1111 Cavern Branch Parkway

Austin, TX 78728

April 26, 2005

John Smith

Save-Our-Trees Organization

12221 Mopac Expressway

Austin, Texas 78758

Dear Mr. Smith:

As agreed in our March 21 contract, I am submitting the attached report entitled *Deforestation in the Amazon.*

This report will discuss the problem of deforestation in the Amazon. It will look into the reasons that the rainforests are being cut down. It will also discuss the consequences of deforestation, such as erosion, disease, and climate change. It will also provide viable solutions to the problem of deforestation.

I hope you find this report satisfactory.

Sincerely yours,

Ben Price

Encl: Technical report on deforestation in the Amazon.

**Report on**

**DEFORESTATION IN THE AMAZON**

Submitted to

Mr. John Smith

Save-Our-Trees Organization

Austin, Texas

April 26, 2005

by

Ben Price

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# ABSTRACT

Rainforests are forests that are only found in certain regions. They have certain characteristics that define them as rainforests, such as location, climate and structure. Over the past 20 years, deforestation has run rampant in the Amazon. Thousands of square-miles of forests are being cut down every year. There are many reasons for this deforestation, such as cattle grazing, logging and colonization. This deforestation causes many consequences such as disease, erosion and climate changes. Solutions to these problems have been identified and suggested. Some possible solutions are land policy reform, rehabilitation and establishment of protected areas. The problem of deforestation demands the attention of the world. If steps are not taken then this precious resource will be lost forever.

# DEFORESTATION IN THE AMAZON

# INTRODUCTION

A rainforest is a dense, moist area of forests that can only be located between the Tropic of Capricorn and the Tropic of Cancer. They are home to approximately half of the animal species on the planet, as well as some rather unique indigenous species. The rainforests are also a vast resource of food, medicinal plants and a number of other useful forest products. Tropical rainforests also play a key role in regulating the global climate and maintaining regular rainfall. They also store a vast quantity of carbon while producing a great amount of oxygen. Just a few thousand years ago over 12% of the world was covered by rainforests, now less than 5.3% remain. The largest stretch of unbroken rainforest is found in South America, the Amazon rainforest (see Figure 1) [1].

The Amazon rainforest consists of 30% of the remaining rainforests in the world. Deforestation is destroying approximately 5.4 million acres a year in the Amazon. Scientists estimate that if deforestation continues at this rate, by 2020 80 to 90 percent of the rainforests will be completely eradicated [2]. The rainforests are also home to many native tribes that have had little if any contact with the civilized world.

This report, prepared for the Save-our-Trees organization, is intended for decision making for governments and logging companies involved in logging in the Amazon rainforest. The purpose of this report is to show the hazards, both environmental and cultural, of deforestation in the Amazon rainforest.

This report gives a overview of deforestation. It discusses the consequences of deforestation and gives some possible solutions.

* Section 2 reviews the characteristics of rainforests. These characteristics include climate, location, and structure.
* Section 3 discusses the reasons for deforestation, such as commercial reasons and residential reasons. Commercial reasons include logging, cattle pastures, and commercial agriculture. Residential reasons include colonization, subsistence agriculture, and road building.
* Section 4 reviews the consequences of deforestation, both environmental and human.
* Section 5 goes over the possible solutions to deforestation, such as land law reform, environmental rehabilitation and establishing protected areas.

Hopefully this report will help lobbyists and loggers become more aware of the problems of deforestation and the havoc they can cause.



Figure - Map of the Amazon Rainforest [1]

# II. CHARACTERISTICS OF RAINFORESTS

Rainforests are very different from regular forests. They have certain characteristics that define them as rainforests. These are characteristics such as location and climate, precipitation, and structure.

## Location and Climate

The location of rainforests is rather specific. They can only be located between the two tropics, the Tropic of Capricorn and the Tropic of Cancer. The location of the rainforests, between the tropics, allows the sun to shine upon the forests at a near ninety-degree angle for a much longer period, resulting in extreme solar energy. Due to this extreme solar energy, rainforests maintain a year round temperature that can range from 72 to 90 degrees Fahrenheit. Although the temperature may fluctuate, in some rainforests the temperature only changes by less than a degree. These temperatures are normally moderated by cloud cover and high humidity [1].

## Precipitation

The most important characteristic of rainforests, and their defining feature, is their rainfall. Rainforests are subject to extremely heavy rainfall, at the least 80”, but some areas can get as much as 430” every year. Rainforests close to the equator can experience year round rainfall with no discernible wet or dry seasons. Even in seasonal rainforests the forest floor rarely completely dries out. This high rate of rainfall is due to a convergence zone where intense solar energy produces a convection zone of rising air that loses its moisture through frequent rainstorms. The constant cloud cover, warm temperatures, and constant rain create very intense humidity in the rainforests [1].

