SOUTH AMERICAN TROPICAL RAINFOREST AND AVIARY
RAIN FOREST TALKING POINTS

Rainforest Definition: A forest characterized by a general rainfall between 75 and 180" or more per year and containing a wide variety of densely growing broad leafed, evergreen trees. (see map)

- **Tropical rainforest:** Found in the tropical areas north and south of the equator with a warm to hot and humid/wet climate
- **Temperate rainforest:** Found in woodland of usually mild, wet climactic areas of the temperate zone; commonly found in coastline areas bordered by mountains, whose geographical proximity help produce large amounts of rainfall
- Although rain forests cover only about 3.3% of the Earth's total land surface, they are home to over half the species of plants and animals in the world.

AMAZONIA TROPICAL RAINFOREST (see map)

- The largest rainforest in the world; located in the part of South America drained by the Amazon River and its tributaries, covering 40% of the South American continent and spanning nine countries.
- The Amazon biome is covered predominately by dense, moist tropical forest, but also features small areas of savanna, floodplain forests, swamps and palm forests.
- The Amazon River accounts for up to 20% of the total fresh water discharged into the oceans.
- The Amazon rainforest is believed to be the oldest and most complex ecosystem on Earth and is at least 55 million years old. It has gone through climate driven stages of development over the millennia and during the last ice age about 21,000 years ago, it was drier with more areas of savanna than are found today.

LAYERS OF THE RAINFOREST (see diagram- Layers of the Rainforest)

1. **Emergent layer**
   - This top layer of the forest contains the tallest and largest trees, mostly broad-leaved hardwood growing to 200 feet or more in height. Because these trees are so large and because the soil on the forest floor is so nutrient poor, they often are supported by large, base buttress roots; these roots both support the trees and provide a greater area for absorption of nutrients from the soil.
   - Sunlight at this level is plentiful.
   - Animals found here include harpy eagles and other birds, bats, monkeys and insects, including butterflies. Birds and insects are the most abundant life forms.
2. **Canopy layer**
   - This is the primary layer of the forest, forming a roof over the two layers below.
   - Trees very abundant, most with smooth, oval leaves.
   - Food sources are abundant.
   - Animals found here include many birds, including the birds seen in the TRA, and monkeys (you can find the howler monkey and various tamarins at this level), the sloth, snakes and tree frogs.
   - Plants include epiphytes (air plants) such as orchids, bromeliads, mosses and lichens. Vines, including lianas or woody vines, grow up the trunks of trees seeking light in the canopy.

- There is a complex relationship between many of the plants and animals in the rainforest canopy layers. For example, bromeliads in the canopy layer store water in their leaf structures, supporting insects, birds and amphibians.

3. **Understory layer**
   - Little sunlight reaches this area.
   - Plants grow larger leaves in order to reach sunlight and seldom grow to 12 feet.
   - Home to plants we consider houseplants, including the philodendron and zebra plant; carnivorous plants can also be found here.
   - Animals found here include a variety of frogs, snakes, leopards and jaguars and a large concentration of insects.
4. **Forest floor**
   - This area is very dark with soil that is only 3-4 inches thick and poor in nutrients.
   - The air is very still and the temperature rather constant.
   - The few plants that grow here include seedlings and ferns.
   - Carnivorous plants have adapted to the nutrient poor soil by obtaining the nutrients they require from animal sources, mostly insects.
   - Only 2% of the available sunlight makes it to the forest floor.
   - The forest floor is active with insects and home to the largest concentration of large animals, including the agouti, giant anteater and is another area frequented by jaguars and leopards. Swamps and river areas are home to the anaconda and of course many fish.

WHY ARE RAINFORESTS IMPORTANT?

