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Water and Sanitation in Ethiopia

People take the flush of a toilet and fresh tap water for granted. However, many people around the world do not have access to these basic resources. With a population of 116,823,237 as of February 15 and continually growing, Ethiopia is facing a major crisis (Ethiopia Population). With access to clean, fresh water depleting, Ethiopia has to find a solution soon (Water in Crisis). Because of a relatively dry climate and a growing population, their problem is getting even worse (Water in Crisis). Water filters would give Ethiopians a way to access clean drinking water, and composting toilets would keep fecal matter out of waterways. Integrating personal use water filters, large water filtering systems, and composting toilets would be a short-term solution to this growing problem.

Ethiopia has a dry climate and strong trade. The country is landlocked on the horn of Africa and is surrounded by six countries: Eritrea, Djibouti, Somalia, Kenya, South Sudan, and Sudan (Ethiopia). Ethiopia has a population of 116,823,237 as of February 15, 78.78 percent of it being rural (Ethiopia - Rural Population). This leaves about 21.22 percent of the Ethiopian population being urban (Ethiopia - Urban Population; Ethiopia Population). A federal republic government runs the country, a federal republic has an executive, judicial, and legislative branch (Ethiopia: Government). Ethiopia has many things to offer and trades products such as coffee, spices, and oil (Ethiopia: Economy). The top three purchasing countries are the United States, India, and China of these products (Ethiopia: Economy). Because of the trade demand in spices, coffee, and other agricultural products, agriculture is Ethiopia's largest employer with 65.2 percent of the population working in ag (Ethiopia: Economy).

The climate in Ethiopia is relatively diverse. In the west they have a tropical savanna climate, and in the east they have a warm desert climate (What Is the Weather). The center of Ethiopia is home to a region of volcanic rock; all around this rocky terrain is a hot, arid desert (What Is the Weather). There is not much rain in a desert climate, causing waterways to dry up or become very shallow (Water in Crisis). This diverse climate causes some parts of the country to receive plenty of water, while other, less fortunate parts receive little amount of rainfall. This causes certain places in Ethiopia to suffer greatly while others do not even realize there is a problem. With a rising population and little rainfall in parts of the country, the water crisis will continue.

Ethiopia is in a water crisis at the moment. The rising population is putting stress on all the natural water resources that Ethiopia has (Water: Ethiopia). Most of the water being used is not even being used for the people; 93% of Ethiopia's water goes directly to agriculture (Water: Ethiopia). It is understandable that so much water is being used in agriculture because it is at the top of Ethiopia's trade, but their citizens are being neglected. Rural populations are being hit the worst; all of their water comes from local lakes and rivers, giving them an unsafe drinking,

bathing, and bathroom water source (Water in Crisis). These waterways are often contaminated with harmful bacteria and fecal matter due to the lack of bathrooms with running water (Water in Crisis). This is not safe for anyone to be drinking or bathing in. Urban populations oftentimes have clean water, if not clean, running water (Water in Crisis). Many in these urban villages do not even know about the poor conditions the rural villagers deal with (Water in Crisis). People both residing in the country, and out of the country, need to recognize that there is a problem in Ethiopia, and soon.

Women and children take on the role of retrieving water every day for the household. Oftentimes children are forced to drop out of school in order to get water for their families (Water in Crisis). Girls are often the first ones to take on this duty when they are young (Water in Crisis). It is often important to Ethiopian families that the boys get an education, leaving the girls without one (Water in Crisis). Only 45% of Ethiopians go to primary school; if young girls were able to stay in school instead of retrieving water, the Ethiopian population would greatly benefit from more citizens having an education (Water in Crisis). The long term goal is to get clean, running water all over the country so children can stay in school and women can earn an income, but for right now there are three short-term solutions that should keep fecal matter out of the waterways and supply clean water to all. The short term solutions will not get these children in school and these women working, but they will greatly improve the living and health conditions for the residents of Ethiopia.

One way people could help ease the crisis in Ethiopia is supplying personal use filters. A personal use filter is considered to be a small water filter that would be used to filter out parasites and bacteria (“How Our Products Work”). Lifestraws are a very popular tool among campers and travelers because of the fact that they guarantee safe drinking water when drinking out of dirty waterways such as lakes and rivers (“How Our Products Work”). LifeStraw uses a special technology called a membrane microfilter (“How Our Products Work”). “These membranes are made of small straws that contain microscopic pores of 0.2 microns in diameter. Dirty water enters one side of the straws and clean water passes through the pores” (“How Our Products Work”). LifeStraw also uses activated carbon to filter out any chemicals that may be in the water (“How Our Products Work”). These filters are not meant as a long term solution; in fact, it is hoped that these filters are used for a very short period of time. A big con of these filters are the fact that they do have a short lifespan. The company Lifestraw suggests that the straw be replaced every two months (“How Our Products Work”). This does create a lot of waste over time. Again this is a short term solution. These filters will buy time for people to figure out how to most effectively get clean, safe, running water to everyone who needs it.

Currently, the company Lifestraw has a program that donates one of their products to struggling families in Kenya (“Giving Back”). Currently, this program is not being used in any other country, but if one similar to it got started, families would not have to be as worried about getting sick from their drinking water (“Giving Back”). A drawback with the straw is that families would still need to walk long distances to access the water they need and lifestraw need to be replaced so often. This does not solve the problem of children being pulled from school to walk and get water. While children will still be losing an education, they will not be getting sick from the

water that they are retrieving. Again, this is by no means meant to be used as a long-term solution, but a way to better the citizens quality of life while waiting for long term change.

