

An Action Plan to Prevent Deforestation of the Amazon Rainforest

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ABSTRACT

With the Amazon rainforest providing many critical ecosystem services, urgent steps are needed to prevent the devastating effects of deforestation. This plan of action prioritizes Brazil, Bolivia, and Peru given their high deforestation rates and areas of cleared land. This timeline-based plan proposes cattle ranch optimization, sustainable agriculture, monitored infrastructure expansion, indigenous community engagement and the use of technology to combat cattle ranch expansion, agricultural sprawl, and the spread of infrastructure. Indigenous people are essential for this proposal as they possess knowledge necessary for protecting the forests. The preservation of their culture and way of living is directly connected to the land they live on, so they should be a part of every component.

Introduction

The Amazon rainforest, stretching over 2.7 million square miles and eight countries, is one of the world's most important ecosystems [18]. It contains a vast array of biodiversity with an estimated 10% of the world's known species [19]. 47 million people call this rainforest home, including about 2 million indigenous people which is more than any other place on Earth [19]. With the Amazon facing deforestation, many species, indigenous groups, and ecosystem services are at risk. Without effective steps to combat deforestation, the tipping point could be reached, and Earth could lose one of its most critical rainforests forever.

Ecosystem Services

One of the biggest services the Amazon rainforest provides is carbon sequestration. The estimated 400 billion trees along with soil collectively store about 123 billion tons of carbon [19][23]. Along with losing the carbon reserve capabilities, through slash-and-burn land clearing, much of the stored carbon will be released into the atmosphere. The carbon released will further exacerbate the devastating effects of global warming and climate change. The Amazon rainforest also regulates both temperature and precipitation around the region. The areas already affected by deforestation have led to an increase in regional temperatures and a decrease in rainfall because less water is evaporating from trees [23]. If the entire rainforest were to be permanently lost, the consequences would be even more catastrophic, affecting agriculture and climate.

Proposal

The Amazon rainforest runs through eight countries. With Brazil, Bolivia and Peru seeing the most deforestation, they must take initiative and lead the fight against deforestation [20]. Along with Ecuador, Colombia, Venezuela, Guyana, and Suriname, the eight ATCO countries must join to share resources and effectively stop

deforestation. This plan includes both common core goals across the eight countries and country specific efforts to deal with the problems most prevalent in their region. The major common core goal is to stop deforestation by 2030. Within that goal, the sharing of knowledge about practices that succeeded in lowering rates of deforestation is important. Regular summits can facilitate the spread of knowledge of efficient and effective methods to be implemented across the eight countries, which will increase the rate of progress. Although not all countries deal with the same problems, regulations implemented in one country, such as moratoriums and carbon taxes, should be adopted by others to prevent transfer of the same problem from country to country.

The second component of the plan is country specific efforts. Cattle ranching, agricultural expansion and infrastructure development are major drivers for deforestation across the Amazon, but it is important for every country to base their solutions off the main plan to combat their specific problems. For example, Colombia's solution to reduce coca cultivation will be different than Peru's solution to reduce illegal deforestation by Mennonites but both plans aim to have the same outcome.

The third component of the plan is to combat any potential societal implications that may result from the practices used to stop deforestation. Indigenous communities are the core of the Amazon and must be included in every step of the plan. All methods utilized should surround them to keep their culture and way of living alive for future generations.

In all the above components, the use of technology plays an important role in monitoring deforestation and tracking progress.

Prioritized Problems

Cattle Ranching and Beef Exports

The clearing of land for cattle ranching accounts for 80% of deforestation [1]. With Brazil being one of the world's largest beef exporters, the \$5.4 billion sector contributes significantly to the country's economy [2]. As the demand for beef increases all around the world, the deforestation of land for cattle farming and the development of slaughterhouses is increasing. Although there are restrictions on the sale of cattle that were raised on deforested land, slaughterhouses often deliberately overlook the sources, leading to environmentally damaging practices and low accountability [3]. For example, the practice of cattle laundering involves moving the cows from farm to farm before selling them to slaughterhouses, preventing these facilities from tracing the original location of the farming. Since slaughterhouses are only obligated to verify the direct suppliers, or the farms that sold them the cattle, any other land used in raising the same livestock would not be accounted for, regardless of the protection status and if it was deforested [4].

Agriculture Sprawl

Commercial agriculture such as the expansion of soy plantations has led to massive deforestation in the Amazon, especially Brazil and Bolivia, with an estimated 20% of exports being grown on deforested land [7]. Soy is used as feed for cattle, pigs, and other livestock around the world, leading to large demand.

The illegal deforestation by Mennonite farming communities in Peru and Bolivia is a big concern. The Mennonites are a religious group that hold farming at the center of their beliefs and seek large areas of land where their communities can settle. This has led to the expansion of agriculture deep in the Amazon rainforest. In Peru, an estimated 3,440 hectares has been illegally deforested without any permits from the government, leading to worries about the environmental impacts of the spread of Mennonite communities [8].

