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Bangladesh: Improving Sanitation and Drinkable Water for All People.

“Because no matter who we are or where we come from, we're all entitled to the basic human rights of clean air to breathe, clean water to drink, and healthy land to call home.” (Martin Luther King). Bangladesh is a small to medium-sized country in South Asia, located on the coast of the Bay of Bengal and bordered primarily by India and Myanmar (Kiprop par. 1). It is a challenging place to live because large areas of the country frequently flood, whether from rivers, ponds, or large lakes. Much of this water is contaminated with E. coli or arsenic, and annual monsoons create unsanitary conditions that damage infrastructure and living quarters. Many families in Bangladesh live in overcrowded and unsanitary conditions and struggle to earn enough income to meet their basic needs. Unsafe water and inadequate sanitation have become a severe problem in Bangladesh. These conditions have harmed many people by spreading disease and contributing to ongoing poverty. This issue affects people across the country by causing unnecessary deaths, worsening food insecurity, and creating extremely unsafe living conditions. As I already mentioned, it hasn't been pursued as it should be. Several potential solutions could address this problem, many of which have been used successfully in other countries facing similar challenges, such as rainwater harvesting. This approach could be sustainable, but my recommendation is to combine water purification technologies and partnerships with agricultural colleges with low-cost, locally sourced household filtration systems to provide safe drinking water. Bangladesh faces widespread poverty, unsafe water, and poor living conditions. To fix these issues, I plan to use a solution that together creates a big picture and hopefully paves the way to a better life for Bangladeshis.

In Bangladesh, traditional family structures and unique cultural practices play a significant role in a person’s everyday life. Bangladesh is a medium-sized country located in South Asia on the coast of the Bay of Bengal. The land area of Bangladesh is 57,321 square miles, and it has a population of 174,370,536 (“Bangladesh”; population), with 33% of those people living in urban areas and 67% in rural areas as of 2024 (“Rural population”). Bangladesh is currently facing a major food crisis, with 15.5 million people in the country being food insecure (“Bangladesh: Acute Food Insecurity Current Situation for April and Projection for May par. 1). The government is a parliamentary republic where a president is elected for a 5-year term and serves as head of state, while the prime minister serves as head of government (Husain par. 1). Bangladesh is primarily an agricultural country, with 60.6% of its land being cultivated in 2023 (“Arable land (% of land area) - Bangladesh”; Bangladesh). The most commonly grown crops are rice, corn, and potatoes (Sultana and Mithun par. 1). Their major exports are garments, leather, seafood, and jute products (“Major Exports of Bangladesh” par. 1-4). The average size of a farm in Bangladesh is currently unknown, but is thought to be around 1.5 acres, which is about the size of one football field (“Average farm size”; Average farm size). Most of these farms are smallholdings, and many farmers work mainly to stay above the poverty line and provide food for their families. Family is very important in Bangladesh. The average household size is around 4.3 people (“Average Household Size” par. 1). There are many different jobs in Bangladesh, with the main sectors including markets, entrepreneurship, artisans, and blacksmiths (“Occupations in Bangladesh” par. 1-3). The average monthly family income is 32,422 Bangladeshi taka, which is approximately 265.51 USD (“Household Income per Month” par. 1). The typical diet for most families includes fish and other protein sources like eggs; carbohydrates such as bread or rice; and usually some fruits and vegetables, which are widely

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available in the community. The most nutritious foods include leafy green dishes, proteins, and fresh produce (“Food in Bangladesh” par. 1-5). Most food in this relatively small country comes from domestic agriculture and fishing. Early schooling is accessible and encouraged, but many children do not continue to secondary school and may instead develop literacy skills later in life. Most families have access to healthcare, although it is often expensive and typically paid for out of pocket (Do education and living standards matter in breaking barriers to healthcare access among women in Bangladesh?” par. 1-3). Bangladesh also faces serious challenges related to clean water and sanitation, with about 70 million people lacking access to clean water and over 108 million lacking access to a clean bathroom (“Bangladesh's Water Crisis” par. 1-4). Other issues affecting daily life include political instability, limited freedom of expression, and natural disasters such as monsoons (Hedrick par. 1-5).

Bangladesh is a country facing many challenges that have a huge impact on everyday life. One of the most pressing issues is that 16 million people are food insecure (“Bangladesh | World Food Programme” par. 4), making food insecurity a major nationwide problem. However, an even larger issue is the lack of access to clean drinking water, with about 80% of regular drinking water containing arsenic or E. coli at levels similar to those found in sampled pond water in the country (“Bangladesh: Access to Clean Water Will Reduce Poverty Faster” par. 1-7). This contaminated drinking water causes millions of cases of diarrhea in children under 5 years old each year (“Assessing Contributory Factors of Diarrhea Among Under‐Five Children in Bangladesh From 2006 to 2019 and Recent Increases: A Cross‐Sectional Study” par. 1-3). Another part of this problem is that 60% of the population lacks access to clean, sanitary infrastructure such as toilets, roads, and public transit (“Bangladesh's Water Crisis” par. 1-4). Both of these problems caused, in 2024, over 272,000 deaths, most of which were premature deaths of children around 5 years old living in these horrible conditions (“Addressing Environmental Pollution is Critical for Bangladesh's Growth and Development” par. 1-2). The last big issue in the area is climate change and natural disasters like monsoons. These issues undermine infrastructure and disrupt other essential services in Bangladesh. Rising sea levels also contribute to this by flooding land used for farming and other important purposes, and when this land is flooded with saltwater, crops go bad (Lazaro par 1). These multiple water-related issues impact Bangladesh’s food supply and population significantly. For example, over 12 million people in coastal regions live in poverty and are severely affected by disasters, displacement, and waterborne diseases. This leads to severe crop destruction, isolation, contamination of crops, and deadly living conditions (“Climate Change Poses Urgent Threat to Poor of Coastal Bangladesh” par. 1-10). Monsoons and floods can submerge up to around 70% of the country during the wet season, putting a large portion of the Bangladeshi population in danger (Marlowe par. 1-8). As well as this, it destroys crops and makes them unsafe to eat, which is already an issue. Not only is potable water limited, but groundwater used by 90% of the population is contaminated with extremely high levels of arsenic, causing 1 in every 5 people exposed to arsenic to die, placing a huge strain on the population (Hedrick par 4).