## Structure

Rainforests are also defined by the structure of their canopies. Rainforests are divided into five layers: the overstory, the canopy, the understory, the shrub layer, and the forest floor. Over 70 percent of the life in the rainforest is found living in the canopy. The thousands of leaves in the canopy act as mini solar panels, heating the leaves and creating great amounts of energy through photosynthesis and water through transpiration. Since the rate of photosynthesis is so high in the rainforests, the yield of fruits, seeds and flowers is much greater than normal. The canopy does not only collect solar energy and regulating the climate, the canopy also shields the understory from harsh and intense sunlight, drying winds, and heavy rainfall, and retains the moisture of the forest below. This results in the forest floor being a relatively safe place to live, as it is sheltered from most of the severe storms and damaging solar radiation [1].

# III. REASONS FOR DEFORESTATION

## Commercial Deforestation

There are many commercial reasons for deforestation in the Amazon. Cattle grazing, logging and agriculture however, are the most prominent.

### Cattle grazing. Cattle grazing is rated the largest cause of deforestation in the Amazon. Since the 1970’s cattle grazing has attributed to more than 38 percent of all deforestation in the Amazon. There are several reasons that companies choose the Amazon to raise their cattle, cost of living, control over disease and land tenure laws among the reasons [1].

### Logging. Logging is the oldest and most recognized cause of deforestation. The methods of deforestation vary from logging company to logging company. Some companies only choose to harvest certain trees such as hardwoods, which are valuable as timber. Other companies choose to clear-cut the entire forest ravaging everything in their paths [1]. Logging is also evident in the creation of roads. When new roads are built, the trees along the road are cut and sold. The logging industry is slowing its’ efforts in the Amazon however, they are beginning to realize that their cash crop will not last forever as the product already begins to wane.

### Commercial Agriculture. Recently commercial agriculture has begun to elbow its way to the top of contributors of deforestation. A bio-engineered soybean is the main agricultural product in the harsh equatorial climate. Its development has brought swarms of farmers to the Amazon and ranchers are claiming increasingly larger swaths of land for their plantations and inroads [1].

##

## Residential Deforestation

Some residential reasons for deforestation include colonization, sustenance agriculture, and infrastructure.

### Colonization and subsistence agriculture. Colonization and subsistence agriculture walk hand-in-hand in the destruction of the Amazon rainforest. Due to Brazils’ land tenure laws poor farmers are encouraged to settle on public property. A squatter gains right to a piece of unclaimed public land by living on and using it for a year and a day. After five years these squatter owns the land and can do with it what they will, this includes selling it. This practice has claimed large amounts of rainforest. Between 1995 and 1998, the government granted land in the Amazon to roughly 150,000 families. 48 percent of forest loss in 1995 was in areas less than 125 acres [1]. Poor farmers that cannot afford any equipment use fire to clear their crops. The fires sometimes cannot be controlled in the sparse forest and can burns far past the limits of the farmers’ land. This burning process also renders the land useless for growing after a few years and new land must be clear-cut for new farmland [2].

### Infrastructure. Deforestation due to infrastructure is widespread in the Amazon. Almost everywhere, there is a farm, pasture or logging firm there is a road. $40 billion of highways, railroads, hydroelectric projects and burgeoning population is overwhelming current efforts to promote conservation in the Amazon Forest of Brazil [2]. While roads are not damaging any particular area in any great amount, the combined total can be damaging.

# IV. CONSQUENCES OF DEFORESTATION

Deforestation has many negative effects. It can affect the environment through, erosion and climate change, or it can effect humans through disease and other factors.

## Environmental Consequences

Erosion, climate changes and extinction are some of the environmental consequences of deforestation. Deforestation has never decreased below 4000 square miles (see Figure 2), continuing at this rate will have irreversible effects upon the environment.



Figure – Deforestation Figures for Brazil [1]

### Erosion. Deforestation causes an unbalance in the ecosystem. When the trees, whose roots hold the soil in place, are uprooted, then the soil is no longer stable and can be swept away by the slightest rain. The silt is swept into nearby streams and is in turn carried to the rivers and oceans that these streams feed. The silt builds in the bottom of the streams and rivers causing riverbeds to rise and increasing the severity of floods. This silting process also creates shoals and sandbars that make river navigation far more troublesome. The increased sediment load smothers fish eggs and causes lower hatch rates. In addition, when the silt reaches the ocean it drifts onto the coral reefs slowly killing them [1].

### Climate Changes. Local climate is affected most by deforestation. With forest loss, the local community loses the system that performed valuable but unnoticed services, like ensuring the regular flow of clean water and protecting the community from flood and drought. The forest acts as a sponge, soaking up the tremendous amounts of rainfall brought by tropical downpours, and then releasing the water at regular intervals. This feature of rainforests prevents destructive flood and drought cycles. However, when deforestation occurs, runoff rapidly flows into streams, elevating river levels and subjecting downstream villages, cities, and agricultural fields to sudden and severe flooding especially during the rainy season. During the dry season, such areas downstream of deforestation are prone to months-long droughts which interrupt river navigation, wreak havoc on crops, and disrupt industrial operations [1]. Additionally the rainforest adds to local precipitation through transpiration. Experts also believe that deforestation will affect worldwide rainfall. Since trees absorb heat and release moisture into the atmosphere, cutting down mass amounts of trees could affect rainfall totals across the globe [1].

