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Smithsonian Early Enrichment Center

Rainforest Lesson Plan

Objectives

1. Understand what a rainforest is.
2. Learn what kinds of plants and animals live in rainforests.
3. Be able to articulate why rainforests are special/unique, and/or how they are different from other biomes/parts of the world.
4. Learn the layers of the rainforest. From top to bottom, they are as follows: emergent layer, canopy, understory, forest floor.
5. Be able to give one or more examples of adaptations that help organisms survive in rainforests.

Materials

Computer/tablet
Paper and writing implement to make KWL chart (unless you're making the chart on your computer)
Sticky notes (optional)
World map/globe
Moist soil and dry soil
Seeds, if available
Rainforest layers matching game (printable)
Blanket and chairs for building a canopy
Flashlight/overhead light/headlamp
Umbrella
Piece of food, like an apple
Coloring/painting supplies to make a rainbow (optional)

Vocabulary words

New vocabulary words to introduce

Biodiversity: variety of life
Rainforest: a thick forest that grows in a wet part of the world; a dense evergreen forest with an annual rainfall of at least 406 cm (160 inches).

Previous vocabulary words to review

Adaptation: a change in an organism or its parts that fits it better for the conditions of its environment (in preschooler language: something that helps a plant or animal live better)
Forest: a dense growth of trees and underbrush covering a large area (aka an area with lots of trees and plants)
Experiment: a scientific test done to answer a question
Hypothesis/prediction: what you think will happen in an experiment
Control: the part of the experiment that stays the same
Variable: the part of the experiment that changes
Conclusion: what happened in the end

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Instructions for lesson facilitation

Monday: review & setup

1. **Review last week's material and create a KWL chart**, like the samples below. As you talk through the lesson, add to the chart. Any questions the child asks belong in the "Want to Know" column. When the questions are answered, put the answers in the "What I Learned" column. At the end of the lesson, review the "Want to Know" column for any more questions you and the child can answer based on what the child learned in the lesson. If the child is not interested in the chart, ask him/her to choose the marker colors and/or sticky notes to write on and add to the chart. Adding color and opportunities for ownership can make the chart more engaging and increase buy-in.

    a. **Say**, "Last week, we learned about forests. Can you tell me what a forest is?" Child will probably mention trees.

    b. **Say**, "We learned that there are 3 types of forest biome. Do you remember what they are?" The children most likely will not remember the names of the three biomes off the tops of their heads. If they do remember that the types are tropical, taiga, and temperate/deciduous, write that down in the Know column. Otherwise, review Ms. Krystiana's PowerPoints from last week. They are attached to this email. Once you have reviewed and found the answers, add that to the Know column.

    c. **Say**, "What else should we add to the chart?" Feel free to give hints to jog the child's memory or come back to this later.

KWL Chart: Forests		
What I Already **K**now	What I **W**ant to Know	What I **L**earned
A forest is a place with lots of trees (or however your child words it) 3 types of forest biome: tropical, taiga, and temperate/deciduous		

2. **Study** the painting above. It is *Rain Forest, Jamaica, West Indies* by Frederic Edwin Church.

3. **Discuss** the painting with the following questions as guidelines:
    a. What kind of forest biome does this look like—tropical, temperate, or taiga? (answer: tropical)
        i. What do you see that makes you think that?
    b. Can you think of animals (don't forget about bugs!) or plants that might live there? Do you see any in the painting?
    c. Look at the painting from up close and from far away. Do you see anything you didn't see before?
    d. What do you think it feels/sounds/smells like there? (think about the buzzing and chirping of insects and other animal noises)
    e. Where are the plants in the painting? Have the child point to the plants.
        i. What do plants need to grow? (answer: water!)

   ii. There are lots of plants. Do you think it is wet or dry there? (answer: wet)

4. **Feel** the soil samples (sensory experience)
   a. Ask child to touch the wet sample with one hand and the dry sample with the other hand.
      i. Do they feel the same or different? How so?
      ii. If you were a thirsty plant, where would you grow better—in the wet sample or the dry sample?

