



The Amazon, a Tropical Rainforest

Objective:

1. Students will demonstrate an understanding of relationships among various organisms in an ecosystem.
2. Students will demonstrate a general knowledge of the plant cycle as it relates to the decomposition of matter on the rainforest floor.
3. Students will demonstrate an understanding of conservation and the interactions between human populations, natural resources and the environment.

Performance Objectives:

Grade 3: SS Strand 3: Concept 2 – PO 2;
Strand 4 - Concept 3 – PO 3

Grade 4: SS Strand 4: Concept 3 – PO 1-4;
Concept 4 – PO 2

Grade 5: SS Strand 3: Concept 1 – PO 1-3
NGSS 3-LS 2. D; 4-LS 1. A; 5-LS 2. A
CCSS 3.W.2; 4.W.2: 5.W.2

Background Information:

The tropical rainforest of South America covers an area over 2 million miles of underdeveloped land. The Amazon River, which begins high in the Andes Mountains of Peru, is the life source that flows through the rainforest. The Amazon River is the second largest in the world and contains more fresh water than any river on Earth. The Amazon River and its tributaries supply most of the ground-level water of the rainforest.

Grades: 3 - 5

Related Literature:

Rainforest Animal Adaptations

Lisa Jo Amstutz

One Day in the Tropical Rainforest

Jean Craighead George

It's A Jungle Out There

Ron Snell

A tropical rainforest is a lush forest of trees and plants that live in a warm, humid climate. The tropical rainforest receives an average of 160 inches of rain a year and maintains an air temperature of 75 to 80 degrees. Regulating temperatures and weather patterns, the rainforests are considered the world's thermostat. The plants in rainforests produce about 20% of the oxygen on Earth and play a vital role in the survival of all living organisms. The Amazon Rainforest is filled with an abundance of living organisms that exist in the ecosystems unique to the region. Scientists reveal that in a four-square-mile section of the rainforest, as many as 1500 flowering plants, 750 species of trees, 400 species of birds and 150 species of butterflies live and contribute to the ecosystem. It is believed that within the dense foliage and diverse populations of animals and insects, there are many species that have not yet been discovered. The remote location of some habitats may be the cause of species remaining unknown. For example, many species live at the top of the tallest trees where they are not seen from the ground and are extremely difficult to reach.

The Amazon Rainforest is comprised of four layers and filled from top to bottom with living organisms. The upper most part of the rainforest is referred to as the **emergent layer**. The name, emergent, describes the manner in which the tallest trees “emerge” some 200 feet from the dense forest below. The crowns (tops) of the trees fan out like umbrellas over the trees below. This layer receives the most sunlight but must survive strong winds and high temperatures. The trees in the emergent layer are the home for creatures such as the Harpy Eagle, Howler Monkey and other raptors and animals capable of living high in the treetops.



The Amazon Rainforest Emergent Layer

(Photo by Keri Granado)



Harpy Eagle

(Public domain photo)

The **canopy layer** is below the emergent layer. This dense layer is crowded with trees that form a continuous canopy approximately 60 to 90 feet above the ground. The upper part of the canopy captures about 90% of the sunlight and is where most of the photosynthesis takes place. Trees in the canopy layer are often covered with vines and other plants that live attached to the trunks or branches of the trees. Plants such as ferns and bromeliads attach themselves to the trees in the canopy layer. The canopy layer is the most populated, making it the home for 90% of the living organisms in the rainforest. The beautiful Morpho Butterfly, Scarlet Macaw and Squirrel Monkey live in the canopy layer of the rainforest. Animals such as the Three-toed Sloth, the Kinkajou and the Iguana find that the canopy layer offers them the most secure habitat with a wealth of branches to call home. Jaguars, poison dart frogs and snakes find that the lower part of the canopy is a suitable

habitat providing food, shelter and a place to rest.



The Amazon Rainforest Canopy Layer is the most densely populated with plants and animal life.

(Photo by Keri Granado)

The environment in the canopy is very different from that of the rainforest floor. During the day, the canopy area is dryer than the rainforest floor, and due to the denseness of the leaves, it is difficult to see the floor below. Some animals living in the canopy rely on loud noises and calls to alert others as a means of communication. Many animals in the canopy layer move about by swinging from branch to branch, flying from tree to tree and jumping from limb to limb. Animals also make use of the vines that grow and hang from the branches on the trees.

