

MARIE SELBY  
BOTANICAL  
GARDENS

Selby Gardens Rainforest Field Studies

Grades 3-5



Photo: Nicoleta-Cristina Stoian

3rd Grade: Life in the Layers  
4th grade: Rainforest Producers and Consumers  
5th Grade: Journey into the Rainforest

Curricular units designed & prepared by Jessica Gardner



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# MARIE SELBY BOTANICAL GARDENS

3rd Grade: Life in the Layers  
4th Grade: Rainforest Producers and Consumers  
5th Grade: Journey into the Rainforest

## 3-5 Content Activities:

Reading/Writing

Math

Science

Art

## 3-5 Resources (websites):

- <http://philip.greenspun.com/cr/rara/> (“Journey through the Rain Forest” included)
- [http://www.ehow.com/video\\_9374\\_make-terrarium.html](http://www.ehow.com/video_9374_make-terrarium.html)
- <http://www.brainpop.com>
- <http://rainforests.mongabay.com/0405.htm>
- <http://www.exploringnature.org>
- <http://www.cpalms.org>
- <http://www.pbs.org>
- <http://www.rain-tree.com/facts.htm>
- <http://www.mobot.org/MBGnet/sets/temp/whats.htm>
- <http://www.eduweb.com/rain/rainfall.html>
- <http://kids.mongabay.com/elementary/002.html>
- [http://www.youtube.com/watch?feature=player\\_embedded&v=C1Ib0-BIBKU](http://www.youtube.com/watch?feature=player_embedded&v=C1Ib0-BIBKU)
- Fairchild Tropical Botanic Garden: <http://www.fairchildgarden.org>
- LEARN NC: <http://www.learnnc.org>
- Eden Project: <http://www.edenproject.com>
- Scholastic: <http://teacher.scholastic.com>

## 3-5 Resources (literature):

- “Layers of the Rainforest” Article, Vocabulary Worksheet and Venn diagram (included)
- “Products of the Rainforest” worksheet (included)
- Ingredients for the “Rainforest Cookies” (included)
- *Welcome to the Green House* by Jane Yolen
- *Nature’s Green Umbrella* by Gail Gibbons
- *The Rainforest Grew All Around* by Susan K. Mitchell
- *Where the Forest Meets the Sea* by Jeanine Baker
- *The Lorax* by Dr. Seuss (book & film)



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- *The Great Kapok Tree: A Tale of the Amazon Rain Forest* by Lynne Cherry

## 3<sup>rd</sup> Grade: Life in the Layers

### Tree-mendous Selby Vocabulary for 3rd Grade:

- *Biodiversity* - Variety among and within plant and animal species in an environment.
- *Canopy* - a thick, overhead layer of the rainforest formed by the branches and leaves of the tall trees. It is the “ceiling” of the forest.
- *Condensation* - when water changes from a gas to a liquid.
- *Conservation* - protection of natural resources from waste, loss or harm.
- *Decomposers* - organisms, such as bacteria, fungi and insects, that break down dead plant and animal materials to be recycled and reused.
- *Drip tip* - the end of a leaf that comes to a point, allowing rainwater to drip off.
- *Ecosystem* - a community of animals, plants, microorganisms, and their physical environment that interact together
- *Equator* – an imaginary line on the Earth's surface equidistant from the North & South Poles, dividing the Earth into the Northern & Southern Hemispheres.
- *Emergent Layer* - the tallest layer of trees in a rainforest, they typically break through the canopy and can reach up to 200’.
- *Epiphyte* - a plant that lives on the surface of another plant, especially the trunk and branches. It does not harm its host plant.
- *Evaporation* - when moisture changes from liquid to gas.
- *Forest Floor* - the ground layer of the rainforest, made up of tree roots, soil, decaying matter and decomposers.
- *Habitat* - the natural environment of an organism.
- *Humidity* - the amount of water vapor in the air.
- *Interdependence* - the concept that everything in nature is connected, and cannot survive without the help of other plants, animals and abiotic factors (i.e., sun, water and air).
- *Leaf Litter* – decaying leaves and other plant material.
- *Liana* - a long-stemmed woody vine that climbs trees or other plants to reach the sun
- *Precipitation* - the forms in which water falls to the ground as rain, sleet, snow and hail.
- *Transpiration* - the loss of water from plant surfaces (usually leaves).
- *Tropics* - hot, humid zone between the Tropic of Cancer and the Tropic of Capricorn.
- *Understory* - the layer growing under the canopy and above the forest floor, made up mostly of young trees and shrubs.
- *Water Cycle* - the circulation of earth’s water.



