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Malawi: **Water First: The Foundation of Food Security in Malawi**

Malawi is a landlocked country in southeast Africa, renowned for its rich culture, breathtaking views, and economy primarily based on agriculture. These are promising factors, but Malawi has some critical issues, the most significant of which is access to clean and reliable water sources. The nation boasts a population of more than 19 million individuals hit by water scarcity and poor quality of water, especially in the rural areas where nearly 83% of the population resides (Ripple Africa). Access to water impacts most facets of life in Malawi, including health and agriculture, and expands circles of poverty. Poor water and sanitation are estimated to account for over 50 percent of Malawi's disease burden, and more than 60 percent of the population relies on drinking water contaminated with bacteria (The James Hutton Institute). Malawi's Sustainable Development Goals report showed a mortality rate of 2,500 adults each year and even more children that are affected due to unclean water related issues (UN SDG Report). This paper will explore the challenges faced by Malawians in accessing clean water, how water scarcity and contamination affect the country, and potential solutions to these problems. Moreover, a sustainable approach to improving water availability through small-scale irrigation and rainwater harvesting will be proposed as an all-encompassing and viable means of solving such issues.

Country and Family Background

Malawi, often referred to as "The Warm Heart of Africa," is one of the poorest nations in the world, where most of its population lives in rural villages. The country has over 19 million people, and approximately 83% live in rural areas, depending on agriculture for their livelihood (Ripple Africa). Most of the population lives in small rural villages where life is still essential, but the strain on natural resources is enormous. The average household size in Malawi is around 4.3 people, with most households having a big extended family arrangement (Mangesh). Such houses are usually constructed from locally sourced materials like mud bricks, thatched roofs, or tin. Here, the limited infrastructure of the country results in most of these houses having no access to basic facilities like clean water, a reliable sanitation system, and electricity.

Malawi has an extended agrarian economy with over 80% of the labor force engaged in agriculture (UNICEF). Most homes engage in subsistence farming, growing such crops as maize (the main crop), beans, groundnuts, and cassava. They play a significant role in providing food security but tend to be environmentally limited by factors such as water accessibility, climatic patterns, and the availability of high-tech farming machinery. While many individuals in Malawi work for the government or small-scale trade, most depend on agriculture for their livelihood. This economic reliance on agriculture helps to highlight the vulnerability of Malawian households to external shocks, such as economic changes and climate change. Moreover, most rural households are economically poor and ca nnot afford essential services, including education and healthcare (Mangesh). With salaries being too low, typically less than $2 a day, the cost of clean water is beyond the reach of most households, worsening the water crisis.

Challenges and Impacts of Access to Water

Access to water is the biggest challenge in Malawi, and the nation boasts many individuals without access to safe drinking water. Rural inhabitants, who form the majority, must cover long distances to find water points such as wells, boreholes, and rivers. These water sources also get occasionally polluted with waste, agricultural runoff, or bacteria, making

it unsuitable for drinking (UNICEF). Boreholes and wells are critical water sources, yet they are abandoned due to neglect and insufficient technical competence to repair the pumps. This situation leaves many communities without reliable access to clean water, which contributes to the spread of waterborne diseases such as cholera, dysentery, and typhoid, devastatingly affecting public health.
Approximately 30% of the population in Malawi lacks access to clean drinking water, making waterborne diseases a constant public health threat (Schwenk). Lack of clean water is hazardous for children, as they are highly susceptible to diseases caused by contaminated water. With poor water hygiene and sanitation behavior, child death rates rise significantly, as children are more vulnerable to life-taking diseases like diarrhea. The lack of water also imposes a massive strain on Malawi's already under-capitalized health system, as clinics and hospitals are regularly overwhelmed by the volume of cases of water-borne diseases (Schwenk). Moreover, those who get water-borne diseases also tend to stay off work or school, perpetuating the cycle of poverty.
A recent study by Dr. Rebekah Hinton uncovered a significant water pollution problem in Malawi, revealing that pit latrines used by over 90% of the population result in microbial (E. coli) and nutrient (nitrate) contamination of the water sources. The study, which analyzed water quality from over 5,000 boreholes, concluded that the number of water points vulnerable to contamination by pit latrines will increase three times (The James Hutton Institute). Despite pit latrines being considered a low-cost method of sanitation, their defective construction, and the fact that they are often constructed near water points pose a significant threat to access to safe drinking water. This situation is especially concerning as it threatens not only the health of Malawi's population but also poses a broader global issue for countries where pit latrines are the standard form of sanitation.
The impact of water accessibility goes beyond public health. Agriculture, which relies heavily on rain-fed water systems, is directly affected by water scarcity. During the dry seasons, when rainfall is insufficient, the farmers usually suffer crop failure, food becomes scarce, and people develop malnutrition. Using conventional farming methods further worsens the plight of Malawian families as they are deprived of modern irrigation equipment and efficient water harvesting mechanisms (Ripple Africa). These crop failures are hindrances to economic growth and food security, and the nation is forced to import food, which can be costly.
Additionally, time for women and children to haul water contributes to the household workload. This then impacts how time is allocated towards education, remunerative activity, or self-improvement. Women, responsible for collecting most of the water, need to go distances, which is not only a wasteful use of time but also impacts their availability for work or school attendance (Schwenk).
Access to water also has an enormous impact on the environment. Unregulated water withdrawal, along with water source deforestation, leads to loss of water resources and soil erosion. Environmental degradation is also responsible for causing water scarcity as water sources diminish and the land loses fertility. Climate change has also been responsible for aggravating the situation of water scarcity, with increased droughts and erratic rainfall patterns affecting water availability throughout the year (Schwenk). The interaction between these factors creates a vicious circle that impacts all aspects of Malawi life.

