

Kindergarten



- **My Forest or the Rainforest?**
- **How Far Away is a Tropical Rainforest?**
- **Biodiversity**
- **The Long Road to Coffee**

Lesson 1

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My Forest or the Rainforest?

Cachalú Biological Reserve, Colombia

Concept

There are many differences and similarities between the flora and fauna of temperate forests and rainforests. Certain environmental conditions allow particular plants and animals to live in the rainforest.

Essential Question

How can something so far away and different be so similar?

Step 1: Connect (the concept to prior knowledge)

Challenge

Challenge students to work with a partner to sort sounds, pictures and objects according to whether they think each item can be found in a rainforest or temperate forest.

Materials (per 3–4 students per group. If you can make more sets of these materials, divide the class into pairs)

- three 12" x 15" presentation cardboards or white boards, labeled "Rainforest," "My Forest (Temperate Forest)," and "Both," respectively, with small pieces of Velcro stuck on at random locations
- a mixed set of pictures, objects and sounds representative of flora, fauna and landscapes from temperate forest and rainforest, with Velcro on the back:

Temperate Forest

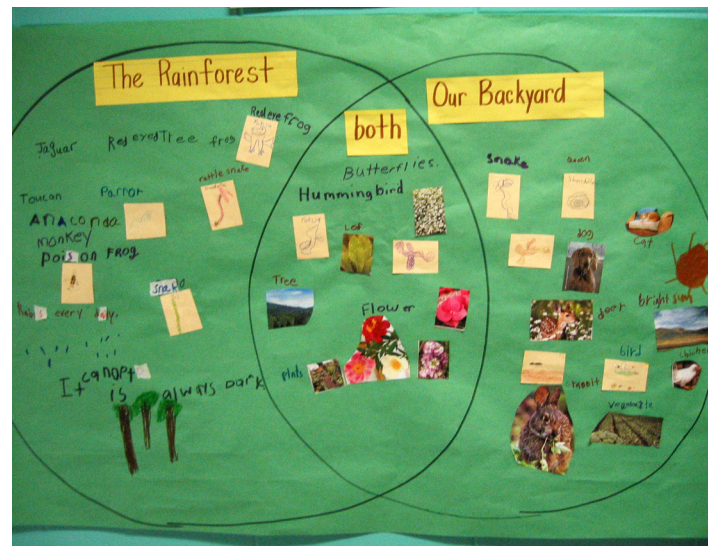
Actual objects

- ferns* (bracken fern, interrupted fern)
- fruit (apple, blueberry, pumpkins)
- leaves: deciduous & coniferous (American beech, eastern white pine needles, red maple, red oak, red pine needles, sugar maple, white ash, etc.)
- lichens and mosses* (*species may be limited geographically, but these organisms thrive in both forests*)
- maple syrup samples—taste it!
- mushrooms*
- seeds (acorns, apple seeds, maple seeds, pine cones)
- snow, ice
- soil*

Rainforest

Actual objects

- coffee beans
- fruit (avocado, banana, fig, mango, orange)
- lichens and mosses* (*species may be limited geographically, but these organisms thrive in both forests*)
- mushrooms*
- plants (with large leaves* [i.e., elephant ear fern, orchid flowers])
- soil*



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Temperate Forest

Pictures

- amphibians (bullfrog, spring peeper, tree frog)
- birds (American crow, American kestrel*, black-capped chickadee, blue jay, hummingbird*, northern cardinal, northern parula*, red-tailed hawk*, rock dove, veery*, wood thrush*)
- insects* (carpenter ants, mosquitoes*)
- landscapes (winter, fall, early spring)
- mammals (black bear, badger, beaver, deer mouse*, gray squirrel, little brown myotis bat, lynx, moose, muskrat, weasel, white-tailed deer)
- rain and lightning*
- reptiles (garter snake, rattlesnake)
- tall trees* (American beech, paper birch, red maple, red oak, sugar maple, etc.)

Sounds**

- animals (see examples from Pictures above)

Rainforest

Pictures

- amphibians (poison arrow frog, red-eyed tree frog)
- birds (American kestrel*, cattle egret, cockatoo, hummingbird*, toucan, parrot, pelican, quetzal, scarlet macaw, rainbow lorikeet, red-tailed hawk*, veery*, wood thrush*)
- ferns* (tree fern, call lily, elephant ear fern)
- insects* (leaf cutter ants*, bees*, large stag beetle, colorful katydids)
- landscapes (ridgelines dominated by green vegetation*, dense canopy with emergent layer of trees)
- mammals (anteater, chimpanzee, deer mouse*, flying foxes* [bats limited to rainforests], howler monkey, jaguar, kinkajou, ocelot, spectacled bear, tamarin monkey)
- rain and lightning*
- reptiles (anaconda, boa constrictor, chameleon, gecko)
- trees (with very large trunks, tall trees*, cacao tree, cecropia tree, kapok tree, teak tree, strangler fig tree)

Sounds**

- animals (see examples from Pictures above)

These are only examples of the different objects, pictures and sounds that can be used for this exercise. The goal is to provide students with a large enough collection of items from which to sort. Items marked with an asterisk can be found in both forests.

Landscape photos can be 8.5" x 11". Plant and animal photos should be no larger than 3" x 5" so that 10 or so of these can later be displayed as a collage on the presentation board.

A computer can be set up at one station with various sounds posted for students to click and hear with headphones. A large collection of rainforest sounds can be found at <http://www.christiananswers.net/kids/sounds.html>. To save these items, open each sound file using Windows Media Player. Click "File," then "Export Playlist to File." Save the file on your computer's desktop and give it a name such as "Sound 1" or "Bird 2." Temperate

forest sounds can be found on many websites. Audiotaping early morning sounds is also an option.

Procedure

Rather than "rainforest," say "a forest where it rains almost every day of the year—often more than 100 inches per year. There is only one season, and the temperatures are typically between 70 and 90 degrees." Rather than "temperate forest," say "the forest around here" if you live near or in a temperate forest. Or say "a forest where it rains about 35 inches per year, there are four seasons and the temperatures range from 0 to 100 degrees."

1. Set up 4–6 stations, each containing the same set of objects, pictures and sounds listed above. These items should be in a random pile.
2. Challenge students working in groups of 3–4 to

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sort the items into three piles consisting of plants, animals, weather and scenery from (a) a temperate forest (presumably their own), (b) a rainforest, and (c) items that belong in both places.

3. Tell students to attach each picture onto the appropriate presentation board and to place each object in front of the corresponding board as well. If they are able to listen to sounds, tell them to attach the sound number on the board they think it belongs.
4. Explain that they will return to their boards in a little while.

