Haiti: Erosion and Deforestation

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Abstract

Compared to the United States, Canada, and other western countries, Haiti is very poor. The poorest of Haiti earn what little income they can get from cutting down trees from forests and making charcoal for cooking needs. When done sustainably, this method of income is fine, but now, Haiti no longer has the lush forests of its pre-colonization days. Haiti’s current rate of deforestation is causing a grave economic and humanitarian crisis, which demands a solution.

Introduction

In 1978, 6.7% of Haiti’s land was covered by forest (Stevenson, 1989). Current estimates indicate forest coverage is between 20-30% (Churches et al, 2014; Ghilardi et al, 2018). Contributors to deforestation in Haiti are poor farming practices, cutting down trees to make charcoal for cooking, and the Haitian government selling land to companies that mismanage and destroy it (Foxx, 2012).

With a GDP per capita of 765.68 USD, (more than twice what it was thirty years prior) Haiti is the poorest country in the western hemisphere (Zimmermann, 1986; Worker, 1994). 80% of the Haitian population lives below the poverty line (Williams, 2011). Haiti’s poor contribute to cutting down trees to make charcoal. They do so out of necessity—they are only simply trying to survive and provide for their families. Viable environmental solutions therefore need to address this economic and humanitarian issue.

Solutions to Haiti’s issue of deforestation must come from changes to personal practices and governance (Bannister & Nair, 2003). The Haitian government will have to distribute land
to companies or organizations with Haiti’s best ecological interests in mind. In practice, this would mean giving more land rights to the local people, with the caveat that they must plant in an amount that exceeds their deforesting rate. Other solutions include integrating trees into farming techniques, where the trees would provide a benefit to the crop output (Bannister & Nair, 2003). Additionally, farm heartier trees suited for Haiti’s terrain and better suited for mass production, could solve this problem. This type of farming would reduce the number of trees being cut down in the remaining forested areas of Haiti but would require land rights given from the government (Bannister & Nair, 2003).

Without Haiti’s forests and vegetation, hurricanes, tropical storms, erosion, and island temperatures become much more extreme in terms of their effect on the Haitian people. Tropical storms combined with little vegetation to retain soil means dirt and minerals wash into the sea on a yearly basis (Bannister & Josiah, 1993). Mudsides cover the few paved roads that Haiti does have, collapsing and destabilizing buildings, bridges, and other infrastructure. Bigger events like the 2010 earthquake that occurred near Port-Au-Prince, or Hurricane Matthew, that occurred in October 2016, have added to Haiti’s erosion and infrastructure damage (Foxx, 2012). The negative effects of these storms could have been dampened if Haiti’s forests were larger.

**Background**

French influence on the western half of the island of Saint Domingue began in 1660 (Worker, 1994). Once called “Pearl of the Antilles,” this land would also become known as Haiti upon its revolution and subsequent independence in 1804 (Eller, 2016). At one point in time it was the most profitable colony that France owned, producing large quantities of sugar and coffee;
however, immense numbers of slaves were used to clear forests and plant cash crops that would generate this wealth. The French goal of mass-producing sugar and coffee degraded the soils of Haiti, removing nutrients and creating an environment where very few plants could grow (Ghilardi 2018, Lindskog 1998).

Deforestation and barren soils have left the nation in extreme poverty. Over 70% of Haiti’s forests have been eliminated resulting in species loss, erosion, and a changed climate in comparison with the Dominican Republic (Hedges, 2018). It is important to note the various factors that are causing deforestation. As France began colonizing Haiti, large acreages of forest were cleared to grow cash crops. This initial practice cleared nearly half of Haiti’s tropical forests (Ghilardi, 2018, Lindskog 1998). Once Haiti gained independence, many of the same farming practices were used, meaning that deforestation continued at a steady, albeit slower, rate.