Because the canopy layer is very high, scientists have difficulty studying some of the animals. Rope bridges have been constructed in the canopy area to help people study the native species.



(Photo by Keri Granado)

This rope bridge in the rainforest canopy was built to study living organisms in the preserve at Jatun Sacha, Ecuador. The bridge allows scientists to cross treetop areas as they investigate the habitats of various animals.

The **understory layer** is closer to the rainforest floor and only receives 2 – 15% of the sunlight. The air is cooler under the leafy plants with smaller shrubs, ferns and vines that have adapted to the understory's filtered light and soil conditions. Some of the plants in the understory are orchids, ginger plants, and bromeliads, which have become home to small birds, insects and amphibians. Poison dart frogs, vine snakes, sloths and jaguars enjoy life in the understory layer of the rainforest.

Heliconia, sulphur, malachite and glasswing butterflies float among the plants in the understory, and the shade and humidity provide a perfect environment for a vast diversity of insects.

The rainforest floor is where **decomposition** takes place and vital nutrients are produced. The process of decomposition is breaking down decaying materials and recycling them back into the forest ecosystem. While this area receives approximately 1- 2% of the sunlight, the top soil is rich in nutrients and filled with dead leaves, twigs and ground-cover plants. The humidity, temperature and shade allows for an environment crowded with moss, ferns, vines, insects, arachnids,



snakes and large ground-loving animals. Birds, beetles, lizards, Goliath tarantulas, funnel-web spiders, termites and Conga ants are only a few of the creatures that inhabit the rainforest floor. Larger animals like the jaguar roam the forest in search of food. The agile jaguar is one of the most dangerous animals in the rainforest because of

(Photo by Keri Granado)

its size and ability to climb trees or run quickly after its prey. Equally dangerous is the poison dart frog with the most powerful poison known to man. Generally harmless if left alone, the poison dart frog produces enough poison in its glands to kill up to 100 people. This tiny amphibian is on the endangered list and is only found in tropical forests. Most poison dart frogs have brightly colored skin used as a warning to predators. South American indigenous tribes have used the poison from the dart frogs to tip their arrows before hunting prey.



The poison dart frog is very small, only about an inch in length. The brightly colored skin is a warning to predators to “back off.” These tiny creatures capture their food with a sticky tongue that darts out and grabs the prey. Poison dart frogs like to eat small insects such as flies, ants and termites. There are several species of poison dart frogs, but all of them live in the tropical forests of Central and South America.

(Yellow-banded poison dart frog public domain photo)

Many rainforest creatures use a disguise to keep them safe from predators. Blending in with the surroundings is one way creatures can **camouflage** themselves out in the open. Some reptiles using this adaptation can change color to blend in with the plants around them. Using **mimicry** is another way creatures have adapted to their need for survival in an environment. Katydid's can mimic twigs, leaves and bark while some butterflies shut their wings to look like leaves. Algae growing on the three-toed sloth's hair allows it to blend in with the leaves as it hangs from branches.



The stick bug can appear to be just another twig on a branch. (Photo by Keri Granado)

The rainforest is the most diverse ecosystem on Earth with enormous numbers of plant and animal species who rely on their particular habitat to survive and reproduce. The relationships within the rainforest range from interdependence to competition and can be observed in all living organisms. Leaf cutter ants and fungus are an example of a mutualism. Their relationship is one in which the ants protect the fungi from harmful insects while nourishing it with small pieces of leaf matter. Bromeliad plants grow on high branches of trees. They do not do damage to the branches and they supply water to insects and birds that have adapted to the

structure of the plant. The relationship between the bromeliad and tree is called commensalisms. An example of a symbiotic relationship in which two or more species interact very closely, would be ants and aphids. Aphids produce and excrete a sweet liquid which is a good food source for ants. Ants protect the aphids from predators and extract the liquid for nourishment. Ants have been known to herd aphids and take them along when moving the ant colony. The rainforest community is made up of all of the populations that live in the habitat of the area.

In addition to plants and animals, humans play a role in the balance of nature within the rainforest region. Indigenous people, native people to the area, have lived in the rainforest for many thousands of years. The Yanomami are the longest surviving group of indigenous people in the Amazon rainforest. They raise crops of plantain, hunt for food and live somewhat isolated in the forest. The traditional past continues to be a part of the lifestyle of the Yanomami people. Many other native people live in the vast region of the rainforest and continue to live much like their ancestors did a thousand years before them. Many of these people rely on the Amazon River for food and other resources. Indigenous people live a sustainable life and use the land without doing harm to the plants and animals in the environment.