Step 2: Literature/Discuss (give expert information book; ask questions)

Challenge

After reading aloud *The Umbrella* by Jan Brett, challenge students to verbalize how rainforests and temperate forests are similar and different. Then ask students to return to their presentation boards and make any changes based on what they just learned.

Materials

- book: *The Umbrella* by Jan Brett

Procedure

- While reading *The Umbrella*, ask questions like:
 - Describe at least five ways a rainforest is different from the forest closest to where we live.
 - What is the difference between the seasons where we live and the seasons of the rainforest we read about?
 - Why do you think moose don't live in the rainforest? Why do you think monkeys don't live in a temperate forest?
 - What kinds of animals and/or plants live in both rainforests and temperate forests?
5. Ask students to work with a partner to describe three ways they think rainforest and temperate forests are different. Elicit students ideas and ask which ideas, if any, they don't agree with and why.

Step 3A: Practice (math and learning centers)

Challenge

Challenge students to work in their original groups to reorganize their forest boards based on what they

learned from the previous reading and discussion.

Materials

- objects and pictures from Step 1

Procedure

1. After presenting the challenge and giving the students a few minutes to make any changes, pick a few of the items from each board and ask them to explain what makes them think it belongs where they placed it. Then tell each group how many of the items on each board do not reflect what we know in real life.
2. When all the groups think they are done, have them rotate around to each of the other groups' presentations and ask them to note any items that are organized differently from their own.
3. Elicit from the whole group those items on which they do not agree. Ask students to explain their thinking and inform them of the correct answer.

Step 3B: Create (performance tasks related to standard indicators)

Challenge

Students create collages that depict the rainforest and the local forest, displaying their understanding of the two types.

Materials

- objects and pictures from Step 1
- large posterboard or butcher paper on which to tape elements and paint
- an assortment of crayons, paints, markers, colored pencils, etc.
- masking tape

Procedure

Ask student to disassemble and mix up their entire set of objects and pictures and then make a final collage using the pictures and objects from the exercise. Invite them to paint and draw other items that they think belong in each forest. You could facilitate the creation of two larger murals on which all the items from all the groups are displayed. In either scenario, use their final work to help them verbalize the similarities and differences between a temperate forest and a rainforest.

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Step 4: Present (edit work/students orally present projects)

Challenge

Students present their newly created landscape collages, explaining what lives in their forest and why it belongs there.

Materials

- objects and pictures from Step 1

Procedure

Ask students to describe their collages to the class. Challenge them to describe the plants and animals that live in the forest they chose. Ask them to explain why some plants and animals live in one forest and not the other, and how some animals can live in both the local, or temperate, forest as well as the rainforest. Challenge students to verbalize the similarities and differences between a temperate forest and a rainforest.

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Teacher observations of performance tasks with rubrics as listed below, as well as collected work samples.

Assessment Guidelines	3=P (Proficient)	2=S (Satisfactory)	1 = NW (Needs Work)
Student uses prior knowledge of local forest to organize elements of the forest. Student is actively engaged in working with partner(s) to make cooperative decisions.			
Student makes appropriate changes to sorted forest elements. Changes are accurate and incorporate new information from literature and/or class discussion.			
Student verbalizes why elements are matched with the appropriate forest. Explanations are accurate and incorporate new understandings of each forest. Student explains why new choices are correct.			

Lesson 2



How Far Away is a Tropical Rainforest?

Cachalú Biological Reserve, Colombia

Concept

The rainforest in Rio Negro, Colombia is about 3,000 miles from New York City (as a crow flies). It will take eight days to travel from New York to Rio Negro in a school bus that is driving 55 mph, seven hours per day (a full day of school). *Numbers will change according to students' geographical residence.*

Essential Question

How long will it take to drive to the rainforest in Rio Negro, Colombia?

Introduction

Objectives

1. Students use the length of their class day as a reference to measure how long it takes to drive from their school to the closest community landmark, town and state. They chart this distance on a calendar and map.
2. Students listen to *Chayo's Andean Home* (www.rainforest-alliance.org/pictures/chayos-andean-home), a Rainforest Alliance original story, and Chayo's Challenge Letter.
3. Using the distance a bus can travel in a school day, students predict how many days it takes to drive to Chayo's home. Students chart this distance on a map and calendar.

Informational Introduction For the Teacher

This series of lessons challenge students to figure out just how far away they live from the Colombian rainforest. Understanding where students live relative to the rainforest provides an important foundation for appreciating in later lessons how interconnected they are to a place so far away and different from their home.

Informational Introduction For the Student

How far away is your home from school? How long would it take you to walk, bike and drive to get home from here? These distances make sense because you live this distance almost every day, both in terms of the physical distance and the length of time it takes to travel between them. But just how far is the rainforest



we're studying in Colombia from here? If someone told you it is 3,000 miles away, what does that really mean? Our challenge is to figure out just how far away the Colombian rainforest is from our school in a way that will make sense to us.

Step 1: Connect (the concept to prior knowledge)

Challenge

Challenge students to: (1) predict how long it will take to drive from school to a local landmark, (2) indicate on a map how far they can travel by bus in one school day (seven hours), and (3) predict how many school days it will take to travel by bus to a neighboring city or state.

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How Far Away is a Tropical Rainforest?

Materials

- large map of your local region that can be seen by entire class
- large map of United States that can be seen by entire class
- 12 3" cut outs of a yellow school bus
- large calendar illustrating morning, afternoon and evening and days of the week over a generic one-month period

Procedure

1. Show students a local map. Pick a significant site on the map that all the students know (a landmark, grocery store or community center) and ask students to decide with a partner how long they think it will take to drive from school to this spot if they left at the beginning of circle time, for example. Rather than think in terms of minutes or hours, ask students to think in terms of shared time periods (from morning circle to choice time, from choice time to afternoon recess). Tell students how much time it would take in these terms.
2. Ask pairs of students to stick a small cut-out of a yellow school bus on the same map to indicate where they think they can drive to if they were to drive as far as they could in one school day (seven hours). Let students know how far on the map equals one mile. After all students have marked their respective distances, ask, "What do you notice about our answers?" Indicate the radius to where you think you could drive in one school day. Ask students to describe what strikes them about some of their answers and your answer.
3. Using a map that includes several states, ask students to decide with a partner how long it will take to travel by school bus to a neighboring town and state. Let students know what distance on the map represents one mile. Represent their answers by illustrating the number of days traveled to their selected place on a calendar as well as by moving a yellow bus from their hometown to the destination. Share your own answer.

Step 2: Literature/Discuss (give expert information book; ask questions)

Challenge

After reading *Chayo's Andean Home*, an original Rain-

forest Alliance story told by a girl living near a Colombian tropical rainforest, challenge your students to predict how far it is from their school to her home.

