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The Amazon Rain Forest



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The Amazon Rain Forest transverses the Andes and the bowl created by the Brazilian and the Guiana Plateaus¹. When most Americans think of the Amazon they picture a steamy Jungle, sounds of Parrots and Toucans, light filtering thru tall trees, ants scurrying about on the forest floor, and natives with blow guns. In this paper I will focus on two theories of its formation, its physical attributes, and its possible future. The Amazon of this paper is one that while it is magnificent and home to many species, is not just one ecosystem, but many threatened by deforestation, modernization, and an influx of people settling the area.

There are two formation theories I wish to discuss in this paper. The first holds that the Amazon flowed west into the Pacific, and at times was a large inland sea. This west flowing river was diverted by the creation of the Andes as they pushed up, to flow east carving their way to the Atlantic Ocean². As the world's climate warmed the tropic Rain Forest formed and lead to the formation of today's forest. This theory was the accepted one in the 1940's. The next theory is relatively new as it was published in 2003. This theory differs from the 1940 one as it claims that the Amazon flowed from the interior North West to the Caribbean. The team who were investigation this theory based it on the deposits of red clay, white quartz, and later turquoise rocks, with gray and green clays with brownstone. They claim that when the deposits changed to the later this was when the flow moved from the NW to the Atlantic Ocean. They also claim that the system was a serious of interconnected lakes and rivers. This allowed for islands of flora and

¹ Haskins, Caryl P. *The Amazon: The Life History of a Mighty River*. Garden City, New York: Doubleday, Doran & Company, Inc., 1943.

² Haskins, Caryl P. 1943.

fauna to diverge and create new species. This system may have covered 1.1 million Km². This theory says that it may have taken 10-16 million years for the modern system to form³.

Both of these processes bring us the modern Amazon. The Amazon Rain Forest and Drainage Basin as we know it today is relatively wet, when compared to the Pacific Northwest. It receives approximately 9ft of rain every year, half of which is returned to the Atmosphere quickly. The Basin covers 8 countries, among them are Peru, Bolivia, Ecuador, and Venezuela. The average temperature exceeds 80°F. The weather and atmospheric conditions mean that nutrients are scarce, between the weather and insects all organic matter is broken down quickly. Sine there is little build up of this material the most nutrients lie in the top two inches of soil. This makes it very unsuitable for European farming styles which are conducive to richer soils. The Amazon River is 4,080 miles long, ranging in size from as narrow as 1 mile to 35 miles. The mouth is about 200-300 miles wide⁴. The great amount of silt carried down the river has created an island in the middle of the mouth. The sea within a hundred miles has a diluted salinity, and a slight yellow color from the silt⁵. The Amazon River's source is the Lake Lavricoha in Peru's Andes⁶, the river Marañón flows from this lake, it changes names once it enter Brazil to Solimões, it changes names once more when it meets the Rio Negro when it becomes the Amazon⁷.

The Drainage Basin, covering 8 countries, is 2,722,000 miles²⁸. The rivers cover 4,000 miles⁹, seventeen of the 1,100 tributaries are more than 1,000 miles long themselves¹⁰. The

³ White, Michael. "This Just In: The birth of the Mighty Amazon". *Vegetarian times* Oct 2005, Issue 335. <http://web.edscohost.com/ehost/detail?vid=7&hid=117&sid=d94ad4c7-8d10-4bba-9d66-619850e0f9cb%40sessionmgr106>. May 25, 2007

⁴ Smith, Sarah. *Amazon Rainforest*. <http://www.blueplanetbiomes.org/amazon.htm>. April 28, 2007.

⁵ McConnell, Rosemary. *The Amazon*. Morristown, NJ: Silver Burdett Company, 1978.

⁶ Haskins, Caryl P. 1943.

⁷ McConnell, Rosemary. 1978.

⁸ Smith, Sarah. April 28, 2007.

⁹ McConnell, Rosemary. 1978.

tributaries to the North Tend to flood in June, which is the end of the wet season, while those to the south flood in the months of March and April according to Rosemary McConnell. The Basin is home to not just the Rain Forest but also lakes, savannahs, swamps, and soil rich flood plains¹¹.

Since the rainforest is the topic of this paper I am now going to talk about the flora and fauna of this ecosystem. The layers of the Rain Forest consist of the emergent, canopy, understory, and the forest floor. The tallest, the emergent layer, is made up of trees of up to 200ft in height 16 ft in diameter and large buttress roots, with small waxy leaves. The canopy consists of trees with large smooth leaves that taper to a point to help water run off reducing the chance for fungi to develop. These large leaves filter 80% of the abundant sunlight; this is where many of the fruits and flowers grow. The understory is where most of the fauna lives. The trees are characterized by being about 12ft in height with large sun collecting leaves. The lowest layer is the forest floor, and is almost devoid completely. The only thing present is the root system of the trees and decomposing organic material. There is 25% of the world's medicine currently based off only 1% of the plants discovered in the Rain Forest as of today¹².

