

Lack of Access to Water in Rural Malawi

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Summary

Lack of access to clean water affects almost every aspect of a person's life in significant ways, and especially impacts the lives of women and children. Measurements of access to water are often deceiving and paint a limited or inaccurate picture of actual access. Building a water point and appointing a water point management committee are the most common methods of addressing the problem, but both are unsustainable because unattended water points typically break down quickly and most management committees are poorly trained. To sustainably increase access to clean water, people should not just create new water points; they should work to build both local water management capacity and aid the government's transition towards integrated water resource management.

Key Terms

Borehole—A well dug deep into the ground to tap into aquifers, or water caught between rocks.

Clean (potable) water—“Water which is free from disease-causing organisms, harmful chemical substances, and radioactive matter, tastes good, is aesthetically appealing and free from objectionable color or odor.”¹

District—A local government body led by a district council. Malawi has 28 districts.²

Gravity-fed water system—A water supply, sourced from a small upland river, stream, or spring, that uses the force of gravity to transport water by pipework to tap stands near homes, reducing the amount of human labor involved in carrying water.³

Groundwater—“Water contained under the ground’s surface, located in the spaces between soil particles and in the cracks of sand, gravel, and rock; a natural resource and source of water for drinking, irrigation, recreation, and industry.”⁴

Improved water source—A water access points that “by nature of [its] design and construction, [has] the potential to deliver safe water.”⁵
Common improved sources of water in Malawi include the following:

- piped water into dwelling, yard, or plot
- public tap or standpipe
- tube well or borehole
- protected dug well or spring
- rainwater collection⁶

Integrated water resource management—“A process which promotes the coordinated development and management of water, land, and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.”⁷

Smallholder farmer—“Farmers owning small-based plots of land on which they grow subsistence crops and one or two cash crops relying almost exclusively on family labour.”⁸

Surface water—“Water above the surface of the land, including lakes, rivers, streams, ponds, floodwater, and runoff.”⁹

Unimproved water source—A water access point that does not protect the water from outside contamination. Common unimproved water sources in Malawi include the following:

- unprotected dug well or spring
- surface water (river, dam, lake, pond, stream, canal, irrigation channel)¹⁰

Water point—A point at which water may be obtained.¹¹ Typically (but not always) refers to an improved water source.

Water table—“The level below the surface of the ground where water can be found.”¹²

Introduction

Access to clean water is necessary for a life of dignity and other basic human rights.¹³ It is essential for basic functions of life, including

drinking, eating, and hygiene. The UN defines the right to water “as the right of everyone to sufficient, safe, acceptable, and physically accessible and affordable water for personal and domestic uses.”¹⁴

The World Health Organization’s definition of access to water states that

- Access to water should be within 1,000 meters [1,093 yards] of the home
- Water collection time should not exceed 30 minutes daily
- Water should not cost more than 5% of a household’s total income
- Water should be free from harmful bacteria and substances
- Sufficient, continuous water for both household and personal use should be available
- Water should be available through culturally appropriate facilities¹⁵

Data about access to water in Malawi varies significantly. The World Bank reported that in 2015, 95% of urban and 89% of rural Malawians had access to water from improved sources. In 2010, USAID reported that 76% of Malawi’s rural population had access to improved water sources.¹⁶ The World Health Organization, however, reported that 42% of people living in rural areas used hand-dug wells or surface water contaminated with bacteria, parasites, or chemicals for washing, bathing, cooking, and drinking—meaning that they reported that only 58% of Malawians in rural areas actually used improved water sources.¹⁷ Although Malawi is technically a water-rich country, with about 20% of its area covered by surface water, many people lack access to clean water.¹⁸ Water delivery differs largely in urban and rural areas because of the central location and high population density of cities and the dispersion of villages and low population density of rural areas. Additionally, water infrastructure is much more developed in urban areas than in rural areas.

Metrics for access to water often paint a limited or inaccurate picture of actual access because most current research methods do not fully capture and describe the complex environmental, economic, and cultural factors that inhibit access to clean water. Important dimensions of the definition of access to water that are commonly ignored or inaccurately captured by survey methodology include the following:

- distance to water sources¹⁹
- number of people using each water point²⁰
- number of trips to fetch water per day²¹ (as many as 23 for women in some countries²²)
- households that use a mix of clean and unsafe water²³

- water quality
- seasonal variation in water access
- improper transportation and storage techniques that result in contamination of water that was clean when it came from the source²⁴

Because of the significant limitations of data and a consensus on definitions, the reported percentage of people who have access to improved water sources is likely overreported or overestimated and should not be used as a standalone indicator of progress.

In rural Malawi, improved water access is provided by two main technologies: boreholes and gravity-fed piped systems. Boreholes provide a cleaner and more stable water source than common shallow, hand-dug wells. They also have relatively cheap upfront costs and work well for dispersed populations. Gravity-fed systems are usually piped from surface water sources to dozens of taps placed in several villages. These systems are relatively expensive to install and manage, so they are typically found only in areas with fairly concentrated populations near surface water sources. A borehole with a hand pump can serve 250 people, while a single gravity-fed system tap (with dozens of taps per system) can provide service for 120 people.²⁵ In rural Malawi, 74% of boreholes compared to 27% of gravity-fed piped systems actually work at any given point in time.²⁶ Because boreholes in rural Malawi are more common and typically more cost-effective than gravity-fed systems, this brief mainly discusses boreholes. However, there are areas in Malawi where gravity-fed systems are more appropriate than boreholes.²⁷

Contributing Factors

Poverty

Malawi is consistently ranked as one of the ten poorest countries in the world based on GDP per capita.²⁸ More than half of the population falls below the poverty line and a quarter is ranked as ultra-poor, meaning they do not have enough food to cover basic caloric needs.²⁹ There is a significant urban-rural poverty divide, with urban poverty at 14% and rural poverty at 43%.³⁰

The relationship between poverty and lack of access to water is cyclical.³¹ Because many Malawians lack resources and skills necessary to develop their water infrastructure, particularly in rural areas, they are left with few options for accessing safe water. Inversely, lack of access to clean water directly impacts a person's economic well-being, causing him or her to miss work or school because of water-related illnesses or the need to spend significant portions of the day fetching water. This is why "poor people [in Malawi] identify lack of access to water as one of the key causes of poverty."³²

Population Growth

Demand for water has risen rapidly because of population increases. This trend will likely continue. Malawi's population has more than quadrupled since 1966,³³ from 4 million people to over 18 million in 2015.³⁴ The 2010 fertility rate was 5.7 children per woman, and "even if the fertility rate declines from the 2010 level of 5.7 to 4.6 by 2020, the population will still grow to 26 million in 2030."³⁵ Additionally, feeding a growing population requires greater supplies of food and charcoal—two natural resources that impact water availability—at a pace that depletes natural resources faster than they can be replenished.