Materials

- one copy of the story *Chayo's Andean Home*, a Rainforest Alliance story (www.rainforest-alliance.org/pictures/chayos-andean-home)
- one copy of Chayo's Challenge Letter to students
- six 2" cut-outs of a red school bus
- two small paper cut-outs of homes (one blue and one green)

Procedure

1. While reading Chayo's Andean Home ask questions such as:
 - How many people are in Chayo's family, including her mother and father?
 - How many more people are in Chayo's family than in your family?
 - Look at the picture of Chayo's dad raking the coffee beans. What kind of pattern do you notice he's making? Why do you think he's making this pattern?
 - What kinds of fruits or vegetables do you eat that grow around here that need to grow under trees or in shade like coffee does?
 - Look at any two of the bird pictures at one time. Describe four ways that each pair of birds is different from each other.
 - Why do you think birds that live in Colombia for half the year would leave Colombia to build nests and lay eggs? Why don't they just do that in Colombia?
 - What have you noticed in the story that looks different from where you live?
 - What have you noticed that looks the same?
 - How far away do you think Chayo lives from us?
2. Read Chayo's Challenge Letter to the class:

Dear Friends:

I'm so glad that you've read my story. I live in a wonderful place and I would like to share that place with you. I think that our homes are full of many similarities and differences. I hope you will learn about my home. But first, I would like to know: How far away do you live from me?

*Curious,
Chayo*

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How Far Away is a Tropical Rainforest?

3. Ask pairs of students to discuss and predict, "How many school days do you think it would take to drive a bus from here to Chayo's home in Rio Negro, Colombia?"
4. Write students' names and predictions on board in a two-column chart.

Step 3A: Practice (math and learning centers)

Challenge

Challenge students to observe where Chayo's and their home are located on a larger map that includes North and South America, consider the distances provided in the table below ("As a Crow Flies") and then modify their previous prediction for how long they think it will take to drive from school to Chayo's home.

Materials

- large map of Western Hemisphere which includes both North and South America, with a small blue paper house representing students' home area and a small green paper house representing where Chayo lives in Rio Negro, Colombia (near the Andes)
- one 12" ruler (for every two students)
- As a Crow Flies: Distance and Time
New York: 3,000 miles, 54 hours @ 7 hours/school day = 8 days
Chicago: 3,200 miles, 58 hours @ 7 hours/school day = 8.5 days
Seattle: 4,600 miles, 84 hours @ 7 hours/school day = 12 days
Note: These are relative times and distances as the crow flies to Rio Negro, Colombia. They are an approximation. Please add or subtract distances and times to represent the distance to your local area. Assume the school bus drives 55 mph and you will travel approximately 380 miles per day.

Procedure

1. Show students the map of North and South America and ask them which homes (theirs or Chayo's) they think are represented by the green and blue paper houses on the map. Tell students the correct answer.
2. Tell students what distance represents one mile

on this map, which covers a larger area than the previous map they looked at. To help them adjust their conception of the scale on this map, place a red school bus along the radius that you indicated a bus could take them in one school day.

3. Ask students to work with their partner to modify their earlier prediction on how many school days they think it will take to travel from their school to Chayo's home.
4. Add a third column to the chart you created earlier and add their new predictions.
5. Ask students to explain and show how they arrived at their new prediction and if they notice any patterns between the class's previous and new predictions.

Step 3B: Create (performance tasks related to standard indicators)

Challenge

Ask students to compare their final prediction with your answer and to imagine that they will begin traveling to Chayo's home tomorrow. Challenge the class to help you mark your journey on both a map and a calendar over the next week or so.

Materials

- large map of Western Hemisphere which includes both North and South America, with a small blue paper house representing students' home area and a small green paper house representing where Chayo lives in Rio Negro, Colombia (near the Andean Mountain Range)
- large calendar illustrating seven days of the week over a generic one-month period
- ten 2" yellow school buses
- ten 2" red school buses

Procedure

1. Tell students how many school days it will take them to travel by bus from their town to Chayo's home. Ask each pair of students to tell you how many more or fewer days their prediction was than your answer.
2. Tell students that they are going on an imaginary trip to Chayo's home. Each day they will tape a yellow school bus onto the large map of North

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How Far Away is a Tropical Rainforest?

and South America to indicate how far they would have driven by the end of that day. They will also put a red school bus on the large class calendar to indicate each day of their trip.

3. When they finally reach the end of their trip, ask students, "About how many school days of riding in a bus will it take to travel from their home to the tropical rainforest in Rio Negro, Colombia where Chayo lives?"

Step 4: Present (edit work/students orally present projects)

Challenge

Students write a class letter to Chayo describing their process for figuring out how far from her they live.

Materials

- easel paper
- art supplies

Procedure

1. After students have determined how long it will take to travel from their home to Chayo's home, tell students they will write a class letter back to Chayo explaining their findings.
2. As a group, using a piece of easel paper, ask students to dictate what you should write to Chayo so she can understand what you did to figure out how far away they live from her.
3. Ask students to draw a picture for Chayo of two of their favorite places they like to go to and indicate on their drawing how far away (in distance or time) from their home it is to each place.

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Assessment Rubric

Teacher observations of performance tasks with rubrics as listed below, as well as collected work samples.

Assessment Guidelines	3=P (Proficient)	2=S (Satisfactory)	1 = NW (Needs Work)
Student works well with partner to make predictions about how long it will take to drive different distances and explains his/her thinking behind the prediction.			
Student works well with partner to predict how far their school is from the Colombian rainforest using newly acquired knowledge. Student can explain how he/she came to this conclusion.			
Student actively (and accurately) participates in charting times and distances on calendar and map with appropriate help from the teacher.			
Student actively participates in writing letter to Chayo. Student draws at least two places they like to go and indicate how far it is from their home.			

Lesson 3

Biodiversity

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Cachalú Biological Reserve, Colombia

Concept

Rainforests are comprised of an extraordinary diversity of plants and animals. Diversity of life is an essential ingredient to healthy ecosystems

Essential Question

Which forest, a tropical rainforest or temperate forest, is more diverse, and by how much more?

Introduction

Objectives

1. Students will identify and group different types of insects and trees in their local forest.
2. Students will create visual representations of plants and animals of temperate and tropical rainforests in order to illustrate the relative differences in diversity.
3. Students will explain to classroom guests how the diversity of life in a temperate forest compares to the diversity of life in a rainforest.

