



# **ECO-EXPLORERS!**

## **AN ECOSYSTEM COMPARISON PROJECT**

TEMPERATE FORESTS OF MICHIGAN AND  
TROPICAL FORESTS OF COSTA RICA

### **PRE-TRIP ACTIVITIES:**

1. Sounds and Writing: Listening to the sounds of the forests, bird activities  
4/7/00
2. Drawing Animals and the Murals – plant and animal research 4/14/00
3. Field Trip to a Michigan Oak-Hickory Forest – observation and  
measurement 5/2/00

### **LESSON PLANS:**

1. Introduction on-going measurements and experiments
  - a) weather measurement
  - b) seedling observation
  - c) decomposition experiments
  - d) lifelists – flora and fauna of Michigan and Costa Rica  
- on going bird watching
2. Soil – soil measurement and graphing (Splendid Soil)
3. Plants – life cycles: seeds, flowers, fruit (My Life as a Forest Plant)
4. Trees – life cycles, measurement (Towering Trees)
5. Ants – life cycles, habits, measurement activities (The Ant Cafeteria)
6. Conservation – importance of conserving resources (How Big Was the  
Forest?)
7. Light – measurement of light and effects on plants (Light for the Living)
8. Erosion – rain's effect on soil (Saving the Soil)
9. Frogs – life cycles (Fantastic Frogs)
10. Water – water's path after it rains, pollution effects (Wonders of Water)
11. Birds – life cycles, migration, habitat destruction (Beautiful Bountiful  
Birds)

## On-going Experiments

**Pinckney 3<sup>rd</sup> Grade Benchmarks Covered: Technology: 3.9; Visual Arts: 3.1, 3.2, 3.3, 3.7, 3.9, 3.11, 3.12, 3.19; Math: 3.2, 3.7, 3.8, 3.14; Science: 3.1, 3.4, 3.6, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, 3.14, 3.17; Social Studies: 3.4, 3.5, 3.20, 3.22**

Teachers divide their class into five groups. Each day, a group is responsible for finding and recording their data for that day. They will record their group's data on the large class chart. Everyone will record all the data in their student field notebooks.

1. Weather Measurement:
  - A. Temperature: Record the outside temperature at the beginning of the day and at the end of the day. (9am and 3pm)
  - B. Precipitation: Record the amount of rain in the rain gauge at the beginning of the day. (9am)
  - C. Wind: Record the wind strength. (Very windy, slightly windy, calm)
  - D. Atmosphere: Record the amount of sun. (Very sunny, some clouds, very cloudy)
  - E. Sun: Record the time of the sunrise and the sunset of the previous day. (Find this in the paper.)
  - F. Share and record the data from Costa Rica. Compare.
  
2. Seed Observation: Each student in the class will plant a seed in a Dixie cup before the week begins. They label their cup with their name, date, and type of seed. This group is responsible for watching and watering the seeds.
  - A. Observe the seed cups and sketch a picture of one each day. Choose the one that is growing the fastest.
  - B. Record the measurement of the tallest sprout.
  - C. Water the plants carefully every other day.
  - D. Make a note of anything interesting you observe in the cups.
  
3. Decomposition: As a whole group, the class will make a small pile of a variety of garbage. Include food products, paper, plastic, metal, etc. Have some sort of "lid" to cover it at night. The class predicts what will happen to their pile over the next two weeks. This group is responsible for watching and recording the changes.
  - A. Observe the decomposition pile and describe any changes.
  - B. Note any evidence of life around it – insects, etc.
  - C. Note changes in color, size, smell, texture, etc.
  - D. Check original hypotheses for accuracy.
  - E. Share and record the data from Costa Rica. Compare.
  
4. Plant Life List: All students will be responsible for observing the plants in their environment and recording what they see. This group is responsible for adding new plants to the plant life lists.
  - A. Survey the class for plants that have been identified. Record the plant name and the place it was seen.
  - B. Record those plants on the Michigan plant life list.
  - C. Share and record the data from Costa Rica. Compare

5. Animal Life List: All students will be responsible for observing the animals in their environment and recording what they see. This group is responsible for adding new animals to the animal life lists.
  - A. Survey the class for animals that have been identified. Record the place and time the animal was seen. Also include animal tracks, road kill, hair/bones, songs identified, and nests.
  - B. Check the school bird feeders. Observe them for several minutes each day. See next section “Bird Watching.”
  - C. Record those animals on the Michigan animal life list.
  - D. Share and record the data from Costa Rica. Compare.