1. Rainforests play a vital role in regulating and stabilizing our climate.
   - Rainforest trees store over half the Earth's rainwater and generate a cycle of rainfall and evaporation. (see water cycle diagram)
   - The trees draw water from the forest floor and release it back into the atmosphere through their leaves.
   - This process of water movement is called evapotranspiration; the rain forest creates 50 -80% of its own rainfall through this process and also releases water into the atmosphere where it is carried by the trade winds, affecting rainfall up into Central America and the U.S. (see water cycle diagram)
   - Rainfall in the Amazon rainforest supplies the water that flows in the Amazon River and as noted above, the Amazon accounts for 20% of all fresh water flow into the oceans. This flow affects currents off the coast of South America and then into the jet stream, creating weather patterns across the globe.
   - Deforestation in the Amazon rainforest creates a domino effect ending in less rainfall and thus less water in the Amazon River and ultimately changes in the weather locally and globally.
2. Rainforest trees help clean our atmosphere through photosynthesis by absorbing tremendous amounts of carbon dioxide and providing oxygen that we need for survival.
3. Rainforest plants have been the source of more than 25% of our modern medicines.
   - It is estimated that we have only learned to use 1% of the rainforest plants.
   - The untapped potential for medicine is huge.
   - Many rainforest plants have developed chemical defenses against predators, infections, pests and disease in order to insure their survival; these same defense systems have application in human plant derived medicines.

- Indigenous people who live in the rainforest have used rainforest plants extensively for their health needs for thousands of years. The success rate for discovery of medicinal plants has been greatly enhanced by the experiments undertaken by these peoples, especially shamans, in perfecting combinations and dosages.
- Unfortunately in most cases large drug companies have benefitted financially from these discoveries without compensating indigenous peoples.

4. Rainforests provide many foods we consume, including nuts, bananas, coffee, spices, chocolate, citrus fruit, sugar and rice. Products provided include wood, fibers, rubber and resins.

BIODIVERSITY IN TROPICAL RAINFORESTS

1. Tropical rainforests contain one of the greatest levels of biodiversity on Earth.
   - It is estimated that over half the plant and animal species in the world are found in tropical rainforests and many can only survive in these ecosystems.
   - 1 of 10 of all animal species lives in the Amazon rainforest.
   - 3000 known species of fish live in the Amazon River – exceeding the number found in the Atlantic Ocean.
   - While diversity is high, dominance by a particular species is low. Competition between species for food, nest sites and energy sources is more intense here than in other habitats. These conditions have forced competing species to specialize and develop adaptations promoting coexistence.
2. We have identified only a small percentage of the plant species living in tropical rainforests; there is vast untapped potential in the species not yet identified.

WHY IS BIODIVERSITY IMPORTANT?

1. Biodiversity provides the variety of living things on Earth.
   - **Species diversity** accounts for the array of living organisms found in ecosystems, from the largest to the microscopic.
   - **Genetic diversity** is the variation in genes within a species and accounts for differences in size, color, shape etc.
   - **Ecological biodiversity** provides diversity in ecosystems, communities and habitats and provides a variety of ways for species to interact with each other and their environment.
2. Biodiversity provides the variety of building blocks necessary for the existence of life on our planet.
3. Biodiversity and genetic diversity help insure the adaptation of species in the event of disasters, disturbances, extinctions, disease or other changes in the environment.
   - Some individuals in a species may possess genetic traits that make them more resistant to disease or more tolerant to changes in the environment such as temperature, humidity, etc. and thus make them more able to adapt to these conditions. Other individuals who do not possess these traits may become extinct.
   - This ability to adapt increases the chances for survival of the species.
   - Genetic diversity also reduces the incidence of unfavorable inherited traits and disorders in a group or species, thus enhancing the survival of the species.