Informational Introduction For the Teacher

This lesson challenges students to examine the diversity of their own forest and make comparisons to a tropical rainforest. By exploring and grouping tree and insect types in their local forest, students will develop and understanding of diversity. This data will be compared to what is known about tropical rainforests, helping students to appreciate the tremendous amount of life in the tropics.

Informational Introduction For the Students

How many different kinds of birds do you see in your neighborhood or school yard? When you see the birds perched at the bird feeder, you may notice some are brown, yellow, blue, and many other colors! Not only are their colors different, but so are their size, shape, beaks, and they even have different songs that they sing. There are all different species, or types, of birds and other plants and animals that live in a habitat, like your neighborhood, together. Forests are home to some of the greatest varieties of life! Tropical rainforests, like the one we are going to learn more about in

We know that the Rainforests have many forms of plants and animals.

Chart to compare ~

	Area	Forest in USA, New Jersey	Rain forest
Ants	1 tree	4 kinds	43 kinds
Birds	40 feet by 40 feet	10 kinds	50 kinds
Fish	1 small river	10 kinds	80 kinds
Trees	40 feet by 40 feet	10 kinds	100 kinds

Shared Reading-ccs 3.3, Math # -ccs 4.3, Data-ccs 4.4, Predicting-ccs 4.3

Colombia, contain the greatest diversity of life.

Step 1: Connect (the concept to prior knowledge)

Challenge

Students predict how many different types of insects and trees they will be able to find in a small area of a local forest and a tropical rainforest. Students collect data in their local forest and compare their findings with their original predictions. They then compare their finding with what others know about tropical rainforests.

Materials

- colorful ribbons to mark perimeter of study area
- plastic containers for capturing insects for observation for each student
- nets for collecting insects for each student

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Biodiversity



- two copies of Chart 1: Local Forest: Tree and Insect Diversity per student
- two copies of Chart 2: Tropical Rainforest: Tree and Insect Diversity per student

Procedure

1. Read aloud the Introduction for Students above.
2. Ask students to predict how many different kinds of insects and trees live in a 40' x 40' area of their local forest (compare the area to the size of your classroom). Help the class realize that counting different types of insects and trees is different from counting the total number of insects and trees. Explain that although your classroom is filled with a diversity of children—that is, children of different ages, sizes, colors, parents, etc.—they all are considered one type of animal called *Homo sapiens*. Have students write down their name and prediction on a piece of scrap paper and give it to you.
3. Show students a large picture of a spider and an insect of your choice. Ask students which one of these two animals is not an insect. Explain that insects must have six legs and three distinct body parts. Ask students to say aloud how they will know if they've discovered an insect in their area.
4. Show students a pile of woody and herbaceous (herb-like or non-woody) branches/twigs. Ask for volunteers to sort the twigs into two piles, one that they think came from trees and another that they think came from other plants. Elicit their ideas for telling the difference between a plant and a tree. Demonstrate the correct sorting (trees have woody branches and stems whereas non-tree plants have fleshy-like branches and stems).
5. Ask students to write down the number of different types of insects and trees they think they will find using Chart 1. Tell students they will compare their predictions to what they actually find.
6. Find a natural forested area to explore with your class and mark with colorful ribbons a 40' x 40' area that is representative of the larger forest.
7. Have students work in pairs and count the number of different trees and insects they find within the marked area. Ask students to share their ideas for how they plan to avoid counting the same item two or more times.
8. Tell students that insects may be found in the air, on trees and plants, and on the ground.
9. Tell students they have 15 minutes to find as many different types of insects in the area as they can. They should write this number next to their insect prediction number and circle it.
10. Tell students they have 15 minutes to find as many different types of trees in the area as they can. They should write this number next to their tree prediction number and circle it.
11. Ask a team of students to show the entire class all the different trees they found in the area. Ask another pair if they agree with the first team's count: Did they repeat any? Did they miss any?
12. After returning to the classroom, ask students to record their findings in the "Found" row under the insects and trees headings in their chart.
13. Help students figure out the differences between their predictions and what they observed.
14. Ask, "Why might our number of different types of insects found not really show the actual number of insects that live in your type of forest?"
15. Ask students to imagine how many different types of trees and insects they think could be found in the same size area of a tropical rainforest. Tell students to write their predictions in Chart 2.
16. After students have made their predictions, reveal the actual figures for a typical 40' x 40' plot of tropical rainforest (50 species of trees,* 312 species of insects**).

**Rainforest areas typically have 10 times more tree species than temperate forest patches of the same size. If students found five types of trees in their local forest, the corresponding rainforest figure is 50.*

***One hectare of rainforest may contain up to 42,000 species of insects. This equates to 17,000 species in one acre. Scaling down further, a 40' x 40' area contains 1,600 sq. ft. of space—approximately four percent of an acre. This equates to 312 species of insects (Source: Sayer, April Pulley. Tropical Rainforest, Twenty-First Century Books, New York).*

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17. Ask students to copy the "actual" numbers into Chart 3.
18. Tell students that they will use their charts later in their unit.

Additional references: Over in the Jungle – A Rainforest Rhyme by Marianne Berkes and Jeanette Canyon

Step 2: Literature/Discuss (give expert information book; ask questions)

Challenge

Students are read a book about tropical rainforests and learn that there are an impressive number of different types of plants and animals that live there.

Materials

- book: *A Walk in the Rainforest* by Kristin Joy Pratt

Procedure

While reading *A Walk in the Rainforest*,* ask questions such as:

- How many different types of animals and plants do you see in each picture?
- How is the diversity of the tropical rainforest different from the diversity in our forest?
- Why do you think tropical rainforests are more diverse than temperate forests?
- How can so many different types of animals and plants live in the rainforest at the same time?

**The introduction to A Walk in the Rainforest provides a good summary of the concept of biodiversity and describes how much diversity exists in rainforests. The following descriptions may also be helpful in expressing how diverse rainforests are: "The rainforest is an ideal place for many types of animals to live. There is plenty of water, shelter and food, and it is warm all year. These conditions mostly benefit the insects, which can grow and reproduce year-round, unlike the annual cycle in colder climates. Some insects grow very large. Walking sticks reach lengths of more than 12". Beetles can be as large as your hand and some moths are the size of small birds. But the really amazing thing about them is their variety. One tree in the Amazon can house 200 different types of insects—not 200 insects but 200 different types! Scientists believe many insects that live in the rainforest have yet to be named and catalogued." (Source: www.tropical-forests.com)*

Step 3A: Practice (math and learning centers)

Challenge

Students create simple bar graphs to illustrate the relative diversity of trees and insects between their local forest and a tropical rainforest.