Most of the animal life in the Amazon is in the canopy. There are 500 species of mammals, 175 species of lizards and 30 million insect species¹³. The fish in the river number approximately 1,300 different kinds; among these are cichlid, pencil fish, and the piranhas¹⁴. The other aquatic animals present are the manatees, dolphins, electric eels, and even sharks have been seen upriver from the sea. Other animals are the well known jaguar, sloth, monkeys, and

¹⁰ Butler, Rhet A. "The Amazon: The World's Largest Rainforest". <http://rainforests.mongabay.com/amazon/>. April 28, 2007.

¹¹ Hecht, Susanna B., Alexander Cockburn. *The Fate of the Forest: Developers, Destroyers, and Defenders of the Amazon*. New York, NY: Verso, 1989.

¹² Smith, Sarah. April 28, 2007.

¹³ Smith, Sarah. April 28, 2007.

¹⁴ McConnell, Rosemary. 1978.

anacondas¹⁵. Some of the most famous types of birds are the Toucans, Macaws, and Humming Birds¹⁶. According to Susanna Hecht there may be as many as 30 million insect species in the world, 25 million more than previously thought as the total for all animal species on the planet¹⁷.

The Spanish Explorers were exploring this new land that Christopher Columbus had just discovered, and trying to find a western water route to the Indies when explorer Yáñez Pinzón and his ship came upon a large quantity of freshwater at sea. They followed this trail to the mouth of the Amazon in 1500¹⁸. When the Spaniards conquered the Incan Empire they had heard many stories of a tribe and city that was very rich with gold. This was known as El Dorado¹⁹. The promise of more gold further in the interior led many Spaniards to explore the steamy jungle east of the Andes. One such explorer started out with what he believed to be enough provisions, Pedro Azures had to turn back what remained of his expedition to the town of Quito when he ran out of food²⁰. The next group was lead by Gonzalo Pizarro. After they became lost and in danger of starving, Pizarro sent his second in command along with a group of men down river to scout the area.

They came upon a friendly tribe about 20 days later, and after spending some time with them, they decided to travel down river as far as they could. They built a small brigantine and sailed the rest of the Amazon. As the countries around it became more colonized, settlements began to appear along the river beginning at the mouth where they found the city of Manaus, and continuing inland from the 17th Century onwards²¹. The settlers who ventured further upstream went in search of slave labor, things to exploit, such as animals for meat, and fur as well as

¹⁵ Furneaux, Robin. *The Amazon: The story of a Great River*. London; Hamish Hamilton, 1969.

¹⁶ McConnell, Rosemary. 1978.

¹⁷ Hecht, Susanna B. 1989.

¹⁸ McConnell, Rosemary. 978.

¹⁹ Hecht, Susanna B. 1989.

²⁰ Meggers, Betty J. *Amazonia*. Chicago, IL: Aldine-Atherton, 1971.

²¹ McConnell, Rosemary. 1978.

plants for use as medicines, flavoring, and food. Before the Europeans arrived there were never any major wars or conflicts, with them pushing down river the natives were displaced and fought with already established tribes over the land above the rapids. They moved above them because at that time the European ships could not safely navigate past them²².

In the Early 18th Century the Academic exploration of the Amazon began. The French Academy of Science funded an expedition lead by the naturalist Charles Marie de la Condamine. This group studied the source of rubber, quinine, which is a treatment for Malaria, and ipecac²³. The many expeditions since then have discovered many new species and characteristics of not only the Amazon but some of the tributaries. The Naturalist Bates found 8,000 new species of the 14,700 he collected during his own expedition²⁴. Late in the 18th century the Spanish King Carlos IV gave permission to Alexander von Humbolt and Aimé Bonpland to make a Cartographic and botanical study of the Amazon. Richard Spruce tried to transplant quinine and rubber to India and South East Asia to harvest on English controlled plantations.

The natives of the Amazon River Basin tend to live in small groups of 60 members dispersed throughout the area, and each with their own specific language. Perhaps some of the languages are based on a common language for an area, yet specific enough to identify the tribe²⁵. Depending on where the tribes live, the way they sustain themselves differs. The Comayra's settlements consist of 6 houses forming a circle around the main plaza where another building hold the sacred flutes, used during the many ceremonies. The gardens, where they grow Manioc, Maize, and Sweet Potatoes radiate out, the newest ones are on the outer rim, and are owned individually. They also grow Piqui fruit which is harvested every 10-15 yrs. either about

²² Hecht, Susanna B. 1989.

²³ Hecht, Susanna B. 1989.