**RESEARCH REPORTS & ORAL PRESENTATIONS:**  
**Pinckney Third Grade Benchmarks: Language Arts : 3.8, 3.10, 3.12, 3.13;**  
**Technology: 3.1, 3.2, 3.3, 3.5, 3.7, 3.8**

Each child has been assigned to research a Michigan plant, a Michigan animal, a Costa Rica plant and a Costa Rica animal. These species will be assigned ahead of time so that research can be done before the trip. Students will complete their research outlines using a variety of sources. Students will complete drawings on index cards of their four species.

These animals and plants will “belong” to that child. When their animal or plant is spotted, in Michigan or in Costa Rica, the student will have the opportunity to share with the class a few brief comments about that plant or animal. If there are too many students who “need” to share that day, they may be carried over to the next day. When the student is finished sharing about their plant or animal, they post their drawing on the hallway mural.

At the end of the two weeks, the teacher allows time for students to share information about species which were not spotted. Hypotheses can be made as to why they were not seen.

For a more in depth research project, students chose the species (of their four) which they like the best. They research this species in more detail, and write a multi-paragraph report about it.

See plant and animal life lists for species which can be researched.

**WEATHER IN MICHIGAN: WEEK 1**

	Mon	Tue	Wed	Thu	Fri
9 am temp.					
3 pm temp.					
Rain					
Wind					
Clouds					
Sunrise					
Sunset					

**WEATHER IN COST RICA: WEEK 1**

	Mon	Tue	Wed	Thu	Fri
9 am temp.					
3 pm temp.					
Rain					
Wind					
Clouds					
Sunrise					
Sunset					

9AM Temperature Average for Michigan: \_\_\_\_\_

3PM Temperature Average for Michigan: \_\_\_\_\_

9AM Temperature Average for Costa Rica: \_\_\_\_\_

3PM Temperature Average for Costa Rica: \_\_\_\_\_

Comments: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

### WEATHER IN MICHIGAN: WEEK 2

	Mon	Tue	Wed	Thu	Fri
9 am temp.					
3 pm temp.					
Rain					
Wind					
Clouds					
Sunrise					
Sunset					

### WEATHER IN COSTA RICA: WEEK 2

	Mon	Tue	Wed	Thu	Fri
9 am temp.					
3 pm temp.					
Rain					
Wind					
Clouds					
Sunrise					
Sunset					

9AM Temperature Average for Michigan: \_\_\_\_\_

3PM Temperature Average for Michigan: \_\_\_\_\_

9AM Temperature Average for Costa Rica: \_\_\_\_\_

3PM Temperature Average for Costa Rica: \_\_\_\_\_

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## SEED OBSERVATION: WEEK 1

	Monday	Tuesday	Wednesday	Thursday	Friday
Sprout size					
Drawing					

Comments: \_\_\_\_\_

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## SEED OBSERVATION: WEEK 2

	Monday	Tuesday	Wednesday	Thursday	Friday
Sprout size					
Drawing					

Comments: \_\_\_\_\_

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## DECOMPOSITION OBSERVATION: WEEK 1

	Monday	Tuesday	Wednesday	Thursday	Friday
Weather					
Changes					

Comments: \_\_\_\_\_

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## DECOMPOSITION OBSERVATION: WEEK 2

	Monday	Tuesday	Wednesday	Thursday	Friday
Weather					
Changes					

Comments: \_\_\_\_\_

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## SPECIES RESEARCH OUTLINE

Traits	Michigan Animal	Costa Rica Animal
Animal name		
Where does it live?		
What does it eat?		
What eats it?		
How has it adapted to its environment?		
Size when fully grown		
One interesting fact		

Traits	Michigan Plant	Costa Rica Plant
Plant name		
What does its seed look like?		
What does its flower look like?		
What eats it?		
How has it adapted to its environment?		
Size when fully grown		
One interesting fact		

## Research Report-

Pinckney Third Grade Benchmarks: Language Arts: 3.8, 3.10, 3.12; 3.12

Choose one of your species. Which one would you like to learn more about? Which one interests you? Write a more detailed report about that species. Your report should be at least four paragraphs.

