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Haiti, Degradation of Natural Resources

Haiti: Where in the World Would We Be Without Water?

The mountainous region in the Caribbean Sea known as the Republic of Haiti is a Central American country that borders only one other country, the Dominican Republic. (Pike, n.d.) Haiti is known for its poor economy and harsh impacts from natural disasters. As the poorest country in the western hemisphere, Haitians suffer from food insecurity and many other agricultural related issues every single day. The average farm in Haiti is 2.5 acres, and 80% of all rural farmers rarely have enough harvest to even feed their own household. These households are normally constructed with mud for the walls and leaves and grasses for the roof, with an opening for a door and no windows. Children in rural communities receive very limited education and start school later than kids in other countries, most do not even receive secondary schooling. They are expected to work in their home gardens all day long, and carry out the chores and duties the family needs to survive. (Lawless, 2018.)

The current population in Haiti is around 11 million people, with 59.79% urban and 40.21% rural. The rural areas of Haiti suffer the most from poverty, for only 8% of Haitians that live in a rural area have access to water that is clean and drinkable. Most areas have piped water systems to distribute water to the areas without access, but due to the devastating 7.0 earthquake in 2010, most of those systems have been damaged and are now inoperable. (5 Things You Need to Know, 2015.) The Haitian government has hired professional operators along with the help of The Water Project financially supporting Living Water International who makes Haiti's water availability a priority and contributes to the government's efforts to repair and maintain the damaged systems. These fixed systems provide clean water to over 100,000 people in rural areas or small towns that are prevalent to waterborne diseases. (Sentlinger, n.d.)

The areas of Haiti that do have access to water receive water contaminated with waterborne diseases like cholera. Cholera is a bacterial disease usually spread through water that causes diarrhea and dehydration. Outbreaks of cholera increase drastically after earthquakes and heavy rains, but there is nothing that can be done about it. These diseases affect the people of Haiti not only because of the contaminated water, but also because of their poor diet that weakens their immune systems' ability to fight off bacteria that enters their systems. (5 Things You Need to Know, 2015.)

Not only does this contaminated water lead to major cholera outbreaks, but it is also the leading cause of infant mortality in, not only Haiti, but the entire western hemisphere. Having clean water would provide families, communities and countries the opportunity to use their energy, knowledge and hard work to continue to grow rather than try and survive. "Access to safe and adequate sanitation services has proved to be one of the most efficient ways of improving human health. [It also] has other benefits ranging from the easily identifiable and quantifiable (cost avoided and time saved) to the more intangible and difficult-to-measure (convenience, well-being, dignity, privacy, and safety)" Read the UN World Water Development Report" (International Action, n.d.) International Action also lists four logical and

motivational reasons for why improving water quality in countries like Haiti is important: Prevent deaths, improve the quality of life for the residents, reduce suffering and empower the community.

All across the globe, people are working everyday to conserve water and find ways to purify the water they have access to. In the developing country of Morocco, they are using “Fog Catchers” to capture the moisture in the air at higher grounds. (Spinks, 2017.) The fog will hit the surface of the mesh nets and undergo condensation, where it turns to a liquid and falls into a collection tray, fast, clean and free! In Morocco while using this water retrieving method, they are collecting 6,300 liters (1,664 gallons) of water per day, per system. (Spinks, 2017.) In Haiti, the climate is mostly tropical and there are 5 mountain ranges, where the temperature is cooler at the top. (Pike, n.d.) If Haiti placed mesh nets and collection trays on their mountain edges, they would have near as much success as Morocco. Construction of these nets would not be hard labor and once they are set in place, they do not need to be moved or maintained. Labor costs for construction of the fog catchers can be eliminated by asking community members to help assuming they will be willing to support their community and contribute to the efforts of revitalizing their potable water supply as well as find new efficient ways to conserve water. The only materials needed to construct these fog catchers are mesh nets, tarps or even empty feed bags for the actual harvesting, some form of support (metal or wood beams) to hold up the nets and keep them sturdy while the condensation process is occurring and collection trays or buckets for the water to run off into from the nets for the community members to collect. The need for the funding of these structures would be minimal due to the easy construction and ability to construct these devices with reused items and have the same success rate. These items, as previously stated can be an empty feed bag instead of the called for mesh nets, it can be sticks or old pipes to hold up the nets instead of PVC which could be more expensive, and it could be readily available buckets for the collection of this water. One issue encountered would be how to ensure sanitation of the water from these structures but compared to the other accessible potable water, this is a much more sanitary and healthy solution. Results from this structure may be inconsistent because it is unsure when there will be fog, but due to the tropical, mountainous and coastal geographic location of this country, the occurrence of fog should be frequent and easy to rely on. (Fog Harvesting, n.d.). In no way would this drastically increase the countries water supply, but each community would be provided with easier access to clean and free drinking or cooking potable water everyday.

Improving water sanitation not only includes purifiers, but also educating the people of different behaviors to conserve purified water, and using the water to wash their foods to prevent the spread of diseases and bacteria. Some easy ways to clean water that is already contaminated or ensure clean water from these fog catching structures is to boil it or another simple system using only used water bottles. By taking cleaned water bottles, plastic or even glass sealable bottles and filling them with the retrieved water from these devices, community members in Haiti can leave these bottles of water out in the sun and after being exposed for at least 6 hours, the water is ready to be consumed. Depending on the turbidity of the water and amount in the bottle, some may need to sit out longer than others to ensure safety. The biggest downfall of this method is that the potable water is now warm and will be hard to cool off. Although these methods are not 100% effective, they are simple costless ways to put more effort towards having cleaner water and improving sanitation and health for individual communities in Haiti. (How Does it Work?, 2018)

Certain areas in Haiti are exceptionally susceptible to flooding after heavy rains due to the entire area

lacking roots or trees because of deforestation across the country. (Agriculture in Haiti, 2013.) Repair of the forests is the first priority in solving the issue of deforestation. Going along with the idea of community support and participation to lower the cost of carrying out new water conservation ideas, planting fruit trees would be an easy, low cost solution to the lack of trees and roots in certain areas that are prone to flooding. By replanting, specifically fruit trees that would produce food, in these places, the roots will hold the water and prevent flooding and soil erosion in these areas, strengthening the soil around it and also bringing healthy vegetation to the area.

