes were very low. I was fishing one night—very late—alone. I paddled my boat to the center of a lake, just off the river near the next town over from mine. I'd fished there before—caught a large arapaima there once. I fed half of it to my family, and the rest I sold at market. I hoped for another good catch that night.

The moon was bright and shone on the still surface of the water. I drifted in my canoe—harpoon in hand, a line in the water and a club close by in case I needed to stun a large fish.

Behind me, I heard the sound of an arapaima rising for a breath, and I turned to look and maybe harpoon it. Suddenly, the lake's surface shook with violent waves. The water was churning like it was boiling!

Fear choked me—what could make such a racket? Surely no animal, even a drowning capybara, would cause the water to churn like that.

Then I saw it. It was coming toward my boat, pushing waves of water ahead of it. Its huge head rose above the water's surface, and its wide-set eyes cast orange rays of light. A disgusting stench filled the air. Cobra Grande!

I was so scared I almost couldn't breathe. As fast as I could, I grabbed my paddle and rowed frantically to shore. Behind me, I could hear the rumbling of the giant snake cruising through the water, but I was too terrified to turn around and see how close it really was.

When I reached the shore, I dragged my canoe onto the dry bank and scrambled toward the forest and dove behind a tree. Cobra Grande was close to the shore. It must have been 200 feet long. The rough waves of its wake tossed my canoe high on land like it was a twig.

Hiding in the trees, I watched for a few hours, hoping the snake would leave. But even when I could no longer see it, the water still churned. I finally gave up on paddling to the other side of the lake and walked through the forest instead. I stopped in the village near the lake to warn them of what I'd seen.

No one was brave enough to fish in that lake again until the next year when water was low. It took me even longer to return. But when I did, I discovered the lake was full of fish—more than I ever remember seeing there before. People say Cobra Grande is Mother of Fishes, protecting them from fishermen. And after what I saw, I believe it.

Curupira, Father of Game

Hunters like me know to beware of Curupira, the Father of Game. He can steal your shadow and take your soul if you kill too many animals when you hunt. I myself have never seen Curupira, but I've heard of people who have. He can come in many forms, this creature. But you know who he is because he's trying to confuse you or hurt you when you're out in the forest hunting. Sometimes he even changes into an animal, like a deer or paca. Usually, I've heard, he appears as a young boy, hairy and very, very ugly.

Curupira's feet are turned backward, so they say. Yes, it's hard to believe he can walk like that. But he's sly—and uses the backward feet to trick hunters and lead them deeper and deeper into the forest until they're lost and far from home.

Curupira likes to get hunters lost—he might call you by name, and you'll follow the voice thinking it's a friend. But then, as soon as you don't know exactly where you are, the voice stops calling. Then you realize it was Curupira. Once you're lost, you have to stop hunting.

A man I know told me he saw Curupira once. The man ambushed a deer and shot it at close range. He'd been hunting well all week and already had enough. But he shot this deer anyway. He went to collect the deer but was startled by another deer coming towards him through the forest. And there was Curupira riding on its back—a wiry boy with scrubby brown hair and a twisted face. Curupira held a whip of liana vine and with it slapped the dead deer. "Get up!" he yelled. "Stop sleeping!"

The deer that the hunter thought was dead jumped up and trotted off into the forest, following Curupira.

My friend was shocked and realized he was lucky Curupira hadn't hurt him. He packed up his gear and went home as fast as he could. And he started being more careful not to hunt more than his share. He never wanted to run into Curupira again.

I myself have never seen Curupira—and I never want to!

LESSON EIGHT:

Myth-legends of the Amazon

Subjects:

Language arts, science,
social studies

Objectives:

1. Read to find details and particular information; infer cause-and-effect relationships
2. Write to communicate and demonstrate understanding of textual information

National Science

Education Standards:

K-4 Content Standards C

Illinois Standards:

Language arts 1, 2, 3, 4
Social science 16, 17

Materials:

For each student

- Maxine's journal entry no. 8
- Writing and illustrating supplies

Time:

One or two 45- to 60-minute periods

Vocabulary:

Myth, legend

Background:

The stories that the Amazon's inhabitants have created and passed down acknowledge the Amazon's vast natural resources and their usefulness. The stories are actually a combination of myth and legend. Myths frequently deal with the explanation of natural phenomena and are generally recognized as truthful in the culture in which they are told. Legends are also seen as truthful, but tell of more recent events and generally feature a human. By influencing culture, the myth-legends of the Amazon help to preserve the productivity of game, fish and wild plants for the inhabitants.

Procedure:

1. Have students read Maxine's journal entry, then review the content with students. Ask the following questions to help the students see the connections among the people, the forest and the river.