**Paragraph 1:** Describe your species. What does it look like? What does it look like in different stages of its life cycle? How big is it when its born? How big does it get? Does it turn different colors? How long does it live?

**Paragraph 2:** Describe your species' habitat. Where does it live and why? Does it live in a certain level of the rainforest? Where does it sleep? What hunts for it? How does it stay safe? How does it keep its babies safe? Does it have any special adaptations because of its habitat?

**Paragraph 3:** Describe your species' eating habits. What does it eat? How does it get its food? Does it eat in the day or night? Why? Does it travel to find food? Does it have any special adaptations for eating? Does it live in groups so it can find food?

**Paragraph 4:** What is special about your species? Why did you pick it? Is it endangered? If so, why is it in trouble?? Is there anything else interesting about your species?

Biodiversity Mural & Life List

## **Michigan**

The list below is a general list of commonly seen flora and fauna in and around your schoolyards. Please note that all of the species listed are not full time forest residents. Many species listed are very general which may require more student research. For example, warbler is listed as a bird. There are several dozen kinds of warbler which may occur in Michigan forests.

### **Fauna:**

#### Mammals:

- Beaver
- Chipmunk
- Coyote
- Flying Squirrel
- Fox
- Fox Squirrel
- Grey Squirrel
- Mouse
- Muskrat
- Opossum
- Porcupine
- Rabbit
- Raccoon
- Skunk
- White-tailed deer

#### Birds:

- Belted Kingfisher
- Black Capped Chickadee
- Blue Jay
- Canada Goose
- Cardinal
- Carolina Wren
- Cedar Waxwing
- Crow
- Downy Woodpecker
- Eastern Bluebird
- European Starling
- Goldfinch
- Grackle
- Grasshopper Sparrow
- Great Horned Owl
- Hairy Woodpecker
- House Finch
- House Sparrow
- Indigo Bunting
- Mallard Duck
- Mockingbird
- Mourning Dove
- Oriole (Baltimore – Winters in Central America)
- Pigeon
- Purple Martin

Red tailed hawk  
Red-winged blackbird  
Robin  
Rose Breated Grosbeak  
Ruby-throated hummingbird (Winters in Central America)  
Screech Owl  
Swan  
Turkey Vulture  
Warbler  
Woodthrush (Winters in Central America)

Reptiles:

Box turtle  
Garter snake  
Snapping turtle  
Wood turtle

Amphibians:

American Toad  
Bullfrog  
Gray tree frog  
Green frog  
Salamander  
Spring peeper

Invertebrates:

Ant  
Bee  
Beetle  
Centipede  
Cricket  
Earthworm  
Grasshopper  
Ladybug  
Millipede  
Monarch butterfly  
Moth  
Pillbug  
Snail  
Spider  
Swallowtail butterfly  
Wasp

**Flora:**

Trees:

American Beech  
Black Walnut  
Crab apple  
Elm  
Fir  
Flowering Dogwood  
Green Ash  
Paper Birch

Pignut Hickory  
Red Oak  
Sassafras  
Shagbark Hickory  
Spruce  
Sugar Maple  
Sycamore  
Tulip Poplar  
White Oak  
White Pine  
Willow

Wild Flowers:

Aster  
Blue phlox  
Chickweed  
Clover  
Daisy  
Dandelion  
Dutchman's Breeches  
Jack in the pulpit  
Lady Slipper (Orchid)  
Lilly  
Lily of the valley  
May-apple  
Milk weed  
Morning glory  
Skunk cabbage  
Solomon's seal  
Spring beauty  
Trillium  
Violet  
Wild ginger  
Wood sorrel

Other Plants:

Blackberry  
Blueberry  
Bracket Fungus  
Fragrant Sumac  
Huckleberry  
Lichen  
Michigan Holly  
Moss  
Mushroom  
Poison Ivy  
Poison Oak  
Spicebush  
Strawberry

