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How Sustainable Agriculture Will Save Haiti

Haiti is a country with a population of almost 9.9 million people (World). With a population of this size, it seems like Haiti could be an industrialized country that should be able to provide for its people. In reality, it is far from being able to do so. Having the title as the poorest country in the Western Hemisphere, Haiti cannot provide adequate care for its people. There are 1.3 hospital beds for every 1000 people and one third of its population is getting water from unimproved drinking water sources. Haiti has an unemployment rate of 40.6 percent, which is one of the main reasons why 80 percent of its population is living in poverty. Haiti has over one billion dollars in debt and almost one fifth of children under five years old are underweight. Since 2004, UN peacekeepers have had a mandate in Haiti to help maintain civil order and reduce illegal immigration to the Dominican Republic. As well as maintaining civil order, Haiti faces many other issues in its attempt to feed its people. Hurricanes and tropical storms are common in the Caribbean Sea. Each major storm that passes over Haiti takes with it soil, infrastructure and housing, as well as many lives. The infrastructure of Haiti is minimal and poor at best, severely lacking access to electricity and many other amenities characteristic of a developed country. These factors, the hurricanes, corruption, lack of infrastructure, and low levels of education, have prevented Haiti from receiving investments to help boost its economy. Thus, it cannot create jobs for Haitians or provide solutions to its major problems, creating a dependency on foreign aid. While foreign aid is alleviating the issue of hunger in Haiti, it is not an answer to this issue because food and oil prices are increasing around the world, making it more difficult to send aid to countries who need it. Three million people are in need of immediate food relief (Haiti), and this is a way we can reduce that number.

The average size of a family is 2.88 children per mother. 48 percent of children complete primary education. Very few doctors are taking care of these children and mothers, approximately 0.25 physicians per 1000 people. (World) The traditional diet for a typical Haitian is rice, beans, spicy meat with gravy or stewed vegetables, and chicken. This diet has dramatically changed in recent years because of natural disasters, making the new diet consist of mainly rice and, in many cases, grass and dirt cookies (Malkin). Access to healthcare and education is very limited because of poor/lack of infrastructure.

The average farm size in Haiti is slightly less than 1 hectare, which is an area of land 100 meters by 100 meters, or almost 2.5 acres (Enabling). The agricultural products most grown by Haitian farmers are: coffee, mangoes, cocoa, sugarcane, rice, corn, and sorghum (World). The agricultural practices of Haiti have their roots in history. Intensive monoculture farming has been occurring since its colonization in 1697. This intensive farming has depleted the soil of its nutrients, producing less each year. Only 20 percent of farmers rely solely on farming for their source of income. Many farmers and their family members find a second job as a laborer or seasonal urban worker to enhance their income (Enabling). Remittances also make up a large portion of Haitian family income. While the farmers are the producers of the agriculture products of Haiti, many produce cash crops like coffee and cannot feed their families.

Major barriers to improving agricultural productivity are: urbanization and the expansion of cities onto arable lands, soil erosion and degradation, poor infrastructure, as well as little credit available from banks. Much of the wealth generated by farmers is not returned to them. This keeps the farmers in poverty and makes them desperate for any means to generate an income for their family. Because of Haiti's debt and lack of infrastructure, it is very difficult to generate jobs for Haitians. If infrastructure is improved, farmers

will have better access the cities, helping them generate an income as well as feed the starving Haitian population. The improvement of infrastructure alone will not help Haiti because 80 percent of farmers in Haiti fail to produce enough food to feed their families (Enabling). In order to generate some form of income to offset this shortfall, other members of the household must go out and search for a job. This is not a viable option because there are no/very few jobs available; if farmers cannot feed their families, it is impossible for them to feed others. One fifth of the Haitian diet consists of rice. While rice provides carbohydrates for energy and has many appealing properties like expanding in liquids, which allows rice to fill stomachs and reduce hunger, it has very little nutritional value. Rice lacks Vitamin A, Vitamin B-12, Vitamin C, Vitamin D, and has very low amounts of Calcium and Iron. Another issue facing Haitians attempting to get adequate nutrition is that little food is available, so many Haitians are resorting to eating grass and mud cookies, which provide no nutrition.

Haiti has a long history of overproducing or producing large quantities of sugar, coffee, and other agricultural products for its colonial masters as well as its own governments after Haiti's independence. In a survey done by National Geographic, 70 percent of farmers said the earth was deprived of the resources it needed to enable substantial growth of plants (Bourne). Because of lack of nutrients in the soil, many crops are having trouble growing and producing larger yields, which is reducing the income farmers could have potentially received and reducing the amount of food available for consumption. This is also one of the reasons why the Haitian government must import much of Haiti's food. While this is a soil problem, there is an even bigger issue with the soil: it is disappearing and eroding away at a rapid rate. In Haiti, only 4 percent of its original forest remains and in many areas the soil has eroded all the way down to the bedrock (Agroforestry). This degenerated soil and the lack of soil are two reasons why Haitian farmers are having trouble producing adequate amounts of food and other agricultural products. Reduced yields provide less income if the Haitian farmer is producing a cash crop and diminished yields cannot provide enough food to feed the Haitian people.