Environment

Current environmental conditions inhibit access to clean water in Malawi. Major environmental issues that affect access to clean water are deforestation, poor farming practices, seasonal water variation, and an unsustainable water supply.

Because trees help retain groundwater and hold topsoil in place (keeping it from polluting surface water)³⁶ deforestation has a significant impact on both water quality and supply. Malawi has the fourth highest deforestation rate in the world.³⁷ In 1990, more than 47% of the country was covered in trees, but by 2010 roughly 17% of the forest had been lost.³⁸ High demand for charcoal made from tree wood, Malawians' primary source of fuel for cooking, is the main cause of the rapid deforestation. Ninety-eight percent of households in rural areas³⁹ and roughly half of the households in urban areas use wood for cooking.⁴⁰ Deforestation also increases the chance of flooding, which further pollutes water sources. The loss of trees also means that forests give off less water vapor. Less water vapor results in less rainfall, further decreasing the amount of both ground and surface water.⁴¹ Sediment pollution, caused by both deforestation and poor farming practices, is the second biggest polluter of unimproved water sources in Malawi.⁴²

Traditional farming techniques cause sediment pollution in water. More than 80% of Malawians are smallholder farmers,⁴³ but because of the high population density and limited arable land, they farm on only 52% of Malawi's land.⁴⁴ Because they have no other space to grow food for their families than on small plots of land, many Malawians over-farm their land, using unsustainable farming methods. The use of poor farming practices is a major cause of erosion.^{45, 46} In these fields, the soil runoff caused by erosion pollutes both surface water and groundwater sources. Additionally, many farmers burn their fields to clear them of crops after harvest. Such burning can have a devastating effect on the quality of nearby water sources. As land use intensifies to meet growing population needs for charcoal and food, so does the resulting erosion and subsequent pollution.

Water availability varies widely depending on the season. In the past 30 years,

rainy seasons in Malawi have become much more intense, causing higher flooding frequencies. Conversely, droughts occur more frequently than in the past, adding significant stress to Malawi's already limited clean water resources. Many experts attribute this dramatic shift in weather patterns to climate change.⁴⁷ Ninety-two percent of Malawians use rainfall-dependent water sources that are seriously impacted by floods and droughts.⁴⁸ During normal dry seasons, the water table can drop substantially.⁴⁹ Add a drought to a regular dry season, with groundwater already seriously depleted, and water sources may be completely dry for months. In places with little surface water, groundwater may never fully recharge after such intense dry periods.⁵⁰

As water usage increases to meet growing population needs, groundwater reserves are also being depleted by human activity.⁵¹ Put simply, groundwater use is outpacing natural groundwater replenishment. Evidence suggests that groundwater may not be able to support increased consumption demands from Malawi's rapidly expanding population in the coming years.⁵²

Sanitation

Poor sanitation practices are a major contributor to water pollution in Malawi. The biggest pollutant in rural water sources is fecal matter.⁵³ In 2015, only 39.8% of people living in rural areas had access to improved latrines.⁵⁴ Because most households in rural Malawi lack money and sanitation training, they often use latrines with cardboard, cloth, or brick walls and a shallow pit or no pit at all. To combat the smell, people pour chemicals into the latrines, including ash, detergent, oil, and wash water. These chemicals and the fecal matter then leach into nearby surface water or groundwater sources, making them unsafe to drink from or bathe in.⁵⁵ Access to clean water cannot be achieved without proper sewage disposal.

Poor storage practices also contaminate water. Researchers found that water collected from clean sources had heavy fecal contamination two hours after collection because of poor storage practices.⁵⁶ Many Malawians do not put a cover on their water when it is being stored at home, allowing for contamination from the air or children dipping their hands in the containers.⁵⁷ Eighty-eight percent of households transferred water from storage containers by dipping dirty cups and bowls into the water.⁵⁸ Additionally, people contaminate water with unwashed hands while lifting water pails.⁵⁹

Consequences

Health

Lack of access to clean water is devastating to health, especially for children. Drinking and using unsafe water has serious, direct health consequences. Approximately 8,800 Malawians, more than half of whom are children under

five years of age, die each year from diarrhea.⁶⁰ In fact, diarrheal disease is the second leading cause of mortality for children under age five, accounting for 18% of their deaths.⁶¹ Roughly 90% of diarrhea deaths are either directly caused by or linked back to lack of access to clean water.⁶² Beyond diarrhea, researchers estimate that 50% of Malawi's population has schistosomiasis, a waterborne parasite contracted by coming into contact with contaminated water.⁶³ Schistosomiasis rates are significantly higher in rural areas than in urban areas, and experts attribute this gap to the disparity in access to water. Other common waterborne diseases in Malawi are typhoid fever, hepatitis A, and hepatitis E.⁶⁴

Unsafe water affects the spread and severity of other diseases as well. A person has much greater chances of getting malaria or other mosquito-borne diseases when she has to collect water from stagnant, polluted water.⁶⁵ Children with diarrhea who also have HIV have death rates 11 times higher than those without HIV because their already compromised immune systems cannot fight diarrhea effectively.⁶⁶

Poor health from lack of access to clean water affects Malawi's economy. Malawi's economy loses an estimated \$43 million per year from premature death because of diarrheal disease and an additional \$12 million per year is lost to health care costs attributed to diarrheal disease alone.⁶⁷

Water collection labor, or the actual act of fetching and carrying water, impacts health. Most women in Malawi transport water on their heads in plastic containers called jerry cans.⁶⁸ These containers usually hold about 19 L (5 gal.) of water, weighing roughly 18 kg (50 lb.).⁶⁹ This labor places significant stress on a person's neck and spine—so much so, that 68% of women who regularly fetch water report spinal pain, and 38% report back pain.⁷⁰ The same research found that people who carry large loads on their heads are more likely to develop early arthritis and have a greater likelihood of sustaining injuries. The more trips a day people take and the longer the distance they travel, the more their bodies are strained by the labor.