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# MARIE SELBY BOTANICAL GARDENS

## Pre Visit Activity: Layers of the rainforest

### Objectives:

Students will:

- Understand that rainforests have four distinct layers: forest floor, understory, canopy, and emergent.
- Study the different animals and plants that live in each layer.
- Create a (vertical) class mural showcasing the distinguishing features of each layer in the rainforest

### NGSS:

SC.3.L.14.2, SC.3.L.15.1, SC.3.L.14.1, SC.3.L.17.2, SC.3.L.15.2, VA.3.S.1.2, VA.3.S.2.2, VA.3.S.3.1

### CCSS:

LACC.3.RI.1.1, LACC.3.RI.2.4, LACC.3.RF.4.4, LACC.3.SL.1.1, LACC.3.SL.2.4, LACC.3.W.1.3

### Materials:

- Copies of “Layers of the Rainforest” article (below), Vocabulary Worksheet and Venn diagram.
- Paints, brushes, scissors, four large pieces of paper or cardboard, images of rainforest organisms
- Resource materials (Internet, encyclopedias, newspaper articles, etc.)

### Procedure:

1. Introduce key vocabulary: *habitat, forest floor, understory, canopy, emergent, epiphyte, leaf litter, liana, decompose*.
2. Have students read the “Layers of the Rainforest” article individually or in pairs and complete the vocabulary worksheet.
3. Ask the students to think of animals and plants that live in the different layers. Have them create the Venn diagram.
4. Divide students into four groups. Tell them that each group is responsible for depicting one layer of the rainforest on the class mural. They should label all plant and animal life for identification.
5. After each group has completed their layer of forest, put each piece in order and hang the mural in the classroom.

### Extension:

6. Ask the students to choose a plant or animal that lives in their layer of the rainforest and write a story from the point of view of the animal or plant. Their stories will be fictional, but should include facts about the rainforest and details about the layer where the plant or animal lives.
7. Ask student groups to read their stories to the class and allow time for questions and answers. Which layer would students like to live in?



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## Layers of the Rainforest

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Did you know that rainforests are home to over half of the world's plants and animals?

The trees of the tropical rain forest provide shelter for many animals, such as birds, monkeys, cats, butterflies, insects, snakes, and frogs. Because most trees in the rain forest are very tall, they are equipped to hold many different animals. Some animals live at the bottom of the trees, where it is dark and damp. Others live towards the top of the trees where it is light.

Picture a tree in the rainforest and divide it into four layers: the bottom layer is the **forest floor**; the second layer is the **understory**; the third layer is the **canopy**; and the fourth is called the **emergent layer**.

The **emergent layer** is where the treetops join together to form the roof of the forest. This is where trees soak up the most sun. The harpy eagle lives and hunts here. Other animals, such as the toucan, sloth, macaw, and parrot can be found here as well.

The **canopy** is a bright and colorful place, full of animals and plants. That's right; there are plants that grow on trees! These plants are called **epiphytes**. Epiphytes grow along the branches of a tree. They dangle their roots and collect moisture from the damp air; they also get nutrients from decayed leaves, algae, and moss.

The canopy is also home to many wonderful creatures such as howler monkeys, spider monkeys, orangutans, sloths, and fruit bats. These animals love to eat the sweet fruit that grows in the canopy. Other animals that live in the canopy are tree frogs, parrots, hummingbirds, butterflies, toucans, and bees.

The **understory** is darker than the canopy as it is farther away from the sun. Boa constrictors, emerald tree snakes, anole lizards and monkeys cling to **lianas**. Lianas (thick, woody vines) grow up trees and act as ladders for animals to climb up from the forest floor to the understory. Many cats, such as the jaguar, leopard and ocelot, hide in the branches of the understory waiting to pounce on their prey below.

The **forest floor** is the darkest and dampest part of the forest. Not much sunlight penetrates through here, so little plant life grows. The soil is covered by **leaf litter** (decayed leaves), which provides nutrients for tree roots. Leaf cutter ants, spiders, termites, mice, anteaters, jaguars, leopards, panthers, and gorillas live here.

Now we know how just one tree in the rain forest can provide many different habitats for various animals and plants to live.



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## Layers of the Rainforest Vocabulary Matching

*Draw a line from the definition to the word that it best describes*

Woody vines that are rooted in the ground, grow up a tree and act as ladders to higher layers.

CANOPY

Plants that grow along branches of a tree and let their roots dangle in the air. These plants get nutrients from moss, algae, and decayed leaves.

LEAF LITTER

Underneath these decaying leaves is thin soil with few nutrients. Tree roots are shallow so that they can absorb nutrients from this feature of the forest floor.

FOREST FLOOR

This is the top layer, or "roof," of the rainforest. It is home to the harpy eagle.

EPIPHYTES

This is the layer beneath the canopy and above the forest floor. It is shaded from the sun by the leaves.

EMERGENT LAYER

This is the bottom and darkest layer of the rainforest, home to insects and fungi, rotting leaves, tree trunks, and roots.

HABITAT

The particular environment in which a plant or animal usually lives

UNDERSTORY

This is the second highest layer of the rainforest, home to monkeys, sloths, birds, butterflies, insects, and lizards.

LIANAS



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## Layers of the Rainforest Venn Diagram

Draw three circles that intersect at the center. Label one **Forest Floor**, the second **Understory**, and the third **Canopy**. Write in the organisms where they belong on the Venn diagram. Remember, some organisms live in more than one layer of the rainforest.

boa constrictor

parrot

leaf cutter ants

lianas

fungi

emerald tree snake

ocelot

orangutan

anteater

passion flower

butterfly

leaf litter

anole lizard

spider monkey

fruit bat

toucan

sloth

leopard

epiphytes

tree frog

orchids



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## Pre-Visit Activity: *Experiencing the Rain Forest through the Senses*

### Objective

Students will:

- Read a journal describing life in the rainforest
- Identify descriptive words in the journal and create their own rainforest poems or journals.