5. **Soil experiment (if materials allow; if not, talk through what you think would happen):** Plant an equal number of seeds in the wet and the dry samples. Use the same kind of seeds in each and put samples in areas where they receive the same amount of light. Over the next few days or weeks (depending on what kind of seeds you plant), water only the seed(s) in the wet sample. Monitor growth. The seed(s) in the wet sample should grow better than the ones in the dry.
   a. Use scientific method process and vocabulary*
      i. Make observations. For example, "One sample is wet. The other is dry."
      ii. Ask a question: Will seeds grow better in wet or dry soil?
      iii. Form a *hypothesis or *prediction. Ask the child, "What do you think will happen?" Write down the child's answer.
      iv. Perform the experiment. Review the meanings of *control (stays the same) and *variable (the part that is different).
      v. Record results. Ask the child, "What happened?"
      vi. Make and share conclusions. Ask the child, "Why did that happen?" Post to Shutterfly.
         1. If neither sample shows growth, brainstorm why nothing grew. What else do plants need? Explain that failure is an important part of science and helps us grow our brains.

Wednesday: Rainforests

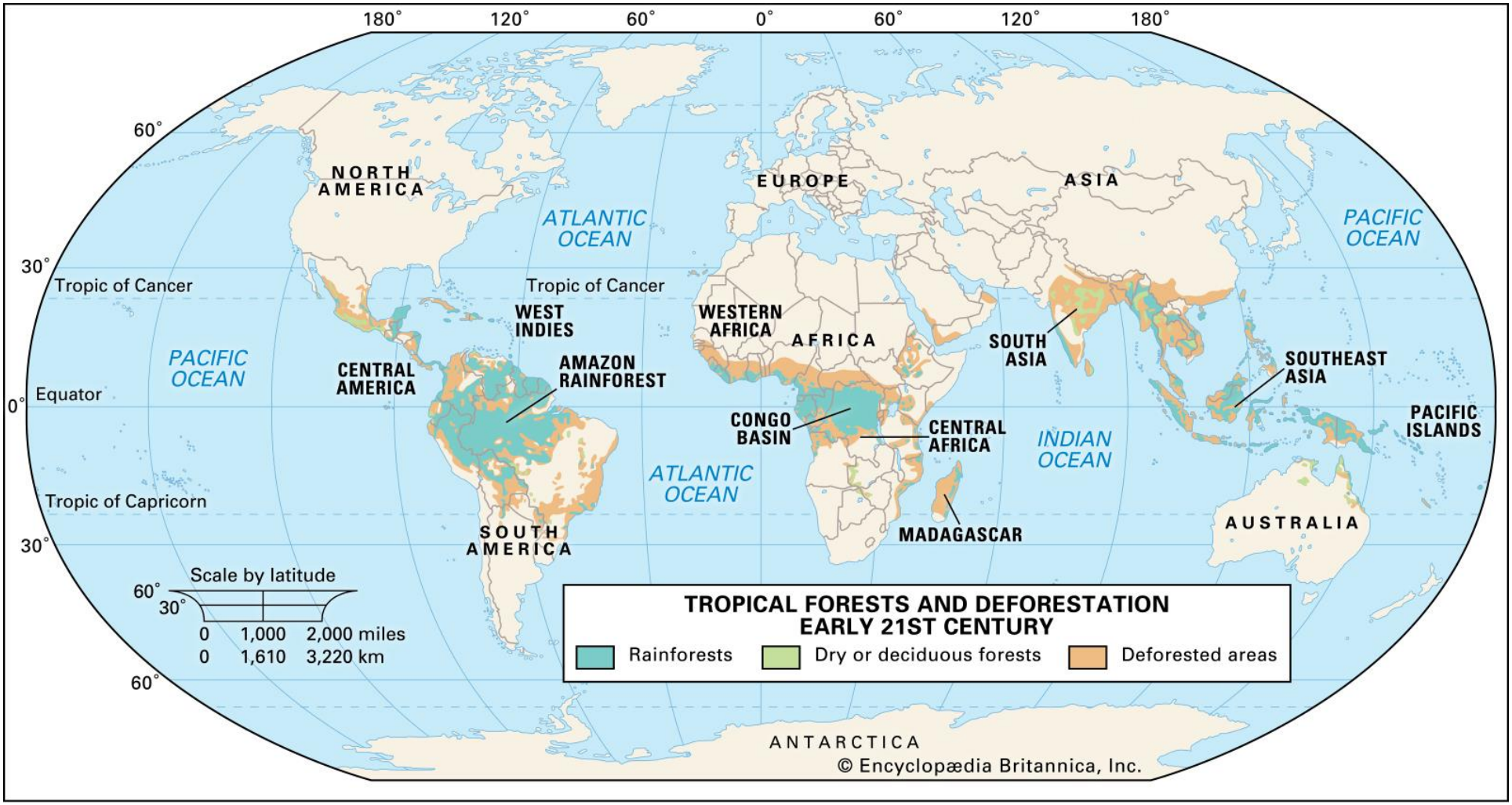
1. **Look** again *Rain Forest, Jamaica, West Indies* by Frederic Edwin Church while introducing this week's topic—**rainforests**. Say, "This week, we will focus on rainforests. What do you know about rainforests? (Pause for answers.) What do you want to know about rainforests? (Pause for answers.)" Add responses to the KWL chart.