Access to clean water improves health. Researchers found that, across sub-Saharan Africa, children of families that live 30 minutes closer to a water source than other families live, have better nutritional status, a 41% decrease in prevalence of diarrhea, and an 11% decrease in mortality in children under the age of five.⁷¹ As previously mentioned, many monitoring and evaluation tools do not take a person's distance from a water point into consideration, meaning an important indicator is missing from data on water access.

Sanitation

People cannot wash their hands properly without access to clean water. Researchers estimate that handwashing before eating and preparing food,

after using the bathroom, and after changing a baby’s diapers could lessen the rates of diarrheal disease by 31–42%.⁷² When a population has limited access to water, water for drinking becomes a top priority and water for sanitation purposes, like handwashing, becomes less important.

Gender

Malawian women perform a disproportionate amount of household labor. This work includes cleaning the house, cooking meals, caring for children, fetching water and doing laundry by hand. A girl’s responsibility to perform these tasks can begin from the age of six, while her male counterparts often remain exempt from these duties.⁷³ This gender gap in responsibility remains consistent from childhood through adulthood for most household tasks, especially fetching water. As shown in figure 1.1, in more than 88% of Malawian households, a woman or girl fetches the water.⁷⁴ Women in Malawi spend significantly more time than men collecting water, with a greater gender gap than other countries in sub-Saharan Africa.⁷⁵ The uneven, gendered division of household labor means that a lack of access to water disproportionately affects women.⁷⁶

Fetching water is time-consuming for women and girls. Not only must women walk to a water source, but they have to wait in water lines, draw water, and carry it home. Malawian women spend more time every day fetching water than on any other task. As shown in figure 1.2, in rural Malawi, women spend roughly 9 times, and girls more than 3 times, as much time fetching both wood and water as their male counterparts.⁷⁷ In areas where women spend less time fetching water, they spend extra time with their children, take advantage of educational opportunities, and increase income-generating activity.⁷⁸

Fetching water can be dangerous for women and girls.⁷⁹ They face the danger of being sexually assaulted on their way to and from water points. The likelihood of being attacked increases with the distance a woman must walk to fetch water and the frequency of trips to water sources.⁸⁰

Education

Lack of access to water impacts a child’s ability to attend school. Although it appears that no data exists for Malawi alone, the UN estimates that throughout the world, children miss more than 272 million school days each year because of water-related illness.⁸¹ Researchers found that 8% of school-age girls and 3%

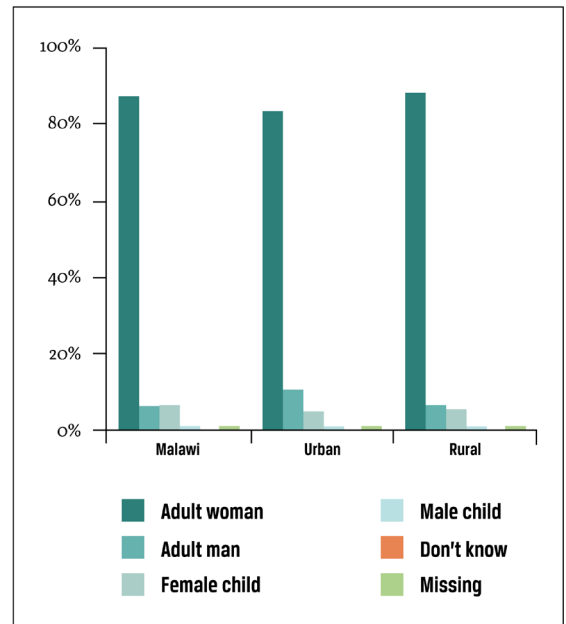


Figure 1.1
Person in Household who Fetches Water

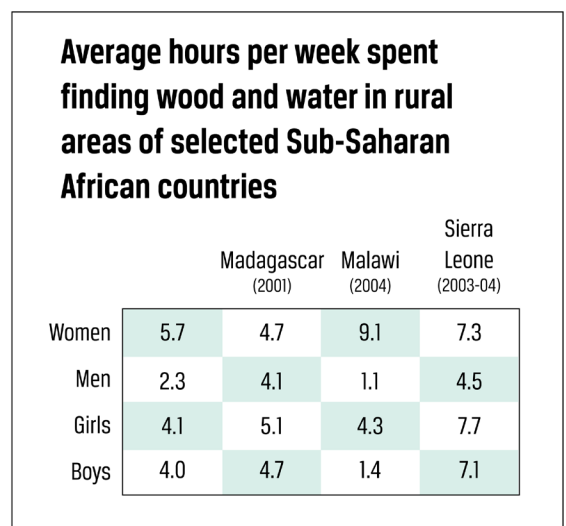


Figure 1.2

of school-age boys in Malawi said they arrived late for school because they were collecting water.⁸² Additionally, school attendance rates were 12% higher for girls living 15 minutes or closer to a water source than for girls living an hour or more away from water.⁸³ Living closer to a water source also positively affected attendance rates for boys, but not as dramatically as for girls.