**NGSS:** SC.3.L.17.2, SC.3.L.17.1, SC.3.L.15.2, SC.3.L.15.1, SC.3.L.14.2,

**CCSS:** LACC.3.RI.1.1, LACC.3.RI.2.4, LACC.3.L.1.1, LACC.3.SL.1.2, LACC.3.L.2.3, LACC.3.SL.2.4

### Materials:

- Internet access to site <http://philip.greenspun.com/cr/rara/>
- Printouts of the journal from the website above

### Procedure:

1. Share printouts of the journal “Journey through the Rain Forest” from the website with your class. Ask students to read the journal about the photographer’s experience in the rainforest, underlining descriptive phrases. (You may opt to read the journal as a class or in small groups, and then have them write down descriptive phrases.)
2. As a class, review the words and phrases they noticed and write them on the board. How does the author use the different senses, such as sight, hearing, and smell, to describe the rainforest? Identify the different words you listed on the board and label them as nouns, verbs, adjectives, or adverbs.
3. Ask the students: What new things have you learned about the rainforest?
4. After the discussion, have students write their own poem or journal about the rainforest using some of the descriptive words they identified. Have students share their poems or journals with the class.

### Extension:

5. Take the class on a nature walk around the campus to record what they see, hear, smell, and feel and describe their campus environment. Label the nouns, verbs, adjectives, or adverbs. How are their descriptions of the campus environment different than that of the rainforest environment?
6. After the discussion have students write another poem or journal about their campus environment using some of the descriptive words they identified.



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## Post-Visit Activity: Observing Life in a Terrarium, aka Itty Bitty Biome

### Objectives

Students will:

- Create a terrarium model to observe plant growth.
- Record observations on how plants respond to environmental conditions.
- Observe the water cycle in an enclosed environment.

**NGSS:** SC.3.L.14, SC.3.L.14.2, SC.3.L.15.2, SC.3.L.17.2, SC.3.N.1.1, SC.3.N.1.2, SC.3.N.1.3, SC.3.N.1.6, SC.3.N.3.2, SC.3.N.3.3

**CCSS:** LACC.3.RI.1.1, LACC.3.RI.2.4, LACC.3.RI.3.9

### Materials:

- Venn diagram
- a large clear plastic container or jug with a lid, one per team
- gravel
- small plants suited to your growing conditions
- rocks, branches, moss
- plastic wrap if the containers don't have lids
- screen or stocking
- science journal
- Internet access: go to [http://www.ehow.com/video\\_9374\\_make-terrarium.html](http://www.ehow.com/video_9374_make-terrarium.html)
- *Welcome to the Green House* by Jane Yolen and *Nature's Green Umbrella* by Gail Gibbons.

### Procedure:

1. Introduce vocabulary: terrarium, water cycle, condensation, precipitation, evaporation, habitat
2. Introduce the lesson by reading *Welcome to the Green House* by Jane Yolen and *Nature's Green Umbrella* by Gail Gibbons. Discuss the different habitats and the animals described in both picture books.
3. Use a Venn diagram to compare the rainforest habitat in *Welcome to the Green House* to the habitats described in *Nature's Green Umbrella*. Display the diagram on a smart board, projector, or make copies for students to use and fill in information. Tell the students that they will be making a terrarium to observe plant life.
4. Divide your students into 4 cooperative learning groups to create a diverse mix of students.
5. Watch a video on eHow on how to prepare a terrarium.
6. Model, step by step, the addition of materials into the terrarium:
  - a) Add a layer of pebbles to provide drainage at the bottom of the container.
  - b) Cover pebbles with about two inches of topsoil.
  - c) Add leaf litter, which acts as a source of food if you are adding worms or insects.
  - d) Place a few rocks in the terrarium.



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- e) Add branches, moss and small plants (i.e.: small succulents, epiphytes, ferns – a good local source is Tropiflora).
  - f) Can add action figures, small plastic animals, glitter, bright pebbles, etc...
  - g) Slightly moisten the terrarium with water (Be careful not to use too much water.)
  - h) Cover the opening with a piece of plastic.
  - i) If you add worms or insects to the terrarium, cover the top with a screen to let air through.
  - j) Mist the soil with the water from the squirt bottle. Place in an undisturbed area for daily observation.
7. Mist the soil every few days. If you added worms, you should be able to see them forming tunnels in the soil. You should also be able to observe the water as it evaporates, condenses and falls back to the ground.
  8. Have the students write in their science journals about the process and their daily observations.
  9. After one week, have students pair up with a member of a different team to compare plant growth observations. You may opt to do this weekly over several weeks.
  10. After a two week (or longer) period, have students meet and discuss their final observations and discuss differences among the terrariums and the possible variables that caused the differences.