People outside the rainforest rely on the immense resources that stem from the Amazon region. Much of the food that we consume today originated in the rainforest. Coffee, cocoa, spices, fruits and nuts are only a few of the foods produced in the rainforest. Products such as rubber, gum, resins and dyes also come from the region and are important in the various products derived from them. Medicinal plants and herbs from the Amazon rainforest have made a significant impact on world health and the advancement in curing some diseases and fighting certain types of cancer. The rainforest has a bounty of resources for both indigenous people and people around the world. However, the balance of nature can be fragile and conservation of the natural resources in the rainforest continues to be of great concern to many.

The rainforests of the world have been a focus for the scientific community for many years. Scientists believe that conservation of the rainforest regions is critical to the balance of life on Earth. Often referred to as the “Lungs of the Earth” tropical rainforests are important because they provide oxygen to the planet and

take in carbon dioxide as a part of the natural cycle. Without the vegetation of the rainforests, the carbon dioxide would be released into the atmosphere causing significant damage. Rainforest plants and trees also protect the underground water supplies and help stop erosion that could take place during climate changes. When deforestation takes place the water cycle is disrupted in the region causing temperatures to increase and drought conditions can be more common. Significant changes in rainforest conditions are likely to affect the region's vegetation, water supply, biodiversity, agriculture and human health worldwide.

Sources: The Nature Conservancy; Oldfield, Sara. *Rainforest*. London: New Holland Publishing 2002; World Wildlife Federation; Wikipedia; NOVA; Discovery Kids; The Rainforest Alliance; Physical Anthropologist Keri Granado; National Geographic; San Diego Zoo; Animal Fact Guide.

Procedures and Pre-Activities:

1. State the learning objective.
2. Read related literature.
3. Refer to a world map and show the location of the Amazon Rainforest and surrounding countries in South America.
4. Ask open-ended questions regarding the rainforest to check for prior knowledge. Give a brief overview of a rainforest compared to other forests.
5. Hand out the note sheet The Rainforest. Students take notes as the background information is presented.
6. Present the background information and refer to pictures as needed.
7. Discuss the relationship of living organisms in an ecosystem.
8. **Activity: Food Chain.** The objective of this activity is to enhance student knowledge of the food chain. Students follow the directions on the worksheet. The worksheets can be used as practice or a quiz. There are two versions of the food chain worksheet. Teachers may determine which is appropriate for the grade level and prior instruction on the topic. (See attached food chain sheet)

9. **Activity: The rainforest mural.**

The objective of this activity is to give students an opportunity to be creative as they demonstrate their understanding of the rainforest layers and the living organisms in the environment.

Attach butcher paper on the classroom wall with tape. The butcher paper is now the mural canvas. After discussing the rainforest layers, plants and animals, students are divided by groups. Each group has an assignment as part of creating the rainforest mural.

Groups:

1. Emergent layer of trees
2. Canopy layer of trees and plants
3. Understory layer of trees and plants
4. Rainforest floor
5. Animals and insects (optional group)

Each group draws the living organisms in their designated area on the rainforest mural paper. Living organisms include trees, plants, animals and insects in the specific area. Group five places additional animals and insects in the appropriate layer of the rainforest.

Once the mural is completed, the students from each group give a brief presentation of their work.

Materials:

Butcher paper – approximately 6 ft. by 10 ft.

Crayons, markers, paint, pencils

Scissors

Tape (Use to attach the butcher paper to the wall of the classroom.)

10. Prepare students to visit **Butterfly Wonderland**. Explain that the environment in the atrium is similar to that of the rainforest with regards to the contained temperature and humidity. Students will notice many different types of plants and a water pond. The butterflies must live in a rainforest-like environment and use flowering plants for survival.

Reflection and Assessment:

After visiting **Butterfly Wonderland**, discuss the experience in the atrium and how the atmosphere relates to the rainforest. The final assessment is participation in the activities and discussions.

Activity: You are a Cryptozoologist (see attached handouts). Students identify and name their new species.

Activity: Students write an essay about their newly discovered species.

The Rainforest

The Amazon Rainforest is one of the most unique places on Earth. While you listen to the amazing information, take a few notes about the Rainforest.