As a center of illegal drug trafficking, the coca cultivation is a significant reason for deforestation in Colombia. Currently the leading producer of cocaine, Colombia produces 60% of the drug, and coca production

grew by 24% between 2021 and 2022 [9]. With large portions of the cultivation being on land reserved for protection, coca production is driving deforestation, a process called narco-deforestation [10]. Also, the infrastructure required for the illegal trade of cocaine, such as roads and airplane strips, is being expanded leading to large areas of forests being cleared.

Infrastructure Expansion

Another large problem is deforestation because of infrastructure expansion. Infrastructure accounts for 9%-17% of deforestation, making it a central problem across all Pan-Amazon countries [15]. Suriname, Guyana, Ecuador, and Venezuela must focus their efforts here to prevent infrastructure expansion due to illegal mining and oil extraction. Currently, many dirt roads going through the center of the Amazon such as the Br-319 in Brazil are not usable for parts of the year because of extreme conditions due to seasonal shifts in weather, especially the rainy season. But in the past few years, plans have been made to pave the middle section of the road, in hopes of solidifying connections between the city of Manaus, located deep in the Amazon, with the rest of Brazil [17]. With increased accessibility, concerns about illegal miners and loggers being able to expand their operations are being brought up. Known as the fishbone effect, illegal roads are often built connecting to the main highway which allows a route of export for illegal activities and products [16]. This effect increases the risk of deforestation near the roads and promotes expansion into the rainforest which could have severe effects of both the environment and the indigenous groups who call the forest home.

Plan of Action

This plan targets the prioritized issues mentioned above and outlines the proposed steps that should be taken. The related timelines are mentioned in each of the steps below.

Carbon Taxes and Ranch Optimization

To combat deforestation for cattle ranching, a multi-faceted approach involving all groups must be taken. First, a carbon tax on methane for slaughterhouses and meat-packing companies must be implemented [5]. For each pound of beef entering the facility, the companies should pay for the methane that would have been emitted. One challenge of this step is getting both governments to implement the tax because prices of beef will increase to maintain profits, decreasing demand and ultimately affecting the economies. However, major importing countries like the US are insisting on higher environmental and supply chain standards for beef imports. To support this effort, the US should collaborate with beef exporting countries to lead efforts in tracking sources of cattle in Brazil and Bolivia to make sure it is ethically produced and meets their standards. The money from the taxes could then be used to fund reforestation efforts and provide economic incentives for the development of subsistence farming. This would both promote sustainability and support small farming communities [6]. In terms of the timeline, this part of the plan should be phased in over the next two to three years to allow time for economic adjustments. Compared to countries in Europe, Brazil's ranch productivity is one-third that of countries such as the Netherlands, which means that more land is used and cleared for the same amount of cattle [21]. With the implementation of proper agricultural and ranching practices in the next year, the amount of land deforested for ranches could be decreased while the export of cattle remains the same.

Sustainable Agriculture, Moratoriums, and Legal Crops

One of the biggest problems with deforesting for soy cultivation and other crops in Brazil and Bolivia is the forest ecosystems hold most of the nutrients that are beneficial for agriculture. Once the land has been farmed enough times that the nutrients are completely depleted, farmers often go on to deforest more land to increase their crop yield, resulting in a vicious cycle that intensifies deforestation [13]. To combat this, a variety of sustainable practices should be widely used in the next two years. Crop rotation is a method that involves varying the crops grown throughout the year to improve the nutrient content of the soil [14]. One potential hurdle is that some rotation cycles will result in low incomes so farmers should be given support in selecting high yield crops.

Over the next year, abandoned pastures should be reforested with native plants such as cacao, Brazil nut and acai palm. Though these reforestation efforts may not show immediate results, in the long term the export of these high demand crops would offer alternate sources of income [12]. CO₂ would be sequestered, combatting the effects of climate change, and nutrients would be restored to the land.

Over the first decade of its implementation, the soy moratorium in Brazil prevented an estimated 18,000 km² of deforestation [25]. In terms of the urgent timeline, expanding the moratorium concept to other crops in the next few months is important and will further reduce deforestation.

To deal with deforestation by Mennonites, stricter legislation should be set in place. Monitoring systems such as drones and satellites should be effectively deployed for more effective and efficient enforcement to curtail further expansion of agricultural land.

In the past, to deal with coca cultivation, the Colombian government incentivized communities to switch to legal crops but compensation was not delivered as promised and legal crops do not hold the same value as coca [22]. With international funding, especially from the US, the Colombian government can set up a market for legal crops in the next two years, which will allow communities to make a living without resorting to coca. This effort is more likely to be supported financially because it will reduce the supply of cocaine to the US. Currently, 90% of cocaine in the US originates from Colombia, leading to almost 25,000 cocaine involved deaths in 2021 [26][27]. Cocaine trafficking and use results in high healthcare and crime prevention costs for the government so reducing the cocaine in circulation will benefit the US financially. One potential hurdle of the shift away from coca is violence and harassment from organized drug traffickers. The use of the environmental protection force (covered in resources section later) would combat this issue.

