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Eritrea (Water, sanitation & hygiene)

“The Land of the Sea”: Combating the water, sanitation, and hygiene (WASH) crisis in Eritrea

A population of 3.6 million, 0.05% of the world (O'Neill, A., 2021), resides in Eritrea, an arid coastal country located in the northeast Horn of Africa (as shown in Figure 1). Unfortunately, this growing population has been faced with a humanitarian predicament: poor water access. As of 2020, 80.7% of Eritreans did not have access to essential water services (Thelwell, K., 2020). The immense lack of basic services forces citizens to use public water sources, such as rivers, for every water-consuming activity, leading to source contamination. An infant mortality rate of 27 for every 1000 births and a life expectancy of 67.5 years reflect the serious consequences of water contamination (World Bank, T., 2020). Through contaminated water sources, fatal infections such as diarrhoeal disease and cholera have proven detrimental to Eritrea's population. In fact, diarrhoeal disease is the leading cause of death for children under age 5 in Eritrea ((Unicef, E., 2020). Issues with clean water resources, sanitation, and hygiene must be addressed.

Crops are directly dependent on clean water access. In the plains of Eritrea, the mean annual rainfall is less than 16 inches, which is considered below average in many other parts of the world (Thelwell, K., 2020). The Eritrean government provides farmers with assistance in practicing farming techniques that require less water. For example, farmers are eligible for a micro-credit and saving scheme using irrigation systems with less water and drought-resistant seeds (Tesfay, M., 2021). Despite these measures, there is still a severe lack of rainfall and insufficient resources to fill the needs of its population. Eritrea is years away from achieving its water quality goals.

The lack of access to essential resources in rural regions has created disparities in child education, healthcare, and other necessities. Programs such as Global Partnership for Education (GPE) are working with Eritrea's Ministry of Education to utilize grants from the United Nations International Children's Emergency Fund (UNICEF) to expand access to classrooms, reduce barriers to education, raise awareness and improve teacher competency (Eritrea, G. P. E., 2020). Almost 33% of the population lives in extreme poverty, surviving on less than \$1 per day. Healthcare access is still a challenge in rural areas with limited facilities and access to physicians. The Eritrean government has compiled a National Action Plan for Health Security (NAPHS) from 2017-2021 to improve its capacity to prevent, detect, and respond to public health threats (Tsfatsion, D. A., 2022).

Water and sanitation are foundational aspects of society, meaning a water crisis has multivariate implications. Eritrea's economy has suffered, especially local businesses, which rely on clean water access to create certain products, sell food, and run facilities. In order to sustain manufacturing and production, employers must leave their companies to find drinkable water sources and sanitation facilities if they do not have clean water at that moment. These practices cause businesses to suffer through production losses and, ultimately, a loss of customers.

To evaluate the water sources in Eritrea, we can direct attention to natural and manmade water bodies, and how they are utilized. Most rivers are seasonal and only contain water after a rainfall, except for the Setit river, which is closer to the Ethiopian border than the Eritrean. Hence, there are few natural fresh surface water bodies in the country. Moreover, hand dug wells for rainwater can lead to waterborne diseases due to groundwater and runoff contamination. Water bodies with artificial dams have been constructed in some areas to store and conserve water. However, the majority of the population depends on rainfall for crop yields and basic personal usage. We need to consider water quality and consumption along with other hygiene practices, which the government of Eritrea addressed in 2019 as the One WASH (Water, Sanitation, and Hygiene) strategy in partnership with UNICEF (Unicef, E., 2020). The One WASH strategy and investment plan commits to the availability of adequate WASH services to all Eritrean citizens by 2030. Specifically, it addresses ending open defecation and allowing more access to clean water and basic sanitation needs. Considering what Eritrea has already issued and the practices of neighboring East African countries, we can establish community-led education campaigns, governmental partnership with non-governmental organizations (NGO) to implement multiple sources of water, and sustainable self-sufficiency within each local area.

