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Jamaica, Water, and Sanitation

Jamaica: Water Quality in rural Jamaica

Historically, it has been a challenge to provide high-quality water for citizens in third world countries. Often, this is because third world countries are impoverished and do not have the resources needed to drill wells and maintain water treatment systems for their entire population. In Jamaica, the rural towns do not have running water. The citizens have to walk every day to a river or stream if they want water and the water in those places might look clean but in reality, the water carries many diseases. The population in Jamaica is 2,940,036. 44.62% of the population in Jamaica lives in rural communities, 55.03% of the population is urban. 30% of the people that live in rural areas live in poverty.

On August 6, 1992, Jamaica gained Independence from England, before August 6th Jamaica was a commonwealth of England. Jamaica's Government is made up of a democratic system set up on the English parliamentary system. Andrew Holness is there newest voted Prime Minister since 2016. The Jamaican government is set up very similar to The United States of America's government as they have a two-party system. If you are 18 and are a Jamaican citizen, you can vote because they have universal suffrage voting.

Jamaica's land size is 4,244 square miles, 43% of Jamaica's land is cultivated. The average farm size in Jamaica is around three hectares, around seven acres for Americans. Jamaica's climate is typically warm. It is very tropical, the temperature is usually 22 degrees Celsius to 31 degrees Celsius. Jamaica is mountainous and tropical, with palm trees and flowers everywhere. Jamaica is also surrounded by the Caribbean Sea with very beautiful coral reef. Major exports in Jamaica include mineral fuels, various types of nuts, fruits, vegetables, coffees, teas, spices, and inorganic chemicals.

The typical family size in Jamaica is three to four people in one house. Rural houses are typically made with wood for walls and roofed with zinc or sheeting. Urban housing is typically made with concrete block walls and steel roofing. A typical Jamaican families' meal would be served with saltfish, ackee fruit, and boiled rice. Saltfish is dried and salted cod. Usually, families shop at local farmer's markets or local markets. Ackee fruit can be found at local markets in Jamaica as well. Rural families usually have one sink and one stove to cook with, in their house.

A typical job in Jamaica is an assistant, an accountant, or working at customer service. A lot of people also work for tourist companies or work in sales. Minimum wage in Jamaica converted to United States Dollars (USD) is 1.34 per hour, averaging about 54 dollars a week. The average salary per year is 13,000 dollars.

In Jamaica schooling is offered from ages six to seventeen. Primary school or elementary are ages six to twelve and is free. They learn basic reading and writing skills, as well as basic vocabulary. They also provide secondary school or high school for teens aged twelve to seventeen. Secondary school is not free, but it is not required to be taken. Because of the cost, a lot of unprivileged kids do not get to go to secondary school. The secondary school has more advanced mathematics and literature. Secondary schools typically still use the England grammar school model. Primary and secondary schools in Jamaica are either state-owned or private preparatory schools. Schools are also separated by sex or are they are mixed ethnicities.

In urban areas of Jamaica they have running water in their home because they can afford it. The water availability is a lot better because they do things like limit the amount of water you can have a day to conserve by using distribution systems to help manage that. They use a Mona reservoir to hold, store, and pump out the water to urban areas. (Water Quality in Jamaica, 2016) Mona reservoirs are dammed off ponds with clean drinking water in it, that only natural substances get into unlike all the rivers and streams in the public. Urban areas are able to do that because the government helps out with money, but the government is still struggling to provide fresh water to its citizens. On the other hand, rural areas are struggling each and every day to get fresh water and most of the time they can't get any, the government also isn't helping get fresh water to rural areas.

In Jamaica, almost all rural residents lack running water to their homes, 20% don't even have flushing toilets. To get the water they need for daily use, Jamaicans have to go to a fresh water station or get water from a stream or river. Freshwater stations cost money and usually, the families can't afford it. Getting water from streams and rivers are very unsanitary. The water from streams is being contaminated by agricultural and urban runoff, and sewage effluent. (Jamaica National Report, 2001) The water might look clear but really isn't, the water has a bunch of bacteria in it. In order for it to be bacteria-free, they would have to boil it but they cannot do that because rural families don't have enough money to pay for electricity to boil water. They would have to gather firewood to boil the water. Another unique way some families get water is catching the water that comes off their roofs (Water Resources of Jamaica, 2015). It drains into buckets and they use that water to bathe themselves.

Freshwater quality is improving in rural communities but citizens still can't afford it. They are building freshwater stations to clean the water but it cost a lot of money just for a little amount of water and requires a long walk to. What doesn't help is the minimum wage is not getting any higher and the number of unemployed citizens in Jamaica is increasing every day, which makes paying for clean water challenging in Jamaica. Men, women, and children are all affected each and every day. They are all drinking non filtered water filled with diseases.

Poor water quality affects the environment also, when sewage or oil get into the water it affects the wildlife. When animals like fish, sharks, or any other sea creatures breath in, the water pollution gets inside of their organs and could possibly kill them or hurt them. Animals on land also can be affected by drinking polluted water and the oils and sewage waste could also get into their organs and damage them. The water is being polluted by farming chemicals that run off and drain in the water. Another pollution problem is waste from humans, because they don't have toilets with pipes in there houses they go to the restroom in the trees and this waste just drains into the same bodies of water they drink out of.

There are a couple of possible solutions to these water quality problems. One solution is having nonprofit organizations go to Jamaica and drill holes for wells. Nonprofit organizations are often able to go to 3rd world countries and some do a great job fundraising from doing charity events and from raising money at fundraisers. Nonprofit organizations are run by volunteers, they devote their time to help third world countries. These organizations could drill wells for rural communities in Jamaica. A nonprofit organization that could help raise money for drilling wells could be, Solar Impulse Fondation.