Children lack access to clean water at school. Nineteen percent of schools in Malawi do not have an improved water source, resulting in students drinking from unimproved sources during the school day.⁸⁴ Because access to clean water is closely related to access to adequate sanitation, many schools without access to clean water also struggle to provide adequate sanitation facilities. Only 4.2% of schools in Malawi have handwashing facilities that include soap, while the rest of the schools provide either inadequate handwashing facilities or none at all.⁸⁵ This is particularly troubling considering the close quarters in which students are held in for much of the day and how rapidly bacteria and communicable illnesses can spread in such environments. Finally, girls who are menstruating have higher absenteeism and dropout rates, which is attributed to a lack of “girl-friendly sanitation facilities in schools.”⁸⁶

Government and corruption

The government has fallen short in its efforts to increase access to water in rural areas. Because the government struggles to manage water resources and infrastructure even in urban areas, it has opted to use a decentralized, community-based water management model. In this model, the central government gives all water management responsibilities to the localized district governments.⁸⁷ Despite this significant responsibility, district water offices receive an average monthly budget of about US\$400 for operational expenses.⁸⁸ That amount barely covers basic expenses like renting an office and maintaining a car. The budget leaves little, if any, money to pay for fuel to make field visits or for monitoring and evaluation activities.⁸⁹ Although lack of resources often becomes the scapegoat for lack of access to water, the lack of skills and professional capability also inhibits access to clean water. In district governments, few personnel have received adequate training on water resource management.⁹⁰

Corruption hinders access to water in Malawi. The World Bank estimates that worldwide, between 20% and 40% of money intended to develop water infrastructure is lost through corruption.⁹¹ Although no aggregate data exists for water-related corruption in Malawi, corruption scandals in the public service and water sectors are common. In late 2016, the European Investment Bank (EIB) called for the Malawian government to repay €18 million (\$20.3 million) after finding evidence of serious corruption involving water projects funded by the EIB.⁹² The investigation found corruption in almost all steps of the water project, including vendor selection, cost estimation, and post-construction management.⁹³

Water corruption affects the poor disproportionately. In Malawi, it is common for politicians or the wealthy to influence water point construction and placement to gain votes.⁹⁴ Such interference means that politically connected areas may have an excess of boreholes, while poorly connected areas have few to none.⁹⁵ Essentially, “the poor ‘don’t have the resources to participate in a corrupt system that relies on bribes’, and therefore ‘lose out in terms of poor water services.’”⁹⁶ Unlike other commodities, there is no unofficial or alternative market where the poor can buy clean water when government systems do not deliver.⁹⁷ Large corruption scandals within the government or non-governmental organizations (NGOs) often lead donors to withdraw their support, causing significant cuts in essential public services, including water services, that disproportionately hurt the poor.⁹⁸

Practices

Note: Sanitation interventions are beyond the scope of this brief, but because of the cyclical relationship, it is important to note that almost any effort to increase access to water should also be accompanied with sanitation interventions.

Borehole Digging

This approach is fairly simple: dig a borehole, usually with an installed hand pump, in a community that has demonstrated need. A variation of the practice involves fixing old water points instead of building new ones.

Impact

No conclusive data exists on the overall impact of borehole digging. There is a lack of aggregate data since the Malawian government and many NGOs built boreholes without coordination or regulation during the late 1990s, when the practice was most popular. During this time, an estimated 10,000 new boreholes were drilled.⁹⁹ However, a 2002 report notes that the significant drilling effort from the previous decade had “not been matched by a proportional improvement in water supply, and more specifically, an improvement in health.”¹⁰⁰ A 2013 study found that at any given point in time, 35% to 50% of rural water systems in Malawi are not functioning.¹⁰¹

Gaps

Borehole construction as an isolated practice is unsustainable and ineffective for the following reasons:

- Many practitioners do not consult experts, like hydrologists and geologists, so many boreholes are not sited, built, or maintained properly.
- Foreign-built water points are difficult to maintain and fix because they use materials and parts that are not available in Malawi.

- Many organizations do not provide maintenance training or materials to locals.
- Communities lack ownership when boreholes are built with no community involvement.
- Providing access to water makes little difference to public health if it is not accompanied by sanitation interventions.

In contrast to building new boreholes, repairing pumps is a fairly resource-conscious way of giving people access to water, but it is still an inadequate practice. Borehole repair can increase access to water only when the pump itself is broken, not when borehole is sited or built poorly. Finally, pump repair cannot help communities that do not have an improved water source.

Community-Based Water Management by Water Point Committee

The “water point committee” approach was developed to fix the problems created by abandoned boreholes. Using this approach, organizations still build boreholes. However, the organization building the water point, typically as a donation or philanthropic endeavor, will choose a council of community members, known as a “water point committee,” who are actively involved in the development and construction of the water point. In best-case scenarios, water points are sited and built with the proper expertise and community input, and a construction manager is onsite during construction for quality control purposes. Committees have sole responsibility for the water point after the organization leaves. Most organizations train their committees, but typically only for a short time. Committee responsibilities include the following:

- Taking either subscription or per-bucket payments from users.
- Maintaining, repairing, and inspecting the water point (or contacting and paying a technician).
- Managing public relations and marketing (for example, if users refuse to pay for water, the committee must educate people on the economic value of using clean water).
- Communicating with government officials (such as reporting on water use to district officials and coordinating visits and water quality tests).

Water for People (WFP), an organization operating in rural Malawi, uses a variation of this practice with three adjustments for effectiveness. First, they group together all the water point committees into “Central Tariff Management Committees.” Each water point committee pays a monthly tariff into a combined account with several other water point committees. If a water point needs repair or additional funding and the committees themselves have not saved enough money yet, a water point committee can borrow from the pooled tariff account.¹⁰² This provides insurance for committees that have not

collected enough money to repair their water point; they can borrow money from the pooled account if necessary.¹⁰³ This system is intended to increase accountability to both collect and save money by requiring committees to deposit a specific amount every month to remain in the group. Additionally, the Central Tariff Management Committee can support and guide water point committees struggling to manage their water point by providing further training and sharing best practices. Second, WFP has created an environment where committees can succeed. WFP developed a framework to train traveling mechanics on how to fix boreholes. WFP distributes spare parts by working with store owners to ensure that parts are kept in regular stock. Third, WFP trains committees to pay water point mechanics for keeping water points working instead of paying them for fixing water points after they have broken down. This change in pay structure provides incentive for preventive instead of reparative maintenance so communities do not lose access to water for months at a time when water points break down.

Impact

Research indicates that community-led water point committees can increase access to water when water points are properly managed.¹⁰⁴ However, the desired impact is achieved only when water point committees have adequate financial and technical skills.¹⁰⁵ Most research about the effectiveness of water point committees is based on observational or anecdotal, but not causal, data.