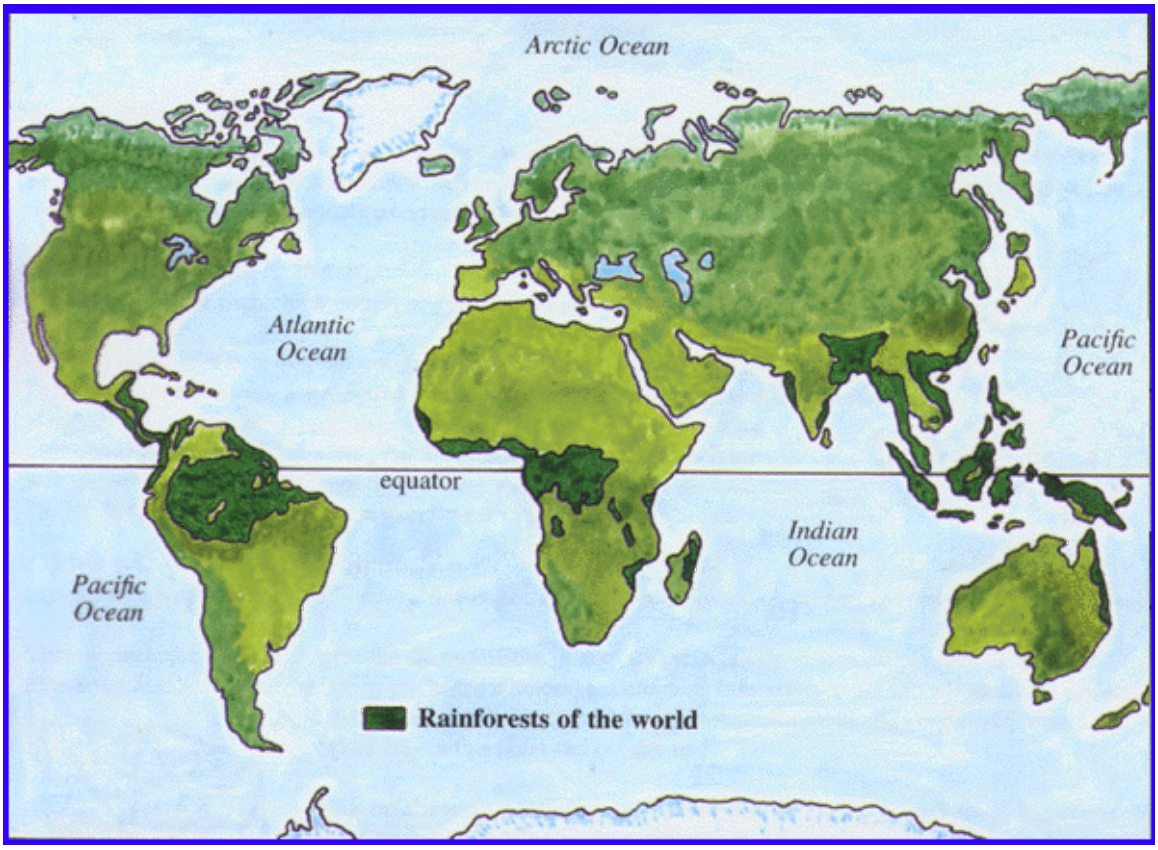
CONSERVATION: THREATS TO RAINFORESTS AND THEIR BIODIVERSITY

1. Major factors threatening the existence of rainforests include:
   - Habitat loss/degradation and deforestation
   - Over exploitation of natural resources, including plant, animal and mineral

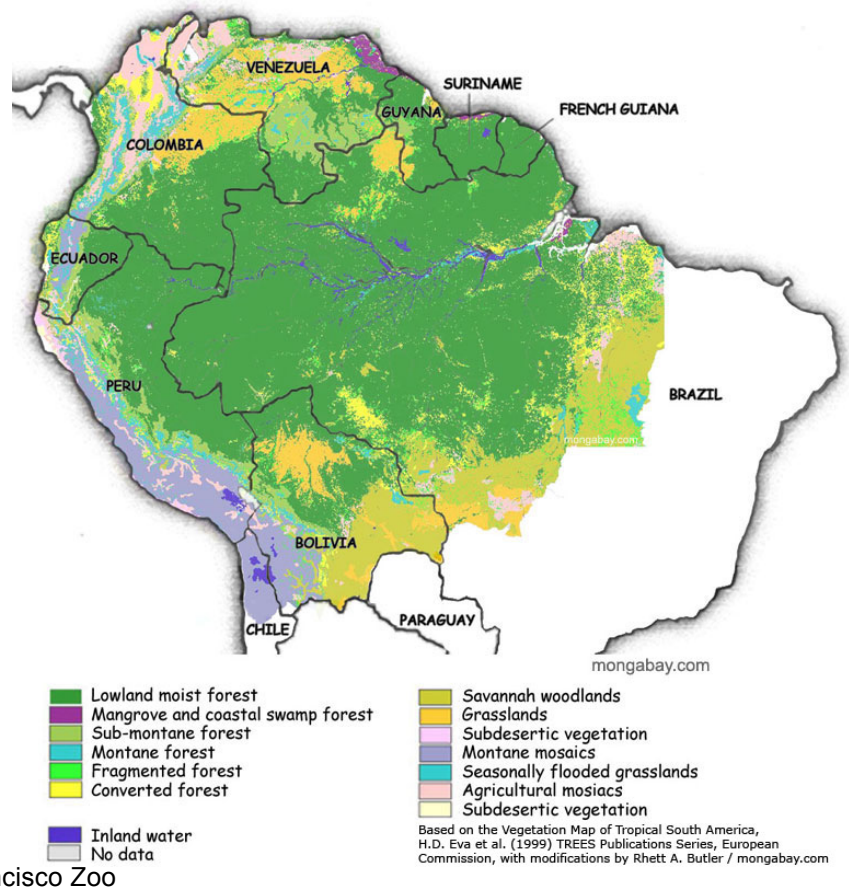
- The introduction and spread of invasive species
- Climate change
- Pollution from mining, agricultural pesticides, fertilizers, etc.