Many countries around Bangladesh have addressed similar issues when it comes to clean water and sanitation. For example, according to Ruchika Kumar, India has implemented a process called the JaJiveenen Mission, which aims to install tap water in all houses and for all families in India. Rural household tap water coverage has improved from 19% in 2019 to 75% in 2025, reaching more than 145 million households, improving consumption of clean water. To add, this movement has also supported the establishment of over 2,000 water quality testing laboratories (Kumar par. 15-17). To add to this, other countries in South Asia have been receiving support and education to improve water quality from a program called UNICEF donating new infrastructure and other things to improve water quality and safe sanitation in South Asia. These practices improve hygiene and overall quality of life. Access to safe drinking water has improved over the last decade from 73% to 93%, but it is very hard to reach Bangladesh due to refugees and other people being out of reach of their donations. UNICEF states that it

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is very hard to do this in the region due to the climate and weather conditions with cyclones and monsoons every year (“Water, sanitation and hygiene (WASH)” par 1-6).

Water-related issues in Bangladesh pose a serious threat and significant challenge to the population. While many solutions could help address and improve this issue, just like the other ones I mentioned, I believe I’ve found one of the best. In 2014, Michigan State University created an invention that turns cow manure into clean agricultural wastewater using reverse osmosis. According to an article by Michigan State University, this machine can be used to clean surfaces—a major issue in Bangladesh—as well as for irrigation and for reuse, such as providing drinking water for domesticated animals (“New Technology Turns Manure into Clean Water,” pars. 1–6). This solution would be implemented at the community level, with manure-to-water treatment systems installed in locations that can serve several households or an entire neighborhood. By putting the technology in busy urban areas, maintenance and training efforts become more efficient, and the benefits can be shared more widely among residents and local farmers. Communities would be engaged in the operation and oversight of the system, helping ensure local buy-in and sustainability. The first major use of this machine would be for cleaning. Much of the infrastructure in Bangladesh is extremely unsanitary, and this invention would improve conditions by providing clean water to wash surfaces such as toilets, dishes, and public facilities. Cleaner public spaces would significantly reduce the incidence of waterborne diseases, like cholera and dysentery, which are prevalent in areas of poor sanitation. By preventing runoff and untreated waste from entering waterways, the system also helps reduce the contamination of surface and groundwater, protecting both the environment and drinking water sources. The filtration process removes pathogens, bacteria, and chemical contaminants, making sure that only clean water is released or reused, further minimizing the risk of waterborne illnesses. The second use of this technology would be for agricultural reuse and fertilization. The treated water can be reused to give animals clean water to drink, which can lead to more and healthier livestock. Healthier livestock can lead to increased milk and meat production, greatly boosting farmers, who are the main occupation in Bangladesh, and improving food security. An additional benefit is that the reverse osmosis process separates out valuable nutrients from the manure, producing nutrient-rich solids or liquid fertilizers. These collected nutrients can be distributed to local farmers, reducing the need for expensive chemical fertilizers. Using organic nutrients improves soil quality and crop yields, while also preventing nutrient runoff into water sources, which is a common cause of water pollution (Hendrick par 3). This creates a closed-loop system where waste is transformed into valuable resources for the community. The last use of this technology would be for fertilizing crops. By providing nutrient-rich water, crop yields would skyrocket, again leading to higher incomes for farmers and making a more stable food supply for the country. This would help reduce hunger, improve nutrition, and make farmers less vulnerable to droughts and unpredictable rainfall. Ensuring long-term plans would be difficult; selling the clean water would be complex, especially in areas with lower incomes. Lastly, while the goal is clear, there is no telling what nature will do; the process of collecting clean manure and water that is somewhat clean water may be tough. Both need to be managed to avoid side effects like wrecking machines and wasting materials. Both of these methods would require education and training, which could create jobs for local machine technicians to operate and maintain the manure-to-water machines, while community health workers and teachers could show families how to build and safely use the bottle filters. To address this large problem, I would begin with a pilot project in the northern part of Bangladesh, where we would test whether this combined approach is effective and sustainable. The pilot project would aim to measure changes in water quality using specific metrics like turbidity and bacterial counts, public health outcomes by tracking disease occurrences, and local income through surveys and economic data. If the pilot program is successful, we would purchase more machines and expand the system to additional regions, using the money earned from selling clean water and related services to help fund further growth. With strong government cooperation, support from local

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communities, and partnerships with international aid organizations, this plan would be challenging but achievable.

In review, Bangladesh is a truly incredible country with a unique culture and way of life. However, many people still need support because the water and infrastructure are often unsanitary and unreliable. After examining daily life in Bangladesh, including family, culture, and everyday routines, it is clear that unsafe water and poor sanitation are at the center of many of the country's challenges. These conditions reduce overall quality of life, worsen poverty, and limit people's opportunities. To address these issues, I plan to use a variety of solutions that, together, create a big picture and pave the way for a better life for Bangladeshis. I believe these challenges can be addressed through my recommendations, which focus on improving access to clean water and sanitation, making life in Bangladesh safer, healthier, and more secure for everyone. Ultimately, it is our responsibility to help those who can't help themselves, like the people in Bangladesh.

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