Materials (per two students)

- large butcher paper for graph
- Chart 3
- Scotch tape
- approximately sixty 1" x 1" square pieces of paper
- markers or crayons

Procedure

1. Post a large representation of Chart 3 with the appropriate data.
2. Ask the following questions:
 - What do you notice about the difference between the number of insects/trees found in a tropical rainforest and a temperate forest?
 - How many more types of insects are found in the tropical rainforest than in a temperate forest?
 - How many more types of trees are found in the tropical rainforest than in a temperate forest?
3. Tell students that they are going to make a picture that will show a comparison between the number of different types of trees "actually" found by experts in a typical 40' x 40' area of their local forest and a tropical rainforest.
4. Give each pair of students a large piece of butcher paper. Ask them to copy your illustration of a large graph onto their paper. Tell them to make a quick sketch of a tree with "#" next to it to indicate number of tree types. Ask them to put a "Te" and a "TR" along the horizontal axis and explain that the "Te" stands for temperate forest and the "TR" stands for tropical rainforest.
5. Ask students to look at Chart 3 and tell you the actual number of different types of trees experts indicate are found in a 40' x 40' area of a temperate forest and tropical rainforest. Determine the average number of trees found and work with that for the rest of this activity.
6. Give pairs of students the materials listed above. Tell students that each 1" square piece of paper represents a different type of tree. Their goal is

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Biodiversity



to tape, end to end on their graphs, the number of different types of trees found in the temperate forest and tropical rainforest. Start by taping one tree on the horizontal axis, and add each tree type vertically.

7. When all of the 1" squares are taped to their graphs, ask students:
 - What does the graph tell you?
 - What other comparisons would you like to make between the diversity of temperate and tropical rainforests?

Step 3B: Create (performance tasks related to standard indicators)

Challenge

Students use real data to create 2- and 3-dimensional visual representations to illustrate the comparative diversity of different kinds of life in a temperate and tropical rainforest.

Materials

- data on plant and animal diversity
- art supplies

Procedure

1. Tell students that their challenge is to create a new way to illustrate the difference in diversity between the number of ants, birds, fish and/or trees in a tropical rainforest and a temperate forest.
2. Tell students they may choose a plant or animal from the list below and create a picture, terrarium or model to illustrate how many different types of plants/animals there are in each forest. For example, a student may draw a picture of two forests, one of a temperate forest containing 10 different types of trees, and one of a tropical rainforest containing 100 different types of trees (i.e., different color, shape, size, pattern, etc.). Other ideas include collections of origami birds, or constructed models of the plants and animals. Use the data chart below to guide their comparisons.

	Area	Temperate	Tropical
Ants	<i>1 tree</i>	<i>4 types</i>	<i>43 types</i>
Birds	<i>40' x 40' area</i>	<i>10 types</i>	<i>50 types</i>
Fish	<i>small river</i>	<i>10 types</i>	<i>80 types</i>
Trees	<i>40' x 40' area</i>	<i>10 types</i>	<i>100 types</i>

3. Help students figure out what types of supplies they can use to represent the different types of plants or animals in their comparisons.

Step 4: Present (edit work/students orally present projects)

Challenge

Students display their projects to older students and family members and explain what they know about the biodiversity of the two types of forest.

Materials

- exhibits created in Step 3B






Procedure

1. Designate a space for each student in the class to set up his/her project.
2. Tell students that they will be expected to explain several aspects of their project:
 - Which part of the project represents the temperate forest and which represents the tropical rainforest?
 - Which type of forest contains a greater diversity of life?
 - If diversity in this project doesn't mean different sizes of the same animal, then what does diversity mean?
3. Invite members of the school and family community to view the exhibitions.

Lesson 3

K






Chart 1: Local Forest: Tree and Insect Diversity

	 <p>Trees number of types</p>	 <p>Insects number of types</p>
 <p>Guessed</p>		
 <p>Found</p>		
 <p>Actual</p>		

Lesson 3



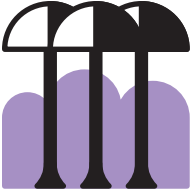

K

Chart 2: Tropical Rainforest: Tree and Insect Diversity

	 <p>Trees number of types</p>	 <p>Insects number of types</p>
 <p>Guessed</p>		
 <p>Found</p>		
 <p>Actual</p>		

Lesson 3

Chart 3: Local and Tropical Rainforest:
Tree and Insect Diversity

	 Trees number of types	 Insects number of types
 Rainforest Actual		
 Temperate Forest Actual		

Lesson 3

Assessment Rubric

Teacher observations of performance tasks with rubrics as listed below, as well as collected work samples.

Assessment Guidelines	3=P (Proficient)	2=S (Satisfactory)	1 = NW (Needs Work)
Student works well with partner to collect data on diversity of insects and trees in their local forest. Student is thorough in exploring, and works hard at sorting trees and insects into different groups.			
Student explains how initial predictions compared to actual data. Student can determine from data which forest has more diversity of trees and insects.			
Student accurately represents the provided data in 2D or 3D form. The project includes both rainforest and temperate forest representation. Student uses creativity to compare the chosen plant/animal.			
Student is able to explain how the representation illustrates the difference in diversity between the two forests. Student is able to explain which forest sustains a more diverse population of the chosen plants/animals and by how much.			

Lesson 4

The Long Road to Coffee

K

Cachalú Biological Reserve, Colombia

Concept

Coffee goes through many processes during its transformation from a plant in Colombia to being sipped in a kitchen in New York.

Essential Question

How can kids help adults understand how their coffee really got in their cup?

Introduction

Objectives

1. Students organize picture cards in the sequence of how food gets from a local farm to their home.
2. Students organize picture cards into a sequence to illustrate how coffee grown in Colombia gets to their home.
3. Students compare the differences between the steps locally- and foreign-grown produce takes to get to their home.
4. Students create an exhibit to illustrate to their parents how Colombian coffee beans make their way from the coffee fields to their home.

Informational Introduction For the Teacher

This series of lessons challenge students to compare and contrast how locally-grown apples and coffee grown in Colombia get to their kitchen. Coffee grown some 3,000 miles away goes through several processes as it travels from being a plant in Colombia to students' homes. Understanding how this process works will help students realize the interconnectedness of their community and Colombia and begin to create an understanding of the differences between locally- and non-locally-grown produce.

Informational Introduction For the Student

How does food grown in a farm near where we live get from the farm to our dinner table? How does coffee that is grown 3,000 miles away in Colombia (where Chayo lives) get to your home? Food goes through many processes and travels in all sorts of vehicles like tractors, boats, planes, trains, trucks and cars just to



get to your kitchen table. Your challenge is to compare how food grown nearby and coffee grown in Colombia compare in terms of how they get to your homes.

