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### **Agricultural Solutions to Address Food Insecurity in Haiti**

In the 18<sup>th</sup> century under French Rule, the country Haiti (formerly Saint-Domingue) was the gem of the French Empire. In the 1780's, Haiti's wealth came from their staple exports, with 60% coming from coffee production, and the other 40% from sugar exportation, all being consumed in the European Nations. The entire island was operated by 800,000 French owned slaves that originated from Africa, who, unsurprisingly, saw little wealth that was accumulated.

Today, Haiti is known for a high poverty rate, political corruption, illiteracy, overcrowding, little infrastructure, and almost no law over large areas. Jon Henley describes Haiti's current state. "In Haiti, the last five centuries have combined to produce a people so poor, an infrastructure so nonexistent and a state so hopelessly ineffectual that whatever natural disaster chooses to strike next, its impact on the population will be magnified many, many times over. Every single factor that international experts look for when trying to measure a nation's vulnerability to natural disasters is, in Haiti, at the very top of the scale. Countries, when it comes to dealing with disaster, do not get worse."

Geographical factors and bad luck are only to partially blame for the country. It is unfortunate to be positioned on the fault line where the Caribbean and the North American tectonic plates collide. It is just as bad of luck to be positioned in the primary pathway of the region's storm movements. To that effect, in the 2008 season alone, you would be ravaged by storms as dangerous and deadly as Fay, Gustav, Ike, and Hannah. Between those storms, 800 people were killed, and more than 70% of the countries agricultural land was destroyed. Not stopping there, the country would fall victim to devastating floods in 2002, 2003 (twice), 2006, and 2007.

What is to blame for Haiti's present state, says historian Alex von Tunzelmann, is its' history. "Haiti has had slavery, revolution, debt, deforestation, corruption, exploitation and violence," von Tunzelmann describes. "Now it has poverty, illiteracy, overcrowding, no infrastructure, environmental disaster and large areas without the rule of law. And that was before the earthquake. It sounds a terrible cliché, but it really is a perfect storm. This is a catastrophe beyond our worst imagination."

So what happened since the days of economic prosperity under the rule of France? To summarize, the treatment of the slaves was atrocious. The Haitians revolted against the country (near the time of the American Revolution). The French Revolution began in 1791 and would ensue a bitter and bloody civil war that would continue for nearly 12 years against Napoleon Bonaparte's forces. As France becomes increasingly occupied with the war against Great Britain, the French commander was finally defeated in 1803. Haiti would declare independence on Jan. 1, of 1804.

The Revolution left Haiti in a state of turmoil with many plantations and infrastructures demolished. To add on top of that, Haiti was forced to pay huge restitution to France in exchange for diplomatic recognition. This was not a strong start to an independent country.

The restitution funds were far more than the country of Haiti could afford, and it was still an overwhelming amount after the French cut the sum in half. In order to pay the French, Haiti took extensive loans out from American, German, and French banks at exorbitant rates of interest. By the 1900's, Haiti was spending nearly 80% of its' national budget on repaying various loans.

In 1957, after a recent revolution, one of the most notorious modern dictators gained control of Haiti. François "Papa Doc" Duvalier was known as one of the most corrupt and repressive political leaders of the last century. Papa Doc exploited the traditional belief of voodoo and manipulated it in order to establish a personal army.

During the 28 years of his reign, he and his heir, "Baby Doc" along with the assistance of their henchmen, killed between 30,000 to 60,000 Haitians. They also beat, tortured, and raped thousands of other Haitians. Millions of dollars was sent to the country in foreign aid for projects that were either abandoned or never even started. Baby Doc's exile in 1986 left the country left the country with no money and left him very rich with nearly \$900m in stolen funds.

It isn't surprising that Baby Doc's disappearing left a corrupt government, where social uprising and political overthrow was more frequent. To switch from a dictatorship to a democracy was a huge shift for governmental function, and this has only slowed down the development of Haiti. Today, Haitians lack the necessary infrastructure in order to operate a modern society. (Henly)

What exactly is the present state of the country of Haiti? Who are the Haitians?

Unlike the United States, Haiti is a matriarchic society, which means that women are socially higher ranking than men. While that is true, men do make final decisions, however, most families have women as the head of a household. The women are responsible for a variety of domestic tasks, such as farming and selling the harvest. However, the men are responsible for providing the home and garden plots.