Additionally, research has shown that these water projects are linked to lower diarrhea prevalence and higher school attendance rates.¹⁰⁶ However, they are usually linked to lower rates of disease only when practices are combined with efforts in the sanitation sector because access to water and proper sanitation practices directly influence each other.

Water for People's variation of water point committees appears to be a best practice for increasing access to water in rural Malawi. Water for People's model received a prestigious endorsement by the Skoll Foundation.¹⁰⁷ The government of Malawi has endorsed different aspects of WFP's model and adopted it in districts WFP cannot yet reach. Although better data is needed to make stronger claims about their effectiveness, WFP has developed one of the most comprehensive methods for collecting data on water access. They have collected good data since 2011, but because they have been refining their methodology, the data is not yet useful for demonstrating impact. Note that Water for People's model is more advanced than the basic approach, so their impact data cannot be used as evidence of impact or effectiveness for other water point committee approaches.

Gaps

While water point committees as a means of community-based water management is the current best practice to provide access to clean

water in Malawi and in much of sub-Saharan Africa, the practice should not be considered a long-term solution to water access problems. Community-based water management developed specifically as a response to an ineffective, resource-strapped government. Experts argue that outsourcing water management to rural communities with even fewer resources and management skills than the government causes political underdevelopment because it decreases the government's accountability to their citizens.^{108, 109} Completely decentralized community-based water management, particularly in areas where most of the population lacks resources and management skills, is not sustainable or effective and "cannot substitute for a functioning, effective state."¹¹⁰

Additional gaps include the following:

- The people who select and train the management groups usually know little about the communities receiving aid and their sociocultural dynamics, so the makeup of water point committees often does not represent the communities well.
- Water point committee training is generally ineffective and inadequate, leaving committees ill-equipped to manage water resources.
- Many Malawians do not view water as an economic good. As a result, water point committees hesitate to charge for improved water sources because community members are not accustomed to paying for water.¹¹¹
- Practitioners often assume that the poor are altruistic and honest, leaving committees and their funds vulnerable to corruption.
- Many NGOs fail to set up effective monitoring and evaluation systems, so they do not follow up on committees after water point construction.
- Men typically hold the decision-making positions on a committee, even when women make up the majority of committee members.¹¹²
- Most organizations do not focus on the areas of greatest need, but instead focus on where they have connections. Some experts believe that efforts could be more impactful if practitioners focused on areas with the biggest water-related problems.¹¹³

In summary, expecting ill-equipped communities to manage water sources organized by people who do not understand Malawians is a short-term way to help rural Malawians have access to water. It should not be considered a long-term solution.

Accurate Monitoring and Evaluation

As mentioned above, the lack of accurate and complete data on access to water in Malawi is a significant gap in improving the issue. Many effective technology-based water evaluation tools have been developed in recent years. These tools enable easier data tracking and storing than other systems,

but do not all collect a comprehensive set of indicators that accurately track the different factors that impact access to water. Water for People has developed a comprehensive set of metrics that covers important facets of access to water. WFP uses a cell phone app to monitor water sources. The system records metrics, including GPS location, without requiring cell phone service. The organization's main indicators include the following:

- Presence of an improved water point or water system
- Number of users per water point meets standards
- Percent of community with access to an improved water point or system
- Amount of drinking water available (enough for every day of the year)
- Number of days system was down in the last 30 days
- Current problems with the water point system
- Quantity of water available meets standards
- Quality of water meets standards
- Water available on day of visit
- Time required to collect water meets standards

Impact

No conclusive data exists on the impact of improved metrics on access to water. In fact, no conclusive data can exist on the impact of improved metrics on access to water without metrics themselves. Since [insert first year], Water for People has been refining its metrics to provide an accurate picture of water access. These changes mean that some improvements in access to water appear to have declined, although the indicators and measurement have simply become more accurate.

Gaps

This gap is not unique to water issues in Malawi. Collecting adequate and accurate data is time-consuming and can be expensive everywhere. In other areas, data collection and analysis usually takes several years to fully understand trends and impact, and then even more time to adjust practices accordingly.

Water Sector Capacity Development

Capacity development is the training and building of institutional ability to achieve goals and meet standards and is an effective and sustainable way to influence rural water management through district governments.

A UN impact evaluation names capacity development as one of the most important ways to increase access to water in Malawi.¹¹⁴ Institutions involved in this practice are not trying to sidestep or control the government, but rather work with and for the government to provide additional resources and help it efficiently manage its own resources. Usually, the institutions that work on capacity development do so to help the government eventually transition to integrated water resource management (IWRM). IWRM is a coordinated, multidisciplinary approach to managing water resources in an area in a way that protects human rights and the environment.¹¹⁵ IWRM is a common approach to water management throughout the world.¹¹⁶ Although Malawi has an integrated water resource management plan, the country lacks the resources, skills, and infrastructure to implement it.^{117, 118} Working to transform the government is an integral part of any intervention intended to scale and spread change in the water sector to all of Malawi.

Capacity development, especially at the district level, is a core part of Water for People's model. Because it partners so closely with the government, it indirectly builds government capacity. The organization aims to "provide technical, financial, and strategic support to districts and municipalities around the world and [bring] over the principles of success, such as cost recovery, finance, long-term planning, and support systems, to communities."¹¹⁹ WFP's willingness to coordinate efforts with an inefficient and sometimes corrupt government has allowed the organization to build trust with the government and help build capacity to manage water resources.

WASH Catalysts, an offshoot from Engineers Without Borders, has developed a unique fellowship program for individual district-level governments.¹²⁰ The group requires district-level governments to apply to this fellowship with an innovative idea for water service delivery within their specific resource constraints. WASH Catalysts then helps those governments develop and implement the new ideas. WASH Catalysts also has an advocacy campaign to convince the national government to increase district government water budgets.¹²¹

Impact

Although a great deal of qualitative research points to the need for capacity development in Malawi's water sector,¹²² no quantitative or causal research exists that signifies impact for current practices. Water for People does not appear to have any impact evidence specifically related to capacity development. WASH Catalysts published a report explaining outcomes of its program in various districts across Malawi.¹²³ The report provides interesting and detailed descriptive anecdotal data about the innovations districts have developed with WASH Catalyst's partnership. Note, however, that WASH Catalysts uses data mainly to illustrate short-term outcome variables instead of long-term impact on local access to water.