Step 1: Connect (the concept to prior knowledge)

Challenge

Challenge students to reveal their ideas for how locally-grown apples get to their kitchen.

Materials

- large map of your local region marked with a blue house for your students' home area
- one set of 4" x 6" cards representing the path that a locally-grown apple travels to get to the students' home (cards: apple tree, apple picker tractor pulling large supply of apples, apple mill at same farm [washing and packaging for distribution], truck,

Lesson 4

The Long Road to Coffee



grocery store, automobile going to store, family buying food at a grocery store, automobile bringing food to home)

- bag of locally-grown apples (one per student)
- one paper cut-out of a red apple (to mark location of locally-grown apples on regional map)

Procedure

1. Show your students the locally-grown apples. Using the map of your region, ask students where they think these apples came from. After a few guesses, tell them that they come from a local apple orchard about x minutes away from school. Ask if anyone can find the orchard on the map. Place a paper cut-out of a red apple on the map indicating the orchard's location.
2. Reveal the 4" x 6" cards that are placed randomly on a board for all to see. Ask students to figure out with a partner how the cards should be ordered to illustrate how the apples from their local orchard get to their home.
3. Invite partners to come up to the board and arrange the cards.
4. After a pair arranges the cards, ask if another group has a different order.
5. Invite other students to reveal and explain their sequence.
6. Tell students to watch you reorder the cards (if necessary) according to the actual pathway the apples take. Ask students if they noticed any differences between how you and they arranged the cards. Ask them what surprises them about the path and processes these apples go through to get to their home.

Step 2: Literature/Discuss (give expert information book; ask questions)

Challenge

Review the story *Chayo's Andean Home*, an original Rainforest Alliance story, and decipher true and false statements in order to consider where the coffee that ends up in your home comes from.

Materials

- story: *Chayo's Andean Home* (www.rainforest-alliance.org/pictures/chayos-andean-home)

Procedure

1. Tell students that you are going to read them some passages from Chayo's story that have to do with coffee. Tell them that you are going to make a number of statements after reading, some of which will be true, and others that will not be true. Tell them their challenge will be to figure out which statements are true and to correct what's wrong about the statements that are false.
 - Coffee is grown in tropical rainforests in Colombia. (*True*)
 - Coffee harvest lasts four months from November to May. (*False. Coffee harvest lasts five months from December to April*)
 - Coffee comes from a plant (tree) that produces orange berries. (*False. The berries are green and red*)
 - Coffee plants on Chayo's farm grow in an open, sunny field like corn is grown around here. (*False. Coffee plants are grown beneath shade trees*)
 - Birds don't like the smell of coffee berries and stay away from Chayo's shady coffee plants. (*False. We don't know if birds like the smell of coffee berries. Lots of birds hang out around the coffee plants under the shade trees*)
 - Only the green berries are picked. (*False. Only the red berries are picked*)
 - Inside the red berries is liquid coffee, like the liquid found in coffee cups. (*False. Inside the red berries are beans*)
 - The beans are laid out on the ground to dry in the sun. (*True*)
2. Ask students these additional questions:
 - Do you know of any coffee farms around our area? If so, where?
 - Have you ever seen a coffee farm? If so, describe what you saw.
 - Why do you think coffee isn't grown in cooler areas like where we live?
 - What five questions would you want to ask Chayo and her father about how they make coffee?

Step 3A: Practice (math and learning centers)

Challenge

Challenge students to determine how the coffee grown on Chayo's farm gets to their home. Then challenge

Lesson 4

The Long Road to Coffee



them to compare and contrast the two pathways they have explored so far.

Materials

- large map of Western Hemisphere which includes both North and South America, that can be seen by the entire class
- a blue paper house marking your students' home area and a coffee bean taped near Chayo's home in the Andean Mountain Range
- regional map used in Step 1
- one can of Colombian coffee
- 4" x 6" cards representing the path that coffee travels from Chayo's farm in Colombia to your students' homes (cards: coffee tree, berries being picked, beans being extracted from berries, farmer raking beans for drying in sun, truck, industrialized coffee roasting or grinding factory, truck, packaging plant, truck distribution center, truck, plane/boat, truck, United States distribution center, truck, store, car going to store, customer buying coffee at store, car going home)
- 4" x 6" cards used in Step 1
- supplemental information about coffee conservation (*see additional resources in the Supplemental Materials*)

Procedure

1. Show your students a large map of the Western Hemisphere.
2. Ask a student to tape a coffee bean on the area to indicate where Chayo lives.
3. Ask another student to tape the blue paper house to indicate where they live.
4. Reveal the 4" x 6" cards that are placed randomly on a board for all to see. Ask students to figure out with a partner how to order the cards to illustrate how the coffee grown on Chayo's farm gets to their homes.
5. Invite partners to come up to the board and arrange the cards. After a pair arranges the cards, ask if another group has a different order.
6. Invite other students to reveal and explain their sequence.
7. Tell students to watch you reorder the cards (if necessary) according to the actual pathway the

coffee takes. Ask students if they noticed any differences between how you and they arranged the cards. Ask them what surprises them about the path and processes coffee goes through to get to their home.

8. Display both sets of cards, with the apple sequence above the coffee sequence. Try to line up similar steps in both, one on top of the other.
9. Tell students that you are going to see how many times you can go around the room and have each of them say something new that compares the path of the local apples with the path of the coffee to their home (ex: "The coffee travels in more different kinds of vehicles than the apples," or "The apples go through fewer steps to get to our home than the coffee once it is removed from the tree."). If you want, you can offer each of them an apple if they can go around at least 1.5 times without repeating each other.
10. Encourage them to do simple counting comparisons when possible.

Step 3B: Create (performance tasks related to standard indicators)

Challenge

Challenge your students to create a new coffee can label that illustrates the many steps Colombian coffee takes to get to their homes.

Materials

- 16 oz. coffee can (one per student)
- colored paper and art supplies
- scissors
- for each student doing the alternative procedure: poster board divided into 8–12 sections (this paper will represent a storyboard)
- tape, glue
- lots of magazines that can be cut up
- 4" x 6" cards depicting the correct sequence of coffee from Colombia to students' homes

Procedure

1. Tell students that they are going to create a new label for a coffee can that they will bring home to educate their parents about the many steps coffee goes through to get to their home. The labels should surround the entire can. Welcome them to

Lesson 4

The Long Road to Coffee

K

use the top and bottom of the can too.

2. Challenge students to use the 4" x 6" cards as a reference to create their new labels.
3. Ask students to tell you what you should name the coffee and where you should write the name on their label.

Alternative Procedure

1. Give each student a storyboard and drawing tools.
2. Ask your students to draw in order each step of the coffee process on this storyboard. The children should draw a picture in each square on the paper.