The typical Haitian household can have between 4-5 members in the family. Trends show that the households with more children tend to be more poverty-stricken. One woman describes educating her children. "It costs a lot to educate a child in Haiti; you have to work very hard. When I helped them with their education, I considered it like putting money into a savings account. My children are my bank account." (A Social Analysis of Haiti)

Education is mostly reserved for elite Haitians. Port Au Du Prince has one public university and one private university. Most citizens leave the country in order to find an education beyond what their community can offer.

In Haiti, nutritional deficiency is not caused by a lack of knowledge, but is directly related to poverty. Rice and beans are considered the national dish and are the most commonly eaten meal in urban areas. Traditional rural staples are sweet potatoes, manioc, yams, corn, rice, pigeon peas, cowpeas, bread, and coffee. More recently, a wheat-soy blend from the United States has been incorporated into the diet.

Most households eat two meals every day, starting with a small breakfast that usually consists of coffee and bread, or juice and an egg. The afternoon meal typically has beans or a bean sauce, and can be accompanied by poultry, goat, or fish (while less common, beef and mutton can also be included). It is also customary to have a light snack before bed. (A Social Analysis of Haiti)

### **Haitian Agriculture**

The agriculture industry is Haiti's largest employer, with 60% of the population being directly related to ag. Major agricultural products produced by Haiti are: coffee, mangoes, sugarcane, rice, corn, sorghum, and wood. The country of Haiti, however, does not produce enough food to feed its' people. Haiti is forced to import 60% of its' total food supply, and as much as 80% of the rice consumed. There are a number of factors and reasons for the continuous decline of the agricultural industry in Haiti. (Rural Poverty in Haiti)

Some of the major ones included the continuing fragmentation of landholdings, low levels of agricultural technology, migration out of rural areas, insecure land tenure, a lack of capital investment, high commodity taxes, the low productivity of undernourished farmers, animal and plant diseases, and inadequate infrastructure. As Haiti entered the 1990s, however, the main challenge to agriculture was not economic, but ecological. Extreme deforestation, soil erosion, droughts, flooding, and the ravages of other natural disasters had all led to a critical environmental situation.

Almost all food, bought or sold, takes place in open-air bazaars and marketplaces. As mentioned earlier, the woman of the household will go to these marketplaces and sell the family's harvest, and buy her groceries while she is there. (Culture of Haiti)

### **Why are Haitians poor?**

An analysis conducted by the World Bank indicates several factors that relate to Haitian poverty. These factors that are highlighted include: poor access of credit, lack of infrastructure, low educational levels, and limited social capital. Other studies show that poverty could be linked to lack of input- tools, water, land, knowledge, ect. The study goes on further to point out an unequal income distribution and the existence of powers to maintain inequality. Finally, there is a clear link between poverty and natural vulnerability. Where Haitians cannot quickly recover from a natural disaster, poverty exists. (Rural Poverty in Haiti)

### **What in Haiti can be improved? More importantly, what *needs* to be improved?**

There are many agricultural practices that can be adopted and implemented onto the Haitian farm which can combat environmental problems and increase their overall food production. Earlier, I mentioned devastating environmental factors that led to the degrading of agricultural land. Because of this country's constant exposure to tropical storms and earthquakes, flooding and soil erosion are a huge problem. (Haiti Agricultural Scorecard)

Sixty-three percent of all land in Haiti slopes more than 20 percent, and more than one-third of the country lies above 400 meters, with peaks in the South up to 2700 m and 2100 m in the Central region. While only 20 percent of the land is considered arable, 50 percent of that land is being utilized for agricultural purposes. In 1940, it was estimated that forested lands covered nearly 30 percent of Haiti. By 1970, that percentage had dropped 10 percent. Today, estimates lie between 1.4 and 2 percent.

Deforestation and soil erosion is largely caused by centuries of agricultural exploitation to the land. It began with the colonial plantation system- intensive monocropping of export commodities- then it later continued with widespread harvests of timber for foreign markets and rural farms moving onto marginal sloping land. Expanding urban populations and an increase in demand for charcoal and firewood added further stress to the environment.