Gaps

Capacity development may feel indirect because supporting local governments and management efforts will not immediately increase the amount of water points. Both the nature of the practice and the differing needs and human capacity in district governments make impact measurement difficult.

Key Takeaways

- Lack of access to clean water affects almost every aspect of a person's life in significant ways, but especially the lives of women and children.
- Measurements of access to water are often deceiving and paint a limited or inaccurate picture of actual access.
- Building a water point and appointing a water point management committee are the most common methods of addressing the problem, but both are unsustainable because unattended water points typically break down quickly and most management committees are poorly trained.
- To sustainably increase access to clean water, people should not just create new water points; they should work to build both local water management capacity and aid the government's transition towards integrated water resource management.

Additional Resources

Videos

[A borehole that lasts for a lifetime](#)

Rural Water Supply Network, May 2015

[Drilling: the importance of good borehole siting](#)

Rural Water Supply Network, May 2015

Articles

[Drilling Deep in Sub-Saharan Africa](#)

Water & Wastewater International

[A Hidden Crisis: strengthening the evidence base on the sustainability of rural groundwater supplies – results from a pilot study in Uganda](#)

Natural Environment Research Council, British Geological Survey

(Study from Uganda exploring the causes of water point failure)

[Nine technologies we love](#)

WaterAid (Comparison of common ways to get water)

[*Integrated Water Resources Management in Action*](#)

The United Nations World Water Assessment Programme

(In-depth explanation of integrated water resources management)

[*The management Committees and users Associations of water resources. Role, operation, tools, advantages and disadvantages*](#)

WikiWater

(Detailed outline of water point committees and WUAs)

[*Sustainability of Community Based Water Management in Mulanje District, Malawi*](#)

Journal of Basic and Applied Scientific Research

(Best practices and pitfalls of water point committees)

[*The Political Economy of Community Management: A Study of Factors*](#)

[*Influencing Sustainability in Malawi's Rural Water Supply Sector*](#)

University of Birmingham

(Full critique of community-based water management)

[*Water Aid Technology Briefs*](#)

[*About Corruption and Transparency in the Water and Sanitation Sector*](#)

IRC International Water and Sanitation Centre

(Potential solutions to corruption in the water sector)

Endnotes

- 1 Erich Baumann and Kerstin Danert, “Operation and Maintenance of Rural Water Supplies in Malawi,” Swiss Resource Centre and Consultancies for Development (December 2008): 4, http://www.rural-water-supply.net/_ressources/documents/default/2o8.pdf.
- 2 Commonwealth Local Government Forum, “Malawi: Country Profile,” accessed August 4, 2017, http://www.clgf.org.uk/default/assets/File/Country_profiles/Malawi.pdf.
- 3 WaterAid, “Gravity-fed Schemes Technical Brief” (January 2013), <http://www.wateraid.org/uk/what-we-do/our-approach/technologies>.
- 4 “Groundwater Glossary,” The Groundwater Foundation, accessed May 15, 2017, <http://www.groundwater.org/get-informed/basics/glossary.html>.
- 5 “Drinking Water,” WHO/UNICEF Joint Monitoring Programme for for Water Supply and Sanitation, accessed September 7, 2017, <https://washdata.org/monitoring/drinking-water>.
- 6 *Drinking Water*, World Health Organization, accessed August 4, 2017, http://www.who.int/water_sanitation_health/monitoring/water.pdf.
- 7 Jan Hassing, Niels Ipsen, Torkil Jønch Clausen, Henrik Larsen, and Palle Lindgaard-Jørgensen, *Integrated Water Resources Management In Action*, United Nations World Water Assessment Programme (2009), <http://unesdoc.unesco.org/images/0018/001818/181891E.pdf>.
- 8 “A framework for the development of smallholder farmers through Cooperatives development,” Department of Agriculture, Forestry and Fisheries of the Republic of South Africa (July 2012), [http://www.nda.agric.za/doaDev/sideMenu/cooperativeandenterprisedevelopment/docs/FRAME-WORK-%20OF%20SMALL%20FARMERS%20\(2\).pdf](http://www.nda.agric.za/doaDev/sideMenu/cooperativeandenterprisedevelopment/docs/FRAME-WORK-%20OF%20SMALL%20FARMERS%20(2).pdf).
- 9 Ibid.
- 10 Ibid.
- 11 “Water point,” Oxford Living Dictionaries, accessed May 15, 2017, https://en.oxforddictionaries.com/definition/water_point.
- 12 “Water table,” Collins English Dictionary, accessed December 4, 2017, <https://www.collinsdictionary.com/us/dictionary/english/water-table>.
- 13 Office of the High Commissioner for Human Rights, “General Comment No. 15: The Right to Water,” United Nations Human Rights (January 2003), <http://www.refworld.org/pdfid/4538838d11.pdf>.
- 14 Ibid.
- 15 *The Human Right to Water and Sanitation*, UN-Water Decade Programme on Advocacy and Communication and Water Supply and Sanitation Collaborative Council, accessed August 4, 2017, http://www.un.org/waterforlifedecade/pdf/human_right_to_water_and_sanitation_media_brief.pdf.
- 16 Malawi National Statistical Office, *Malawi Demographic and Health Survey 2010* (September 2011), <https://dhsprogram.com/pubs/pdf/FR247/FR247.pdf>.
- 17 “Charles Banda,” Ashoka, accessed May 15, 2017, <https://www.ashoka.org/en/fellow/charles-banda>.
- 18 “AQUASTAT—FAO’s Information System on Water and Agriculture,” Food and Agriculture Organization of the United Nations, 2016, http://www.fao.org/nr/water/aquastat/countries_regions/MWI/.
- 19 UNICEF Malawi, *Annual Report 2014* (November 2015), https://www.unicef.org/malawi/MLW_resources_annualreport2014.pdf.
- 20 Ibid.
- 21 Bimla, Sudesh Gandhi, Mamta Dilbaghi, and Kusum Raina, “Rural Women Carry the Load of Fetching Water,” *Indian Journal of Social Work* 64, no. 1 (January 2003): 65–75.
- 22 Jay P. Graham, Mitsuaki Hirai, and Seung-Sup Kim, “An Analysis of Water Collection Labor among Women and Children in 24 Sub-Saharan African Countries,” *PLoS ONE* 11, no. 6 (June 2016), doi: [10.1371/journal.pone.0155981](https://doi.org/10.1371/journal.pone.0155981).
- 23 Mtafu A. Zeleza Manda, *Water and sanitation in urban Malawi: Can the Millennium Development Goals be met? A study of informal settlements in three cities* (London: Methuen, 2009), <https://books>.

