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Haiti, Water Quality

Clean Drinking Water in Haiti

Clean water became a passion of mine five years ago. I did a science fair project to determine how varying water retention times in a denitrifying bioreactor impacted nitrate removal. I built a miniature scale denitrifying bioreactor, performed my tests and traveled to Coe College to analyze my water samples. When I was thinking about possible topics for my Iowa Youth Institute research paper I knew that water quality would be a great fit for me because of my past experiences. As I was looking for countries, I chose Haiti because it has very poor water quality and I have some personal connections through church and the Harvest of Hope to hopefully be able to visit someday.

Only 24% of Haitians have access to clean water. The rest of the population is drinking unfiltered water from streams, rivers, ponds, lakes, and rain water collection systems. In addition, a large part of their diet consists of seafood which comes from these contaminated water sources. As of 2016, Haiti's population was 10.85 million people. The country is about the size of Maryland and shares an island with the Dominican Republic to its east. It is a semi-presidential republic and the current president is Jovenel Moise. It is very heavily populated considering its geographical size. While there are many problems affecting Haitians and their poverty, water quality is the most important because many other problems stem from it.

Haiti has a hunger problem that arises out of its water quality challenges. Many Haitians aren't only water deprived but are malnourished and in some cases deprived of food. Even if they had enough healthy food, they would still be malnourished due to the parasites from the water living in their intestines. These parasites steal the nutrition from the digested food and make it impossible for a person to be healthy. If Haiti's water problem can't be solved, then their hunger problem won't be solved either. This is just one example of a problem stemming from the clean water crisis.

Haiti is a poverty stricken country that has been hit by many natural disasters that have continued to slow its economic progress. The most recent large natural disaster was an earthquake in 2010. It destroyed Haitians tiny houses and left many people without food, clean water, or shelter. The island used to be tree covered but in the last decade has lost most of its trees and has a dangerously low amount of tree coverage. In addition, it is a mountainous country. Its main exports are textiles and clothing but its primary crop export is rice. The annual average temperature is 82.6 degrees Fahrenheit. Haiti's natural environment can be dangerous and testing.

An average family in Haiti lives in a small hut typically made of cinder blocks, concrete, and sometimes only mud plastered over sticks. Temporary shelters consist of small tents covered in tarps. After the earthquake in 2010 much of Haiti's population was living in these shelters. To this day, eight years later, there are still Haitians living in these shelters. Several organizations,

such as the World Bank and the World Health Organization, have been involved in efforts to lift Haiti from its extreme poverty.

Most Haitians live in small shelters that only have enough room for them to sleep in. Because of this they cook, eat, and do pretty much everything else outside. When they cook it is typically done over a fire in a large pot or pan. The only sanitation of the cooking utensils is done in water from rivers, ponds or lakes. The clean water that they can get is too precious to be spent towards these things.

Several water kiosk systems have been tried in order to fix the water quality issue. A water kiosk is similar to a drinking fountain on a much larger scale. Citizens wait in a line to fill up their water containers and carry them home. The main flaw with this solution is they are always busy with long lines and in most cases the kiosks aren't open year round. This forces many Haitians to get their water from other sources such as contaminated rivers, ponds and lakes. These contaminated water sources are lined with garbage and waste on their shores. While kiosks are a temporary fix, it requires constant support from outside organizations and is not meant to last forever.

It can be very difficult to understand a problem as an outsider so I decided to seek perspective from a Haitian. Brad Kinsinger, the Director of Global Ag Learning at Hawkeye Community College, connected me with a couple he knows in Haiti. I conducted an online interview with the mother of the family, Kristie, to learn more about the water crisis in Haiti. She told me water quality is a huge issue because water borne diseases spread quickly in dirty water. Because of these diseases, the quality of life for Haitians is worse. Solving this problem could extend the average life expectancy from its current 63.1 years according to the United Nations Human Development Report. She also told me large cities and lucky rural villages have reverse osmosis water treatment facilities that are very effective. However, people still don't have safe running water in their homes with this system. In the places that do have these systems, the public must pay to get clean water.

Kristie said that in addition to money, corrupt government and lack of education play a major role in the water quality crisis. According to the 2018 Index of Economic Freedom published by Heritage.org, "[Haiti's] judicial system performs poorly due to antiquated penal and criminal procedure codes, opaque court proceedings, lack of judicial oversight, and widespread judicial corruption. There has never been a successful conviction on drug trafficking or corruption-related charges in Haitian courts." In such an environment, it is very difficult to hold anyone accountable for upholding important regulations intended to improve quality of life or protect citizens. In some cases, resources and support offered by outside donors does not effectively reach those it's intended to help.

The worst effect of the poor water quality is long term diseases citizens contract from contaminants in their water. The primary disease for adults is cholera. This disease affects many people in Haiti each year. According to the CDC there have been approximately 665,000 cases and 8,183 deaths in Haiti alone since the start of the outbreak in October of 2010. While it is mostly in adults it can occur in children as well.

The primary disease in children is diarrhea. While adults can contract diarrhea it is not usually lethal. According to the World Health Organization 842,000 people die from diarrhea each year

worldwide. It is not just a problem for Haiti but also for many third world countries where safe water is hard to access. If a solution is found to this problem, it would be able to save lives in many more countries than just Haiti. This is incentive for multiple countries worldwide to work together in the search for feasible solutions.