2. **Read** through this Prezi: https://www.neprimateconservancy.org/tropical-rainforests-activity.html
    a. I love the information in this presentation; however, I recommend **stopping the presentation after the "Hummingbirds" slide.** The rest focuses on deforestation and conservation. I'm all for conservation, but some of the slides in this section may be upsetting to children. I'm choosing to keep the material I read and share a little lighter these days. You, of course, are welcome to choose to use those slides.
    b. If you do use the deforestation and conservation section of the presentation, I recommend you **skip or reword the "Rainforests are the Earth's Lungs" slide** because it is misleading. Rainforests do produce lots of oxygen, but they use up about the same amount of oxygen, resulting in almost no net gain in Earth's oxygen levels.

3. **Say**, "There are two types of rainforests, tropical and temperate."
    a. Tropical = near equator, hotter and wetter than temperate
    b. More detailed info for adults: Tropical rainforests sit between the Tropic of Cancer and the Tropic of Capricorn, and they are hot and super humid; the temperatures fall between 70°F and 80°F year-round, with an average humidity of 77% to 88% and 80 to 400 inches of rain per year. Temperate rainforests, on the other hand, are found in mostly coastal, mountainous areas; they get their rain when the moist, hot air that comes off of the coast gets trapped by the nearby mountains. The temperatures in temperate rainforests are usually between 50 and 70°F, and they receive more like 60 to 200 inches of rain per year. You'll find these in places like the Pacific Northwest, Chile, the United Kingdom, Japan, New Zealand, and southern Australia.

4. **Watch** *Explore the Rainforest! Ecology for Kids* video

5. On a **map or globe**, find examples of each, such as the Amazon Rainforest for tropical and the Olympic Rainforest in the Pacific Northwest for temperate. If technology allows, use Google Earth: 3D Interactive Virtual Tour of Amazon Rainforest + accompanying photos and info



6.

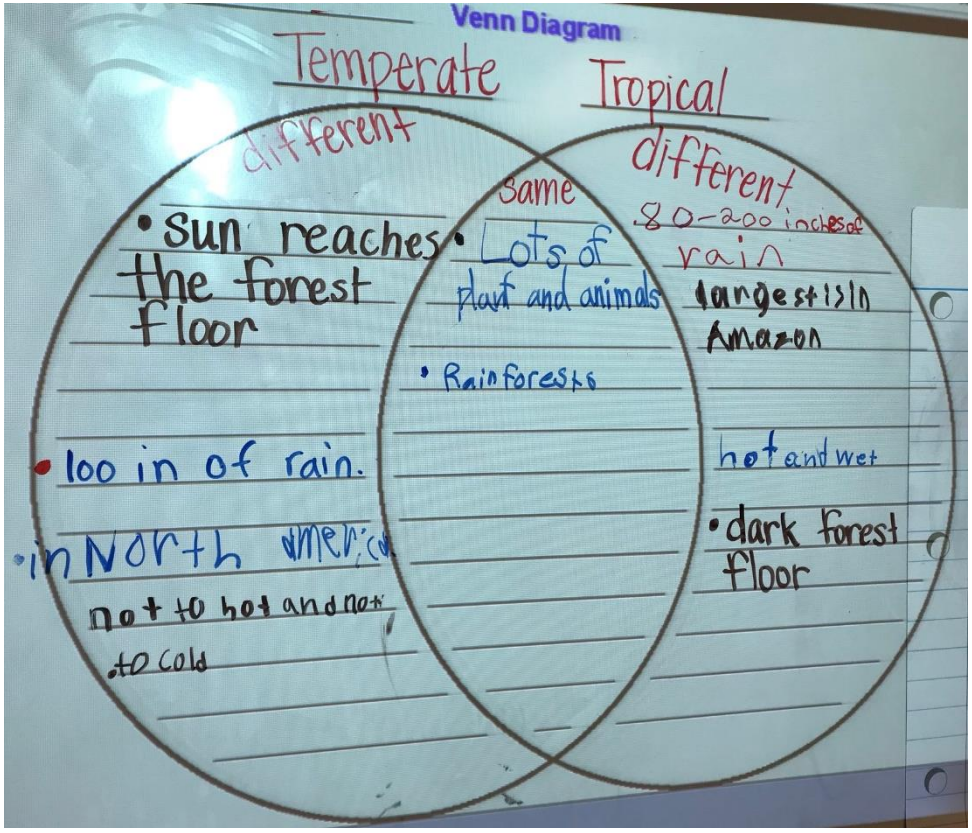
^Map with tropical rainforests in turquoise