Contemporary causes of deforestation can be grouped into two categories: 1) cutting down trees for use as charcoal and 2) cutting down trees for farming. Cutting down trees for usage as charcoal is a practice that has become second nature for the people of Haiti. Haiti lacks the proper electricity and resource infrastructure to provide electricity to its people; therefore, in order to heat a house, cook, or boil water, timber and charcoal are required (Michel, 2013). The process of creating charcoal is relatively inefficient. In turning wood into slow-burning charcoal, a large portion of the original fuel is lost as a gas byproduct (Michel, 2013). Once produced, the charcoal can be used for heating, cooking, or can be sold for the U.S. equivalent of a few pennies. This entire charcoal making process creates a market for the Haitian people, some of which utilize charcoal as a means of earning money to provide for their
families (Michel, 2013). However, questions arise as to whether this process is sustainable, or whether it is simply putting off the inevitable situation where not enough charcoal will be available with the limited number of trees in Haiti. The distance a Haitian would have to travel to get to a patch of trees, would not be worth the amount of money they could get from turning them into charcoal. Around 66% of all Haitians are dependent on agriculture and subsistence farming (Williams, 2011). Cutting down trees for farming, is done to make way for crops that help generate vital income (Dolisca, 2007). Only with new knowledge, and the proper incentives (like land rights and freedom to cut and sell some of the wood while planting excess) can Haitian farmers be expected to plant trees.

Given the negative effects of erosion and nutrient loss that coincide with deforestation, growing trees, either in addition to crops or as a crop itself, could help save Haiti’s soil and aid in combating deforestation throughout Haiti. The ideal goal in this process would be to have multiple farmers take part in this process. This paper will explain deforestation and where it occurs in Haiti. It will assess the effects of governmental control, poverty, and cultural practices, evaluating the intricacies of their relationship on deforestation.

**Extent of Deforestation**

Some scientists claimed that Haiti’s tropical rainforests were almost fully destroyed by the conclusion of the nineteenth century. They estimated that in 1954, roughly 9% of Haitian land remained under forest and by 1978 it had gone down to 7%, of which 36% had dense canopy and 64% had open canopy (Lewis & Coffey, 1985). Additionally, existing forests were only located along watershed divides and in areas of steep and rugged terrain, with large areas
of forest cover, greater than one square kilometer, expected to be gone within 50 years (Lewis & Coffey, 1985).

This data has been directly criticized and called into question due to a limited scope/sample area. The scientists who made these claims sampled forest tracts in Haiti and utilized three specific areas: a south to-north strip from Anse Rouge to Jean Rabe, a southwest area from Camp Perrin to Roseaux, and another southwest area in Morne Macaya National Park (Pellek, 1998). With a total area of 146,192 hectares, roughly 5% of Haiti’s land area of 2,770,000 hectares, not enough of Haiti’s land was represented in the study (Pellek, 1998). Although deforestation is occurring, the low rates of 1-3% original forest cover quoted by some scientists is not representative of what was found by 1988. Data received from a Landsat Thematic Mapper (TM) in 2011 backs up this point, calculating tree cover for Haiti to be 32.3% (Churches et al, 2014). Other tests done found that under a reasonable set of assumptions about woody biomass growth and harvest, Haiti will likely experience levels of NRB (Non Renewable Biomass) that are much lower than other assessments report, meaning that deforestation is not as rapid as pervious findings have stated (Ghilardi et al, 2018).

**Erosion in Haiti**

Assessing the effects of deforestation on river discharge is not easy since nearly all Haitian river discharge values come from measurements taken in the 1930’s and 40’s (Brenner & Binford, 1988). Discharge values are predicted to be much higher now with less vegetation present to undergo evapotranspiration. Less vegetation and thin soils mean that water is not retained in the soils but rather empties out into steams at much faster rates (Brenner &
Binford, 1988). An assessment of the sedimentary record of human disturbance at Lake Miragoane was done in the late 1980’s and found that in the top thirty centimeters of soil, taken at several sample sites, arboreal pollen declined by more than an order of magnitude as a result of forest clearance. Below thirty centimeters, pollen levels appeared at larger and more normalized levels. In addition, erosion diluted sediment-pollen concentrations in the top thirty centimeters as more pieces of old broken rock were swept to the lake shore at higher rates (Brenner & Binford, 1988). Thus, the absence of trees caused by deforestation accelerated the down wasting of riparian soils (Brenner & Binford, 1988). When this study was taken, it was found that the average mass accumulation rate for the top 3 cm deposited was twice as high as that calculated for the underlying 3 cm interval, indicating that for the past 25 years there has been increased soil erosion (Brenner & Binford, 1988). This information indicates how direct of an impact deforestation has had on the sediment that entered Lake Miragoane, and how fast topsoil can be lost if vegetation is not there to retain it.