### Extinction. Extinction of native species is an undeniable consequence of deforestation. As loggers, farmers and corporations destroy the trees, they also destroy the habitat of many creatures. Not only the fauna of the forest are affected however, many plants, flowers and bushes are also destroyed, never to be seen again [1]. Sometimes deforestation itself does not outright kill spices, but the climate and rainfall changes will finish them. Interdependence of species also effects extinction, if one species is killed by deforestation other species that relied upon that first might also die [1].

## Human Consequence

Deforestation does not affect only the plants and animals of the forest. It also affects the local people and intruders alike. As people pushes further into unexplored forests, they starts to encounter microorganisms that a normal immune system cannot handle. This leads to outbreaks of new diseases including hemorrhagic fevers like Ebola and Lassa Fever. As the primary hosts of these pathogens are eliminated or reduced through forest disturbance and degradation, disease can break out among humans. Someday one of these microscopic killers could lead to a massive human die-off as deadly for the human species as humans have been for the species of the rainforest. Just as these unknown pathogens are unfamiliar to the loggers and settlers, the diseases of the world outside the rainforest are unfamiliar to the native people. These native people are so unfamiliar with diseases of outside the rainforest that a common cold can kill.

# V. SOLUTIONS TO DEFORESTATION

There are many viable soulutions to the problem of deforestation. Some of these solutions include rehabilitation of the environment, establishing protected areas, and reform to land laws.

## Rehabilitation

In reducing the loss of tropical rainforests, concern need to be taken with the transformation of existing natural ecosystems as well as the more rational utilization of already cleared and degraded areas. To lessen future forest loss, productivity of farms, pastures, plantations, and scrubland must be increased and sustained, in addition to restoring species and ecosystems to degraded habitats. By reducing wasteful land-use practices, consolidating gains on existing cleared lands, and improving already developed lands, the need to clear additional rainforest can be diminished [1].

The restoration of entire ecosystems is most possible in regions where parts or at least remnants of the original forest remain and there are few human population pressures. Small clearings surrounded by forest recover quickly and large sections may recover in time especially if we provide some assistance in the reforestation process. After several years, a once barren field can once again support vegetation in the form of pioneer species and secondary growth. Although the secondary forest will be low in diversity and poorly developed, the forest cover will be adequate for some species to return (assuming they still exist). In addition, the newly forested patch can be used for the sustainable harvest of forest products and low intensity logging [1].

Tracts of replanted forest may have ecological returns in addition to economic ones. In the short term, forests absorb large amounts of atmospheric carbon and the more trees that are replanted, the more atmospheric carbon will be sequestered [1]. Replanting and rehabilitating secondary forests around the world has tremendous potential for offsetting greenhouse gas emissions. Furthermore, rehabilitated forestlands can attract eco-tourists and sustain some native forest wildlife.

## Establishment of Protected Areas

The extension of protection to critically important habitats within the Amazon region is key to maximizing survival of biodiversity and countering the effects of deforestation. Actions paramount to the success of conservation efforts:

* Prioritizing areas for protection by focusing on biological hotspots.
* Ensuring sufficient enforcement agencies and funding exist for the maintenance of protected areas.
* Encouraging the involvement of locals: the fate of protected areas rests largely in the hands of local people and only by improving their living condition can we expect conservation efforts to be successful.

## Land Policy Reform

Under Brazilian law, much of the Amazon is essentially an open access resource so there little incentive for squatters, farmers, or developers to use forest lands or resources in a sustainable manner. Developers can also acquire rights to unoccupied forest land simply by "using" it for at least one year and a day, typically by burning the native forest and establishing some cattle on the land.

To remedy this wasteful use of land, lawmakers in Brazil should consider laws that restrict these practices, Or maybe lawmakers could enforce some of the existing laws like the 1996 law that forbade Amazon landowners from cutting more than 20% of the forest on their land [1]. For whatever reasons the laws on the books are not that effective, deforestation has increased dramatically in the past couple of years.

# VI. CONCLUSIONS

The Amazon rainforest is a fantastically diverse land that offers many things to the surrounding regions as well as the entire world. This beautiful land however is slowly being destroyed year after year. The deforestation of the land causes many serious consequences such as erosion, climate change, and disease. There are actions to be taken however; land reform policies, habitat and land rehabilitation and protective areas are a few ideas. If something is not done soon then soon there will be no forest left. The world cannot afford for this to happen.

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