# Costa Rica

## **Fauna:**

### Mammals:

Agouti  
Armadillo  
Brocket deer  
Capuchin monkey  
Central American dwarf squirrel  
Fruit bat  
Howler Monkey  
Jaguar (endangered)  
Jaguarundi (endangered)  
Kinkajou  
Margay (endangered)  
Ocelot (rare)  
Opossum  
Paca  
Peccary  
Raccoon (looks similar to N. American raccoon, but different species)  
Sloth  
Spider Monkey  
Tamandua (Anteater)  
Tapir (endangered)  
Vampire bat  
White-tailed deer

### Birds:

Amazon Parrot  
Baltimore Oriole (migrant)  
Barbet  
Bee-eater  
Belted Kingfisher  
Brown jay  
Clay colored robin (National bird of Costa Rica)  
Cooper's Hawk  
Cuckoo  
Curassow  
Flycatcher  
Harpy Eagle  
Hermit  
Honeycreeper  
Hummingbird (many kinds, but ruby-throated – migrant)  
Indigo Bunting  
Kestrel  
Kingfisher  
Manakin  
Motmot  
Osprey  
Puffbird

Quetzal  
Rock Dove  
Rose Breated Grosbeak  
Scarlet Macaw  
Spectacled Owl  
Tanager  
Three-wattled bellbird  
Tinamou  
Toucan  
Toucanet  
Trogon  
Turkey vulture  
Warbler  
Woodcreeper  
Woodpecker  
Woodthrush (migrant)  
Wren  
Yellow billed Cuckoo

Reptiles:

American Crocodile  
Anole  
Basilisk lizard  
Boa Constrictor  
Bushmaster  
Caiman  
Coral snake  
Gecko  
Green Iguana  
Green Spiny Lizard  
Litter skink  
Pit viper  
Tropical Kingsnake  
Turtle (Brown land, Black River, or Mud)  
Vine Snake  
Whiptail

Amphibians:

Caecilian  
Glass frog  
Leaf frog  
Poison arrow frog  
Salamander  
Toad  
Treefrog

Invertebrates:

Army ant  
Assassin bug  
Beetle (Harlequin, Rhino, Scarab,)  
Blue morpho butterfly  
Centipede  
Cockroach  
Fireflies

Heliconia butterfly  
Katydid  
Ladybug  
Leaf cutter ant  
Millipede  
Monarch butterfly  
Scorpion  
Snail  
Spider  
Swallowtail butterfly  
Turantula  
Weevils

**Flora:**

Trees:

Acacia  
Balsa  
Brazil nut  
Brosimum (emergent layer)  
Cecropia  
Cedrela  
Cocoa  
Coconut palm  
Coffee  
Dumb cane  
Ficus  
Kapok (Ceiba)  
Manioc (Cassava)  
Papaya  
*Pentaclethra maculoba* (legume tree)  
Pineapple  
*Welfia georgii* (palm)  
Winter's bark tree

Plants:

Banana  
Bole climber (hemi-epiphyte)  
Bromeliad  
Clusia (hemi-epiphyte)  
Epiphyll  
Fern  
Heliconia  
Liana  
Mistletoes  
Monstera  
Moss  
Orchid  
Passion flower  
Philodendron (vine)  
Piper  
Psychtria (shrub - coffee family)  
Rattlesnake plant

Strangler fig  
Sugarcane  
Tree fern

## **On-Going Experiments Continued**

### **Bird Watching Tips**

#### **Objectives:**

1. Students will observe the feeding behavior of birds.
  1. Students will conclude that the anatomical structure of a bird's bill is adapted to its food source.
  2. Students will compare the number of different species of birds observed in Michigan to the number of different species found in Costa Rica to learn about biodiversity.
  3. Students will draw conclusions based on their observations.
  4. Students will collect observational data and use mathematical sums to compare and contrast the diversity and bill structure of birds in Michigan and Costa Rica
  5. Students will record their observations with drawings and notes.

#### **Materials:**

General materials:

Reference materials to identify Michigan birds

Thistle or niger seeds

Larger seed mix (example: oil-type sunflower seeds, black-striped sunflower seeds)

Hummingbird feeder and nectar

Meat/prey of some type (example: Dead mouse, chicken leg)

Fruit (example: Berries)

Feeders or areas for different seed and food types

Large bowl for water

Binoculars

Data sheets for morning, noon and afternoon.