[google.com/books?id=-KnEhFyRzKwC&pg=PA39&lpg=PA39&dq=water+consumption+in+malawi&source=bl&ots=NwZoMkLaj&sig=-60J-w3gnJr8vA2P3HlKokoPAVM&hl=en&sa=X&ved=0ah-UKewjwhpPn6erTAhXrxVQKHbzjBuk4ChDoAQhBMAG#v=onepage&q=water%20consumption%20in%20malawi&f=false](https://books.google.com/books?id=-KnEhFyRzKwC&pg=PA39&lpg=PA39&dq=water+consumption+in+malawi&source=bl&ots=NwZoMkLaj&sig=-60J-w3gnJr8vA2P3HlKokoPAVM&hl=en&sa=X&ved=0ah-UKewjwhpPn6erTAhXrxVQKHbzjBuk4ChDoAQhBMAG#v=onepage&q=water%20consumption%20in%20malawi&f=false).

- 24 Jim Wright, Stephen Gundry, and Ronan Conroy, "Household drinking water in developing countries: a systematic review of microbiological contamination between source and point-of-use," *Tropical Medicine and International Health* 9, no. 1 (January 2004): 106–117, doi: 10.1046/j.1365-3156.2003.01160.x.
- 25 Baumann and Danert, *Operation and Maintenance of Rural Water Supplies in Malawi*, 4.
- 26 Ellie Chowns, *Community management in Malawi: part of the sustainability problem, not the solution*, (November 2016), https://rwsnforum7.files.wordpress.com/2016/11/full_paper_0164_submitter_0251_chowns_eleanor.pdf.
- 27 David Hansen, *Statistical Bulletin Malawi: Water*, Human Sciences Research Council (July 2010), <http://www.hsrc.ac.za/en/research-data/ktree-doc/10997>.
- 28 "The World Factbook," United States Central Intelligence Agency, accessed August 4, 2017, <https://www.cia.gov/library/publications/the-world-factbook/rankorder/2004rank.html>.
- 29 Food and Agriculture Organization of the United Nations, *Malawi—Country Fact Sheet on Food and Agriculture Policy Trends* (March 2015), <http://www.fao.org/3/a-i4491e.pdf>.
- 30 Maxwell Mkondiwa, Charles B.I. Jumbe, and Kenneth A. Wiyo, "Poverty—Lack of Access to Adequate Safe Water Nexus: Evidence from Rural Malawi," *African Development Review* 25, no. 4 (2013) : 537–50, doi: 10.1111/1467-8268.12048.
- 31 Ibid.
- 32 Ibid.
- 33 Malawi Department of Population and Development, *Why Population Matters to Malawi's Development: Managing Population Growth for Sustainable Development*, accessed May 15, 2017, <http://www.prb.org/pdf12/malawi-population-matters.pdf>.
- 34 "Population, Total," World Bank Data, accessed August 4, 2017, <http://data.worldbank.org/indicator/SP.POP.TOTL?locations=MW>.
- 35 Malawi Department of Population and Development, *Why Population Matters*.
- 36 "Soil Erosion and Degradation," *World Wildlife Fund*, accessed May 12, 2017, <https://www.worldwildlife.org/threats/soil-erosion-and-degradation>.
- 37 Maston Kaiya and Mirriam Banda, "Malawi ranked first in SADC deforestation rate," MANA Online, May 2015, <http://www.manaonline.gov.mw/index.php/national/environment/item/2939-malawi-ranked-first-in-sadc-deforestation-rate>.
- 38 "Malawi Forest Information and Data," Mongabay.com, accessed May 16, 2017, <http://rainforests.mongabay.com/deforestation/2000/Malawi.htm>.
- 39 "Malawi State of Environment and Outlook Report," Malawi Government Ministry of Natural Resources, Energy and Environment (2010), http://www.unpei.org/sites/default/files/e_library_documents/Malawi%20State%20of%20the%20Environemnt%20and%20Outlook%20Report_2010.pdf.
- 40 Karen Sanje, "Malawi deploys military to protect its Fast-Dwindling Forests," *Reuters*, March 20, 2017, <http://www.reuters.com/article/us-malawi-deforestation-military-feature-idUSKBN16SooT>.
- 41 Sanje, "Malawi deploys military."
- 42 M. Pritchard, T. Mkandawire, and J. G. O'Neill, "Groundwater Pollution in Shallow Wells in Southern Malawi and a Potential Indigenous Method of Water Purification," *Appropriate Technologies for Environmental Protection in the Developing World* (2007): 169–179.
- 43 "Agriculture and Food Security," *USAID*, accessed August 1, 2017, <https://www.usaid.gov/malawi/agriculture-and-food-security>.
- 44 "Malawi," *Worldstat.info*, accessed May 16, 2017, <http://en.worldstat.info/Asia/Malawi/Land>.
- 45 "Soil and Land," *Malawi Environment: State of Environment Report for Malawi (1998)*, Malawi Sustainable Development Network Programme (1998), http://www.sdn.org.mw/enviro/soe_report/chapter_3.html.
- 46 Len Reynolds, "Malawi," Food and Agriculture Organization of the United Nations, October 2000, <http://www.fao.org/ag/agp/agpc/doc/counprof/malawi.htm>.
- 47 John Magrath and Elvis Sukali, "The Winds of Change: Climate Change, Poverty and the Envi-

ronment in Malawi,” *Oxfam International* (2009), https://www.oxfam.org/sites/www.oxfam.org/files/file_attachments/rp-winds-of-change-malawi-0906_3.pdf.