A more expensive, but more effective solution is installing large water filtration systems. A Berkey, which is a larger water filter than a life straw, can store and filter water at the same time (Berkey Water Filter Systems). Many off grid homes use this as a primary water filtering system because it can filter, and hold, large amounts of water (Berkey Water Filter Systems). Berkey offers seven different size and package options (Berkey Water Filter Systems). The Crown Berkey would be one of the best options to integrate into Ethiopia because of its large size (Berkey Water Filter Systems). Filtering twenty six gallons of water an hour, and being able to hold six, the Crown is a great option for families (Berkey Water Filter Systems). The downside to the Berkey is that they cost three to four hundred dollars a unit without the filter cartridge replacements; this is very expensive to get started with (Berkey Water Filter Systems). The Berkey cartridge has to be replaced every two to five years, this will be an ongoing expense for families (Berkey Water Filter Systems). An upside is that it would produce much less waste than the Lifestraw. The Berkey also has a lifetime warranty; this means if anything on the filtration system ever breaks or malfunctions, Berkey will replace it. This is important because this will be the main water filtration source for many families.

A solution to the financial problem that comes with maintaining a Berkey is giving it to neighborhoods instead of individual families. For larger neighborhoods, who have more residents, may receive multiple systems, this way there would not be much of a wait to filter, and many families could filter at the same time. The water filters would be kept in a small shelter-like area in the central part of the neighborhood. When the water replacement cartridges expire the neighborhood would be able to all donate money to purchase a new one, this prevents individual families from paying such a large sum of money at one time. When a family would want to go filter their water, they would bring their water to the shelter, pour it into the Berkey, and wait for it to be filtered. This is not meant to be a solution to solve this problem forever, this is only meant to improve the living conditions for Ethiopian families living through this water crisis.

Another immediate, partial solution to Ethiopia's sanitation crisis is to supply households with composting toilets. Currently, human waste is unintentionally being put into waterways. Human waste can get washed off onto the waterways by rain when it is not properly disposed of. Human waste is being put unintentionally into the waterways, contaminating peoples' drinking and cooking water. "During the rainy season, this fecal material is washed into the various water-trapping gullies. In the evening, children play in this water laced with fecal material. This directly exposes these children to typhoid and cholera" ("2 Million Ugandans Have No Toilet Facilities"). This puts children who play in the local streams, rivers, lakes, and ponds at risk. They can easily get sick if they happen to encounter the harmful bacteria from the waste. Not only can this bacteria harm playing children but it can also affect anyone who drinks or bathes with the water that has come in contact with the waste. A toilet can be used to keep the bacteria contained and out of many local waterways. The difference between a composting and regular toilet is that a composting toilet does not require any water, while a traditional toilet does. When using a composting toilet, all pathogens and viruses are eliminated by the bacteria breaking down the waste ("How Do Composting Toilets Work"). Many Ethiopians have their own gardens or

fields, so they would be able to use this compost on their crops. One of the only downsides to composting toilets is that most commercial toilets are quite expensive (Amazon). Commercial composting toilets range from 600 to 900 US dollars (Amazon). Ethiopian families that are in need of toilets will not be able to afford these commercial composting toilets. Luckily, composting toilets are not hard to make as long as an individual has the right supplies. Making one of these toilets can be as simple as using just a bucket, toilet seat, and some dry leaves, sawdust, or wood shavings (Poindexter). Human waste is 90% water; in a composting toilet, that water evaporates, and the organic material will eventually break down over time and become safe to use as fertilizer (“How Do Composting Toilets Work”). When using a composting toilet, the user will go to the restroom on the toilet and after cover the waste with the leaves, sawdust, or other dry, organic material. Yes, this may not be the most glorious or ideal situation, but this keeps human waste out of waterways and greatly minimizes the risk of waterborne illness. Another con of having one of these toilets is the odor that it may produce. Two solutions to this problem would be keeping the toilet outside in an outhouse type of building or using some plastic tubing to make a vent outside. Regardless, there will be an unpleasant smell somewhere, whether that be inside or outside of the living quarters. Again, these toilets are not meant to be long-term solutions. These would be used in rural areas where they have no running water at all and no safe way to dispose of human waste. The overall end goal is to have a plumbed bathroom of some sort. This just simply allows some time to get there. These toilets will be an improvement over not having a toilet at all.

One way that these projects could be funded is by hiring an administrator with job experience in grant writing. To make this a sustainable project, crowd funding would cover the administrator’s first two years of salaries and money for an office and office supplies. Crowdfunding is receiving small amounts of money from people who donate money to the cause. This means it would cost nothing out of pocket to start up this project. The grant writer's job would be to apply to government funded grants and corporate investors to receive money to purchase the personal water filters and the supplies to build the composting toilets. The grant writer should be self-sufficient, and with some luck, over time we could build a team of writers. When done correctly, grant writers can pay for both their own salaries and for the cause that they are applying to grants for, making this project self-sufficient.

Over time the grant writer should also be able to pay for another office type position. In the beginning there would not be a need for this job, but as time goes on, and problems may arise, there would need to be someone to help sort through the issues. This person would also be able to assist the grant writer when needed doing things such as proof reading future grant applications, maintaining the office, and answering any calls that may come in. Again this position can wait to be implemented later so it would not apply to the initial start up cost for the grant writer.

Overall, Ethiopia is lacking the infrastructure and resources in the water and sanitation industry. The personal use filters and composting toilets are short-term solutions. These short-term solutions would buy time for the big overall solution of supplying every Ethiopian with safe, running water and proper sanitation. We do not know how long that long term solution will take.

However, in the meantime citizens will have access to safe drinking water and a proper restroom until more, better, permanent solutions can be put into place.

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