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The Water Crisis in Puerto Rico

Puerto Rico is a quaint island filled with wonderful wildlife and kind people; it truly seems to be the ideal place to go. However, looks can be deceiving. Puerto Rico is in the warpath of most major hurricanes. Due to this, water systems have been consistently ruined and rebuilt, only to be damaged again. Droughts have caused water levels to drop in reservoirs and has even prompted water rationing at times. Because more than 8,000 families in rural areas of Puerto Rico are exposed to the risk of contracting harmful diseases through the water and environment, the government should give more assistance in providing alternate resources. These examples may include, but are not limited to: wells, change of fertilizer, filtering systems, and more.

Puerto Rico is a small island located between the Caribbean Sea and the North Atlantic Ocean. The island is the smallest and most eastern of the Greater Antilles (Cuba, Hispaniola, Jamaica, and Puerto Rico). Puerto Rico is a self-governing commonwealth that is in association with the United States. Its current population is approximately 3.7 million people, where 94.1% make up the urban population (Puerto Rico - Rural Population). Small rivers and high central mountains help ensure the land is well watered, but the south coast is relatively dry with a fertile coastal plain in the north. Hurricanes frequently hit Puerto Rico between August to October, although the US National Weather Service considers the hurricane season for the North Atlantic Basin to be June 1-November 30 (Puerto Rico Geography). Typically, the family size in Puerto Rico is only three to a household. However, in rural areas, houses are known to hold several generations due to low supplies of water, food, and electricity. Puerto Rico has to import nearly 85% of its food due to lack of competitiveness, bad soil, and high fertilizer costs (Lant.com).

In 2017, Puerto Rico was hit by Hurricane Maria. The island suffered and had many deficits due to the storm and is currently still in the process of restoring the rural areas. Each hurricane that hits the island puts setbacks on access to importing and exporting goods. While running water has returned to the majority of Puerto Ricans, families in the rural areas are still dealing with intermittent access to it, sometimes for a few hours a day, sometimes for weeks on end. (Water Is Everything). Puerto Rico produces a fair amount of rice, sugar cane, coffee, and corn. Yet due to the increasing amount of non consumable water, there has been a discussion on whether to increase or reduce agricultural production. Farmers seem to be on either side of the argument. Currently, about 85% of food consumed in Puerto Rico comes from imports and the island is heavily dependant on each shipment for their food (BioMass). Eduardo Burgos and Franco Marcano, who run a small farming business for local markets and private deliveries, want to expand Puerto Rico's agricultural output. Hurricane Maria devastated about 80% of the total crops on the island and severely damaged the island's dairy industry. The plantain and coffee plantations were ruined as well (The Push). While groups of agricultural entrepreneurs would like to gain more farm land for the island, other farmers still believe that the island's Gross Domestic Product (GDP) would increase with a boost in agricultural production, but others think that they would be better off investing in something else (BioMass). There have been shifts from agriculture being the 'future' of the island in the past to manufacturing, so change coming up again is plausible. The idea to invest in something else comes from the simple fact that not all Puerto Rican soils are not best suited to grow many of the crops farmers plant. There are about five different soil types on the island, and only 6.76% of that land is actually arable (Puerto RICO Geography). In order to optimize the fields many farmers use heavy amounts of fertilizer. This can damage the soil and nearby watersheds (BioMass). Runoff from the fertilizer mixed with lead pipes used by factories will damage what usable soil is left. Having even a

small amount of pollutant can prevent the normal biochemical process that purifies the calcium pool for grazing animals and decomposer organisms (www.lead.org.au).