Building more water treatment plants is another way to get the citizens fresh clean water (Solutions to Water Pollution, n.d.). These stations filter out the bacteria and waste from the water. Citizens can take jugs and buckets to fill full of water and take back to their dwellings. These stations are always open for citizen use. Some downfalls of these systems are you have to keep them up and running they take maintenance to run. An additional pitfall of the current system is that people have to carry these jugs sometimes very long distances. Ideally, water would be piped to citizen's homes. In addition to providing clean drinking water, it would also provide water for toilets and bathing in homes.

According to the Jamaican Observer, (2014), 25% of Jamaicans do not have access to piped water. An ideal solution for piping fresh drinking water to rural communities would be to use PEX tubing. PEX tubing is flexible yet durable and is currently being used extensively in the United States. As a matter of fact, the city of Des Moines allows PEX tubing to be used quite extensively when carrying water from the water main into the house. Based on this fact, it appears reasonable that heavier gauge PEX tubing with reinforced thick wall lining could be used to carry fresh water from the source to rural houses (Des Moines Water Works, n.d.). PEX tubing would prevent leakages from happening which is important because currently more than half of the water meant for drinking seeps out of leaky pipes, some of which were built in the late 1800's (Kebede, Rebekah, 2015).

Organizations could teach people from the community how to run and maintain water treatment plants which pipe water to homes. This would provide jobs and would keep the system up and running. Usually, water treatment stations require a fee for citizens to get water. Money may be better spent if piping were also included. Funding this option may be expensive, but a way to fix that could be having nonprofit organizations join with private companies and the government to fund these stations in a cooperative style setup.

Water quality has also been greatly affected by climate change, this coupled with the effects of El Niño cause Caribbean areas to become warmer, drier and experience below average rainfall. This not only affects the citizens but also their livelihood if it depends on farming as a source of income. Below we will explore a process called desalination to make what water is available safe to consume for residents and tourists in Jamaica.

Desalination systems are another possible option to use in Jamaica considering they are surrounded by the ocean and salt water. Desalination systems filter out the salt from seawater to turn it into clean drinking water. The desalination system heats the water to a boil which evaporates the water and the salt doesn't evaporate with the water. Which causes the water and salt to separate.

There are different types of desalination systems and the type we would use would be a pervaporation desalination system. This system would cost less and be more energy efficient because this system doesn't have to push the water through different filters which cost lots of money. This system would just heat the water to a boil which cause the water to evaporate and kill all the bacteria living in the water.

A downfall of desalination systems are they cost a lot to start up. The upfront cost of a small desalination system is extremely expensive. As a matter of fact, a desalination system is being put into place near San Diego, California and it is estimated to cost 1 billion dollars to desalinate enough water for 7% of the population. If the government were to get behind something of this magnitude these systems could be paid for, but again, it is very expensive and unlikely the Jamaican government would support this because of the price tag. Another way to decrease those prices is to use different materials. Today they are inventing other materials to use so the cost can be brought down, researchers have been considering using graphing lining for the desalination system because it is cheaper and will last longer. In the long run, the desalination system would pay for itself because it will give citizens fresh drinking water. This would help keep citizens healthy and live longer lives.

Another excellent solution which I would recommend is drilling wells. I think drilling wells would be more effective because wells can be in the middle of a rural community and if the wells are deep enough, water can also be piped from them to local houses in a village. They also are not as expensive to maintain or construct. My plan of action would be to find a nonprofit organization that could help fund it and build

it. They would need to dig at least a 300-foot deep well because for a well to have safe water it has to be 300 feet deep. Nonprofit organizations would run this project for fresh water.

These above solutions would provide all the water needs for Jamaican citizens. These three solutions will provide fresh filtered water and in the case of a water treatment plant and wells, provide piping to homes, and running water for toilets and bathing. The water quality would be much better and Jamaica would not have 2 million people die each year from contaminated water.

Fundraisers conducted by nonprofits every year including social media awareness campaigns and donations from individuals, would be an idea to help pay for maintenance and for building more wells or even upgrading to better systems like treatment plants or desalination systems. For this to work the Government might have to give incentives to companies to come out and build these systems or, to work collaboratively with nonprofit organizations and the local community. Incentives like tax abatements, tax credits, or incentives for rural water cooperatives where community members and the government pay for these systems would work. This would also be funded by foreign aid because right now in Jamaica money is already scarce. The United States of America could use a portion of foreign aid money to help out with the costs. Jamaica isn't going to have the money to pay for these systems or be up kept. So, we will have to use money or raise money from other countries and organizations.

The government would have to open to private and for-profit cooperative agreements in rural areas of the country. There would have to be cooperation between the local and national government and perhaps local communities to make this happen.

If at all possible it would be best to have a local company that is open to international investment involved because they would best understand the local and national laws. However, if that possibility didn't exist then it would have to legally be worked out to allow foreign companies to invest, build and profit in their country. One of the upsides would allow people who are unemployed, employment for a region that usually is in poverty and out of jobs.

This project can be sustainable if the community, government, and private enterprise work collaboratively because everyone wins. The community gets clean fresh drinking water, private enterprises makes money, and the government has happy citizens because there is lower unemployment in that area along with clean drinking water. This will also help keep citizens healthier. The death rate in Jamaica from contaminated water will go down because the citizens drinking water will be fresh and clean with little to no bacteria in their drinking water.

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