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Ecuador, Sustainable agriculture  
March 15, 2025

## **Ecuador: Working Towards sustainable agriculture**

Ecuador is a country located in South America. Ecuador is currently home to roughly 18 million people. 64.8 percent (11,816,488) of the total population is located in urban areas, and the other 34.2 percent (6,418,833) are located in rural areas. And 33 percent of the population, approximately 6 million people, are food insecure. This means that 33 percent of the population lacks access to sufficient nutritional food. The country is currently being run by a Presidential republic. Like the United States, where the elected head of government serves a four-year term. Roughly 29.7 percent of the land of Ecuador is being used for agricultural means. Crops commonly grown in these areas include corn, bananas, sugarcane, rice, beans, and others. Ecuador's main exports for trade are crude oil, fish, shrimp, bananas, and coffee. The average size of the farms for cultivating these products ranges from 49 acres to 123 acres, which seems relatively small compared to America, where the average farm size is 449 acres. This is clearly due to the fact that they are a smaller country, and their diverse geographical location also imposes limitations. Ecuador consists of tropical coastlines, cool inlands at higher elevations, and the tropical Amazonian Rainforest, which covers half of the land.

The average household size in Ecuador is 3.2 family members. The average wage of a household per person is 1,360 USD per month (Ecuador has adopted the US currency in 2000). This consists of jobs across various sectors, including agriculture, oil production, and services, which encompass a wide range of activities, from teaching to tourism. The typical family in Ecuador has a different diet based on their location. In southern Ecuador, the diet is based on goat meat, whereas in the highlands, guinea pigs are the primary source of protein. The rest of the diet is usually made up of corn, rice, and a source of wheat. Food is often accessible to families through local markets, farm to table, street vendors, or even mobile deliveries which are reliable. The food is often cooked with imported oils through trade. Ecuador has free public schools. It raises funds for poor families through the Cash Transfer Program, which is based on students' attendance and medical checkups. This also helps with healthcare, making sure each kid is healthy. Ecuador transportation is made up of roads, railways, and airports. Ecuador's mountainous terrain makes road maintenance extremely challenging, with heavy rains and mudslides causing significant damage to the road system, which is not in the best condition. Ecuador's energy system has been in a state of disrepair. Ecuador suffered a severe drought in 2024, which had a significant impact on the country because it relies heavily on hydropower. This led to many blackouts throughout the entire

country unless the building had generators. The blackouts would reach up to 14 hours. This also led to rationing of water. Since then, Ecuador has been recovering and has now reached a better point, with the government focusing on diversifying electricity production. Water purity is also a massive issue in Ecuador. Ecuador's inadequate wastewater treatment leads to pollution in rivers, streams, and the ocean. Oil production also has a big impact on the pollution of water. Overall, the water system in Ecuador is deeply harmed and unsafe. A big problem in Ecuador is gang violence. This is because of the rivalry over drugs between gangs. This led to many deaths, and the government is pursuing this challenge with a hands-on solution.

The topic I'm focusing on is the problem of sustainable agriculture. The problem is that the government of Ecuador wants to expand, but because of the diverse terrain, it is hard to do so. Ecuador's geographic location is particularly unique, with the Amazon Rainforest covering 50 percent of its territory and mountains scattered throughout its central region. The resulting problem is that agricultural expansion is being limited. As agriculture is limited, food production will not increase, whereas Ecuador's population is constantly growing. This means that the country will be unable to sustainably provide nutritious food for everyone in the future. This affects groups of people differently. Ecuador is currently attempting to expand by deforesting the Amazon Rainforest. However, the goal of groups of indigenous women is to protect the Amazon, making it difficult for both sides to achieve their objectives. These groups are trying to maintain the Amazon rainforest because it provides many things. It helps the atmosphere by absorbing 2 billion tons of CO<sub>2</sub> annually. CO<sub>2</sub> affects the atmosphere because it contributes to the greenhouse gas effect which increases global warming and climate change. The Amazon Rainforest is also home to 10 percent of the world's known species, making it the most biodiverse region on Earth. Biodiversity helps with finding new medical and scientific discoveries. The rainforest also helps maintain the soil quality. Cutting down the trees would lead to soil erosion, making it unusable. The many environmental benefits of the Amazon Rainforest make it difficult to justify cutting it down.

My initial solution was for the government to strike an agreement with the community, ensuring that every acre of rainforest cut down would be regrown in another part of the country. My second idea was to maximize the use of the land they have. By investing in vertical farming and harnessing rising sea levels to create floating farms. Other solutions that have been proposed are the Yasuni-ITT, whose goal was to leave the oil reserves beneath Yasuni Park in exchange for financial contributions. Another solution proposed was Conservation and Ecotourism. The goal was to create jobs for local communities with eco-friendly jobs and promote environmental education through tours and research. Both programs were successful in bringing attention to the subject. This challenge is also faced by the majority of South America because the rainforest stretches throughout the entire continent. Projects done to address these issues were aimed at restoring the forest and utilizing the available land by using crop rotation. These solutions would help Ecuador a little, but none are a long-term solution; Ecuador still needs more crops to grow.

My solution is to utilize their currently unused land to its fullest extent. First the government needs to invest in vertical farming by providing funds for the projects. Instead of expanding left to right, we focus on expanding from bottom to top. As global water levels rise, we can utilize this to our advantage. As the water levels rise and overflow some land, they can use this as an opportunity to start floating farms. I aim to prevent deforestation in a highly valuable region while meeting the agricultural needs of not only Ecuador but also other countries worldwide that could adopt this approach. The only drawbacks or limitations of this project are whether the government will participate, as a business-led initiative alone would not achieve any of my objectives. We need a government that leads, so we can focus on supplying the country with nutritional foods, rather than just focusing on income. As this project takes off, some things will need to be understood and accepted. If this project proves successful and more beneficial than an average farmer's farm, it will eliminate competition in the agricultural sector. It will largely be dominated by vertical farming, and the way of life of many people might change. For the project, they would need the government to cover the production costs. For the vertical farming project, I would recommend Plenty to lead because the other companies only demonstrated green production. Plenty's ability to produce strawberries demonstrates their potential to grow a wide variety of crops. The resources and cost needed in total would be about 1 million dollars per farm. To construct and supply the farm with its needs, such as artificial light and workers to manage its care. Here is where I would suggest that farmers who might be overrun by competition learn to adapt. Floating farms work by using hydroponics, which enables it so plants are not grown in soil but in water. The plant nutrients will be directly dissolved in the nutrient rich water and up the roots. Floating farms also use solar panels to energize the system for the LED grow lights. The Government would cover the costs for the floating farms, and given the recent success of Notre Dame in this area, led by Beyond Border.. I would put them in charge of the project. The goal of this project is not short-term. This project would serve as a reliable resource in the future; all that would be needed for this to be feasible is a patient government and people.

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