Step 4: Present (edit work/students orally present projects)

Challenge

Invite your students to exhibit their respective coffee labels (or storyboards) with each other before bringing them home. Then challenge your students to teach their parents how coffee grown in Colombia makes its way to their coffee cup.

Materials

- newly-labeled coffee cans
- student-created storyboards

Procedure

1. Have students exhibit their coffee cans around the room. Invite students to roam around the room like they would an art exhibit, to admire each other's labels.
2. Tell the students that they can take their new coffee cans home to help teach their parents about what they just learned.
3. Send your students' coffee cans and storyboards home to their parents with a note explaining what the students were learning about. On this note, encourage the parents to ask their child the following questions. Review these questions with your students first.
 - Where is coffee grown? (*Coffee is grown in places that are hot and humid like the tropical rainforests in Colombia*)
 - Does coffee come from a bush? (*No. Coffee comes from a shrub-like tree that grows 10–12 meters high*)

- If a coffee farmer saw green and red berries on the coffee tree, which ones should they pick? (*The red berries*)
- What's inside the berries? (*Coffee seeds*)
- How long does the coffee harvest last? (*About six months, from December through May*)
- Is it better for coffee trees to grow under shade trees or in the open like corn? (*Coffee plants should grow beneath shade trees, not only to help the coffee plants survive, but to create a place that birds will be protected and can feed*)
- Are the beans laid out on the ground to dry in the sun? (*Yes*)
- Do other animals, like reptiles, depend on coffee too? (*Yes, they do. The coffee plants provide habitat for birds, insects, mammals and reptiles*)

Read more about Rainforest Alliance Certified coffee at www.rainforest-alliance.org/articles/rainforest-alliance-certified-coffee.

4. In your note to the parents, tell them that their child expects them to share at least five things they learned from their child's coffee label or storyboard that they didn't know before about how coffee gets from Colombia to them.

Extensions

1. Chart the path of other fruits and vegetables grown in the United States and Colombia, such as potatoes, pineapples, oranges and corn.
2. Let your students smell and touch the ground coffee, and look at the pictures of the coffee plant and beans. Remind them to think about this coffee's journey.
3. Using the list of rainforest products provided in the supplemental information, ask your students to determine if there are any other products that they use in their everyday lives that make the same type of journey.
4. Read "Rick and the Gang Find Out Why Some Coffee is Bad for Birds" to your students and begin a discussion on this topic. Information about this article can be found in the Supplemental Materials.

Lesson 4

Assessment Rubric

Teacher observations of performance tasks with rubrics as listed below, as well as collected work samples.

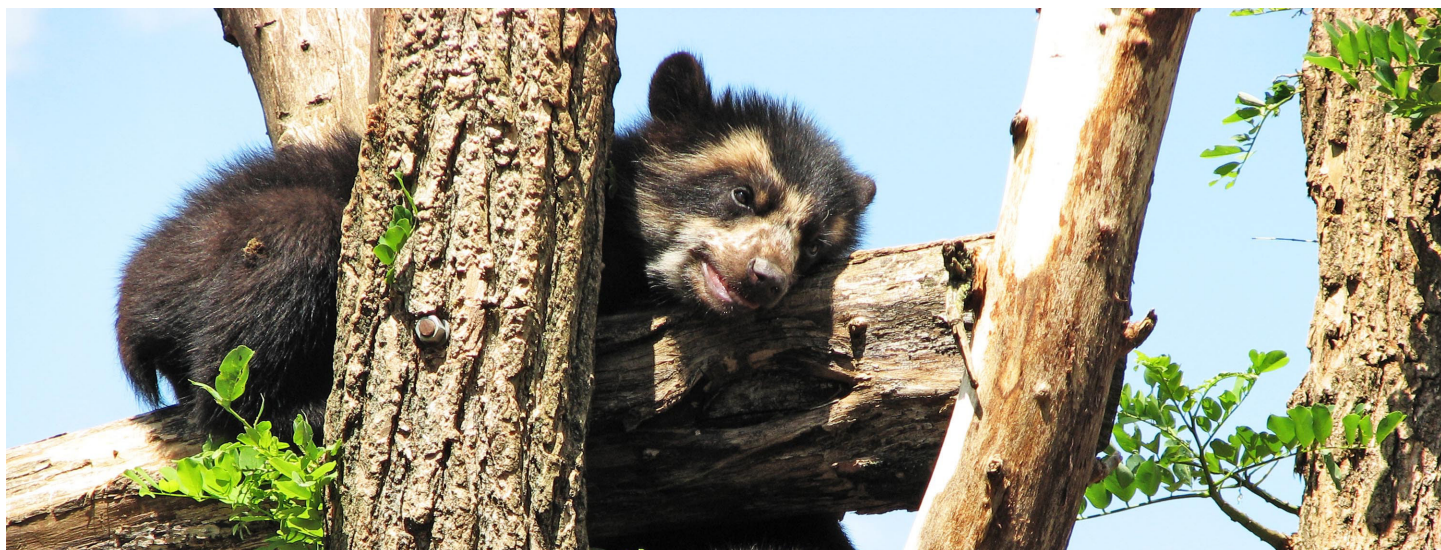
Assessment Guidelines	3=P (Proficient)	2=S (Satisfactory)	1 = NW (Needs Work)
Student works well with partner and focuses on task to reveal their current thinking about the process it takes for locally-grown apples to get to their home.			
Student actively shares his/her ideas for how coffee gets from Colombia to his/her home.			
Student creatively and accurately illustrates the coffee process by creating a new coffee can label or storyboard.			
Student is able to answer many of the questions about how coffee is produced and the process it goes through to get from Colombia to their home.			

Kindergarten



Supplementary Materials

- **Teacher Summary**
- **Resources**
- **National Standards**



Colombia is an extraordinarily geographically diverse country, with landscapes ranging from coastal pasturelands and rainforests, extensive plains and low tropical forests, to varied ecosystems on the Andean mountain range. In what is only 0.7% of the world's continental area, it hosts almost 10% of the world's biological diversity.

Nearly 80% of the population of Colombia is located on the three branches and numerous valleys of the Andean mountain range, which crisscrosses the country. Part of the population is involved in agricultural production (primarily coffee) and cattle ranching. The subsistence economy of 70% of the rural population has turned to wood extraction, harvesting vegetable fibers and hunting activities. But, because of the long sociopolitical crisis more of the population is migrating to the already over-populated urban centers.