^Map with both types of rainforest in green


United States (Alaska)
Canada
Gulf of Alaska
United States
Northeast Pacific Basin

^Map with temperate rainforest in green. The north Pacific coastal temperate rainforest extends from Alaska to northern California.

7. Make a **Venn diagram** of tropical and temperate rainforests. Here's an example from another school:



   a. Try to write at least one item in each section—temperate, both, and tropical.
   b. Next, make an easier Venn diagram that compares and contrasts well-known things, like cats and dogs or school and home.

c. After making the easier Venn diagram, return to the rainforest Venn diagram. Try to come up with more items to add to the diagram.

8. **Play** rainforest layers matching game with printable game board and tiles

9. **Look** at *The Umbrella* by Ito Sozan and *Umbrella Lady* by Carroll Cloar. Discuss uses and effects of the umbrellas in these two pieces.

10. Discussion questions:
    i. Why are the people using umbrellas? What do umbrellas do? (Keep people from getting wet/rained on.) If it's not raining in the art pieces, why are the people using umbrellas? (Point out the shadows in *Umbrella* Lady. A shadow means something is blocking the light.) What else could the umbrellas protect the people from? (sun!)
        1. Look for your own shadows the next time you're in the sunlight.
    b. Compare rainforest canopy to umbrellas: both block light. Ask, "Do you think it is bright or dark under the canopy in a rainforest? What makes you think that?"

11. **Make** your own canopies, first with an umbrella and then with a blanket fort. While the child is under each canopy, shine a light above. Ask the child how much light gets through the canopy. Try without the umbrella and the blanket. Does more or less light reach the floor? Make predictions/hypotheses first. Test them. Talk about conclusions.

Thursday: animals and sounds of the rainforest

1. **Study** the images in SAAM's *Experience America* exhibition. Think about the sounds you might hear in each scene. Encourage your child to use descriptive language and try to make the sounds they say they would hear in the scenes. Help your child remember times they were in situations that might have sounded like the situations depicted in the paintings.

2. **Sit** with your child as quietly as you can for 20 to 60 seconds. Name everything you can hear.

3. **Ask,** "What do you think a rainforest sounds like?" Compare and contrast with the sounds you hear at home and the sounds you think you would hear in the paintings. Try to find both similarities and differences.

4. **Ponder**: What does rain sound like? Use your hands and feet or other instruments to make rain sounds. Here's an example.

5. **Listen** to the sounds of rainforest animals. Who and what do you hear?
    a. Black howler monkey sound
    b. Sounds of forty other rainforest animals

c. Play animal charades. Listen to the animal sound and act out what you think the animal is. The other players can see the screen. They tell the actor if (s)he's right, or they give the actor hints to figure out the animal that is making the sound.

6. **Watch** 0:11 to 1:50 of 3 Fun Facts about Bats! from SciShow Kids.
   a. **Play** this echolocation game (Marco Polo): Player 1 wears a blindfold and tries to touch player 2. When player 1 calls out, "echo!" player 2 responds, "location!" while quietly moving around the room.
   b. **Listen and dance** to this echolocation song

7. **Play** rainforest plant and animal memory game: no set-up required online version

8. **Learn** about sloths.
   a. **Say**, "Rainforests are full of life, which means lots of animals are competing for the food that's available. Animals' bodies, including our own bodies, need food to make energy."
      i. **Demonstrate** this concept by setting down one piece of food, like an apple. Show that if you take the apple, your child does not have the apple, and vice versa. Your child will enjoy seeing you make a big show of having no food and, therefore, no energy.
   b. **Say**, "We can use the energy we get from food to grow and move our bodies."
      i. **Do** a simple physical activity, like 5 jumps or running in place, with your child.
   c. **Ask**, "What will happen if I don't have energy from food? Will I move quickly or slowly?"
   d. **Explain** that sloths have adapted to having little food by moving very slowly and sleeping for about 15 hours/day. Because they move so little, they use little energy and, therefore, do not need much food. This is how sloths have adapted to survive despite the competition for food. For more info and photos, check out "Why are Sloths Slow? And 6 Other Sloth Facts" from World Wildlife Fund.
   e. **Read** or watch "Slowly, Slowly, Slowly," said the Sloth by Eric Carle
   f. **Challenge** your child to move like a sloth.
   g. **Check out** this *Smithsonian Insider* article if you would like to learn more about sloths…and sloth poo.