Because the majority of rural farmers have access only to the hillsides, most of the hills are visibly eroded. According to USAID (United States Agency for International Development), one-third of all land is severely degraded in Haiti. Gully erosion is endemic, particularly along footpaths and roads, severely impacting both soil fertility and infrastructure. In one research site in the Sud-Est region, 60 percent of all soil was eroded to the B-Horizon, and 20 percent to the C-Horizon. In many areas, basalt bedrock is visible at the surface. Many Haitians have made the comment, "the mountains have grown old. You can see their bones poking through their skin." (Agroforestry and Sustainable Resource Conservation in Haiti: A Case Study)

Erosion has a devastating impact of agrarian land, which can render it unsuitable for farming. Soil erosion occurs when water or wind gradually removes soil particles, causing the soil to deteriorate. The problem can even continue until the soil is unsuitable for cultivation and must be abandoned. Many agrarian societies have suffered from erosion, which lead to the downfall of their societies. (Soil Erosion: An Agricultural Production Challenge)

Fortunately, there are environmental management practices that farmers can implement into their land in order to preserve and maintain their land. **Conservation Tillage** is the practice of leaving the previous year's crop residue (such as corn stalks or wheat stems) on the land to prevent or combat soil erosion and runoff.

There are different methods of conservation tillage, and each one requires special adaptations of equipment and management practices.

The first two are **no-till** and **strip-till** methods. No-till involves planting a seed directly into a plant residue that has not been tilled at all. The second one is planting seeds into narrow strips that have been tilled, while leaving the rest of the field untilled.

**Ridge-till** involves planting row crops on permanent ridges about 4-6 inches high. The previous crop's residue is cleared off ridge-tops into adjacent furrows to make way for the new crop being planted on ridges. Maintaining the ridges is essential and requires modified or specialized equipment.

**Mulch-till** is any other reduced tillage system that leaves at least one third of the soil surface covered with crop residue. (Conservation Practices)

### **Why should conservational methods be practiced?**

Depending on the method you are using, you can reduce the amount of soil erosion between 60-90%. This also improves soil and water quality as you are adding organic matter into the soil as the plant residue decomposes, which creates an open soil structure that allows water to run in, thus reducing runoff. Furthermore, water is conserved into the soil by reducing evaporation from the ground. By retaining moisture in the soil, the quality of the top soil will improve and plants will be able to survive for longer periods of time during droughts, which are problematic in Haiti. (Conservation Practices)

If every Haitian farmer adopted any of the conservational methods of tilling, the quality of the soil would show noticeable improvement, instead of degrading. Moisture will be retained, farm land would become more readily available, and the amount of food produced would increase.

However, there is an additional approach to soil erosion that I would like to present. This solution roots from the deforestation problem that I mentioned earlier. Because of the increase in the demand of firewood and charcoal among the urban population, Haitian farmers had been focusing on harvesting their lumber resources. This began to rapidly deplete their environment of crucial forests for some "guaranteed income." As a result of so much deforestation (dropping from 30 percent of total space taken, forests are now estimated to be closer to 1.4 percent of all Haitian land), the soil loses the support that it once had from a vast root network, and is now susceptible to massive soil erosion- especially where a slope is present.

There have been many resource conservational initiatives that have promoted several agroforestry techniques in an effort to curb soil erosion as well as improve soil fertility. These programs have focused

their reforestation initiatives on providing and replanting cash crop tree species. The largest of those programs was the Pan American Development Foundation (PADF), which was funded by USAID's Agroforestry Outreach Project, provided nearly 200,000 farmers with over 48 million free seeds between 1981 and 1991.

One of the highly promoted agroforestry techniques in Haiti by developmental programs is a method called **alley cropping** that uses contouring of hedgerows on the hillside with a shrub species that are rich in nitrogen. (A hedgerow crop is planted on a surface that has a slope anywhere between 10 and 40 percent, and can be very beneficial to maintaining the soil on a hillside). One example of these shrub species is *Leucaena leucocephala*. These shrubs are regularly coppiced, pruned, and scattered about-acting as mulch. This accomplishes two things. First, it allows for the shrub to release its' nutrients for the crop to ingest and the soil to retain. Secondly, it contributes organic matter to the soil, which impedes erosion by increasing soil prosperity and infiltration, while improving soil fertility. By 1992, 1.4 million meters of hedgerows had been established throughout Haiti, and it was estimated to have saved 350,000 metric tons of soil. (Agroforestry and Sustainable Resource Conservation in Haiti: A Case Study)

This method, however, was met with some resistance from Haitian farmers, as they were hesitant to use their limited space to plant "unprofitable shrubs." With economic insecurities, most farmers chose to invest their limited capital in short-term, annual cropping systems as opposed to the long-term benefits of an agroforestry system.