Proposed solutions range from biological prevention systems for waste in water to large water filtration centers to small modular filters that would be handed out to individual households. Many believe the filth in the water and the root cause of the water crisis originates from farmland and livestock. They believe the biological waste from animals that is spread on the crops is reaching the water sources and contaminating them. This definitely does reach the water sources but I don't believe it is the root cause for the issue. The amount of waste needed to make the water as bad as it is in Haiti is large. While animal feces isn't good for water quality, human feces contains chemicals that are much worse. People in Haiti haven't been educated on how to properly dispose of their waste and so they dump it in their water sources. If Haitians were educated on this matter, then over time the filthy water would fade away. In that long period, many lives would be lost which is why we need a temporary solution to help save lives today.

Many water filtration systems used in the United States could be used in Haiti as well. Solutions to stop the waste from reaching water sources include wetlands and waterways. A wetland is formed by taking an area at the bottom of a watershed where water collects, and forcing water to pass through heavy vegetation and filters. It is an effective way of filtering farm water and also is great for retaining water during heavy rains thereby reducing soil erosion. As water passes through a wetland, the thick vegetation acts like a natural strainer, filtering out undesirable contents such as sediment, fecal matter, chemicals and biohazards. Waterways are grass strips running through farm land that filter water by passing it through vegetation. Their main purpose, however, is to slow water runoff and prevent erosion of precious topsoil. If storm water retention time can be increased and waterways are used to protect the land, this can help improve the growth of more plant matter in the natural landscape, and the resulting reduction in soil erosion will even further improve water quality. Both of these techniques are common and successful in the United States.

Large water filtration systems that are central in the community and feed it with clean water are a possible solution. They have been proposed to use in Haiti but would be expensive. These systems are similar to what we have in the United States where there is one filtration center that feeds water to the other buildings that have running water. While these systems have been used, they are expensive so they are only used in a couple large cities that had the funds available. These systems are large, expensive, difficult to build, and not very feasible to install in most of Haiti.

Small modular options can be easily passed out to Haitians and are inexpensive. There are several different types of devices that can filter water on a small scale. One example is the water straw which is basically a straw that can be stuck into a water source and sucked to filter the water as it goes into the user's mouth. They are cheap and easy to use but would be expensive to hand out on a large scale such as all of Haiti. Other models are water bottles that you fill up and let sit for several minutes to filter. Most of these models are solar powered so they use renewable energy and last a long time. Some of these portable devices have already been passed out but the filters on them do not last long and are hard to find (Kristie).

While the biological filters can keep many contaminants out of the water, it is more of a long-term solution and will not have many short-term effects. Large filtration centers aren't feasible for Haiti right now but they may be in the future when there is new technology that is less expensive and easier to install. For a short-term solution, small modular systems can be handed out to Haitians. In addition, replacement filters will need to be readily accessible.

Filters are just as important as the actual device because while the device may last a long time, the filters do not. If the filters aren't made easily accessible then all of the money spent will be a waste. Haitians will depend on the filters and will have to get them a couple times a year. When Haitians go to get their filters, it creates an opportunity for education. They could be required to take a short course to receive their filter. It is comparable to driver's education in the United States. People need their license but they don't want to go through the educational process. The government requires US Citizens to go through it anyway because it helps keep them safe. Haitians will need filters and so they will go through whatever they need to go through in order to get them.

There is not one single solution out of these listed possibilities but rather a combination. I would like to focus on what can be implemented immediately while solutions to larger and more expensive options continue to be improved. Lives are being lost today and we need to do a better job of implementing our current known solutions. I believe we need to do a better job of distributing small modular solutions, educate Haitians on water quality and improve organizational collaboration on the issue. As soon as these devices are passed out to the population, they will start saving lives right away. While these devices aren't necessarily sustainable for a long period of time, they can help for the time being.

One possible way to distribute the small modular systems would be handing them out to students. Not all Haitian children are going to school. Their parents decide that it is too expensive and not worth all the time. They may think that they need their children for their labor at home. Families and parents may be more motivated to send their children to school if they get water filtration systems. Families will have access to the physical materials they need without having to go out of their way to get them.

Access to any education has been difficult for Haitians, especially in rural areas, but has been improving since the World Bank implemented the Education for All Project for Haiti after the 2010 earthquake. Tuition, school lunch, and teaching materials all contribute to making education for Haitians difficult. Students could be given the small modular systems and educated on safe water practices. In turn they could then educate their parents and families on safe water practices that they learned at school.

At the moment there aren't any permanent solutions to the water quality issue that are feasible. Over time scientist and inventors will come up with high quality, cheap, and simple water treatment systems. These systems will have the capacity to lift Haitians from their water crisis once and for all. Until that time arrives, small modular water treatment devices are the most feasible to save lives today and buy Haitians more time.

There are many charities providing financial and human resources to help solve these issues. If these charities can collaborate to focus their efforts toward a common goal then they will be much more successful. They will need to be strategic about how these solutions are implemented and follow up with the families to get feedback. The feedback should be used to make changes to

the model to improve its effectiveness. It would also be beneficial for the strategies to include a component on educating the public on water quality. If all this is accomplished then Haiti could be lifted from its poor water quality and, in time, its poverty as well.

In my research I ran across an old Haitian Proverb I felt applied to this problem.

“Little by little the bird makes his nest.” Haitian Proverb

The world is making progress on solving water quality issues. The problem is so varied and large it can be overwhelming and the solutions frustratingly slow. However, each little step towards a new solution or distribution of a solution is building a nest to keep water clean!

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