9. **Wrap up** any remaining questions and add to the KWL chart.

Book & TV Recommendations

Magic Tree House Fact Tracker: Rain Forests by Will Osborne and Mary Pope Osborne
Magic Tree House #6: Afternoon on the Amazon by Will Osborne and Mary Pope Osborne
The Great Kapok Tree by Lynne Cherry
Sloths Don't Run by Tori McGee
Magic School Bus season 3, episode 12: *The Magic School Bus in the Rainforest* (on Netflix)

Extension Activities

Games and Challenges

1. **Find** foods that come from rainforest: 80% of food we eat originally came from tropical rainforests: avocados, coconuts, figs, oranges, lemons, grapefruit, bananas, guavas, pineapples, mangos and tomatoes; vegetables including corn, potatoes, rice, winter squash and yams; spices like black pepper, cayenne, chocolate, cinnamon, cloves, ginger, sugar cane, turmeric, coffee and vanilla and nuts including Brazil nuts and cashews.

2. **Record** yourself/your family making rain sounds. Close your eyes and listen to the recording. Does it sound like rain?

3. Rainforest trivia
    a. Rainforests only cover 6% of the Earth's surface, yet account for more than half of the world's plant and animal species. A 4-square-mile patch can contain as many as 1,500 flowering plants, 750 species of trees, 400 species of birds, and 150 species of butterflies. The Amazon rainforest itself is home to around 40,000 plant species, nearly 1,300 bird species, 3,000 types of fish, 427 species of mammals, and 2.5 million different insects.
    b. A new plant or animal species is found in the rainforest approximately every two days.
    c. Since it's so damp and hot on a rainforest floor, things decompose super quickly down there; a leaf that might take a year to decompose in another environment will break down in only 6 weeks.
    d. Rainforests produce 20% of the earth's oxygen, and they store a huge amount of carbon dioxide. They also absorb lots of solar radiation, helping to stabilize temperatures around the world.
    e. Rainforests are so densely packed with vegetation that a drop of rain falling from the forest's top layer can take 10 minutes to reach the forest floor.

f. Lions are called the “king of the jungle,” but they’re not actually found in jungles—they live in savannas and grasslands!

4. **Look** at this photo of a double rainbow over the Amazon Rainforest. Use this as inspiration to make a rainbow and put it in your window. Some families are putting rainbows in their windows and posting the locations in a shared google doc for others to come find. SEEC has no affiliation with the project, but it could be a fun activity to do with your family.

5. **Fly** a kite. Discuss how the fabric in the kite catches the wind, like the skin flaps of a flying squirrel. Check out this NatGeo video for more information. 0:37 to 1:17 offers a good explanation and slow-motion video of the squirrel in flight.

Crafts

1. Rain stick craft
2. Leaf rubbings
3. Make your own kite
4. Rainbow window art
5. Rainforest animals coloring page More coloring pages are available at the bottom of this webpage.

Sources

1. SYSK how rain forests work episode—for adults, not children (it gets grim)
2. Amazoninstitute.com
3. Sloth institute
4. Rainforestmaker.org
5. National Geographic for Kids
6. Amazon Aid
7. Google Earth: 3D Interactive Virtual Tour of Amazon Rainforest + accompanying photos and info
8. What's the diff? Rainforests vs. Jungles
9. New England Primate Conservancy
10. http://kids.nceas.ucsb.edu/biomes/rainforest.html
11. National Center for Ecological Analysis and Synthesis Kids Do Ecology Program
12. 11 Amazing Rainforest Animals from Rainforest-Alliance.org
13. World Wildlife Fund
14. EOS: Science News by AGU
15. University of Calgary: Energy Education
16. Britannica Kids
17. Scientific method for kids
18. Five Myths about Tropical Rainforests *Washington Post* article