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### **Kenya: Distillation of saltwater to end water scarcity issues.**

Jambo; in Kenya's native language Swahili that means hello. Kenya is a country with vast wildlife and the second highest peak in Africa, Mount Kenya. Kenya also has beautiful white sand beaches along its more than 500 kilometer coastline, which includes trees, blue seas and resorts with cool Martinis. Some of the main natural resources that can be found are limestone, soda ash, salt, gemstones, fluorspar, zinc, diatomite, gypsum, wildlife, and hydropower. Kenya has a total of 582,650 square Kilometers and 13,400 sq km of that land is water.

Kenya is inhabited by approximately 36.6 million people whose water supply is frighteningly scarce. Only 6 percent of the people have access to improved drinking water (CMF International). Many women and children spend their days walking miles to find water to support their families for that one day. Most of these children don't get the joy of attending school because they spend their day in such a way as searching for water. Even the water these women and children eventually find is very unsanitary and is only about 5 gallons that must be used for cleaning, bathing, cooking, and drinking. The containers used to collect the water are almost always second-hand objects, previously used for oil, fertilizers or wastes. This causes millions of people; a majority of them children to die every year from water-borne diseases (interview:Donoho).

When about the passion behind this topic: a picture of Fredrick is what is presented to them. Fredrick is a five-year-old boy who loves going to school, drawing and playing with tractors, he lives in Kenya and he is my sponsor child. Each month a donation is sent to make sure that he and his family have clean water and food on their table (compassion). "The families in Kenya never complain about the hardships they have. They are just happy to be alive and have their family and friends. They often go to bed hungry, thirsty, and dirty, but they don't seem to mind and keep hope that they will some day never have to worry about what they will be eating or drinking the next day." (Lanny Donoho)

The water collected is often found from a swallow well; which is a shallow hole that contains water, or surface sources (Water.org). It's often very contaminated with many different pathogens such as e-coli and Typhoid which cause water-borne diseases. A major water-borne illness that has recently struck Kenya is Cholera. Cholera is a severe infection which affects the small intestine. The symptoms include profuse watery diarrhea and vomiting. The severity of the diarrhea along with the vomiting can lead to rapid dehydration and loss of electrolytes, which can lead to death if left untreated. This is only one of thousands of water-borne diseases which can be contracted from the daily consumption of infected water. Water-borne diseases are the main killer in children today in Kenya killing 1.5 million children a year (Global perspectives). Children have been

seen trying to collect water from a leaking sewage, not knowing the dangers of it (News From Kenya). The children live day-to-day being thirsty because that's all they know. They just know that if they see some kind of water it can be drunk to satisfy their thirst. If this problem can be solved or even teach them a little about water safety it could cut down on the death rates significantly.

The water that is used for drinking is a very murky brown color (Big Stuf Church Camp). When it is put in a bottle you can see the dirt settle to the bottom. The people of Kenya drink this kind of water everyday and are happy with what they get. Even if they know it may make them sick they are just happy to have something to drink and cook food with for that day.

The people of Kenya are always very happy. Even though they don't have the luxuries as we do they still stay strong in their faith and enjoy their life as if nothing were wrong. The job of gathering water is often a child's job or a woman's. They often have to walk up to ten miles in one direction just to find water. They collect the water in containers that are often very heavy. This was learned from experience. Attending a church camp every year and being chosen to carry a container of water into a session one night. Only having to carry it about 200 meters to the stage was a challenge on account it was so heavy. Children as young as 5 and women as old as 80 have to carry these buckets up to 10 miles every day, when an active 17 year old could barely carry it for 200 meters on level ground.

A real life example is a 50 year old woman, Mary Kamau who wakes up at five o'clock in the morning with her three daughters to find water for the day. They have to travel five kilometers to the Sisiani River where the water is severely contaminated. They say it may be early but they want to get there early because if they get there too late there will be a long wait and the water will be even more dirty from all the people stirring up contaminants during their water gathering.. The amount that they do get is still not enough for the whole family (News From Kenya).

An exchange student at Switzerland County High School once said, "You live the American Dream and you don't even know it." This statement is very true. As Americans today we do not realize all the luxuries we have. We have all the basic needs to get us through our day, and when something does not go our way we complain. Many people in the world would be happy just to get one glass of clean water to drink. When we daily pour a glass down the drain because we don't want the rest. While those in America are worried about the rising gas prices the people in poor countries are worried about how they are going to get water.