Technology Led Monitoring of Infrastructure Expansion

Paving roads may have negative effects on the environment but are essential for connecting rural areas with the rest of the country to improve the economy of these regions. To counter the negative consequences, the government should invest in sophisticated monitoring systems within the next year to control activity on the roads. Using an on-the-ground monitoring group, only authorized vehicles should be allowed to travel on these roads to curb illicit activity. In addition, previously mentioned monitoring systems should be utilized to supervise activity in the middle stretches of the paved highway to stop any possible deforestation before it expands deeper into the forest. These technologies should also be used to monitor illegal mining and oil extraction activity to prevent the spread of roads for exporting these commodities.

Tapping the Knowledge of the Indigenous People

The Yekuana, Waiapi, Yagua, Kayapo, Munduruku, Waorani, Witoto and Yanomami tribes, along with many other indigenous communities are the core of the Amazon, possessing important knowledge about the environment and sustainability. When considering a plan for the region, it is critical to think long term but with a few quick start efforts to reap the most benefits.

In terms of jumpstarting the effort, strict land titling should be implemented immediately, with indigenous groups being given lands to live on and protect using their own knowledge. The indigenous groups should be given full control of their own land regarding the encroachment of others, such as those seeking to expand agriculture and farming. This would allow the power over criminalization of certain illegal activities to be more decentralized, allowing for a more effective way of making sure the land is protected. For example, if cattle ranchers were to deforest sections of the protected areas, the indigenous government in charge would be able to charge an appropriate fine without approval from the state government, allowing the process to be quicker and more efficient.

In addition, governments must urgently invest in widespread educational efforts to introduce the technology use to monitor deforestation in the indigenous communities. With funding from foreign grants and organizations, data from technology such as satellites can be available to the public and with proper education, indigenous people could make use of this knowledge to better protect their land [11]. The use of monitoring systems and the spread of smartphones would be beneficial in tracking and recording deforestation on a smaller scale, again allowing the regional governments to make decisions on the next steps that should be taken to prevent those groups from continuing to expand and restoring the land that is now deforested.

Creating a new channel for the economy in the next two years through Brazil nut, cacao and acai palm would be significantly beneficial. Combining indigenous knowledge and the opportunity for farming of these highly sought after resources would provide benefits for both the communities and the environment. The sustainable practices and knowledge implemented by the indigenous groups would ensure that the forests with these crops would be well protected as well as yield crop for years to come. Environmentally friendly crop harvesting would also be used to provide ethically produced nuts, berries, and cacao. Establishing a direct channel from the indigenous people and their protected to outside consumers for the spread of these natural products would allow for a steady source of income for the communities.

Resources Needed for The Action Plan

One of the most important resources needed across the Amazon countries is funding. The G7 nations have large amounts of sovereign funds. Committing a percentage of these funds for sustainable development efforts in these eight countries would help stop deforestation. The United Nations Development Program and private foundations can also provide funding.

To effectively implement such a complex action plan across the Amazon, technology usage is a critical resource. Publicly accessible dedicated satellites and drones can allow governments and communities to monitor deforestation and potential illegal activity in real-time. Artificial intelligence and the environmental protection force can be used simultaneously to predict areas that are at risk for deforestation and increase ground protection around those areas. AI and software can be used to keep track of land records and land titling to ensure that protected areas are not illegally occupied. Agricultural productivity can be improved through AI technology that predicts weather patterns and recommends the best crops for that region. The spread of smartphones in rural and indigenous communities allows all groups to report illegal activity and track progress individually.

A joint operational task force dedicated to environmental affairs across all eight countries is important. This team would consist of experts, indigenous people, and farmers to ensure that efforts are socially equitable for all. This team would also facilitate the transfer of knowledge and practical ideas to stop deforestation between the countries.

Another proposed resource is a multinational environmental protection force to support the local police. This protection force would help safeguard forest areas and reduce environmental crimes such as illegal mining and deforestation. It would also monitor and track activity on the previously mentioned highways that go through the center of the Amazon, reducing the illegal development of roads. One of the most important

goals of this environmental protection force is to reduce conflict and violence between indigenous people protecting their land and encroachers. Many indigenous people have reported harassment from large companies encroaching on their protected land and people involved in illegal activity [24]. As the center of the Amazon, these indigenous communities should be protected and be able to report illicit activity without fear of retaliation.

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Conclusion

The Amazon can only be saved if a multifaceted approach is adopted by all eight countries with a sense of urgency based on an aggressive timeline. Combatting the spread of cattle ranches, agricultural expansion and infrastructure development while focusing on indigenous communities and reducing poverty is essential. Protecting the Amazon rainforest and ecosystem is critical and a responsibility that belongs to all.

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