Soil erosion is also a huge problem, and because of the uneven grounds, surface runoff and flooding breaks down and moves the soil and therefore farming in most areas is extremely difficult. Some solutions for preventing soil erosion are planting grass strips or vegetation where the root systems of the plants will hold the water and revitalize the nutrients in the soil. Also building rock barriers near areas of flooding can help redirect the water to areas it can be cleaned and used, and will help reduce the amount of soil loss in flood prone areas. This strategy is costless for they can use the rocks and boulders from the mountains and requires, once again, only labor from the members of the community. Not only do these strategies help rebuild ecosystems, keep the soil from eroding and provide a new generation of plant growth, but it also helps eliminate the opportunity for the underground aquifers to be at risk of contamination by water borne diseases.

For hundreds of years, the tropical Caribbean Island region has been controlling sediment, erosion and improving their water quality by using vegetative barriers of “Sierra” Vetiver. Vetiver is a perennial grass native to India used strategically for improving water quality, movement, and soil erosion. This has been proven the most efficient, low cost strategy and natural solution for solving multiple environmental issues in one. Vetiver roots can grow up to 15 feet deep, this depth helps hold the soil in place and the vegetative cover helps protect the underground water from contamination and movement. Having this retained water provides easier access to more abundant amounts of water in a shorter period of time. Since this plant is a perennial, once it is planted it will continue to grow back every year and is very easy to maintain. If cut, vetiver can be used as mulch for gardens, and if used in Haiti this could help farmers with producing more crops by revitalizing the soil in their gardens and fields. Vetiver also does not host or spread agronomic pests or diseases so it will not die off very quickly. If applied to Haitian communities, people could use this grass as a way to redirect water from floods, let it run through the thick grass layers to be cleaned, collect that water and use it for their own needs. This would also eliminate the soil erosion problems on farms if farmers planted thick strips of vetiver along the edges of their fields to redirect the water flow and control the sediment loss for their crops. The vetiver plant is resistant to drought, flood and fire and can adapt to most environmental changes including elevation, climate and soil fertility conditions. (U.S. Department of Agriculture [USDA], 2015). Once again, by using this method of conservation, individual communities would be improved rather than the entire country as a whole. By using this natural sediment barrier, Haitian communities would be able to improve their water sanitation, water accessibility, and protection of underground water as well as control how much soil is removed from their fields through sediment loss from soil erosion.

Some other beneficial uses for vetiver grass can be “phytoremediation and bioremediation.” (U.S. Department of Agriculture [USDA], n.d.). Vetiver grass is known for being able to break down metal particles in soil. “Vetiver grass has been shown to enhance the degradation of heavy metals such as

aluminum, cadmium, chromium, copper, lead, and nickel and polycyclic aromatic hydrocarbons in the soil. It is used for wastewater treatment and rehabilitation of old mines.” (U.S. Department of Agriculture [USDA], n.d.). Vetiver grass also has a unique perfume that is known to be used in repelling insects as well as essential oil extracted from the roots that were used in ancient India as a sign of royalty and even medications. (U.S. Department of Agriculture [USDA], 2015). These extra advantages from this plant may not relate directly to the purification or access to water, but with this, community members can not only improve water quality and control soil erosion, but also benefit in other ways from these natural control strategies.

Two of the major crops produced in Haiti are maize and rice, used as exports and food for the nation. (Haiti, n.d.) The cause of deforestation in Haiti is due to the need of wood fuels and burning the cut down wood to make charcoal for cooking. (Lawless, 2018.) While cutting down the trees may seem to be the only solution for this, it is not. The burning of maize or rice stalks provides an alternative for burning wood and also provides a way to dispose of the stalks by putting them to use somewhere else and not wasting the resources. This solution would have to be occasional for the farmers let the stalks lay in their fields to undergo a process called mineralization to maintain the nutrients in the soil so they can continue to farm.

The first step to solving any agricultural issue is identifying the level of education given to the community being affected and finding a proper way to teach those in that community new ways to conserve their resources and utilize what they have to its greatest potential. One way that agriculture education could be spread to Haiti is by implementing a program paid for by the college for college graduates who studied agriculture to travel to this country for a period of time and introduce easy, practical systems to the community that would improve their production or sanitation. This program is advantageous to all parties involved. The college or university supporting this program would benefit most through their partnership with a previously established non-profit organization dedicated to environmental health and sanitation. By pairing with an organization already travelling to this country, the college or university could share travel and human resources for the development of their program. The students involved in this outreach program, will not only have the opportunity to travel to a third world country, but grow their knowledge through teaching and doing. Often times, the best way to learn is by teaching. A participating student will have fresh knowledge, innovative ideas, and an eagerness to apply their agricultural skills to help those in need. While it is evident that the college or university and student are benefitting from this experience, the true beneficiaries are the citizens of Haiti. Not only will they be gaining basic knowledge of simple systems to help their community, but they will also be taught how to be more productive in agriculture and use their resources to increase yields and improve environmental health. With improving conditions from this productivity, citizens of Haiti would be less likely to emigrate to a developed country, leaving Haiti with young minds and a strong workforce to use these skills for generations to come.

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