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## 4th Grade: Rainforest Producers and Consumers

### Tree-mendous Selby Vocabulary for 4th Grade:

- *Buttress roots* – large roots on all sides of a shallowly rooted plant. Typically they are found in thin or nutrient-poor rainforest soils and do not penetrate to deeper layers
- *Bromeliad* – any of numerous, usually epiphytic tropical American plants, having long, stiff leaves and showy flowers.
- *Canopy* - Usually the highest level of plant growth in a forest. Here the tree branches touch one another
- *Consumer* - an organism that feeds on plants and/or animals.
- *Decay* - the slow breakdown (decomposition) of once-living material.
- *Ecosystem* - a community of animals, plants and microscopic life that interact together in the environment.
- *Epiphyte* - a plant that grows on another plant or tree; it derives its nutrients from the rain and debris that fall into it.
- *Erosion* - the wearing away of the land by water or wind.
- *Exotic* - having been introduced to an area where the organism would not naturally be found.
- *Food Web* - a series of interconnected food chains that show predator-prey relationships.
- *Hammock* - an area of higher ground that supports a community of plants that are different from those in lower elevations.
- *Native* - an organism that lives in the area where it originated; for example, plants that have lived in Florida for thousands of years and were not introduced to the area by humans.
- *Orchid* – an epiphytic plant of temperate and tropical regions, having usually showy flowers.
- *Producer* - an organism that produces its own energy, such as photosynthetic plants.
- *Understory* - the plant layer growing under the canopy, made up mostly of young trees and shrubs.



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# MARIE SELBY BOTANICAL GARDENS

## Pre Visit Activity: Dramatic Food Chains

### Objective:

Students will:

- Act out food chains
- Understand the transfer of energy through the food chain
- Construct their own rainforest food chains
- Write an explanatory paragraph to explain the flow of energy in their food web

**NGSS:** SC.4.L.17.3, SC.4.L.17.2

**CC:** LACC.4.W.1.2, LACC.4.L.3.6, LACC.4.SL.1.1

### Materials:

- Internet access: go to <http://www.brainpop.com>
- Resource materials on the rainforest
- Food Chain Planning Sheet (below), 1 per student

### Procedure:

1. Show the class a video on food chains through BrainPOP-*Food Chains*.
2. Have students complete the supplemental activity titled “Categorize the Organisms” either the whole group using the Activboard, or print the activity and have students complete it in pairs.
3. Explain that the most important part of the food chain is the sun. Go over this simple food chain with the students. “The sun’s energy is used by the grass to PRODUCE its own food, that’s why the grass is a producer. Then it is eaten by the grasshopper, who is CONSUMING it, that’s why it’s a consumer. Then the grasshopper is CONSUMED by the frog, which is CONSUMED by the snake, which is CONSUMED by the hawk. The hawk isn’t consumed by anything, but when it dies, bacteria will break down its body to join the soil again, where a new plant will grow to start a whole new food chain!” Then point out that the hawk is still getting its energy from the sun, because he’s getting his energy from the snake, which got it from a frog, which got it from the grasshopper, which got it from the grass, which got it from the sun.” Review that a few times if necessary.
4. Ask for a volunteer to come up and “act” as the sun. After getting them in place, ask for a volunteer to be the grass. Tell the student to “wave their blades” toward the sun to get its energy. Next ask for a volunteer to be the grasshopper to come “nibble” on the grass. Then ask for a frog to come gobble up the grasshopper. Then ask for a snake to “slither in and attack the frog.” Finally, ask for a hawk to “swoop in and catch the snake.” Students will have fun acting it out. When everyone is in place, start with the beginning and review the transfer of the sun’s energy as they all act out their parts. Thank your volunteers and have them sit down.



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5. Explain to the students that there are many different types of food chains that exist in each type of habitat. The food chain they just practiced as a class was a grassland habitat food chain and now groups will be focusing on rainforest food chains.
6. Hand out the "Planning Sheet" worksheet (below) to the students as well as various reference materials on the rain forest to each team. Tell them that each group will have fifteen minutes to plan and draw out their rainforest food chain on the planning sheet and practice "acting out" their food chain.
7. Circulate and assist groups in deciding who will be who in the food chain, and how to act out each part.
8. After all groups have practiced and have completed the first half of the worksheet, have all students return to their desks for the "performances." Have each group act out their food chain. After each group finishes, review their food chain aloud, pointing out the energy transfer from the sun through each food chain from beginning to end.
9. Display the "Amazon Rainforest Food Web" (pdf available as attachment from Selby Gardens) up on the Activboard, or print a copy of the worksheet for each student. Tell students they are about to write a paragraph about the sun's energy transfer through a rainforest food chain. Remind students that while working on an explanatory writing piece, it should be to the point, use time-order words such as "first, next, then, last," and should be reread and edited before being turned in.
10. Remind students the paragraph must have a topic sentence and concluding sentence.



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## Acting Out a Food Chain Planning Sheet

Name: \_\_\_\_\_

Draw your food chain below. Begin with the sun. Label each organism either a producer or a consumer.

