The Water Crisis

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On average, Americans "waste 7 billion gallons of clean drinking water a day" (James) and 1 trillion gallons of usable water each year while nearly 1 billion people around the globe (over three times the population size of the United States) lack access to safe drinking water. While many people in first-world nations leave faucets running, neglect to fix leaky pipes, and waste valuable drinking water, "women and children spend 125 million hours each day collecting water" in places such as Africa and Asia, "⅓ of the global population lives without access to a toilet", and "every 90 seconds, a child dies from a water-related disease" (Water.org). Many nonprofit organizations are trying to innovate new methods that will provide safe water to millions of people, and the solution to these problems lies in Science, Technology, Engineering, and Mathematics, or STEM.

Circle of Blue's Brett Walton, after the World Economic Forum released 11th edition of the Global Risks Report in 2016, wrote

> The World Economic Forum, whose membership includes heads of state, CEOs, and civic leaders, ranked water crises as the top global risk to industry and society over the next decade. Last year, water crises earned the top spot as the most damaging short-term risk. Along with water's rise in the Paris climate talks, the rankings indicate that water, long the purview of engineers and lawyers, is now an urgent political matter (Walton).

"1 in 9 people worldwide do not have access to safe and clean drinking water" (The Water Project). Although the Water Crisis burdens developing regions such as Africa and Asia, it affects all six inhabited continents. Even here in America, droughts are occurring in California and other Western states and lakes that supply water to millions of citizens are drying up. Water

scarcity is not the only problem society today faces; water contamination is also a big problem. “Water-related diseases affect more than 1.5 billion people every year” (World Health Organization). Even in the United States, contaminated water infiltrates the bodies of unwary users. In the Flint Water Crisis, residents of Flint, Michigan, are discovering highly toxic levels of iron in their water supply, which was revealed to be mistreated. Currently, engineers are trying to find solutions to provide clean water to as many people as possible while decontaminating these supplies from harmful materials, bacteria, and diseases.

Whenever I visit the Philippines, a third-world island nation in Southeast Asia, for summer vacation, I have to drink from a plastic water bottle because the tap water there is not safe to drink, and filters there are extremely expensive, yet many of the country’s inhabitants resort to consuming the hazardous water. With “nearly ½ of the world’s population- more than 3 billion people- live on less than $2.50 a day,” these people cannot afford to buy water bottles or water filters and end up resorting to drinking out of hazardous and dirty sources (DoSomething.org). In addition, “the World Health Organization says that every year more than 3.4 million people die as a result of water related diseases, making it the leading cause of disease and death around the world” (Berman). To reduce these statistics, engineers could create water filters that can be used in both public and private sanitation and water systems. Although many companies have already created these kinds of filters in the forms of pitchers, straws, tanks, and other contraptions, inexpensive water filters are still yet to exist, which would become available for purchase for either those who need them or those who want to donate them. With most filters too expensive for Africans and those in poverty and even those who wants to distribute them to buy, innovators in the STEM field can create cheap filters that are both long-lasting and efficient

in order for impoverished people to have access and the ability to purchase these items without becoming too dependent on nonprofit organizations and filtering companies too much.

In many remote regions of sub-Saharan Africa, women and girls are usually tasked with the strenuous duty of transporting gallons of water to their homes, lugging barrels of water on their shoulders for miles for hours on end. Each woman or girl walks an average of 3.7 miles for up to 6 hours a day to collect water, spending a total of 125 million hours combined every year. Advances in STEM can also make this process much more efficient and easier. Instead of using breakable barrels or heavy tubs, women and children could use more durable containers that could be transported more easily across rough terrain. These containers could be rolled across the surface without even creating a single leak or spilled drop. Although such an invention exists, the Q Drum, a wheel that can become filled up with water and rolled for transport, it is “too expensive for the end user. Those that need them ultimately, can't afford them and those who can, most likely don't need them” (Q Drum). To improve this invention, engineers could formulate less expensive solutions that could be widely available to those in poverty. A more durable, less expensive, Q Drum-like container, created by STEM, could find women and girls with less work to do and more time for the things that matter, such as education and household work, and more water available to those families.

A majority of those affected by the Water Crisis, live in insular towns in rural regions, especially in Africa. “Eight out of ten people without access to safe drinking water live in rural areas and nearly half of them live in sub-Saharan Africa” (UNICEF). People living in these areas have difficulty accessing clean water resources, and these remote regions are also hard to reach, creating a large obstacle for nonprofit water conservation and distribution agencies. In addition, the irrigation and water systems of these towns aren’t as updated as those in urban areas. The

geographic barriers, such as deserts, mountains, and valleys, prevent relief aids and other organizations to reach these areas in order to help out these communities and hand out water bottles or other clean water innovations. To overcome this, civil and environmental engineers can blueprint sanitation, pipeline, and irrigation systems to transport water to these regions. Most of these regions often use systems that are neither frequently checked nor clean, so fixing and enhancing their sanitation systems can both increase access to clean water and reduce waterborne diseases.

In addition, "scientists say the notoriously dry continent of Africa is sitting on a vast reservoir of groundwater. They argue that the total volume of water in aquifers underground is 100 times the amount found on the surface… The movement of the water through the aquifer removes many impurities and it is often cleaner than water on the surface" (McGrath). Although Africa's surface water is scarce, Africa's groundwater is plentiful. Engineers could unlock this new source of water, which is also clean enough for human consumption, using collection systems that would extract water from these reserves and place it into hands of millions of thirsty people. Using the groundwater from these aquifers is a double win: This could reduce not only the stress water scarcity has suppressed Africa but also the number of people infected by waterborne disease. These newly discovered reservoirs are both abundant and safe. Plus, this kind of water needs less filtering due to its higher cleanliness, which is beneficial in the medical (less waterborne diseases and the hindering of the spread of such diseases), economic (more water and less money on complex filtering systems), and engineering (new yet simple extraction systems and more environmental and civil engineering jobs) fields. Extracting water from these subterranean reserves could prove to be one of the most effective solutions to solving the scarcity in Africa, the most hard-hit continent affected by the Water Crisis.

There are many solutions engineers could innovate to solve the world's most impactful risk, the Water Crisis. Tweaking current designs could lead to inexpensive water filters and containers that could be not only be purchased by those who need them, but also be widely available for worldwide consumerism and charities. Creating new water systems would filter out impurities, transport water to rural regions, and make use of the hidden aquifers underneath Africa's surface that could provide water to millions of people. New progresses in STEM could solve the Water Crisis and potentially give most of the global population access to safe, clean drinking water, potentially slowing, or maybe even stopping, the rapid spread of the Water Crisis.

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