**Charcoal Production**

In Haiti, people need both firewood and charcoal to heat, cook, boil water, and otherwise provide for themselves. Obtaining this wood can be done from clearing areas for agricultural purposes or from general gathering endeavors (Stevenson, 1989). Both methods take their toll on the land in the form of soil erosion and soil nutrient depletion. Haitian’s cite poverty as the main reason for cutting down trees (Stevenson, 1989). For the immediate necessities of being able to provide for oneself and kin, in the form of food, heat, and money, the decision to continue cutting down trees is based on survival (Dolisca, et al, 2007).
Government lands in Haiti are very poorly managed and given focus of Haiti’s leaders (present and past) on staying in control, very little attention is given to protecting trees on government land (Wallich 1994). Private yet open access lands in Haiti are lands that have been owned by a household and subsequently passed down to generation after generation. However, the original owners of the land did not subdivide or section off their land to individual children, thus making the land and its trees a free resource among large family and neighboring denizens (Stevenson 1989, Zimmermann 1986). Even the private and restricted access lands, consisting of poor farmers who do not let other households cut trees on their property, opt to cut their trees down themselves to clear land in preparation for planting their annual crop. The income generated from growing and harvesting crops is the main farmer focus. Trees take a long time to grow and lack the ability to provide income as soon as yearly crops can (Zimmermann 1986). This is compounded by the fact that farmers, if growing trees for income, would be competing pricewise with those who have obtained their timber for free. In the 1940’s and 50’s Haitian fuelwood was cut down and gathered in the same areas that it was sold (Stevenson, 1989). Central market hubs located in Haitian cities still had a fair number of trees on their outskirts. However, as the years progressed, the distance between where trees were cut, and where firewood and charcoal were sold increased. Major hubs like Port-au-Prince soon began relying on wood from Port-de-Paix, Anse Rouge, Baie de Henne, Mole St. Nicholas, and Jean Rabel, all located on the northern peninsula of Haiti (Stevenson, 1989). Tree harvesting endeavors in the northern peninsula of Haiti became harder to sustain with lessening tree numbers, therefore Port-au-Prince was forced to also take in wood from the
southern peninsula, southeastern Haiti, and an area known as Gonaives part, which sits east of the northern peninsula (Stevenson, 1989).

The charcoal making process is one that is done by Haiti’s poorest (Stevenson, 1989). It is only when major cities like Port-au-Prince demand more charcoal (and thus are willing pay higher prices) that whole rural villages will participate in the charcoal making process (Stevenson, 1989). The work is time intensive and low paying. For working roughly 20 days a Haitian charcoal maker may only hope to receive an average of $9 (Stevenson, 1989). A single working man or woman, putting in a full day’s work, will usually gather enough wood to make 19 kilograms of charcoal. After 2-3 weeks’ worth of gathering, it will take an additional 8 days to convert all the wood into charcoal.

Wood to charcoal conversion traditionally occurs in earthen mounds (Stevenson, 1989). The wood is buried under a layer of dirt with a fire set on top of it. This layer of dirt prevents the wood from burning in its entirety and heats the wood into its charcoal state. The process of selling the charcoal usually involves three of four different sales, involving middlemen who sell charcoal created in various locations to Port-au-Prince, where the demand and price for charcoal is the highest. The first sale involving the single, poor worker, may also involve a system of advanced payment known as “pratik” (Stevenson, 1989). Pratik mainly involves poor individuals who receive payment from middlemen in advance of the wood gathering process, in exchange for a reduced price in the wood (Stevenson, 1989).

Port-au Prince receives the bulk of Haiti’s charcoal, with a population of just under one million people outside its metropolitan area. Commercial uses of charcoal can be seen when at
the various schools, restaurants, food stands, bakeries of Port-au-Prince. Residential households throughout Haiti are almost entirely charcoal dependent.

Charcoal is the primary fuel source for cooking (Stevenson, 1989). Using charcoal for heating is very seldom utilized given costs and Haiti’s tropical climate. The prices for charcoal are so affordable for wealthy and middle-class Haitians, that even with conventional cooking ovens/stoves, many will also have a stove that can use charcoal. Kerosene is a non-conventional cooking and heating fuel used by few Haitians. The Government of Haiti had opted to raise the price of kerosene to generate a small revenue from its several other uses. In Port-au-Prince, it was found that middle class and rich Haitian’s consume more charcoal per person than poor Haitians (Stevenson, 1989). Middle class Haitians are in the middle of being able to afford different fuels and still needing to utilize charcoal. Their charcoal stoves are often multiple-hearth and iron framed, in comparison to cheaper single hearth and circular sheet metal charcoal stoves used by poorer Haitians (Stevenson, 1989).