Fundación Natura, the Rainforest Alliance's partner in Colombia, is a local conservation organization founded in 1983 which initially focused its conservation and community work on the tropical lowland forests in the Chocó and Amazon regions. These areas were identified early on as hotbeds of biodiversity. In addition, the forests remained largely intact, making them obvious areas for conservation. Later, Fundación Natura identified the eastern area of the Oriental mountain range as a high priority area for conservation due to the quickly diminishing oak forests found along its slopes.

Andean oak forests are said to host an even higher biodiversity (more 30,000 plant species) than the Amazon regions, in smaller areas and at high altitudes (5,400 to

8,300 ft above sea level) with temperatures that reach 54°F—unusually cold for tropical species. Oak trees establish complex relationships with other important plant species, like smaller shrubs, palms and epiphytes to create a uniquely biodiverse environment that is host to 225 species of birds. Some of the more exceptional bird species are: gallito de roca (*Rupicola peruviana*), las pavas de monte (*Penelope montagni*) and hummingbirds. The region also boasts more than 70 species of mammals, many endangered, including the spectacled bear (*Tremarctos ornatus*), white-tailed deer (*Odocoileus virginianus* y *Mazama rufina*) and the river otter (*Lutra longicaudis*).

Although this area of the country has not suffered from any major population migrations, the traditional land use techniques of slash-and-burn agriculture in fragmented forest areas have endangered an important and unique high-altitude Páramo and upper montane forest system. Páramo, which is found only at the highest elevations, is a uniquely Andean ecosystem that resembles the Swiss Alpine forests. The vegetation is low, plants and animals are small in size (to minimize loss of heat) and must be able to adapt to temperatures below freezing. Working with the residents of the area, Fundación Natura was able to convince the government to declare the area a natural protected zone in 1993 under the name of Santuario de Flora y Fauna de Guanentá - Alto Río Fonce. Additionally, in 1997, Fundación Natura bought nearly 1,830 acres (740 hectares) of forest and 50 acres (20 hectares) of open space next to a park in the municipalities of Encino, Charalá and Coromoro), an area that was going to be turned into cattle farm. This park was named Cachalú Biological Reserve. Fundación



Natura was also able to secure the most vulnerable area at the birth of the Virolin River.

Fundación Natura has obtained support from diverse communities and government institutions. Its main projects include identifying alternative uses of forest resources, recuperating local traditions regarding resource use, characterizing the production systems, diagnosing hunting activity, organizing environmental education planning workshops, and finally, giving technical support to the government's Parks Unit of the Ministry of Environment who is in charge of the Park.

Fundación Natura has put together a larger program called "Programa Andes Tropicales," which aims at identifying a conservation and sustainable use model that can be applied in other regions with similar characteristics. The area of action includes the 1,830 acres of the Cachalú Biological Reserve mainly composed of high Andean oak forest, plus, the areas around it (a total of 323,708 acres or 131,000 hectares) defined as pasture land which contains secondary forests in different regeneration stages.



1



2



3

Resource Index

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

www.rainforest-alliance.org/curricula/resources

Slideshow

The Curriculum site provides a slideshow and script about the Cachalú reserve in Colombia that includes background information about the animals, people and landscape of this region. The slideshow can be downloaded for viewing in the classroom, printed out and read as a story, or viewed online with the students.

www.rainforest-alliance.org/pictures/cachalu-colombia

Unit-Specific Stories (1)

The Rainforest Alliance has developed two original stories for use with these units, available in English, Spanish and Portuguese. The stories are available to download and print or can be viewed on-screen.

- *Chayo's Andean Home*
www.rainforest-alliance.org/pictures/chayos-andean-home
- *Clara and the Armadillo*
www.rainforest-alliance.org/pictures/clara-and-the-armadillo

Species Profiles (2)

The species profiles, available to view on screen or download from the beginning of the unit or the Resource Index, include photos, habitat, foraging behavior, group relationships, threats and many more facts.

- Andean condor
- cock-of-the-rock
- leafcutter ant
- nine-banded armadillo
- red-eyed tree frog
- spectacled bear
- praying mantid

www.rainforest-alliance.org/species

Certificate of Accomplishment

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

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

Rainforest Products

Check out a summary of products that we use in our everyday lives that originate in rainforests. Both teachers and students will find information on the products found in their homes and supermarkets that either originated in tropical forests or are currently produced there.

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

Conservation Coffee Summary

Download this summary, which includes the cultural, environmental and social impact that coffee has had on the Americas, the connection between coffee farms and wildlife, and a glossary of relevant terms.

www.rainforest-alliance.org/sites/default/files/uploads/pdfs/curricula/conservation-coffee.pdf

Ranger Rick Article (3)

Download "Rick and the Gang Find Out Why Some Coffee is Bad for Birds," a colorful article from the National Wildlife Federation's *Ranger Rick* magazine which describes the impact some coffee harvesting techniques have on bird habitats.

www.rainforest-alliance.org/sites/default/files/uploads/pdfs/curricula/ranger-rick-coffee.pdf

Fundación Natura (Nature Foundation)

Check out these online resources for more information about the Rainforest Alliance's partner group in Colombia:

www.rainforest-alliance.org/adopt/projects/colombia
www.natura.org.co

Thinking and Reasoning

Topic 1

Level 1: Grade K–2

- Uses a variety of strategies in the problem-solving process
- Uses whole number models (pattern blocks, tiles or other manipulative materials) to represent problems

Topic 4

Level 1: Grade K–2

- Understands and applies basic and advanced properties of the concept of measurement
- Understands the concept of time and how it is measured
- Knows process for telling time, counting coins and measuring length, weight and temperature, using basic standard and nonstandard units

Topic 6

Level 1: Grade K–2

- Understands and applies basic and advanced concepts of statistical data analysis
- Understands that observations about objects or events can be organized and displayed in simple graphs

Standard 3

Level 1: Grade K–2

- Effectively uses mental processes that are based on identifying similarities and differences.
- Classifies objects by size, color, or other significant characteristics.
- Describes and compares things in terms of number, shape, texture, size, weight, color, motion, sound and behavior.

Standard 5

Level 1: Grade K–2

- Identifies simple problems and possible solutions

Life Sciences

Standard 5

Level Pre-K: Benchmark 2

- Understands the structure and function of cells and organisms
- Knows that living things go through a process of growth and change
- Understands how human actions modify the physical environment
- Effectively uses mental processes that are based on identifying similarities and differences

Standard 6

Level 1: Grade K–2

- Understands relationships among organisms and their physical environment
- Knows that living things are found almost everywhere in the world and that distinct environment support the life of different types of plants and animals

Standard 7

Level 1: Grade K–2

- Understands biological evolution and the diversity of life
- Knows that there are similarities and differences in the appearance and behavior of plants and animals