A large factor that is causing the water scarcity is water irrigation. In northern Kenya water irrigation is being used to grow crops. A lot of the water used for this is wasted. It is understandable that water is needed for crops. The water irrigation systems are drying up lakes and even rivers. Along with that another problem is climate change. Most of Kenya is desert so there for it does not rain often. Without rain it is near impossible to keep a lake or river filled with water. The climate change has made it even worse. It

didn't rain much before but now in the past few years it has become even hotter and dryer which makes it even harder to find water.

Experts predict that the biggest challenge in the coming years for a majority of the world's people will be the ability to access clean, healthy and safe water. The rate of population increase in Kenya is 2.779% (Nation-by-Nation). Hospitals in Kenya are begging to worry because they are not able to give clean and safe drinking water to their patients. Many of the hospitals don't even have water plumbing leading to them. With out water and plumbing in a hospital it's almost impossible to treat people.

The lack of water in Kenya can cause many different issues. Water is a basic need for life. Water is not only used for drinking and cooking, it is also needed to grow crops. With out water those in Kenya can't grow crops; therefore they do not have a lot of food to eat. The water collected every day is not enough to take care of the families needs let alone have enough to water crops, because of this Kenya is not vast in growing crops. With-out water it's almost impossible to live, as many Kenyans exemplify everyday.

The limited access to water in Kenya has an effect on all the people of Kenya. Kids often don't attend school because they spend there day searching for water. The kids that do get the chance to attend school love it. The little boy Fredrick gets the joy of attending school because he is sponsored so his family has access to water. The water scarcity effect not only the health of the young people of Kenya but their chance of learning as well..

Water is a natural resource that once it's used up it's gone. Many people use irrigation to get water to their crops which takes away from the limited lakes and rivers. It's very possible to build wells which can provide clean and safe water to thousands of people all over Kenya. The thing is the earth's water is made up of 97% of salt water. The question is why can't we come up with some kind of system to turn salt water into fresh water?

Distillation is the answer. This is a process of boiling saltwater and collecting the condensation off of it which is fresh water. This is the earliest form of water treatment (USGS). It can simply be done by just sticking a cup in a boiling pot of seawater and putting a lid over the pot and the freshwater will be caught in the cup. There are plants that distil water but it's a very expensive process. The hope of this is that it can become cheaper by coming up with a way to make a product that can distal water in villages all over Kenya.

The idea is to have one distillation processing plant in every village in Kenya. This product would boil the saltwater and put out the fresh water into a well so that the villager can then get the fresh water and take it back to their families. This would produce fresh clean water from a resource that we have so much of. Being close to the ocean this would be the perfect idea to develop. This item could change the life of so many in Kenya. It would cut back on the worries of those parents that worry every day about their children's health. The children would no longer have to go search for water

everyday and be able to attend school instead. People would be able to grow their own crops for food because they will be able to water them.

Americans live day to day not having to worry about a loved one dying from drinking unhealthy water. In America all we have to do is walk down the hall and turn on the sink to get our water instead of having to walk up to 5 kilometers to get just 5 gallons for your whole family. This project will give those new chances to do things that they were never able to do before. They will be able to take baths and even cook. So many go with our water everyday and with this project it could help so many that need it.

Distillation can be an expensive process. Distiller can run anywhere from \$200 to \$1500 (NDSU). The funding for this process could be done by raising awareness about this serious issue. By doing this people would see that there are people not as fortunate as they are. At that point fundraisers can be developed to raise enough money to have distillers in all the villages in Kenya.

This project could give the people of Kenya a chance at a new life. Water is life and it's needed for survival. Without water life would not go on. The earth is only made up of one percent fresh water. This is why the saltwater would be a good transition to freshwater. Starting in Kenya would be a great step. Many people die every year from water born-diseases. This is a very sad thought when it can so easily be fixed by just getting fresh water to those who need it. Water that is collected from streams, lakes, and rivers is extremely contaminated by bacteria, which causes these water-born diseases such as Cholera which can often result into death if left untreated for a long period of time.

Fredrick who loves his tractors and attending school in Kenya would love to be able to grow up and graduate high school without the worry of getting sick from drinking water that is full of bacteria. He would love to know that his family and friends are all safe and happy and that they have water to drink and cook with that day. He always lets us know that he is praying for us and that he loves us. He is a very unselfish kid for this when he is the one living the hard life. He never complains about anything at all. He is just happy that he is alive and has family and friends and has the chance to go to school everyday and learn. This just goes to show you that these people are happy and have hope that one day they will be able to walk out their back door and have fresh and clean water to drink.

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