**Solutions for Stoves in Haiti**

The stoves used by most poor Haitians are inefficient and of poor quality. Many stoves are made of scrap metal and have holes and open spaces that allow more air to dissipate than needed. These inefficient cooking stoves release so much heat, that to properly cook food, Haitians may have to refill or waste extra charcoal at the end of the cooking process. This waste translates to more trees needing to be cut down to produce charcoal.

Established in 2009, D&E Green Enterprises trained unemployed Haitians how to assemble these energy efficient cook stoves, called the EcoRecho stove (Lask, 2011). This stove
is a cylinder with a heat retaining, cone-like, inner lining which allow airflow to pass by the coals through and assortment of perforations. It also contains a small door in which to control airflow into the stove. Retailing for $11 US, with an estimated life of around 12-18 months, the EcoRecho stove is a feasible way to cut down on charcoal usage (Lask, 2011). The Lawrence Berkeley National Laboratory put stoves including EcoRecho, Envirofit CH-2200, Mirak, and Prakti Rouj, against traditional Haitian stoves to test cooking efficiency. Although the EcoRecho performed better than traditional stoves in terms of fuel efficiency, Evirofit and Prakti Rouj were slightly more efficient, but were more than twice the cost of an EcoRecho. Similar findings were also made when testing boiling efficiency (Booker, 2011).

Using agriculture waste to create charcoal

Traditional methods of creating charcoal are flawed for several reasons. Conventional approaches to producing charcoal mean that trees must be cut down. In addition, the process of making charcoal can release harmful smoke and particulate matter, which can result in many health problems throughout one’s life (Manpreet, 2011).

Fuel from the Fields (FftF), a Michigan Institute of Technology, team has sought to create solutions to the health and deforestation issues surrounding the process of creating charcoal. This group developed a method of producing charcoal from unused agricultural waste products. Carbonization of agricultural waste products in this manner reduces emissions of particulate matter in the air, reducing health risks among users while still creating a fuel that does not require a change in cooking stoves, which many Haitians are unable to afford (Manpreet, 2011). Unlike traditional charcoal making methods, Fuel from the Fields technology
uses a metal kiln filled with agriculture waste, which is then sealed and ignited creating anaerobic conditions (Manpreet, 2011). The creation of charcoal occurs within two or three hours, which is faster than traditional methods of burying wood below a layer wood below earthen mounds and lighting a fire on top of said mounds, which takes between one and three weeks. The motive for this technology, is that many things that the Haitian people discard can be turned into charcoal as an alternative to trees (Toussaint, 2007). Anything composed of carbon that is deemed unfit for consumption and is otherwise thrown away, can be used. Examples can include agriculture byproducts like “bagasse” (dried sugar cane) a leftover of the sugar production process, yard waste such as palm fronds and shrubbery debris, or leftover parts of food like coconut shells and corn cobs (Manpreet, 2011, Toussaint 2007). Things that would otherwise be discarded and left to decompose can now be put to good use as efficient fuel for Haitian households.

The total price for such a kiln devise is quoted as being between twenty to forty U.S. dollars, with the bulk of this price being the purchase of an oil drum (ten to twenty U.S. dollars) which is converted into a kiln with some minor welding (Manpreet, 2011). Additional devises like a small impact press, which can convert the charcoal into manageable bricks can be obtained for around two or three U.S. dollars (Manpreet, 2011). The practicality of such a devise is very high. Although the start-up costs are high for families that survive on a few dollars a day, the pay of could be highly lucrative and worthwhile. The brickmaking process is far less time consuming, allowing one to produce larger quantities of charcoal on their own time. However the time it takes to gather such debris in comparison to gathering timber is not factored into this. Considering this information, it is possible that charcoal made from this
device could be made in surplus and then sold in markets, thus netting a small interest for its users. In addition, the use of discarded debris as fuel saves trees in Haiti from being cut down, preventing deforestation and reducing harmful erosion of the land.