Adding to Haitian resistance, many turn bitter at the idea of foreign aid- as past experiences have had disastrous social and economic impacts in the country. One such experience is the USAID-led effort to eradicate native Creole hogs to preempt an outbreak of African swine fever in the early 1980's, which very negatively affected the livelihood of many rural farmers. Another similar experience of this occurred in the 70's and 80's when development initiatives sponsored by foreign agencies attempted to force rural population participation in the construction of capital-intensive soil conservation technologies. The agencies relied heavily on the Haitian government to force participation by offering food or cash incentives. The approach failed for a number of reasons. The farmers were not involved in the planning process. Many times, the developments infringed on land rights, it provided little economical gain, and traditional methods and knowledge were completely ignored. (Agroforestry and Sustainable Resource Conservation in Haiti: A Case Study)

### **How do we distribute this knowledge of agricultural practices to the farmers of Haiti?**

Dispersing our agricultural knowledge isn't as easy as putting on a workshop or an educational course. There is a huge cultural barrier- especially when trying to modify traditional methods that the people have used to for several decades. The material isn't the challenge we face, it is that barrier that we are trying to cross in order to teach them what we know to further improve their agricultural practices. Knowing from past experiences, Americans have tried for the last several hundred years to force other cultures to assimilate to the "American Way." We have seen this countless times- from the Africans to the Native Americans as well as the Haitians. We saw a disastrous backlash when USAID eradicated the Creole hogs in Haiti- negatively impacting social and economic factors of people in the rural area of Haiti. A strong-armed approach did not work when developmental agencies attempted to force participation of farmers in the construction of soil conservation technologies. It is these past experiences that have left a bitter taste in the mouths of Haitians when "foreign-aid" is mentioned. This has only further built on to that cultural barrier that is so difficult to get through.

### **Is there anything we can do to bypass the barrier?**

My answer is yes we can. At the end of June in 2013, I had an amazing experience of traveling to Haiti through the Global Compassion Network (GCN) -an Iowa-based nonprofit organization located in Eagle Grove, IA. The trip was organized and participated by FFA members across Iowa and other members of the Midwest. Because the trip was organized through FFA, my time down there was very agriculturally oriented. During my trip to Haiti, I learned so much that can be applied to solving hunger in Haiti.

The operation of GCN is very remarkable and is the solution to sharing our knowledge with Haitian farmers. Instead of solving problems with handouts, GCN believes in providing the tools and resources that Haitians need in order to develop a sustainable future for them- not a relationship of dependence on foreign aid. While they are out in foreign land sharing their knowledge and resources with others, members of the mission are very careful to respect any and all cultural boundaries that are present. It isn't about forcing the people to do it the "American Way." The best way to share your knowledge is to respect and preserve the culture that you are working with.

Sharing conservation tillage methods and agroforestry practices cannot happen in one day. Dispersing our agricultural knowledge will require long-lasting relationships and trust, just as the Global Compassion Network has established. That is why I recommend an agricultural partnership with GCN in order to teach our methods to combat soil erosion and deforestation in Haiti. GCN has the relationships, knowledge, and resources that we need to reach out to farmers of Haiti in order to combat the detrimental state of the soil.

### **What resources are necessary?**

It is evident that the majority of the population of Haiti has a very limited access to resources and capital. Keeping that in mind, methods and practices that do not require additional resources will be the most beneficial to Haitian farmers and agrarian farms.

Ridge-tilling requires special/modified equipment, and would be the most difficult method of conservation tillage to become accessible to every Haitian farmer. Costs for a brand new ridge tillage cultivator with bolt on attachments can be up to \$20,000. The technology also requires the use of a tractor, which is not accessible among rural Haitians.

With mulch-tilling, planting can only be accomplished by utilizing a disc opener that can go through several inches of mulch. Adding on to that, the process of mulch decomposition deprives the crop of nitrogen, and so fertilizer must be applied beneath the mulch layer (Agricultural Technology; Encyclopedia Britannica). This is very different from the traditional methods of Haiti, and probably would not make a lot of economic sense for the farmers.