Given that countries in close proximity with Eritrea share similar climate conditions, governmental structure, economic resources, and other important societal factors, it would be beneficial to observe the best practices of these countries as they can guide solutions to Eritrea's water crisis. Since 2000, Kenya's access to safe drinking water has increased by 12% (Kenya, U., 2017). Kenya's positive transformation of its water quality and access was largely due to a resourceful architectural method: sand dams (Glick, H., 2015). Inspired by ancient Roman technology, these barriers trap water flowing from rivers or other water bodies in layers of accumulated sand (as shown in Figure 2). The sand itself acts as a purifying filter by removing pathogens from the water while preventing it from evaporating (Guide, L., 2015). There have been 500 sand dams constructed in the Kitui District of Kenya since 1995, attributed to the SASOL (Sahelian Solutions) Foundation, an NGO (RAIN Foundation, R. A. I. N. F., 2007). As this technique of sustainable water source utilization has proven to improve water access in Kenya, it could be well-effective in enhancing water abundance for Eritreans and reducing the human labor of Eritreans directly collecting water from rivers themselves. It is important to consider that sand dams may not be a viable year-round solution due to the lack of rainfall and seasonal nature of Eritrea's water bodies. However, considering that there are seasonal rivers and even other ephemeral water sources in Eritrea, their ability to contain flowing water could extend the period of time in which water is abundant.

The Eritrean water crisis is not a temporary situation; it has been and will continue to be a longstanding systemic concern. NGO-government partnerships could confront the goal of bringing local communities to the point of self-sufficiency in terms of water and sanitation. Local governmental authorities, who have centralized involvement with the different needs of their respective rural areas, have a great understanding of the communities' needs. Meanwhile, nonprofit organizations contain financial, educational, and material resources that would be of value to rural areas. Funding, in particular, is a valuable resource that NGOs can provide by allocating funds from their donations. Furthermore, NGO lobbying for certain policies will have greater likelihood of implementation with the support and alliance of the government. The Eritrean government may be open to this proposition due to the diverse improvements that could be made by their partnership. These actions can push rural areas upward and build long-term self-sufficiency.

Identifying and implementing solutions to a community's shortfalls can be incredibly difficult if those within it do not have the full picture of said shortfalls at every level. Awareness and education about the current water and sanitation crisis and initiatives is the key for Eritreans to understand what solutions will be practical for their homes and families. Unfortunately, the One WASH Strategy has pointed out its high-level goals but has failed to report on the current progress of the Eritrean government and UNICEF. This is largely due to the single executive system in Eritrea; Eritrean President Isaias Afwerki, who serves as both head of state and head of government, has been in power since 1993, so his conservative policies are still influencing efforts, including those regarding the water crisis. Therefore, the One WASH Strategy's report of information may be hindered by such a consolidated government system, which does not see the need for transparency of information.

To achieve accountability and productivity, local leaders should oversee their communities' efforts, information which can then be disseminated to communities and spread in educational systems. Local administrators of rural areas would be very effective in localizing this country-wide issue and educating individual members of smaller communities. NGOs would be able to provide their resources to assist local leaders in organizing such efforts, and providing strategies for ensuring the longevity of these programs. As part of sanitation and hygiene intervention at schools, these leaders need to ensure schools have enough toilets with water supply, promote hygiene messages across schools of all ages, increase hand-washing facilities, and encourage consistent sanitation practices at both school and home for Eritrean students. This way, ordinary citizens can contribute to sanitation in their communities and will be educated on effective practices.

Many of the rural communities in Eritrea rely on external support for creating solutions and financing their implementation. There are certain facets with which government aid can issue change, but nonetheless NGOs tackle often-overlooked problem areas. Therefore, emphasis on the partnership of government and NGOs in Eritrea may introduce a multifaceted approach to identifying primary and secondary solutions for clean water access. Local governments will have access to information regarding the geographical factors of the area such as terrain, population, and existing water sources in the region, while non-profits will be able to recommend solutions based on available resources in the region. For example, a primary solution could be wells dug drilled to reach fresh aquifers, a secondary solution could be a rainwater-storing system extending availability of rainwater past the rainy season, and a tertiary solution could be building sand dams similar to those in Kenya.