**Biogas as fuel for Haiti**

While solutions like producing charcoal from agriculture waste aim to solve the problem of deforestation in Haiti, solutions like utilizing biogas as a fuel for cooking, takes aim at individuals living in the condensed cities of Haiti. Charcoal is shipped into densely populated zones like Port-au-Prince from all regions of Haiti. If a transition to a less environmentally degrading fuel was feasible, it would have to be implemented in the cities of Haiti first. Biogas is a mixture of various gasses, with its primary component being Methane (CH4) (Ariste, 2018). Biogas can be formed from the decomposition of organic materials with a scarcity of oxygen. Purifying this mixture to ninety-five percent methane, creates a natural gas (NG) (Ariste, 2018). Substituting this gas for charcoal would help reverse deforestation, but its implementation would be arduous. A facility capable of converting large quantities of organic waste into biofuel, would need to be constructed within the city it would be providing fuel too. With an average installation cost of US$ 971/ \( m^3 \) and the volume of the digester needing to be roughly 280 \( m^3 \), we can predict that the total installation cost would be around $745 million US (Ariste, 2018).

It has been estimated that eleven million tons of organic waste exists in Haiti as feedstock, household organic waste, crop residue, and farm animal dung. It is predicted that 700 million \( m^3 \) of biogas is emitted from this waste on a yearly basis. Even if only sixty percent of said waste could be feasibly be collected, that leaves 420 million \( m^3 \) of biogas that can be
collected and utilized for cooking purposes in Haiti (Ariste, 2018). Using propane as a substitute for methane/biogas, may be an option. It is known that propane costs less than charcoal when used with an appropriate cook stove. However, the cost of a propane stove is too expensive for many Haitians. A standard propane kit is estimated at $125.5 US, and although few biogas stoves exist, Ruolz Ariste estimates that they are 75% of what a propane kit costs, US $94 (Ariste, 2018). Observing that moderately affluent Haitians utilize propane more, it can be assumed that this would be the target user when it comes to utilizing biogas for cooking. Three hundred and ninety-seven thousand households, or roughly 16% of Haiti’s population could initially afford the conversion to natural gas cooking (Ariste, 2018). However, with time and proper implementation, biofuel could be a contributing factor to the reversal of deforestation in Haiti.

**Distillation of Mesquite Tree Wood**

Many issues arise when considering the costs of switching from coal to fossil fuels, and how foreign economies could affect these fuel prices in Haiti, especially fuels that must be imported. Haiti has oil reserves but is limited in its ability to extract and refine said fuel (Michel & Kendall, 2013). Because of this, implementing a different fuel, like propane, would mean that fuel would have to be imported. Importing fuel would also mean that it would be susceptible to market shifts. If the price of oil was rising in America, it would also affect the prices of various gasses in Haiti, which could render them too expensive for Haitians living on $4 US a day. Therefore, when thinking of fuels for Haiti, charcoal may need to be reconsidered, this time in a more sustainable manner.
The traditional charcoal making process involves stacking wood in a pit, then covering that pit and then setting the earth atop the pit on fire. What occurs is incomplete combustion of the wood which is wasteful and does not make economic sense because smoke escapes and part of the wood is destroyed. The smoke that the wood burns off is comprised of methyl alcohol, tar, wood vinegar (which has acetic acid, formaldehyde, ethyl-valerate, etc), and creosote (Michel & Kendall, 2013). These gases are worth more than the resulting charcoal and could be put to better use. The utilization of these gases can be done via a process known as destructive distillation or wood distillation. This process is done within a device known as a retort, which can funnel gas from pyrolysis and filter it into the heating process as fuel, thus requiring less starter wood, whilst producing more heat and creating more usable charcoal (Michel & Kendall, 2013). “Bayawon” or the mesquite tree, would be an ideal fuel source with which to produce this charcoal, due to its hardiness and ability to grow in the wilderness of Haiti. However planters would have to be mindful of their invasive nature and tendency to further erosion (Tiedemann & Klemmedson 1977). Farming mesquite trees in barren areas of Haiti would be possible due to the tree’s hardy nature (Michel & Kendall, 2013). *Prosopis juliflora*, or the mesquite tree, is an aggressive habitat invader, and can potentially out compete native trees; however, when it comes to farming trees for fuel, this trait could be an advantage (Tiedemann & Klemmedson 1977). Other positive traits of this tree are that it has edible fruit and flowers whose nectar can be used by bees to make honey.