The basic idea of strip tilling is to preserve crop residue from the previous year's harvest. Only a narrow strip is removed, where the seed will be planted. As a result, this will create a warmer, drier bed for the seed to grow in. (What are Strip Till and Conservation Tillage) This method would be effective in retaining the composition of the soil and reducing erosion. Furthermore, while there is mechanized equipment available, strip tilling can be accomplished using only a hoe.

No-tilling requires no additional equipment, as the crop is planted directly into the previous year's plant residue. This has become a way to reduce soil erosion, increase organic matter, and enhance soil physical properties (Conservation Tillage; CEFS). Because of the lack of need for specialized equipment along with success from this technique, this method becomes a popular candidate for farmers in need of conservation tillage with little cost input.

The final method, alley cropping, is a strong candidate to promote among Haitians for a number of reasons. It is very effective on Haitian farms because the majority of farms are located on a sloped land.

The land that they are planting on has a lack of trees and forestation, which makes their land susceptible to soil erosion, and the deprecation of the soil only magnifies as the slope increases. By installing hedgerows, a root network will be able to support the soil of those farms that are located on a graded surface (which is a large majority). The shrub, *Leucaena leucocephala*, would be a popular plant to use for these proposed hedgerows. Not only is it cheap, but it has many uses (it is referred to as the “miracle tree” for a reason!). First, for our purposes, it has worldwide success in cropping systems, specifically on sloping lands. The shrub serves not only for soil erosion, but can also be coppiced and spread (similar to mulch) to provide essential nutrients to the crops and increase the yield (as it was seen in the Phillipian Islands and Indonesia). Secondly, the leaves of *Leucaena* are highly nutritious for ruminants and it is well documented confirming the value of fodder from *Leucaena* for livestock. Third, this plant makes for excellent firewood, producing high volumes of medium-light hardwood fuel with low moisture and a high heating value. It also makes for outstanding charcoal, producing little ash and smoke. (*Leucaena leucocephala* - the Most Widely Used Forage Tree Legume)The distribution of this plant would seem very beneficial to Haitian farmers.

### **What is the Role of the Community in this Plan?**

We want to create an independent and sustainable future for the Haitian people. Our goal is to share our knowledge of conservation tillage and agroforestry methods to the farmers, but at the same time, we don't want to return every year in order to teach the next generation of farmers or other members of the rural community who haven't heard about conservational farming. This is why I recommend the establishment of agricultural coops and organizations within the Haitian community. This could be the equivalent of FFA or the USDA in the United States.

The basic idea is that once we share our knowledge with “farming authorities” or “farming leaders” in Haiti, then an organization of Haitian farmers composed of the agrarian leaders and other rural population members can meet in order to discuss farming techniques and practices with each other. From those meetings, the leaders can share what they know, and other farmers can apply those techniques to their home farms to impede erosion and soil degrading. Coops will be beneficial because other farmers won't perceive the information as “foreign-aid,” as the information is coming from another Haitian. I believe the farmers would be a lot more receptive to change if the information was distributed in this fashion. Another benefit to establishing coops could be the potential to share resources and funds to own common equipment. Creating that network of farmers and rural population members will also provide for an efficient way to distribute supplies, such as the seeds of *Leucaena leucocephala*.

The best way to establish such an organization or network would probably be in the hands of Haitian farming leaders or authorities. They know they people best, and they know the best way to reach them and convince the farmers to join these coops.

### **Conclusion**

Soil erosion is a huge problem that needs to be addressed in Haiti. Continuing their traditional farming methods will not be an option in the future. However, we also must respect traditional culture when introducing new methods. Past experiences, such as the creole pig or the development efforts of the 70's, proved that not respecting cultural boundaries can lead to disastrous consequences. Truly, the best way to disseminate new methods of conservational farming is to educate Haitians who seem to have agrarian authority as well as an established relationship with the US. The creation of coops across Haiti can have numerous benefits, as Haitians would be teaching each other- eliminating potential cultural strains and dispersing conservational farming methods in an orderly fashion. Conservation methods will play an important role in creating a secure food source for the country as opposed to either importing or relying on hand outs in order to create a sustainable future for Haiti.

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