Who will you be playing? \_\_\_\_\_

How will you act as this organism? \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



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## Pre Visit Activity: Products of the Rainforest

### Objectives:

Students will:

- Identify products made with materials that originate in the world's rainforests.
- State why plants in the rainforest are important.
- Explain the different components of a rainforest ecosystem.

**NGSS:** SC.4.L.17.4

**CCSS:** LACC.4.RL.1.1, LACC.4.L.2.3, LACC.4.L.3.6, LACC.4.SL.1.1

### Materials:

- Brazil nuts
- *The Rainforest Grew All Around* by Susan K. Mitchell
- "Products of the Rainforest" worksheet (below)
- Ingredients for the Rainforest Cookies recipe (below)
- Copies of Rainforest Cookies recipe, 1 per student

### Procedure:

1. Distribute several handfuls of brazil nuts around the classroom. Ask students if they know where "nuts" come from. (Do they grow underground, on trees, in the water, etc.?) Have they ever seen or tasted this particular nut? Inform students that this nut is called a Brazil nut. Explain that the Brazil nut is one of many products that come directly from the rainforests of the world.
2. Read *The Rainforest Grew All Around*. Before reading, ask kids if they know what a habitat or ecosystem is, then help them to define it. A habitat is an area with all the things a particular animal needs to survive (food, shelter, water, and space). An ecosystem includes all the living and nonliving parts of a habitat. After reading, ask what made up the ecosystem in the book. Be sure to key in on the products that come from the rainforest that we use-like the Brazil nut.
3. Use the recipe at the end of the book to bake "Rainforest Cookies" They include ingredients such as bananas, coconut, and different nuts. While mixing the dough, talk to the kids about all the things that we get from the rainforest. Mention medicines, foods, and timber.
4. While the cookies bake, hand out the "Products from the Rainforest" worksheet. Go over the contents. Instruct students to go through the list marking which products they have used at least once in their lives.
5. Direct students to highlight the five products that are most important to them. (*THINK*)
6. Have students work in pairs (*PAIR*) to compare and contrast their choices. Circle the products they had in common. Which were the same, which are different? (*SHARE*)
7. Take a short hike to a nearby tree. When you arrive at the tree, have the kids brainstorm how it is similar to the tree in the book. List animals (squirrels, birds, etc.) that live in the tree or rely



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on it in some way. Ask what things we might get from this tree. Ask what would happen if the tree were removed from the ecosystem.

8. When you are back in the classroom, hand out a copy of the recipe and a “Rainforest Cookie” to each student to eat and enjoy!

## Extension:

Herbs and spices come from plants; and many of them grow in the rainforest. The difference between herbs and spices depends on which part of the plant it comes from. Generally speaking, herbs are the leaves, while spices are from the other parts of the plant: bark, seeds, roots, flowers, fruits. Have students create a spice collage using the following:

*Roots* - ginger, turmeric

*Leaves* - basil, oregano, rosemary, tarragon, sage

*Fruit* - allspice, pepper

*Seeds* - mustard, caraway, dill, poppy seeds, sesame seeds

*Flowers* - cloves, saffron



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## Rainforest Cookies

These delicious cookies contain several ingredients that originate from tropical rainforests. We are sure that you will enjoy eating them as much as we enjoyed making them!

### *Ingredients*

- 2 to 2 ¼ cups all-purpose flour
- 1 tsp. baking soda
- 1 tsp. salt
- 1 tsp. cinnamon
- 1 stick butter (1/2 cup), softened
- 1 medium ripe banana
- ½ cup granulated sugar
- ½ cup brown sugar
- 1 tsp. vanilla extract
- 2 eggs
- ¼ cup sweetened coconut flakes
- 4 cups (12 oz.) chocolate chips
- 1 cup chopped cashews

### *Directions*

1. Preheat the oven to 375° F.
2. Combine 2 cups flour, baking soda, salt, and cinnamon and set aside.
3. Beat butter, banana, and sugars until creamy.
4. Beat in eggs and then add the coconut flakes.
5. Gradually add flour mixture using extra flour if needed.
6. Stir in the chocolate chips and cashews.
7. Drop by rounded tablespoon onto an ungreased baking sheet.
8. Bake for 10 to 12 minutes until golden brown.



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## Some Products from the Tropical Rainforests

Food and drinks	Herbs, spices and flavorings	Craft and construction material
coconut cashews coffee tea macadamia Nut tapioca figs Brazil nuts Papayas bananas guava lemons limes oranges mangos pineapple avocado	allspice annatto cinnamon ginger chocolate vanilla turmeric black pepper nutmeg sugar chili pepper cloves sesame seeds bay leaves	bamboo rattan jute teak mahogany ramie balsa wood rosewood
Medicines	Landscape and Houseplants	Miscellaneous
Curare ( <i>muscle relaxant</i> ) Vincristine, Vinblastine ( <i>Hodgkin's Disease,</i> <i>leukemia, other cancers</i> ) Diosgenin ( <i>arthritis, asthma</i> ) Ouabain ( <i>heart medication</i> ) Quinine ( <i>malaria,</i> <i>pneumonia</i> ) Emetine ( <i>bronchitis,</i> <i>dysentery</i> ) ipecac ( <i>causes vomiting</i> )	orchids African violet ficus philodendron Christmas Cactus rubber plant palm trees peace lily snake plant umbrella tree	varnish chewing gum printing ink latex (rubber) camphor insect repellent Kapok Patchouli Sandalwood

"Rainforest Resources/Facts" at <http://www.rainforest-alliance.org/>  
 Braus, Judy (ed.) "Rainforest: Tropical Treasures." *Ranger Rick's Nature Scope*, National Wildlife  
 Federation, 1989. Pg. 46.