By helping Haiti gain a foothold in sustainable farming practices, many starving Haitians can acquire the adequate nutrition they need to live. By letting the soil rest and restore itself, yields of crops will increase, leading to more food and higher food security for Haiti. An increase in the amount of food will also bring an increase in the quality of nutrition because excess food can be used to feed livestock, which will create a more balanced diet. With the hopeful abundance of food, family members in a farming family and others in society will be freed from focusing on finding food to survive, allowing them to work in urban areas or perform labor once jobs are available. An increase in the amount of food can also create a surplus, allowing farmers to sell this surplus to generate an income. It can also allow farmers to diversify what they grow, providing them an opportunity to grow cash crops alongside their crops for food.

Sustainable farming practices will also help sustain the environment and reduce its degradation. Farming using the no-till or reduced-till method will reduce soil erosion and the decomposition of plants will promote future plant growth. Eventually, plant growth could spread across Haiti into the mountain areas where contour farming is occurring and attempting to reduce soil erosion (Agroforestry).

A way to alleviate deforestation and promote sustainable agriculture is to plant woody plants for use as cooking fuel, the most common use of fuel in Haiti. A plant that could be used for this is bamboo. A property that makes bamboo appealing for this use is the fact that it grows quickly and can therefore replenish supplies faster than growing a tree to replenish supplies will. Something to consider in this approach is that bamboo is an invasive species. This could lead to it spreading across Haiti, essentially becoming a weed.

An alternative to growing bamboo as fuel is to produce organic briquettes. Organic briquette is a type of fuel, like charcoal, made from organic waste. Because it is using organic matter from the carbon cycle, there is very little carbon emission from burning these briquettes. These briquettes can be made from essentially any type of organic matter, including municipal solid waste and solid waste from other organisms. In order to burn effectively, briquettes require organic matter with a higher concentration of nitrogen.

While sustainable agriculture can be the saving factor for Haiti, there are many other factors that can impede its effectiveness. A major issue with Haiti is its location. Located in the Caribbean Sea, Haiti is in the path of multiple natural disasters like hurricanes, tropical storms, and earthquakes. With each hurricane or tropical storm, soil is blown away from the Haitian land and vegetation is uprooted, allowing for more soil to be blown away with the next hurricane or tropical storm. Urbanization is another major issue facing sustainable agriculture. Urban expansion is mainly onto land that is flat and arable, leaving available land space for farming only in mountainous or already degraded regions of Haiti. Planting crops and other agricultural products on hills increases the likelihood that they will be blown away and uprooted by each storm. Urban centers also need large quantities of water for its population, drawing water away from farms and into the city. This causes farmers to move farther away from cities to grow their crops, but this creates a new problem. Because the farmers are farther away from the cities, the urban population has a harder time obtaining food. This problem is heightened by the fact that Haiti has very poor infrastructure, making it difficult to transport food from the countryside into the city.

Another factor that could dampen the effects of sustainable agriculture is that deforestation is one of the main sources of fuel for most Haitians. Much of the original Haitian forest has been cut down for this use. Cutting down the Haitian forests has led to many of the environmental problems Haiti is facing today. Without the trees in the mountains, much of the mountain's soil has eroded away, leading to the exposure of the mountain's rock face. Obviously, crops cannot grow on rocks, thus the cutting of the forest has reduced the area of Haitian land available for agricultural use.

In order to combat these issues, I would recommend a reorganization of what is grown in Haiti. I propose that seed of legumes, mainly beans and peas, be given to farmers and that these farmers plant only legumes. Legumes have the unusual property of having a symbiotic relationship with nitrogen fixing bacteria. This allows for plants of the legume family to live in soil that is degraded, like the soil in Haiti. When these plants die, the nitrogen that is contained in these plants is broken down by decomposing organisms and is returned to the soil. Over time, this process will rejuvenate the soil, helping it reach the point where it has enough nitrogen in the soil to sustain other varieties of crops. This will also provide the nitrogen needed for the effective burning of organic briquettes as a fuel source. After the soil has been rejuvenated, crop rotation could replace the practice of only planting these legumes. In order to combat soil loss by hurricanes and tropical storms, trees or woody bushes would be planted in order to form walls around a field to stop or slow the wind as it passes over the field. Local farmers are already doing planting of woody bushes to mark farm plots. After the establishment of legume planting and a rejuvenation of the soil, the "Three Sisters Approach" could be taken to stabilize farming. The Three Sisters calls for planting three different types of crops together: corn, beans, and squash. The corn provides the beans with a structure they can climb on (if they are not bush beans), the beans provide the nitrogen for the soil, and the squash leaves keep moisture in the ground like mulch as well as deter pests (Vivian)gyftdsq`. An issue that faces this approach is that strong winds like the ones in hurricanes and tropical storms could blow down the corn stalks, negating some of the benefits they might bring. If these stalks are blown

down, they could be incorporated into the briquettes as a replacement for fuel in cooking, helping to alleviate deforestation.