2. Deforestation is destroying tropical rainforests.
   - It is estimated that 80,000 acres of rainforest is destroyed every day – burned, cleared or cut for timber.
   - Large scale clearing is done for cattle ranching, planting of soy crops and palm oil palms.
   - Burning the forests releases carbon into the atmosphere, ultimately increasing the rate of climate change on a global scale.
   - Forested areas that still exist are often impacted by human activity and no longer retain their original biodiversity.
   - Deforestation is accompanied by extensive road building, which brings more people and industries into the fragile ecosystems and impacts the habitats and movement corridors of the animals.
3. The economic/social forces of developing countries containing rainforest areas are often at odds with natural resource exploitation.
   - The short term needs of a poor, local and rural population must be reconciled with the long term benefits of conservation if illegal mining, logging, uncontrolled land clearing and on-going industrialization are to be controlled.
4. What steps can be taken?
   - Enrich the soil in areas already deforested and support sustainable agriculture
   - Help poor farmers gain land rights and provide incentives to use farmland sustainably
   - Apply pressure to commercial agriculture to reduce pesticide and fertilizer pollution
   - Enforce laws to slow or halt illegal logging and counterfeit labeling of timber products
   - Enforce laws to slow or halt the illegal trade in animals and plants
   - Develop timber plantations on degraded non-timber lands instead of clearing natural forests
   - Consider/implement plans for payment by developed countries directly to tropical countries in exchange for reducing deforestation and forest degradation
   - Promote ecotourism in rainforest areas
   - Increase the number of protected areas and parks and charge entrance fees that go back to the local communities
   - Involve local/indigenous people in the park management

RAINFORESTS OF THE WORLD



AMAZON RAINFOREST MAP



LAYERS OF A RAINFOREST

	**EMERGENT LAYER** The tallest trees are the emergents, towering as much as 200 feet above the forest floor with trunks that measure up to 16 feet around. Most of these trees are broad-leaved, hardwood evergreens. Sunlight is plentiful up here. Animals found are eagles, monkeys, bats and butterflies.
	**CANOPY LAYER** This is the primary layer of the forest and forms a roof over the two remaining layers. Most canopy trees have smooth, oval leaves that come to a point. It's a maze of leaves and branches. Many animals live in this area since food is abundant. This includes: snakes, toucans and treefrogs.
	**UNDERSTORY LAYER** Little sunshine reaches this area so the plants have to grow larger leaves to reach the sunlight. The plants in this area seldom grow to 12 feet. Many animals live here including jaguars, red-eyed tree frogs and leopards. There is a large concentration of insects here.
	**FOREST FLOOR** It's very dark down here. Almost no plants grow in this area, as a result. Since hardly any sun reaches the forest floor things begin to decay quickly. A leaf that might take one year to decompose in a regular climate will disappear in 6 weeks. Giant anteaters live in this layer.

THE WATER CYCLE