FINDING THE CONNECTIONS

*How are the river, the forest and the people connected?
How can stories protect the river and forest?*

2. Have students write and illustrate their own myth-legend about a conservation issue from their own locality or from the Amazon. Explain that the purpose of the myth-legend is to encourage the reader to conserve a natural resource. If students are unaware of a local conservation issue, the issue of recycling could serve as a topic for students. Some topics students can explore to understand pressures on the environment in the Amazon are:

- logging
- cattle ranching
- hydroelectric dams
- mining

3. Allow students to share their myth-legends with the class. Re-create the setting by sitting in a circle on the floor, turning off the lights, closing the blinds and allowing the reader to use a small flashlight to read the story.

Extensions/Enrichment:

1. Discuss with students: How have the myth-legends of the Amazon helped to protect the environment? Could you envision more ways to utilize myth-legends to protect this environment?
2. Create a campaign for conservation using the symbols of myths and legends of this region.

July 9

My last days in the Amazon were busy. I had to finish my work for school and say good-bye to my new friends. I will always remember Raul and his family, the humid tropical weather, the tambaqui, the beautiful flooded forest, Charlie the capybara, the stories and everything else about our trip. I missed my friends at home, but I was sad that our trip to the Amazon was over.

We traveled overnight and arrived in Chicago early this morning. Before our plane was about to land, it circled above Lake Michigan and the Chicago River. From my window, I could see all of the beautiful buildings along the lake. A bit farther away, I could also see smoke stacks rising from a few factories and rows of houses that look like tiny Monopoly pieces.

My mom loves Lake Michigan and told me that the lake is very important to the city of Chicago. It suddenly occurred to me that I have not been to the Chicago beaches all summer, and it's been almost a whole year since I last buried my dad in sand. I asked my mom if we could go to the beach, and she said yes! I don't think she wanted to start doing all our laundry.

I was so excited. I didn't even unpack. I found a swimsuit, towel and suntan lotion and waited forever at the door for the rest of my family. Since we live close to the lake, we decided to walk to the beach. When we finally arrived, we started running towards the shore—because we were excited to be back home and because the sand was so hot, even with sandals. It felt like we were jumping on burning coals.

When we got to the beach there was a group of kids and some instructors standing in the water. They all had green shirts on that said "Shedd Aquarium." I told them I had just got back from the Amazon. Some of them were holding test tubes and tablets and jars of lake water. They explained that they were sampling the water and checking the levels of oxygen, nitrate and other stuff including the bacteria in it. I ran back and told my mom what they were doing.



LESSON NINE: What Can I Do?

Mom explained that they must be monitoring our water. She said it is one way to help take care of our natural resources. This is why we have to take care of our natural resources: Lake Michigan and other lakes and rivers here in the United States have been changed because of the things people do. When resources like forests and rivers change, people, plants and animals will all be affected. I know she's right. I remember last summer how disappointed I was when the beach was closed because there was too much bacteria in the lake.

How could the lake not be safe when it looks so beautiful? I was mad all the way home. I started to think about the Amazon River and pictured my friends canoeing in their dugout boats. Suddenly, I wondered what the people of the rain forest would do if they could no longer use the river. The people depend on it so much. I wished that I could make things better. I remembered what my teacher always says...

Each person has the potential of making the world a better place.

I wonder what a kid like me can do?

LESSON NINE:

What Can I Do?

Objectives:

Students will develop and carry out a civic action related to the concepts of this unit.

National Science Education Standards:

K-4 Content Standards F
5-8 Content Standards F

Illinois Standards:

Language arts 1, 4
Science 13
Social science 17

Materials:

For each student

- Maxine's journal entry no. 9
- Dependent on student projects

Time:

One 45- to 60-minute period with additional project time outside of class

Background:

One way of introducing students to ecological concerns and issues is to teach through multiple perspectives. The first step is to identify all of the key players associated with the problem and their perspectives. Once the students have researched the issue and how it affects others, they should be encouraged to develop an opinion of their own. The next step is to encourage civic responsibility by developing plans for social action. Social action is not limited to concrete solutions to the problem, but rather, it can include such activities as signing petitions, writing letters to community members, starting clubs, etc. The premise of these activities is to educate and involve people.

Why should social action be an integral part of education? Each child should be able to recognize that simply being alive has an impact on our environment. By educating our children, we teach them that they can choose to leave "small footprints" in the world rather than to lead lives that can be ecologically destructive. Social action activities are meant to inform and empower students by teaching them that they can be agents of positive change. By being informed, they are able to identify the consequences of their choices and make healthier decisions. It can be as simple as knowing to shut off the faucet while you are brushing your teeth in order to save up to two gallons of water.

For additional resources related to the Amazon or conservation, visit the Shedd Aquarium Web site at www.sheddaquarium.org.

Procedure:

1. Have students read Maxine's journal entry, then review the content with them. Ask the following question to help the students see the connections among the people, the forest and the river.