Moreover, Eritrea has recently emphasized the strategic importance of constructing dams in the eastern and western lowlands of Eritrea. The government and NGOs have coordinated earth-fill dams using soil, which are economical compared to concrete dams (Ghebrehiwet, K., 2022). If there is not enough water for these dams to be filled year-round, they can still serve as a temporary, secondary solution. The Eritrean government should consider accelerating the building of more dams to enrich water access.

Eritrea was once known as Mdree-Bahree, which means Land of the Sea. This name was initially used because of its proximity to the Red Sea (ATLAS, 2013). The proud national emblem of Eritrea depicts a camel adorned by an olive wreath, as camels were used during Eritrea's war of independence from Ethiopia to transport war supplies (Eritrea Ministry, 2013). The camel is known for its efficient water usage. Ironically, these water-centered symbols create a false illusion of the challenges Eritrea has faced with water quality and access. Even in 2022, Eritrea, like other countries in the Horn of Africa, is experiencing drought and as a result, severe household water insecurity. The undeniable implications of

water and sanitation struggles encompass Eritrea's health, mortality, economy, nutrition, education, and overall quality of life. There certainly are current schemes in support of fixing the Eritrean water crisis, such as the One WASH Strategy, government action plans, farming assistance measures, and NGO engagement. However, there are gaps in these initiatives that hinder significant progress. Eritrea must create action in the establishment of governmental advocacy for education and awareness on sanitation practices, NGO-Government partnership to build multiple sources of water for communities, and partnership within local rural areas to aid their perpetual self-sufficiency.

As Dr. Norman Borlaug said, "The destiny of world civilization depends upon providing a decent standard of living for all mankind" (The Nobel peace prize, 1970). If no accelerated action is taken by the Eritrean government and NGOs to fill the gaps in water quality and access to improved sanitation, Eritrean communities will be faced with an enduring humanitarian crisis that will impair multiple facets of their livelihood.

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Figure 1 -



Figure 1. Map of Eritrea, on the Horn of Africa. Picture reference from ResearchGate, 2016.

Figure 2 -

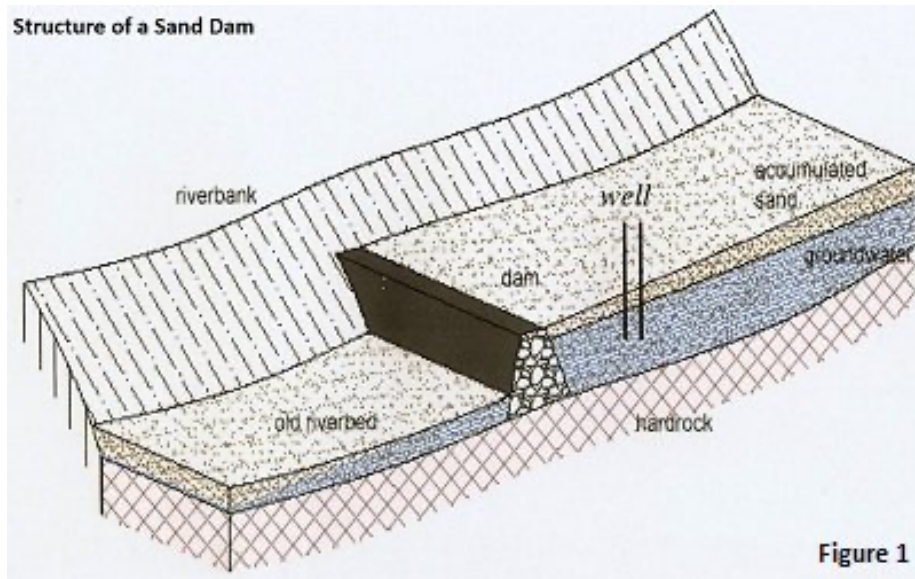


Figure 2. Structure of a sand dam depicts how the accumulated sand and the dam help store the groundwater and prevent it from evaporating. Picture reference from Guide, L., 2015.