#### **Getting Ready:**

- A. Before the bird observations begins, set up the feeders at least a week beforehand so that birds become aware of this new food source. Don't forget to also set out a large bowl of water or birdbath to help attract birds. Water is a prime attraction for nearly all backyard species and will improve the results of your efforts to attract birds many times over. Also try to place bird feeders at a place where other animals can not easily reach the food. Squirrels can eat the contents of a bird feeder very quickly.
- B. Collect reference materials with pictures to help students identify the birds. Field guides work well. Have students become familiar with how to use them before getting started.

## **Procedure:**

1. For two weeks, students will observe and tally the number and types of birds that visit feeders placed outside the window of their classroom. There will be at least 4 different feeders: 1) seed, 2) fruit, 3) nectar, and 4) meat. The 4<sup>th</sup> feeder can also be used for smaller seeds such as thistle or a 5<sup>th</sup> feeder may be added. A bowl of water should also be placed near the feeders to supply drinking and bath water. Near the windows have reference materials with pictures of common Michigan birds for identification.
2. Each student will be assigned a day and time of the week (morning, noon, and afternoon) to check the feeders and record data. Students will record data by adding a tally mark on the data sheet next to the bird sited at each feeder.
3. During the two-week period set aside some time, 20 or 30 minutes for students to spend observing and drawing the birds that visit the feeders. This will give students a chance to draw from live creatures and become more aware of certain characteristics, such as bill type and size. Binoculars can be used to get a closer look at the bills of these birds. In their drawings, encourage students to show the shape and size of the birds' beaks.
4. At the end of the two weeks students will tally up the results of the data sheets and make conclusions during the Bird lesson (Day 10).

## **Background info:**

When setting up the feeders be sure to buy quality seeds that many different types of birds are likely to eat. Most prepackaged bags of birdseed and grain available at most supermarkets contain extraordinary amounts of grains and seed types that most birds will not eat. They will simply eat the few seeds they do want and leave the rest. The best seed mixes are available through nature stores, nurseries, garden centers, farm supply stores and home improvement centers. The type of seeds you want to include are black oil-type sunflower seeds (the most attractive seeds for the widest variety of birds), black-stripe sunflower seeds and thistle or niger seeds. In smaller amounts try to include, peanut kernels, red proso millet and white proso millet. A combination of these will attract any bird in the area that is inclined to come to feeders. Avoid hulled oats, milo, peanut hearts, rice and wheat. These have no attraction for almost any bird species.

Bird feeders don't have to be fancy to work. A simple platform can be constructed out of wood and sprinkled with a variety of seeds and food types along its length. Using a mesh bag can easily make a feeder for smaller seeds such as thistle or niger seeds. Red is a very attractive color for all species of hummingbirds, a red tinted feeder should be used or try tying red flags or ribbons on the feeder.

With a relatively stable climate, food sources in Costa Rica are abundant year round. This has allowed birds of the Tropics to specialize anatomically and behaviorally. Many birds eat only a single source of food, such as fruit-eaters, flycatchers, or seed-eaters. The

structure of their bills is adapted for the type of food they eat. Structure also relates to whether they swallow it whole, bite, crack, or tear it. Although students in Michigan will not see the large bills of the fruit-eating parrots, they can observe the differences in bills among seed-eaters, hummingbirds, and scavengers (crows). Listed below are different types of bill shapes and the types of foods they are adapted to eat.

