

**Grade 5**

**Rainforest Ecosystem  
Forest of Uco Message Stones**



## **Rainforest Information**

Though they are home to nearly half of the world's plant and animal species, tropical rainforests cover only about 7% of the earth's land surface. Stretching in a broken band centered on the equator, tropical rainforests are located in more than 40 countries. Many of these countries contain only small remnants of forests. Air temperature in the rainforest changes little during the day or during the year. Average yearly temperature is at least 75° F but can be as high as 86° F, depending on the forest's altitude. Rainforests average 80 or more inches of rain per year.

## **Plants and Animals**

The tropical rainforest biome is considered one of the most biologically diverse biomes in the world. The small country of Ecuador has more than twice as many plant species as the entire continental United States. There are many species of trees, vines, epiphytes, and woody plants. The plant biomass (the total weight of plant matter) for any given area within the rainforest is generally higher than in other biomes.

The plants are arranged in a complex, layered structure (see below for more information). This layered structure adds to the ability to maintain a greater diversity. Each layer of the structure comprises an entire micro-system within the rainforest ecosystem. The number and variety of animals is higher than any other biome. Many animals are specialized to feed on just one or two foods. They have complex relationships with other animals and plants.

### Layers of the rainforest

Rainforest trees grow in distinct layers, each with its own plant and animal species. Life is richest in the canopy, which contains most of the leaves, flowers, and fruits. Under the canopy is an understory of smaller trees and a shrub layer of large-leaved plants that can tolerate shade. The forest floor is dark and cool with rotting leaves, which are quickly broken down by insects, worms, and fungi. Tall trees, called the emergent, poke above the rainforest canopy. Consider that without one layer, the other layers would be considerably different if they would even exist at all.

### Emergent

The emergent layer is made up of the tops of the tallest trees, which stand 75 – 250 feet tall. These trees are wide scattered. They tend to be very straight, with just a few lower branches and leave to intercept sunlight. Animals that live here include the Harpy eagle, Giant morpho butterfly, and Hyacinth macaw.

### Canopy

The canopy is just below the emergent layer. Canopy trees are usually 40 – 90 feet tall and closely spaced. They are generally very straight, with branches only at the crown, where the sunlight falls. The top of the canopy in most rainforests is in nearly constant sun, but the branches of the canopy block most of the sun from reaching the lower layers of the forest. Many tree leaves contain potent poisons to protect them from plant eaters. This is the most active and diverse layer of the forest. Animals that live here include the Toucan, Spectacled owl, Leaf-cutter ant, monkeys, parrots, boas, and iguanas.

### Understory

The understory extends from near the ground up about 40 – 50 feet. It consists of the trunks of canopy trees, of young trees still growing toward the canopy, and of shade-tolerant trees. These trees receive very little sunlight. But, unlike most trees outside the canopy of the rainforest, these trees don't need a tremendous amount of light. Leaf-eating animals dine here because leaves are large and often less poisonous than those in the canopy. Animals that live here include the Ocelot, Spectacled bear, Prehensile-tailed porcupine, and herons.

### Forest floor

The image we often see in movies of people hacking through jungles with machetes occurs only near a river or some other clearing where sunlight reaches the forest floor. Most of the rainforest's ground level is in deep shade, and plant life is quite sparse.

### Soil quality

Soil quality on the forest floor is very poor. "Litter" falls to the ground in the form of leaves, limbs and trunks, and the remains of dead animals (about 5 tons per acre every year). The debris breaks down very quickly due to the high temperature, humidity, and the activity of termites, earthworms, and fungi. The organic matter, recycled into nutrients, tends to stay on the surface where it's quickly absorbed by the trees' shallow roots. Because the soil often is not rich, rainforest trees don't send roots deep into the earth. Instead, many roots break through the earth and grow along the ground. Since these shallow roots are often unable to support the weight of the tree, some trees have developed supports called buttresses. These are large growths that spread out from the base of the tree to keep the tree from toppling. Animals that live here include the Tapir, Land Crab, Earthworm, Beetles, and Anaconda.

### **Clear Cutting**

Clear cutting in the rainforest happens when large plots of trees are cut down in order to clear the land. These cleared plots are typically used for large-scale/corporate farming land or building development. Since most of the recycled nutrients and decaying leaf matter in the rainforest rests on top of the soil and is quickly used up by the trees, without the trees and constant "litter" typical rainforest soils are nutrient poor. The topsoil layer is thin, often not more than an inch deep. Often the wood from the trees are burned down to create a layer of ash that rejuvenates the soil; even so, the soil is only viable for about 3 years and then nothing will likely be able to grow in it again.

The rainforest's nutrients are held in the trees, not the soil. This is the reason that clear-cutting is such a hazardous act in the rainforest. Without the trees, the rainforest habitat is not able to function as an ecosystem and the plants and animals that depend on it cannot thrive.





### **Rainforest Resources**

Tropical rainforests contain renewable resources that we use every day. These include such food products as fruits, nuts, and spices, and such medicines as antibiotics, anti-cancer drugs, and anesthetics. (One fourth of all medicines we use are derived from rain forest plants and trees). Other products include rubber, rattan, latex, cocoa butter, and some diesel fuels (made from sap that comes from the copaiba tree.) Tropical rain forests also contain such non-renewable resources as tropical lumber products (mahogany, teak, ebony, and rosewood).

Research is being done to find more renewable resources as well as to find ways to substitute for the non-renewable resources. Having answers to these questions will add to our ability to maintain the diverse ecosystem.

### Forest of Uco Message Stone Symbols

There are stones throughout the Forest of Uco with symbols on them. This key will help students to decipher the messages on the stones.

	spectacled bear		survival		strong
	human		resources		greed
	animal		community		depends on
	plant		balance		conserve
	land		migrate		threaten
	all living things		precious		stories
	non-living things		seed		teach
	ecosystem		renewal		animal's environment
	biodiversity		decay		bear's environment
	climate		results in		animal's life
	interaction		choice		human's life
	relationship		conflict		bear's life
	create		changes		dead bear
	ability		means		endangered bear
	inside		money		extinct bear
	species		live well		endangered species