²⁴ McConnell, Rosemary. 1978.

²⁵ McConnell, Rosemary. 1978.

the time they move on to the new site, or shortly afterwards²⁶. Before the Europeans arrived there was an estimated 6-12 million natives according to one source²⁷, but many were destroyed by the European diseases, the exploitation of labor and fighting²⁸. As of 1978 there were an estimated 100,000 natives left.

The future of the Amazon is a hotly debated topic today. The forest has been cut away to produce land for farming, cattle ranching, and to make way for infrastructure in the form of roads. Many organizations such as the World Wildlife fund have tried to preserve sections of the forest, and promote awareness of the extent of the deforestation. In the past the natives have joined the fight to preserve the forest, but stressed the aspect of their culture and land disappearing instead of the environmental aspect. The Process of Deforestation can have dire effects if it is not controlled, one effect could be the loss of much needed nutrients because when a section is cut the nutrients that are contained in that tree are released from the following burning. Since there are not plants to take up the nutrients, they are washed away by the rains of the wet season²⁹. It also causes the soil and understory to be dried out by contact with direct sunlight, increasing the chance of fires to get out of control, and create serious damage to the surrounding forest.

When it rains the water carries off the finer clays and silts leaving behind the heavier material causing what is called sandification. According to Harald Sioli as the sandification deepens it will cause more runoff to occur because the ground cannot absorb the water as it once did. He also states that as more trees are cut down it will lead to a reduction of rainfall because

²⁶ McConnell, Rosemary. 1978.

²⁷ Hecht, Susanna B. 1989.

²⁸ McConnell, Rosemary. 1978.

²⁹ Sioli, Harald. "The Effects of Deforestation in Amazonia". *The Geographical Journal*, Vol. 151, No. 2. (Jul., 1985), pp. 197-203. <http://links.jstor.org/sici?sici=0016-7398%28198507%29151%3A2%3C197%3ATEODIA%3E2.0.CO%3B2-M>. May 25, 2007.

not as much water is recycled within the ecosystem. This in turn means that the government created reserves may also die because their roots do not reach the deep level of ground water; the forests survive on the recycled water as it soaks up surface water. If there is less for them to suck up then more will die for lack of water³⁰.

There is a study that has some suggestions for conservation and the possible outcome if nothing is done. This study was conducted as a joint effort between Brazilian Universities, and organizations, and American Universities and Research Centers. According to them there may be as much as 40% of the Amazon Destroyed by 2050 if current trends persist³¹. They claim that there may need to be a total of 70% of the forest cover remaining and under strict preservation laws for the Amazon to survive. They have created two scenarios for the future of the Amazon, one is “business-as-usual” the other is the “governance model”³². The first is a model of what may happen if roads are paved, the enforcement of private land reserves are not enforced, and no new government preserves are created. The area of forest cover may be reduced from 5.3 million Km² to 3.2. This scenario also predicts that by 2050 four years worth of carbon emissions will be released just through the “slash and burn” agriculture and general deforestation. There is also concern for the watersheds expressed by this study. One such concern is the loss of 40% of forest cover of 18 out of 32 eco-regions and 12 that will loss 70% at least.

The “governance” model is structured on a more government reserves being created, strict enforcement of preservation laws, eco-friendly land zoning, and more pressure on ranchers

³⁰ Sioli, Harald. May 25, 2007

³¹ Soares-Filho, Britaldo Silveria, Daniel Curtis Nepstad, etc.. “Modelling Conservation in the Amazon Basin”. Nature, Vol. 440, 23 March 2006. doi:10.1038/nature04389.
<http://web.ebscohost.com/ehost/pdf?vid=4&hid=101&sid=a9a305df-72a6-4702-917e-0669698f7a6d%40sessionmgr106>. May 25, 2007.

³² Soares-Filho, Brialdo Silveria. May 25, 2007.

and farmers to follow environmental laws in order to access markets. It also assumes that there will be no more paved roads as that makes it easier for logging to occur, and farms to appear along the paved road. Under this model the area would reduce to 4.5 million Km² from 5.3, also only half of the carbon would be released³³. Since 2003 there has been 20% of the Rain Forest has been destroyed and will never make a recovery³⁴.

The Amazon Rain Forest is a source of inspiration for the imagination. The green filtered light, jungle noises, and the hot, steamy atmosphere give rise to the images of jaguars resting on branches, and a brown river flowing past rich green scenery. The future of the Rain Forest cannot be passively ignored; as the world's population grows we have a responsibility to our children to not only reserve resources, but to protect a natural wonder for extinction. We also need to preserve it so we can study it in future generations, so we know it better than the bottom of the sea, not less.

³³ Soares-Filho, Brialdo Silveria. May 25, 2007.

³⁴ Smith, Sarah. April 28, 2007.

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