There are many projects in Haiti that are being implemented as we speak and some of these can be used scaled up to achieve our goals. One of the projects that can be scaled up is the International Fund for Agricultural Development's (known as the IFAD) ongoing Small-scale Irrigation Development Project (Enabling). This project is already working with rural farmers to help improve rural irrigation. While improving irrigation, the IFAD could distribute the seeds needed to implement the planting of legumes. Because they are working with the farmers and in the communities, the IFAD is the perfect method in which to show farmers how to plant these seeds and how to implement later stages of this recommendation. Starting with a demonstration farm, IFAD workers can show communities the benefits of planting legumes.

Feed the Future West, a program by the USAID, is another project that could be scaled up. This project has shown significant results in increasing yields and incomes for many Haitians. From 2009 until 2013, corn yields increased 448 percent, rice yields increased 139 percent, bean yields increased 94 percent, and plantain yields by 56 percent (Haitian). With this increase in yields, a significantly larger income is being generated for each seller. Unfortunately, Feed the Future West will end May 2014. A new program will be replacing it: Feed the Future North, focusing on the northern part of Haiti. Seeing how successful this program was in the West, scaling up the North program could bring even greater results.

The Legacy Foundation also has a small presence in Haiti. The Legacy Foundation provides briquette presses and training to local communities so they will have the means to reduce their reliance on firewood. The Foundation has three locations in Haiti where they have brought their briquette presses, and these presses are providing a crucial benefit for each community. This must be scaled up to reduce Haitian dependence on firewood, charcoal, and coal in order to reduce deforestation and its environmental impacts.

In order to implement this recommendation, a number of organizations would need to coordinate together over a series of time spanning years. The national government would need to encourage farmers to plant these crops. A way it could do this is to provide farmers with the information about why they are planting these crops and the benefits legumes will bring. This would have to be done methodically in order to insure the maximum number of farmers is informed. The best way to do this is to have the IFAD, a branch of the United Nations, administer the seeds and information to farmers alongside the other projects currently in operation in Haiti. In order to supply beans to Haiti, there could be two methods. Countries like the United States or other countries where beans are grown in large numbers could donate them or Haiti could attempt to get a loan from the World Bank or the International Monetary Fund in order to purchase beans. Once these seeds are distributed, it is the role of farmers and urban citizens to plant these seeds. When planting these seeds, a no-till approach will be taken to reduce soil erosion. Due to costs of no-till machinery and oil needed to power these machines, as well as the relative size of farms in Haiti, planting will be done by hand. A way urban families can assist in trying to achieve sustainable agriculture is by bringing organic materials to the briquette presses in order to make their fuel for stoves.

Funding for these projects could be achieved through multiple ways, however the source that has the greatest potential is crowd funding. An example of this in action is the aid given to the Philippines after

Typhoon Haiyan. In order to provide monetary relief for the Philippines, mobile phone users could donate directly from the app store on Android and Apple devices. Using this method for funding, these projects have the potential to acquire millions of dollars for aid in Haiti. One potential setback is that this funding will not come in all at once because there is not as much media attention on Haiti's recovery as there was on Typhoon Haiyan's destruction.

As Haiti faces these challenges, it is important that Haiti does not face them alone. Millions of people in Haiti, almost one third of its population, are in need of immediate aid. Many have resorted to eating grass and dirt to put off hunger pains. By attaining sustainable agriculture in Haiti, these starving people will no longer have to hope that the charity of the world will help them live one more day. By planting legumes, the soil will replenish itself, providing larger yields for farmers, increasing their income and the amount of food available to Haitians. After implementing the Three Sisters approach, agriculture in Haiti will stabilize and Haitian reliance on wood for fuel can be reduced using leftover organic material for briquette creation. The deforestation of Haiti is the largest threat to sustainable agriculture in Haiti, which is why this factor must be brought under control if we hope to achieve the goal sustainable agriculture. By achieving sustainable agriculture, we can achieve the Millennium Development Goals of eradicating extreme poverty and hunger and ensure environment sustainability in Haiti. This is how sustainable agriculture will then help boost the Haitian economy, allowing the government to have better resources to help its people.

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