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## Pre Visit Activity: *Hang Tough*

### Objective:

Students will:

- Learn about special adaptations of rainforest plants.

**NGSS:** SC.4.L.16.2

**CCSS:** LACC.4.RL.1.1, LACC.4.L.2.3, LACC.4.L.3.6, LACC.4.SL.1.1

### Materials:

- *Where the Forest Meets the Sea* by Jeanine Baker
- Science journals

### Procedure:

1. Begin the lesson by asking the students to brainstorm all the names of rainforests that they have heard of. Show them the rainforest in the book, North Queensland, Australia, on a world map.
2. Ask the students to name plant needs (sunlight, water, nutrients, space). Explain that as you read the book, they will be looking for the different ways rainforest plants obtain their needs. Remind them that because the rainforest is so dense, plants struggle for sunlight.
3. Read *Where the Forest Meets the Sea*. Point out the twisted roots of the rainforest trees in the story. Also point out the roots called *buttress roots* and the roots called *stilt roots*.
4. Have students brainstorm possible reasons why rainforest trees have such roots.
5. Explain to students that those types of roots provide extra support. The soil in the rainforest is very thin and these kinds of roots help stabilize tall trees. The soil also has very few nutrients because it rains daily and the nutrients are washed away. The trees have to absorb what they can quickly.
6. Also point out the *epiphytes* and vines on the rainforest trees in the story, a plant that grows on top of, or is supported by another plant but does not depend on it for nutrition.
7. Introduce three types of epiphytes common to the rainforests of the Americas (bromeliad, orchid, and fern) and describe their characteristics.
8. Take the class outside to compare the roots of nearby trees to those in the rainforest. Have them sketch and label descriptions in their science journals. What similarities and differences do they notice between local trees and the trees of the rainforest? What accounts for the different roots? If possible, have the students look for and name different types of epiphytes.

### Extension:

Grow a bromeliad. Cut off the top of a pineapple, leaving about 2-3 inches of fruit. Let it dry for a few days, and then cut off the soft fruit, leaving the core. Plant the pineapple top with the core in the soil and the leaves out. Cover with a large, clear plastic bag and put in a warm, sunny place. Watch it grow!



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## 5th Grade: Journey into the Rainforest

### Tree-mendous Selby Vocabulary for 5th Grade

- *Abiotic* - non-living, or without living organisms.
- *Adaptation* - the state of being adapted; adjusted.
- *Biome* - a complex biotic community made up of distinctive plants and animals that interact in an environment.
- *Biotic* - pertaining to life or living organisms
- *Botany* - the scientific study of plants.
- *Botanical Name* - the scientific name of a plant used and recognized internationally, as opposed to common names which can vary from place to place.
- *Botanist* - one who studies plants; a plant biologist.
- *Canopy* - thick, overhead layer or “ceiling” of the rainforest, formed by the intertwined branches and leaves of trees.
- *Ecosystem* - a community of animals, plants, microorganisms and the physical environment that interact together
- *Emergent* - the tallest layer of trees in a rainforest, they break through the canopy and can reach up to 200’.
- *Epiphyte* - a plant that grows attached to another plant or object, not rooted in the ground. Epiphytes obtain nutrients from the rain and debris that fall into it, and are often found growing on the branches and trunks of trees. They do not harm the plants they grow on.
- *Fern* - a primitive plant that reproduces using spores instead of flowers and seeds.
- *Flower* - the blossom of a plant that contains reproductive organs.
- *Forest floor* - the ground layer of the rainforest, made up of roots, soil, decaying matter and decomposers.
- *Fruit* - the plant part that develops from a pollinated flower and contains seeds.
- *Inflorescence* - a structure that consists of more than one flower.
- *Leaf* - the part that uses solar energy to produce food for the plant.
- *Leaf Scar* - a mark left on the plant stem or trunk where a leaf was attached.
- *Niche* – the position, or function, of an organism within a community of plants and animals.
- *Palmate* - leaf with leaflets or veins emerging from a center point, shape resembles a hand
- *Photosynthesis* - the process that plants use to make their own food.
- *Pinnate* - a leaf with leaflets or veins along a central stalk, thus having a feather like appearance.
- *Root* - the part that holds the plant in place and takes in water and nutrients from the soil.
- *Stem/Trunk* - plant part that carries water and nutrients through the plant, and provides structural support.
- *Understory* - the layer below the canopy but above the forest floor, made up mostly of young trees and shrubs.