The most important thing is that the people of the rural population can have access to clean water. Puerto Rico's aqueduct system estimated that 99% of its clients had water service at the end of August in 2018 and that less than 1% experienced interruptions; yet, that 1% was composed of more than 8,000 families, and didn't account for the numerous families that aren't connected to the aqueduct system (Water Is Everything). Since so many families have to resort to using their own wells or natural springs, they are becoming substantially more exposed to the harmful toxins in the soil and water. Clinicians found that in the aftermath of Hurricane Maria, out of the 3,000 Puerto Ricans that passed away, 26 died due to leptospirosis (Puerto Rican Government). Leptospirosis is a bacterial illness spread through contaminated water and soil. The only way to combat the illnesses and death is to create long lasting solutions. The government had began giving bottled water to all residents, and while this is a smart idea, it is only a temporary fix. In September of 2018, CBS News found that there were thousands of abandoned water bottles of the taxiway of a naval base in Ceiba, Puerto Rico (Puerto Rican Government). These bottles are thrown away without a proper disposal, causing potential harm to the environment. The people of the rural areas cannot afford to be spending money on wasted bottles; instead they need to be focusing on rebuilding their lives and homes. They cannot do this if they are trying to find access to clean water constantly on a consistent basis. Many celebrities, such as Lin Manuel-Miranda, have raised higher than \$2.5 billion to help non-profit organizations combat this health issue. The government should be encouraging the world to help the people that need it the most, or even providing money to the citizens who need it.

Installing new pipes, reducing the fertilizer consumption, and investing in levies would be examples of longer lasting solutions that would be better for the people. Currently, Vivendi and Suez are the companies controlling Puerto Rico's water systems. In August of 1999, the Puerto Rican Office of the Comptroller a report that severely critiqued Vivendi's services, stating there were "deficiencies in the maintenance, repair, administration and operation of aqueducts and sewers, and required financial reports that were either late or not submitted at all" (Puerto Rico ?). Not having proper checks and maintenance is part of the reason the lead levels are so high and people are getting so sick. The government should be checking on these systems and investing in any companies who are willing to provide safe things for its people. The health of people who were still not connected to the pipes were poor, as they were experiencing higher incidence of skin allergies, gastroenteritis, and muscle spasms (Puerto Rico ?). These people have no choice but to consume the contaminated food and water unless they are able to get an imported good. Puerto Rico dropped its agricultural production by a major 20% in 2003, likely due to high labor costs, as well as rising energy and fertilizer costs (Lant.com). In many areas of the island, there is a high level of salinity within the soil, which makes many plants struggle to prosper (BioMass). Soil conditions prevent certain plants from growing and/or flourishing, so the farmers need to be educated on what plants or seeds could spring best on their fields. Simply putting more fertilizer on the soil may help in the moment, but ends up having very a harmful effect in the long run.

While fertilizer may supplement the plants with the proper nutrients it needs, it ends up taking those nutrients out of the soil and turning the soil useless. This means that since there is the imbalance in the process, the soil is no longer able to: convert nitrogen into a reusable resource, make water available for plants, release nutrients, breakdown pesticides and various chemicals, or suppress harmful pathogens that can lead to disease (Natural Remedies). Adding compost and manure can help combat and turn the soil healthy again and may be the easiest way to help soil. Manure is rich in many minerals and chemicals, and when it decomposes it releases its nutrients, helping strengthen the soil. If wanted, Puerto Rico could partake in soil treatments. One soil treatment that has proven to be effective is Effective Microorganisms (EM) Technology. EM is made up of beneficial and highly efficient organisms that are not harmful, non-pathogenic, not genetically modified, or chemically synthesized (What Is EM Technology). EM can be

used to better the physio-chemical and the micro-biological conditions of the soil and help increase the speed of the natural decomposition process (Agriculture). The use of this technology had expanded from agriculture to effluent and waste water treatments, control of foul odors, farms and animal health, human health, and innumerable industrial treatments (What Is EM Technology). Helping the soil regain the nutrients and natural chemicals it has lost due to poor treatment will help improve the quality of the water since it will be able to filter out the harmful chemicals that are currently staying stagnant.

Unfortunately, there are many different issues with the water and soil in Puerto Rico; yet, for every issue there is a solution. While some may be costly, they prove to be better options that last longer than the solutions that have been put into effect in the past. The island of Puerto Rico has people that are suffering every day due to the fact that they are unable to obtain one of the basic necessities of life. Due to failure to properly eradicate this issue, it has spread to the soil and the food. The government should feel pressure from people to combat this issue and become aware of how serious the situation actually is.

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