**Reforestation Efforts and Difficulties**

The lines between humanitarian efforts and pure ecological recovery efforts, are tough to spot from a restoration lens. Because the Haitian economy is tied to trees for use as fuel, it
is very likely that remote Haitian villages will not want to cooperate with the vision and goals of many reforestation agencies without having their basic needs met (Dolisca, et al, 2007, Murray 1987). One of the first groups to acknowledge this issue was the U.S. Agency for International Development (USAID) whose financial donors were frustrated with the way tree planting was being handled in Haiti (Gibbons, 2010). In 1981 USAID brought on anthropologist Gerald Murray, who recognized that previous attempts to plant forests were doing poorly on account of the focus being on pure reforestation, and not giving Haitians trees to use for fuel (Dolisca et al 2007, Gibbons 2010). Before Gerald Murray arrived, very little was done to see how planting efforts were progressing following the dispersal of seeds to farmers. In addition, most initial donor funds went to "predatory and mistrusted state bureaucracies," as described by Murray (Gibbons, 2010). The key to fixing this issue was allowing farmers to plant the trees they wanted, allowing farmers to plant these trees on their own land, and allowing farmers to cut trees down to sell or use as fuel when need be (Bannister & Josiah 1993, Dolisca et al 2007, Murray 1987).

Giving farmers rights to the trees they planted would make planting more of them in their best interest, and given that farmers would always want to grow and benefit from more trees, some would have to be left alone in order to grow the next generation (Bannister & Nair, 2003, Dolisca, et al, 2007). USAID successfully provided fast growing, non-native trees like Neem (Azadirachta indica) and Eucalyptus (Eucalyptus obliqua) which Haitians wanted because of their rapid first year growth rate and hard wood (Gibbons, 2010). Money from tree crops outweighed the need for native trees in the farmer’s eyes. This project was deemed more
humanitarian, and only replaced the native trees that were being cut down with non-native trees, so its efforts did not align itself with traditional reforestation efforts.

The Haiti Timber Re-Introduction Project (HTRIP) began in 2006 with its founder Starry Sprenkle, a graduate student in ecology at the University of California (UC), Davis (Gibbons, 2010 (Sprenkle, 2008). Its goal was like that of the revamped USAID, in that it attempted to “improve the economic stability in the mountains by restoring their natural capital, which should be forest” (Gibbons, 2010). The HTRIP focused on the Artibonite valley and tried to provide trees that farmers would want to grow, that could also handle Haiti’s dry topsoil (Bannister & Nair, 2003). Starry Sprenkle implemented a plan that involved growing mostly native trees with a few exotic trees that provided fruit (Sprenkle, 2008). She found that when comparing Paulownia (*Paulownia tomentosa*) from China versus a variety of mahogany (*Swietenia mahagoni*) native to Haiti, Paulownia may grow fast in its initial year but does not thrive like the native mahogany tree, especially in the mountains (Gibbons, 2010). This is also important as research into how a landscape affects tree growth and soil, found that abiotic conditions (mainly relating to water availability) have strong correlations with sapling survival in this dry forest system, meaning that the native mahogany tree would have a survival advantage when it comes to coping with Haiti’s mountainous and dry terrain (Sprenkle et al, 2016).

Restoration workers in Costa Rica viewed Starry Sprenkle’s efforts to find trees that farmers would want to grow and that also maintained the functions of the original forest as much more of “a balancing act” given how people and economics factored into the restoration equation (Gibbons, 2010). However, the trees Starry Sprenkle and HTRIP provide still take five to ten years to grow and communicating with local Haitians to wait that long before collecting the
timber is something that will need continuous oversight throughout the project (Gibbons, 2010). Other projects have found similar difficulties and solutions when it comes to restoration, redirecting their focus to the people and helping address tenure and land security as well as educating farmers and townspeople in a bottom-up approach to reforestation (Sprenkle 2008, Dolisca et al 2007, Murray 1987).