How to Engage Young People in Agriculture

The youth are one of Malawi's most vital drivers of increased water availability and food security. If equipped with the necessary tools, education, and support, youths can help boost the country's agriculture sector, which comprises many of the nation's population. Some of the methods through which youths can be engaged in agriculture are:
1. Education Programs: Inculcating agricultural science, irrigation practices, and climate resilience strategies in schools and vocational schools is essential to prepare the youth to handle the realities of modern agriculture. These programs would prepare them with the required knowledge and skills to increase productivity and sustainability in agriculture and understand the importance of water conservation and efficient irrigation.
2. Youth-Led Farming Cooperatives: Establishing support groups that give young

farmers access to land, tools, and education is another key strategy. Through youth-led cooperatives, young farmers can pool resources and exchange information, thus making farming a viable and profitable career. The cooperatives can also help mitigate the effect of water scarcity by using shared irrigation methods and rainwater harvesting techniques, increasing agricultural resilience.
3. Agricultural Entrepreneurship: Providing startup grants and mentorship programs for young people to begin agribusinesses can result in innovation in the agricultural sector. This can include creating businesses specializing in water-conservation technology, such as drip irrigation systems or water filtration devices. By encouraging entrepreneurship in agriculture, Malawi can have a more energetic and independent agricultural sector.

Discovering Solutions to Increase Water Accessibility

Because of the scope and complexity of the Malawi water crisis, different solutions need to address the problem in an integrated manner. Various strategies have been proposed to improve water access and quality, from infrastructure development to community-based approaches. Some of the most promising solutions include the following:

1. Small-Scale Irrigation and Rainwater Collection: One of Malawi's most viable and low-cost interventions to mitigate water shortages is investing in small-scale irrigation schemes and rainwater collection. These technologies can help communities to harvest and store rainwater during dry seasons, supply crops with sufficient water, and reduce dependence on erratic rainfall (Ripple Africa). Simple irrigation methods, including drip irrigation, need little infrastructure and can be done at the household or community level. Rainwater harvesting, where rainwater is collected in reservoirs or tanks, can be a valuable means of supplying water for agriculture and household use.
2. Borehole Rehabilitation and Maintenance: Rural boreholes and water pumps are generally in bad condition due to the lack of maintenance and technical assistance (Schwenk). Installing maintenance schedules and informing rural communities on how to maintain these water sources can restore access to clean water. This low-cost approach could have a long-term impact on rural community water supply.
3. Water Purification Technologies: Simple, low-cost water purification technologies can significantly enhance Malawi's water quality. For instance, solar-powered water purifiers or chlorine treatment systems can render water potable without the need for costly infrastructure (Schwenk). By treating water sources adequately, these technologies can prevent the transmission of waterborne diseases and enhance public health outcomes.
4. Improved Sanitation and Waste Disposal: Unclean sanitation and waste disposal practices generally contaminate water quality. Building proper latrines and encouraging hygiene practices can prevent water sources from getting contaminated. Sanitation facilities are not found in rural areas, so simple modificatio ns to sanitation and waste disposal can protect water sources and public health (Ripple Africa).
5. Government and NGO Partnerships: Cooperation among the government, NGOs, and international donors is key to obtaining the funds and technical know-how necessary to solve the water crisis in Malawi. Enhanced partnerships have the potential to mobilize funds for large-scale water infrastructure schemes and ensure rural communities gain from improved access to water (UNICEF). Partnerships can also enhance community-based programs and local ownership of water projects, leading to long-term sustainability.

Recommendation: Scaling Up Small-Scale Irrigation and Rainwater Harvesting

Of the several solutions, scaling up small-scale irrigation and rainwater harvesting offers the most practical and sustainable solution to enhancing water access in Malawi. This method would enable communities to harvest and store water during wet seasons for use during dry months, ensuring that

agricultural output is constant throughout the year. Key elements of this proposal are:

• Community Training: The most significant challenge in small-scale irrigation and rainwater harvesting is a lack of knowledge and technological expertise. Farmers and community members must be trained to maintain and construct such systems for them to succeed. Training can teach communities how to design rainwater harvesting systems and install drip irrigation equipment (Schwenk).

• Affordable Irrigation Technologies: Farmers can access water for crops at a reasonable cost with low-cost solar-powered pumps and gravity irrigation systems. These can be miniaturized to provide for individual households or entire communities and provide an inexpensive and efficient solution to water scarcity (Ripple Africa).

• Government Subsidies: The government could offer subsidies or economic incentives to farmers for taking up irrigation and rainwater harvesting systems to promote water-saving agricultural techniques. These would make it economically feasible for farmers, especially rural farmers, to implement water-conserving technologies (Schwenk).

In conclusion, water availability is still a crucial issue in Malawi that has far-reaching implications for many aspects of daily life, from public health to economic development. Agricultural dependence of the nation and insufficient access to clean water make already deteriorating situations more complicated. However, by applying realistic and feasible alternatives such as micro-scale irrigation and rainwater harvesting, water availability and quality may improve substantially. More essentially, culture and involvement of the youth in such practices will have a systemic effect. These solutions, alongside investment in infrastructure, education, and community empowerment, will lead the way to a more water-secure Malawi and a better future for its people, with better health, economic security, and long-term sustainability.

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