FINDING THE CONNECTIONS

What will happen if the people who live along the river can no longer benefit from it?

2. Remind students that Maxine ended her journal wondering what she could do to make the world a better place. Have students begin to make a local connection and ask them to name the nearest river or body of water that benefits their community. Ask if they are aware of conditions that are endangering the water.

LESSON NINE: How Can I Help?

3. Explain that students will choose a project that will help protect rivers in some way. Explain that their projects will be social actions because they will help many people. Brainstorm a list of ideas for projects. Some ideas could include:

- Write a letter to a friend, make a checklist for an adult, create a poster, write a book, create a Web page, or make a video that explains how to conserve water in the home.
- Read a book about the importance of water and write a summary to a friend.
- Visit a nature center and create an advertisement for it to post in your school.
- Start an environmental club. Test the water in your neighborhood and tell people about the results.
- Create a fundraiser and send the proceeds to a reputable environmental organization.
- Ask people in your community to sign a petition about the importance of keeping your local rivers, oceans, streams, ponds and lakes clean. Send the petition and a letter to your local congressperson.
- Write a letter to the president of the United States and discuss why America needs to protect its natural resources.
- Write a commercial or a play about the importance of conservation. Perform it in front of the class.
- Draw conservation messages on new paper grocery bags and return them to the store to be used when bagging customers' groceries.
- Do extra chores to earn money to buy your family a reusable canvas grocery bag.
- Create and implement a "reduce, reuse, recycle" plan for your home, school, or classroom. If you currently have a recycling plan, you may wish to monitor and assess it.

4. Students may work on these projects outside of class individually or in teams. Schedule time for projects to be presented in class or to other classes.

Note to teachers: Allow students time to reevaluate the items they packed in their suitcases in Lesson One. Students should be given the opportunity to review Maxine's journal and add to or take out items in their suitcases. Ask students to explain the changes they made as a result of their learning. This activity allows students to summarize, review and reflect as a group before working independently on their social action projects.

Glossary



adaptation—the change or modification that makes an organism better suited to an element of its environment

arapaima (air-uh-PYE-muh)—one of the largest fish in the world. It can grow to 10 feet long and 350 pounds.

bromeliad—a tropical plant that lives in the branches of trees. It does not depend on roots in the ground for obtaining nutrients.

canopy—the highest layer of branches and leaves in a forest

commercial fishing—fishing, usually on a large scale, that provides an income for the fisherman

condensation—the formation of water droplets as water vapor or gas changes to a liquid. Clouds and moisture on a cold window are examples of condensation.

conservation—the careful use and management of resources. Examples of conservation include reducing, reusing and recycling, preserving natural habitats and protecting species.

control—the standard for comparison in an experiment

deforestation—the process of clearing forests

dugout canoe—a canoe commonly used in the Amazon, made by hollowing out the trunk of a tree

ecosystem—a balanced community of organisms and their environment

emergent layer—lower level of vegetation in a forest

equator—an imaginary horizontal line that circles the Earth, dividing it into northern and southern hemispheres

erosion—the wearing down of land, commonly by wind and water, where rock and other underlying structures of the Earth are broken down into loose materials. The loose materials are transported and deposited elsewhere by wind and water. This is a natural process, but it can be accelerated by the removal of vegetation or natural landscaping.

evaporation—to change from a liquid to gas (i.e., water changes to water vapor)

evapotranspiration—the process in which plants release moisture (water) through their leaves

fishery—the occupation or business of fishing

floating meadow—temporary habitat, containing grasses, sedges and broad-leaved floating plants, along the edge of a riverbank or floodplain lake. Floating meadows are temporary homes for aquatic insects, birds and fish.

flood—a flow of water over an area that is usually dry land

floodplain—broad flatlands along a river that naturally flood as heavy or seasonal rainfall causes the river to overflow its banks

floodplain lakes—open bodies of water in the Amazon River lowlands that are present year-round. These lakes get replenished with sediment-rich water during the floods. During the low-water season, they are cut off from the main river channel.

fry—juvenile fish

germinate—to sprout or develop

habitat—the natural home of a species of plant or animal

high-water season—that portion of the year when Amazon floodwaters are at their highest

GLOSSARY

humid—damp

humidity—the amount of moisture in the air

hydroelectric dam—a dam that creates electricity by harnessing power from a moving body of water

indigenous group—people who are native to a geographical area

interdependence—when two or more organisms depend on each other

juvenile—a fish that has not reached maturity

latrine—a waterless receptacle for use as a toilet

legend—a story handed down from earlier times. Although many of these stories are believed to be historical, they are unproven.