The Impact of Haiti’s Government

Haiti’s government has had corruption and turmoil throughout its existence, from Jean-Bertrand Aristide, to Jocelerme Privert and Jovenel Moïse (Worker, 1994). Jovenel Moïse faced money-laundering allegations that threatened his political legitimacy from the outset of the 2017 inauguration, while men like Jean-Bertrand Aristide were literally forced to flee the country as a result of a Haitian insurgency (Dupuy 2008). The shortcomings of these “heads” of government only show a certain amount of the total government corruption in Haiti. Considered to have “no role other than as a predatory mechanism for the elite,” many government decisions are economically destructive and counterintuitive, functioning as a substitution of potentially higher profits, for the assurance that not enough money will trickle down to the lower tiers of society and help fund and upset the established power balance (Dupuy 2008, Wallich 1994). Instances exist where the Haitian army has destroyed tree seedlings simply because the restoration efforts they were being used for were allegedly unifying peasants and diminishing the army and local crime groups in terms of “manpower” (Wallich, 1994).
Much of what the Haitian government does serves to keep the wealthy Haitians wealthy, and the poor Haitians in a state of destitution. A major government reason for not importing cheap kerosene as a means of preventing deforestation was that such a transition would disrupt the profits the government was making from taking other fuels like diesel (Wallich, 1994). If Haiti imported kerosene, the fear was that some would try to use it to run their trucks or other equipment. The Haitian government has not hesitated to exploit the land in hopes of gaining profits. Government lands near Port-au-Prince served as concrete quarries that could build the mansions of the elite. However, when resulting erosion from the quarry polluted local drinking water, the creators of the quarry imported fresh water from distant rivers and sold said water to those whose water they had tainted.

Conclusion

Haiti’s political, social, and environmental past have stacked the odds against reforestation; however, there is hope in the knowledge of the past and ingenuity of future generations. For reforestation to occur, many current systems must change. Giving farmers and working-class Haitians power over their land and planting options is key. Having the rights and profits of the trees one plants and utilizes gives farmers incentives to grow more trees (in excess of what they can cut down and turn to charcoal). In addition, growing more trees regardless of purpose or intention means that more seeds can be dispersed to grow more trees. Choosing what trees to grow and how long to grow them before utilizing them as charcoal is a difficult decision. On the one hand, Haitians are dependent on getting income as soon as they can, and will want to chop down trees faster, therefore a farmer would prefer a more rapidly growing trees, which are often not native on the other hand, ecologists and reforestation
groups want to utilize trees that are native and more reminiscent of traditional Haitian forests, citing that trees like the native mahogany, do better on Haiti’s mountainous and steep terrain and are more accustomed to Haiti’s soil (Gibbons 2010). The drawback of some of the native trees, is that they take longer to grow. We need to take a middle approach and promote the planting of the fastest growing native trees, and possibly companion planting these trees with other trees that help restore Haiti’s soils and promote the reforestation process.

Prior to this however, Haiti’s political corruption would have to lessen or be mitigated. Those in power in Haiti fear to lose it and allowing the poorer among Haiti to generate more income though planting and selling their own trees and charcoal, could be perceived as a threat to current power structures. There is no simple solution to fixing Haiti’s political system. What can be addressed however, is how charcoal is grown, created, and utilized. When growing a tree to chop down, economically it makes sense to plant a tree that grows fast. Farming trees in a way that is sustainable and promotes the growth of more trees, not only benefits growers, but prevents the continued deforestation of older forests, allowing them to recover and grow back. Changing the way Haitians utilize and transform wood into charcoal more efficiently, also helps save these forests. Ingenuity in the pyrolysis process, combined with capturing escaping gasses, creates efficient charcoal and reduces waste. When utilized in cooking, opting for more efficient heat stoves, also helps save charcoal. Perhaps the most cost-effective solution, would be to turn preexisting organic farm waste (that would otherwise rot) into charcoal through another pyrolysis method. Further still, is the option to utilize other forms of fuel when beneficial to the people. Kerosene could be a benefit to Haitians when it is cheap. However, this
option does mean that money would be leaving Haiti rather than being distributed around it, like in the charcoal process.

A focus in reforestation efforts should be to educate Haitians about growing and harvesting trees in a sustainable manner. The goal should not be to force or pressure Haitians to reforest Haiti, but to instill a passion and appreciation for trees and nature that helps them see the economic advantage of reforestation efforts. Despite the obstacles that interfere with reforestation in Haiti, there is much ingenuity and passion amongst its people. If we can help provide Haiti with a means to rebuild its forests in a way that also helps benefit the common people economically, Haiti’s forests will have a chance to grow again.
References