**Short, rounded** – seed and fruit-eater (ex. Dark-eyed Junco)

**Long, sharp** – insect-eater (ex. Blue-gray gnatcatcher)

**Long, needlelike** – nectar feeder (ex. Ruby-throated hummingbird)

**Large, broad and stout** – scavenger (ex. American crow)

**Large, conical** – seed-eater (ex. Evening grosbeak)

**Heavily hooked** – bird of prey (ex. Red-winged hawk)

**Short, stout** – seed-eater (ex. Cardinal)

**Short, sharp** – seed-eater or insect-eater (ex. Song Sparrow)

**Small, conical** – seed- and fruit-eater (ex. Tufted titmouse)

**Long, sharp** – insect-eater (ex. House wren)

**Long, flat, rounded** – waterfowl (ex. Mallard)

**Crossed mandibles** – very specialized seed-eater (ex. Red Crossbill)















## RAINFOREST ANIMAL EXTENSION ACTIVITIES

1. **Multi-layered Dioramas:** There are four layers in a rainforest and each has unique plants and animals. Have each child bring in a shoebox and a paper towel roll. Divide students into groups of four and have them stack their four boxes on top of each other. Tape them together and tape the rolls onto the side of the boxes going all the way up. The rolls will be the trunk of the tallest rainforest tree. Glue green construction paper on the top of the boxes to resemble the top leaves and branches of the tree. Each box will be one layer of the forest: Floor, Understory, Canopy, and Emergent. Using paper, paint, markers and any other art materials, students create a scene in their box that includes a variety of plants and animals of the rainforest that live in their level. The final result is a tall diorama with distinct sections of rainforest life.
2. **Rainforest Riddles:** Students chose a rainforest animal and research it. Then they use their information to come up with five clues about their animal. At the top of their paper, they write, "Guess who I am!" Then they write their five clues. Finally, they draw and color a picture of their animal near the bottom of their paper. They cover it with a stapled page so the reader has to lift it to find out. For example:

Guess who I am!  
I am very small, but I work very hard.  
I live underground, but I come out to work.  
I have a big family, with hundreds of sisters.  
I chew on and carry leaves.  
I have 6 legs and three body parts.  
Who am I?  
( leaf cutter ant)
3. **Lots of Life!** How much life is in a rainforest? Much more than we have in our temperate forests. To convey this simple fact, sent students outside with a five foot length of yarn tied together in a circle. Have them lay it out on an area in the forest. Have them count and record all the different kinds of plants and animals they can find inside their circles. "Grass" would count as one kind of plant. They should discuss their results. Then tell them that the same circle, in the rainforests will probably have ten times as many different kinds of life. If there are 20 different things in our Michigan forest, there will be 200 different things in a Costa Rica rainforest.
4. **At Home in the Rainforest:** Have students choose a rainforest animal to research. They should read about that animal's habitat. Where does it live? Where does it eat? Where does it sleep? What does it need for shelter? How does it protect its babies? Then, have students write a real estate ad. They're advertising the perfect home for that animal. They may check some real ads in a newspaper for inspiration. They may include a picture of that animal's perfect home.

## ***AMAZING RAINFOREST FACTS:***

1. Rainforests are the “most alive” places on Earth. Over 2/3 of the world’s species of plants and animals live in the rainforest.
2. Rainforests cover only 6% of the Earth.
3. Rainforests get a lot of rain. They have up to 300 inches of rain a year.
4. It rains almost every day in the rainforest. There is rain about 200 days each year.
5. Rainforest plants are important to medicine. About 3,000 plants from the rainforest can be used to make medicines.
6. One out of every four medicines comes from a rainforest plant.
7. Rainforests have a huge variety of plant and animal species. In a Costa Rica rainforest, you could find 950 different kinds of beetles on one large tree.
8. In one acre of Peru rainforest, you could find up to 150 species of trees.
9. You could find more than 1,500 species of butterflies in one square mile of Brazilian rainforest. That’s twice as many species as are in all of the US and Canada.
10. Poison-dart frogs are some of the deadliest creatures on earth. Some have enough poison in their skin to kill 1,000 people.
11. Rainforest trees can grow up to 160 feet tall.
12. Rainforests are being cut down at an alarming rate. About 5,800 acres of rainforest are destroyed each hour.
13. A rainforest area the size of a football field is destroyed each second.
14. Half of the world’s rainforests have already been destroyed by man. The other half are in danger right now.
15. About 50 species of plants and animals become extinct every day in the rain forest.