life cycle—the series of life stages in time or growth that an organism progresses through

low-water season—that portion of the year when the Amazon River is at its lowest

manioc (MAN-ee-ahk)—a basic food throughout the Amazon

migrate—to move from one location to another

myth—a story dealing with ancestors, heroes, or supernatural beings that explains aspects of the natural world, a custom, or ideal of a society

nutrients—a substance that furnishes nourishment

observation—the recording or noting of something using one or more of the five senses

oxbow lake—a lake formed from a section of river as that river changed course

photosynthesis—the process by which plants use sunlight to manufacture food

precipitation—rain, snow, sleet, or other form of atmospheric water that falls to the ground

predator—an animal that survives by feeding on other animals

prevailing winds—belts of wind that tend to come from a particular direction. For example, the trade winds near the equator generally come from the east.

rainy season—that portion of the year in the Amazon with more-than-average rain

receding-water season—that part of the year when Amazon floodwaters drain from the forest and water levels drop

riberños (ree-beh-REN-yohs)—a Spanish term for a group of people living near or along the Amazon River

river basin—all the land that is drained by a river

river mouth—a place where a river or stream empties into a larger body of water

riverbank—the land at the sides of a river

sediment—suspended particles of rock, soil and organic matter in water

seed dispersal—the distribution of seeds from a plant to a new location by wind, water, animals, etc.

silt—tiny particles of sedimentary material such as soil or rock

source—where a river originates

subsistence fishing—fishing to support your own family's needs

substrate—the substances that form the bottom layer such as the ocean floor or riverbed

suspension—a liquid containing nondissolved particles

GLOSSARY

sustainable fishing—fishing that does not deplete the populations of fish species. Depletion can occur when too many fish are taken or when juvenile fish are taken before they can reproduce.

symbiotic relationship—a beneficial partnership between two species

tambaqui (tahm-bah-KEE)—a large fish that lives in the Amazon River and eats fruit and seeds

temperate zone—a geographical area marked by variations in temperature and precipitation during the year. The temperate zone in the Northern Hemisphere is located between the tropic of Cancer and the Arctic.

transpiration—see evapotranspiration

tributary—a stream that flows into a larger stream or some other body of water

turbid—muddy

understory—lower level of vegetation between the forest canopy and the ground

vapor—a substance in a gaseous state

vegetation—any type of plant growth

Amazon Learning Standards



ILLINOIS LEARNING STANDARDS

English Language Arts

State Goal 1: Read with understanding and fluency

State Goal 2: Read and understand literature representative of various societies, eras and ideas

State Goal 3: Write to communicate for a variety of purposes

State Goal 4: Listen and speak effectively in a variety of situations

Mathematics

State Goal 6: Demonstrate and apply a knowledge and sense of numbers, including numeration and operations (addition, subtraction, multiplication, division), patterns, ratios and proportions

State Goal 10: Collect, organize and analyze data using statistical methods; predict results; and interpret uncertainty using concepts of probability

Science

State Goal 11: Understand the processes of scientific inquiry and technological design to investigate questions, conduct experiments and solve problems

State Goal 12: Understand the fundamental concepts, principles and interconnections of the life, physical and earth/space sciences

State Goal 13: Understand the relationships among science, technology and society in historical and contemporary contexts

Social Science

State Goal 16: Understand events, trends, individuals and movements shaping the history of Illinois, the United States and other nations

State Goal 17: Understand world geography and the effects of geography on society, with an emphasis on the United States

NATIONAL SCIENCE EDUCATION STANDARDS

Grades K-4

Content Standard A: As a result of activities in grades K-4, all students should develop

- abilities necessary to do scientific inquiry
- understanding about scientific inquiry

Content Standard B: As a result of the activities in grades K-4, all students should develop an understanding of

- properties of objects and materials
- position and motion of objects
- light, heat, electricity and magnetism

Content Standard C: As a result of the activities in grades K-4, all students should develop understanding of

- the characteristics of organisms
- life cycles of organisms
- organisms and environments

Content Standard D: As a result of their activities in grades K-4, all students should develop an understanding of

- properties of earth materials
- objects in the sky
- changes in Earth and sky

Content Standard F: As a result of activities in grades K-4, all students should develop understanding of

- personal health
- characteristics and changes in populations
- types of resources
- changes in environments
- science and technology in local challenges

NATIONAL SCIENCE EDUCATION STANDARDS

Grades 5-8

Content Standard A: As a result of activities in grades 5-8, all students should develop

- abilities necessary to do scientific inquiry
- understandings about scientific inquiry

Content Standard C: As a result of their activities in grades 5-8, all students should develop understanding of

- structure and function in living systems
- reproduction and heredity
- regulation and behavior
- populations and ecosystems
- diversity and adaptations of organisms

Content Standard D: As a result of their activities in grades 5-8, all students should develop an understanding of

- structure of the earth system
- Earth's history
- Earth in the solar system

Content Standard F: As a result of activities in grades 5-8, all students should develop

- abilities of technological design
- understandings about science and technology

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