1. Rainforests are the home for many creatures.

A. _____

B. _____

2. Many plants are in the rainforest.

A. _____

3. Rainforests are important.

A. _____

B. _____

4. The rainforest has a different climate.

A. _____

5. The trees are special.

A. _____

B. _____

C. _____

D. _____

6. Where is the Amazon Rainforest located?

A. _____

7. This is what I like the most about the Amazon Rainforest.

A. _____

B. _____

C. _____

8. One interesting fact about the rainforest.

A. _____

The Food Chain

A Food Chain is a series of steps in which energy is obtained, used and changed by living organisms. For example, sunlight helps seeds grow, seeds turn into grass, which feeds cattle and humans eat the beef from the cattle. The parts of the food chain are as follows:

Producers: This is the start of the food chain. Producers are plants which take energy from the sun and use the energy to grow and produce food for other living things.

Consumers: They eat food but do not produce food for themselves. For example, animals eat food.

Decomposers: The final part of the food chain is the decomposer. When living organisms die, the decomposers eat/decompose the living matter returning it to the soil. The soil is then used to grow more plants thus completing the cycle.

Label the following: **Producer** **Consumer** **Decomposer**



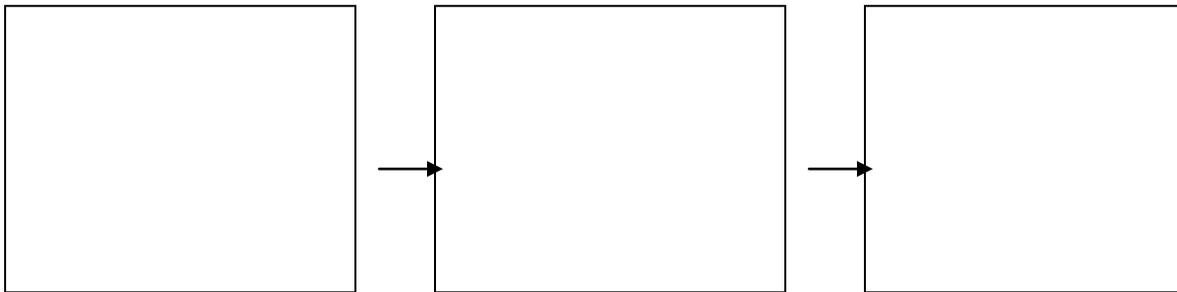
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Food Chain

Cut out the living things and paste them in the right place to form a food chain.



Draw your own food chain in the boxes below. Start with a green plant.





(Public domain photos)

You are a Cryptozoologist

A Cryptozoologist is a person who studies hidden or unknown animals. Cryptids, the name for unknown animals, may be hiding anywhere in the Amazon Rainforest, and you have to rely only on stories and alleged sightings to locate and name a new species. Cryptids are animals that are currently unrecognized by the scientific community and could be considered unlikely to actually exist.

Once you locate the new species, you must follow the identification process below:

Location – exactly where was the species found – what rainforest layer, on a tree, branch, ground, plant, etc.

Habitat – give a full description of the creature's habitat

Description - Color and markings, size, shape, distinctive features, skin

Locomotion – how does the creature move

Adaptations – how has the creature adapted to life in the rainforest

Food chain – describe the creature's part in the food chain

Relationship – how does the creature fit into the ecosystem

Draw an illustration of the new species and give it a name.

New Species

Scientific Name: _____

Description: _____

Habitat: _____

Discovery Date: _____

Cryptozoologist: _____

THE FOOD CHAIN



Living organisms must have energy to survive. Plants rely on the sun, soil and water for the energy to grow. Animals rely on the sun, water and plants as a source of energy. Animals also may rely on other animals as a source of food, which produces energy. This interdependence is called a “food chain.”



A food chain shows how different living organisms consume each other to survive in the environment. For example, grass receives energy from the sun, soil and water. Plants are producers because they produce energy for the ecosystem. The grass grows and supplies food for the katydid that eats the grass.



The frog eats the katydid as a source of food and energy. The frog is called a consumer because the frog “consumes” energy.



As the food chain continues, the tree snake eats the frog. The tree snake is also a consumer.



Animals that eat other animals are called secondary consumers or carnivores. Some animals eat both plants and animals; they are called omnivores. The eagle, considered a predator, eats the snake as part of the food chain. The final link in the food chain is the decomposer. Decomposers eat decaying matter such as dead plants and animal remains.

Decomposers are organisms such as bacteria, fungi and worms. Decomposers contribute to the food chain by putting nutrients back into the soil for the plants to consume. All living organisms are a part of the food chain.

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