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## Pre Visit Activity: Deforestation in the Rainforest

### Objective:

Students will:

- Identify the effects of deforestation.
- Demonstrate understanding that trees are a resource that people and animals need to survive.
- Compare and contrast the authors' messages in *The Lorax* and *The Great Kapok Tree*.
- Create a visual that will inform, persuade, and convey a message to stop deforestation.

**NGSS:** SC.5.L.15.1

**CCSS:** LACC.5.RI.2.4, LACC.5.RL.3.9, LACC.5.SL.1.1, LACC.5.SL.2.5

### Materials:

- *The Lorax* by Dr. Seuss
- *The Great Kapok Tree: A Tale of the Amazon Rain Forest* by Lynne Cherry
- ActivBoard or chart paper
- Poster board, construction paper, markers, colored pencils, crayons, etc.

### Procedure:

#### Part One

1. Tell the students that the class will be learning about the impact humans can have on the earth. Begin by reading *The Lorax* aloud to the class.
2. After page 49, ask students to discuss the effects of chopping down the Truffula Trees. Create a T-chart on the Activboard to record responses. Label one column "Positive effects" and the other column "Negative effects." Encourage students to give specific examples from the text.
  - a. Positive effects might include: job-creation, making money, and expanding business.
  - b. Negative effects might include: animals have to migrate to find food or shelter and it pollutes the environment.
3. Finish reading the story. Ask students what message Dr. Seuss wanted them to get from the following statement: "*Unless someone like you cares a whole awful lot, nothing is going to get better. It's not.*" Give students time to discuss this with a partner sitting next to them.
4. Ask students to think of places where they have seen or heard of humans destroying environments like the Once-ler did. Give students time to share their thoughts with the class. Answers may vary, but should be connected to the activities and concepts discussed above.
5. Ask the students: "Is deforestation a global issue, or does it only occur in certain places?" Allow students to discuss this and share their understanding of deforestation around the world.
6. Ask the students why humans would cut down trees, and to discuss why chopping down trees can be positive and negative. Have students share their thoughts and record them on a T-chart.



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Label one column “Negative effects of cutting down trees” and the other column “Positive effects of cutting down trees.”

7. Wrap up by reviewing what students have learned and connections that they made between our world and *The Lorax*.

## Part Two

1. Ask the students to recall the information they learned in the previous lesson. Revisit the T-charts you created in order to activate their prior knowledge.
2. Ask the students: “Why are rainforests such special environments?” Have them share what they already know about rainforests. Record this information on chart paper or the Activboard.
3. Display the following facts (taken from <http://www.rain-tree.com/facts.htm>) about rainforests or read them aloud to the students. You could also have students research this topic to gather their own information
  - a. “Rainforests represent a store of living and breathing renewable natural resources that for eons, by virtue of their richness in both animal and plant species, have contributed a wealth of resources for the survival and well-being of humankind. These resources have included basic food supplies, clothing, shelter, fuel, spices, industrial raw materials, and medicine for all those who have lived in the majesty of the forest.”
  - b. “The Amazon covers more than 1.2 billion acres, representing two-fifths of the enormous South American continent, and is found in nine South American countries: Brazil, Colombia, Peru, Venezuela, Ecuador, Bolivia, Guyana, French Guiana, and Suriname. With 2.5 million square miles of rainforest, the Amazon rainforest represents 54 percent of the total rainforests left on Earth.”
  - c. “Rainforests once covered 14% of the earth’s land surface; now they cover a mere 6% and experts estimate that the last remaining rainforests could be consumed in less than 40 years.”
  - d. “Nearly half of the world’s species of plants, animals and microorganisms will be destroyed or severely threatened over the next quarter century due to rainforest deforestation.”
  - e. “There were an estimated ten million Indians living in the Amazonian Rainforest five centuries ago. Today there are less than 200,000.”
4. Have students share their reactions to the facts about rainforests.
5. Introduce the book *The Great Kapok Tree: A Tale of the Amazon Rain Forest* by Lynne Cherry.
6. As you read, invite the students to share why people should not cut trees in the rainforest. Record these reasons on chart paper or the Activboard.
7. Have students discuss and compare the messages in *The Great Kapok Tree* and *The Lorax*.
8. Have students create a visual product that persuades others to stop deforestation. Their final product should:
  - a. Provide factual information about deforestation and rainforests.
  - b. Send the same message as the books: protecting rainforests and resources is important.
  - c. Persuade others to help save rainforests and stop deforestation.



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## Pre Visit Activity: *How Much Rain in a Rainforest?*

### Objectives:

Students will:

- compare the annual rainfall of the world's major ecosystems
- Create bar graphs comparing the annual rainfall of the Amazon rainforest to rainfall in different regions of the US as well as other global rainforests

**NGSS:** SC.5.E.7.6

**CCSS:** LACC.5.RI.2.4, LACC.5.RI.3.7, LACC.5.SL.1.1, MACC.5.MD.2.2

### Materials:

- Graph paper
- Pencils, colored pencils, markers, crayons
- Internet access to the following sites:
  - Biomes of the World: Rainfall in Different Ecosystems  
<http://www.mobot.org/MBGnet/sets/temp/whats.htm>
  - Amazon Interactive: Rainfall in the U.S.  
<http://www.eduweb.com/rain/rainfall.html>