## **GENERAL FACTS ABOUT COSTA RICA:**

1. Costa Rica gained its independence from Spain in 1821.
2. Costa Rica is a democracy.
3. Its official name is “The Republic of Cost Rica.”
4. The capital is San Jose.
5. The population is 3.2 million people.
6. The official language is Spanish.
7. The money is the Costa Rican colon
8. Costa Rica does not have an army. Its Constitution is the only one in the world that forbids a national army.
9. In Central America, Costa Rica is between Nicaragua and Panama.
10. Costa Rica has a President. Jose Maria Figueres is the President.
11. Costa Rica exports coffee, beef and bananas.
12. Costa Rica has mineral resources: bauxite, gold, silver manganese and mercury.
13. Tourism is an important industry in Costa Rica.
14. 39% of Costa Rica’s exports are to the USA.
15. Forests cover 34% of Costa Rica.
16. Costa Rica is developing hydroelectric power.

## ***RAINFOREST LITERATURE:***

### NON-FICTION

Conserving Rain Forests by Martin Banks

Crafts for Kids Who are Wild About Rainforests by Kathy Ross

Explore a Tropical Forest, edited by Donald J. Crump

First Field Guide: Amphibians by the National Audubon Society

Here is the Tropical Rain Forest by Madelein Dunphy

Journey Through a Tropical Jungle by Adrian Forsyth

Jungle by Theresa Greeaway

Life in the Rainforests by Lucy Baker

Look Closer: Rain Forest by Barbara Taylor

Make Your Own Rain Forest by Damian Johnston

Nature's Green Umbrella: Tropical Rain Forests by Gail Gibbons

Our Endangered Planet: Tropical Rain Forests by Cornelia F. Mutel and Mary M. Rodgers

Rainforest Destruction by Tony Hare

Rain Forest Ride by Julia Andrews

Rain Forest Secrets by Arthur Dorros

(A study guide for this book is included)

The Rain Forest by Billy Goodman

Totally Amazing Rain Forests – a Golden Book

Water by Francois Michel (a pop-up book)

Wonders of the Rain Forest by Janet Craig

### FICTION

Feathers Like a Rainbow by Flora, Harper and Row

Flute's Journey: The Life of a Wood Thrush, by Lynne Cherry

Journey of the Red-Eyed Tree Frog by Martin and Tanis Jordan

Panther Dream by Bob Weir and Wendy Weir

The Great Kapok Tree by Lynne Cherry

Treeman by Carmen Agra Deedy

Welcome to the Green House by Jane Yolen

### VIDEOS

# Eco-Explorers!

## Glossary of terms:

- Abiotic:** Factors that influence organisms that are not living (wind, temperature, fire, etc.)
- Acre** A unit of land area equal to 4,840 square yards, or 43,560 square feet (1 acre is slightly bigger than a football field)
- Agriculture:** The system humans use to grow plants and animals for food.
- Air pollution:** Harmful substances in the air
- Amphibian:** A cold blooded vertebrate whose larvae live in the water breathing through gills and whose adult lives on land breathing through lungs. Frogs, toads, and salamanders
- Biodiversity:** The variety of different kinds of living organisms.
- Biotic:** Factors that influence organisms that are living (plants, animals, humans, etc.)
- Bromeliad:** Any of various mostly epiphytic tropical American plants usually having long, stiff leaves, and colorful flowers. Many bromeliads hold a pool of water in their center. Bromeliads include the pineapple, the Spanish moss, and numerous ornamentals.
- Carnivore:** An organism that eats the flesh of other animals.
- Circumference:** The distance around a circle.
- Clear Cut Forest:** A forest in which every tree is cut down.
- Conservation:** .Preservation from loss, damage, or neglect. The controlled use and systematic protection of natural resources, such as forests, soil, and water systems.
- Deciduous:** A kind of tree that drops its leaves with a change in the seasons.
- Decomposition:** The process of breaking down plant or animal material into basic substances.
- Deforestation:** Humans intentionally cutting down trees in a forest.
- Detritus:** Natural byproducts of a forest that accumulate on the ground (leaves, seeds, bones, feathers, etc.)
- Dispersal:** Spreading an object (seed) away from where in came (grew).
- Eggs:** A female reproductive cell, which after a period of development or incubation will hatch or emerge into the offspring of the organism.
- Epiphyte:** A plant, such as a tropical orchid or a staghorn fern, that grows on another plant upon which it depends for mechanical support but not for nutrients.
- Equator:** The imaginary great circle around the earth's surface, equidistant from the poles and perpendicular to the earth's axis of rotation. It divides the earth into the Northern Hemisphere and the Southern Hemisphere.
- Erosion:** The processes by which soil is worn away from the earth's surface
- Fauna:** Animals – invertebrates (insects, spiders, etc.) and vertebrates (mammals, birds, etc)
- Filtering:** The process of separating substances from each other, usually by using a porous barrier.
- Flora:** Plants – fungi, moss, flowers, shrubs, trees
- Flower:** The bloom or blossom of a plant.
- Forestry:** The system humans use to harvest trees from a forest for lumber or paper.
- Fruit:** A nutritious part of a plant's lifecycle which contains the plant's seeds.