### Procedure:

1. Using a world map, ask the students to locate the Equator and the Tropics of Cancer and Capricorn. Explain that tropical rainforests are found around the world between the Tropic of Cancer and the Tropic of Capricorn. Rainforests are home to over half of the species on our planet, and have a high measure of biodiversity.
2. Review the definition of *ecosystem*: a community of living things—plants and animals—and the environment in which they live. Explain that the rainforest is a type of ecosystem, like the grasslands, the desert, or the tundra.
3. Tell the class that one way rainforests are unlike other ecosystems is the amount of rain they receive every year.
4. Explore the “Biomes of the World” site, which compares rainfall in different ecosystems, or *biomes*. How much rain falls in the tropical rainforest compared with temperate deciduous forests? (Deciduous forests are those with trees that change colors in fall, go dormant in winter, and bloom again in spring.) Which two ecosystems receive the least amount of rainfall?
5. Have students go to the “Amazon Interactive” site and find out how much rainfall your region receives. Click on the nine different US regions and use the data to create a bar graph comparing the rainfall of the regions of the US and the Amazon rainforest.

### Extension:

6. Have the students research other global rainforests and use the data to create a graph comparing the rainfall of different rainforests.



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## Post-Visit Activity: Rainforest Adaptations

### Objectives:

Students will:

- begin to develop an understanding of the rainforest ecosystem
- describe the challenges faced by plants living in the rainforest
- explain how various adaptations help the plants thrive in this extreme ecosystem

**NGSS:** SC.5.L.15.1, SC.5.L.17.1

**CCSS:** LACC.5.RI.2.4, LACC.5.SL.1.1

### Materials:

*Part One:*

- 2 large plastic containers
- Three different size sponges
- Water
- A measuring cup
- Science journals

*Part Two:*

- Craft/ recyclable materials such as boxes, buttons, ribbons, pipe cleaners, foam, bottle tops, fabric offcuts, cans, cards, paper, egg cartons, paper towel tubes, bottles. You could ask the students to bring items in.
- Masking tape, Sellotape
- Scissors
- Computer, projector, speakers
- Internet access to site:  
[http://www.youtube.com/watch?feature=player\\_embedded&v=C1Ib0-BIBKU](http://www.youtube.com/watch?feature=player_embedded&v=C1Ib0-BIBKU)
- Chart paper
- Markers

### Procedure:

*Part One:*

1. Write this on the board: *What kinds of plants do we find in the world's tropical rainforests? Can you name any?* They can think about this as they walk in and settle. Once they are settled get some feedback. Ask them to recall some of the rainforest plants they saw at Selby Gardens.
2. Explain that many plants in the rainforest have very large leaves. Large leaves are helpful because they have more surface area. The more surface area a leaf has the more sunlight it can absorb. We can't measure the amount of sunlight that a leaf absorbs, but we can make a model to show how a larger surface area lets a sponge absorb more water.



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3. Complete the following steps as a class, or in teams:
  - o Put the measuring cup in the empty container.
  - o Fill one container ½ full of water.
  - o Squeeze the smallest sponge under the water so that all the air bubbles escape.
  - o Let the sponge fill up with water.
  - o Take the sponge out of the water.
  - o Squeeze the sponge so that the water in the sponge goes into the measuring cup.
  - o Record the amount of water in the measuring up in your science log.
  - o Repeat steps 1-7 for the next two sponges.
4. Which sponge held the most water? Least? How would the surface area of leaves be a beneficial adaptation at the different levels of the rainforest?

## *Part Two:*

5. Organize the students into pairs. Give each pair a piece of chart paper and markers.
6. Explain to the students that they are going to watch a video (Eden project YouTube video in materials list above) about the adaptations that plants have evolved to survive in the rainforest. Encourage the pairs of students to record key bits of information as they watch. For example – the main challenges the plants face and perhaps some of the plants' adaptations.
7. After the video, collect feedback on what the main challenges for the plants are, making a note of these challenges on the board. You could also record any other information about plant adaptations that the students feel is important.
8. For higher ability students you could record in different colors those challenges presented by the living (biotic) conditions and those presented by abiotic factors
9. At this point you could extend this into a conversation about how the abiotic conditions change at different layers of the rainforest. For example, the forest floor is dark, hot, humid, sheltered and wet. As you move higher the amount of sunlight increases; it is drier and there is more exposure to wind, heavy rainfall and storms. The biotic conditions also change in the different rainforest strata. These changing conditions result in myriad niches which can be occupied.

## Extension:

10. Challenge student pairs to make a plant that they think would be well adapted to life in the rainforest. Use the mind map on the board to help you design adaptations that would give your plant the edge. Each pair makes one plant model. Things for the students to consider:
  - Where does it live in the rainforest? What are conditions like there?
  - What are the main challenges? What adaptations has it evolved to meet those challenges? Remember, the challenges on the forest floor, for example, will be different to those found in other layers.
11. Divide the class into four groups. Each group should have a few pairs of students in it. Have the students present their plant to the rest of the group clearly explaining where it lives (habitat), its set of adaptations and why they are important.



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