**Germinate:** Part of a plant's lifecycle where the seed begins to grow.

**Habitat:** A community or place where organisms live.

**Herbivore:** An organism that eats plants or parts of plants.

**Larvae:** An early developmental stage in the life cycle of some organisms.

**Leaf:** A green, usually flat, part of a plant where photosynthesis occurs. Leaves may also store food, act as protection, store water, catch insects, or be part of reproduction.

**Leaflet:** One of the divisions of a compound leaf.

**Liana:** A type of long woody plant, climbing vine – usually tropical

**Life cycle:** A progression through a series of differing stages of development.

**Light:** Energy in the form of radiation from the sun.

**Light gap:** An opening in a forest canopy formed when a tree dies and falls or is cut down.

**Light meter:** An instrument which measures the amount of light.

**Microscope:** An instrument which lets you view very small objects.

**Migration:** To change location periodically, especially by moving seasonally from one region to another.

**Migratory:** A type of organism which migrates regularly.

**Nectavore:** An organism which eats plant nectar.

**Nut:** A kind of seed – often times it is in the middle of the fruit.

**Nutrient cycle:** The process of nutrition moving through an ecosystem.

**Old growth forest:** A forest which has not been clear cut.

**pH:** A measurement of acidity. 1 is very acid, 7 is neutral and 14 is very basic.

**Pharmaceutical:** Relating to the production of medicines and drugs.

**Photosynthesis:** The process plants use to convert light energy from the sun, with water, and carbon dioxide to make their own food.

**Pond:** A small body of standing water.

**Pupae:** The nonfeeding stage between the larva and adult in the metamorphosis of some insects, during which the larva typically undergoes complete transformation within a protective cocoon or hardened case.

**Queen Ant:** The one female ant in a colony who lays eggs.

**Rainfall:** A measurement of the amount of rain – usually measured by a rain gauge.

**Resident:** An organism which lives in the same place all year.

**Seed:** A ripened plant ovule containing an embryo.

**Shady:** An area which is blocked from the direct rays of the sun.

**Soil:** The top layer of the earth's surface, consisting of rock and mineral particles mixed with organic matter.

**Soil pollution:** Harmful substances in the soil.

**Specialization:** How an organism is adapted to a specific function or environment.

**Species:** A way of naming organisms. A species is a group of individuals that share the same traits and characteristics and can reproduce with each other.

**Sprout:** A young plant which has begun to grow, bud or give off shoots.

**Square area:** Unit of measurement which equals length multiplied by the width.

**Suburbs:** An area around cities where housing and shopping districts exist.

**Tadpole:** The limbless aquatic larva of a frog or toad, having gills and a long flat tail. As the tadpole approaches the adult stage, legs and lungs develop, and the tail gradually disappears

**Temperate:** Areas of Earth that are characterized by moderate temperatures, weather, or climate; neither hot nor cold. There are usually distinct seasons.

**Topsoil:** The upper layer of soil which has most of the nutrients needed for plant growth.

**Tropical:** Dealing with the tropics

**Tropics:** The area of the Earth that is located between the Tropic of Cancer and the Tropic of Capricorn. This area is usually warm and moist with little changes in the seasons.

**Vine:** A weak-stemmed plant that derives its support from climbing, twining, or creeping along a surface.

**Water pollution:** Harmful substances in the water.

**Worker Ant:** A female ant who has a specific job to do for the colony. Soldier, forager, scout, etc.