48 “Malawi Climate Change Case Study,” *Troicare*, accessed August 4, 2017, <https://www.troicare.org/sites/default/files/resources/policy/malawi-climate-change-case-study.pdf>.

49 “Groundwater Glossary,” *The Groundwater Foundation*, accessed May 15, 2017, <http://www.groundwater.org/get-informed/basics/glossary.html>.

50 “Climate Change Adaptation in MALAWI,” *USAID*, accessed May 16, 2017, https://www.climatelinks.org/sites/default/files/asset/document/malawi_adaptation_fact_sheet_jan2012.pdf.

51 “Groundwater Glossary.”

52 Nick Robins, Jeff Davies, and John Farr, “Groundwater renewable resource versus demand: ‘good news’ or ‘bad news’ for rural communities?,” *Waterlines* 32, no. 3 (2013): 243–253, doi: 10.3362/1756-3488.2013.025.

53 Pritchard, Mkandawire, and O’Neill, “Groundwater Pollution,” 169–179.

54 “Improved sanitation facilities, rural (% of rural population with access),” The World Bank, 2017, <http://data.worldbank.org/indicator/SH.STA.ACSN.RU?locations=MW>.

55 Anthony Martin Grimason, K. Davison, K.C. Tembo, and M. H. Jackson, “Problems associated with the use of pit latrines in Blantyre, Republic of Malawi,” *Journal of the Royal Society for the Promotion of Health* 120, no. 3 (September 2000): 175–182, doi: 10.1177/146642400012000307.

56 Manda, *Water and Sanitation in Malawi*.

57 Ibid.

58 Ibid.

59 Ibid.

60 Water and Sanitation Program, “Economic Impacts of Poor Sanitation in Africa,” March 2012, <https://www.wsp.org/sites/wsp.org/files/publications/WSP-ESI-Malawi.pdf>.

61 UNICEF Malawi, *Annual Report 2014*.

62 “Children Dying Daily Because of Unsafe Water Supplies and Poor Sanitation and Hygiene, UNICEF Says,” *UNICEF*, March 22, 2013, https://www.unicef.org/media/media_68359.html.

63 “Schistosomiasis Fact Sheet,” *World Health Organization*, January 2017, <http://www.who.int/mediacentre/factsheets/fs115/en/>.

64 UNICEF Malawi, *Annual Report 2014*.

65 Manda, *Water and Sanitation in Malawi*.

66 *Diarrhea: Common Illness, Global Killer*, Centers for Disease Control and Prevention, accessed August 4, 2017, <https://www.cdc.gov/healthywater/pdf/global/programs/globaldiarrhea508c.pdf>.

67 Water and Sanitation Program, “Economic Impacts of Poor Sanitation.”

68 Vicky Hallett, “Millions of Women Take A Long Walk with A 40-Pound Water Can,” *NPR*, July 7, 2016, <http://www.npr.org/sections/goatsandsoda/2016/07/07/484793736/millions-of-women-take-a-long-walk-with-a-40-pound-water-can>.

69 Ibid.

70 Jo-Anne Geere, Paul R. Hunter, and Paul Jagals, “Domestic water carrying and its implications for health: a review and mixed methods pilot study in Limpopo Province, South Africa,” *Environmental Health* 9, no. 52 (2010), doi: 10.1186/1476-069X-9-52.

71 Amy J. Pickering and Jennifer Davis, “Freshwater Availability and Water Fetching Distance Affect Child Health in Sub-Saharan Africa,” *Environmental Science & Technology* 46, no. 4 (2012): 2391–2397, doi: 10.1021/es203177v.

72 “National Hand Washing Campaign 2011–2012,” Malawi Ministry of Health, October 2011, <http://www.healthpromotion.gov.mw/index.php/2013-08-12-12-52-31/2013-08-12-12-52-32/policies-strategies?download=10:wash-national-hand-washing-campaign-strategy-2011-2012>.

73 Carol A. Minton and J. David Knottnerus, “Ritualized Duties: The Social Construction of Gender Equality in Malawi,” *International Review of Modern Sociology* 34, no. 2 (2008): 181–210, <http://www.jstor.org/stable/41421678>.

74 Malawi National Statistical Office, *Malawi Demographic and Health Survey*.

75 United Nations Development Programme, *Sustainability and Equity: A Better Future for All*, 2011,

- 58, <http://hdr.undp.org/en/content/sustainability-and-equity-better-future-all>.
- 76 Minton and Knottnerus, “Ritualized Duties: Gender Equality.”
- 77 UN Development Programme, *Sustainability and Equity*, 58.
- 78 Vicky Hallet, “Women Take a Long Walk.”
- 79 Manda, *Water and Sanitation in Malawi*.
- 80 Marni Sommer, Suzanne Ferron, Sue Cavill, and Sarah House, “Violence, gender and WASH: spurring action on a complex, under-documented and sensitive topic,” *Environment and Urbanization* 27, no. 1 (2014): 105–116, doi: 10.1177/0956247814564528.
- 81 “Lack of safe water and sanitation in schools affects children’s learning—and their lives,” UNICEF, April 5, 2010, https://www.unicef.org/media/media_53234.html.
- 82 Gina Porter, Kate Hampshire, Albert Abane, Alister Munthali, Elsbeth Robson, Mac Mashiri, Augustine Tanle, Goodhope Maponya, and Sipho Dube, “Child Porterage and Africa’s Transportation Gap: Evidence from Ghana, Malawi, and South Africa,” *World Development* 40, no. 10 (October 2012): 2136–2154, <https://doi.org/10.1016/j.worlddev.2012.05.004>.
- 83 United Nations Development Programme, *Human Development Report 2006—Beyond scarcity: Power, poverty, and the global water crisis* (New York: United Nations Development Programme, 2006): 45, <http://www.undp.org/content/dam/undp/library/corporate/HDR/2006%20Global%20HDR/HDR-2006-Beyond%20scarcity-Power-poverty-and-the-global-water-crisis.pdf>.
- 84 “The state of water, sanitation and hygiene in Malawian primary schools,” UNICEF Malawi, March 18, 2010, https://www.unicef.org/malawi/media_7140.html.
- 85 “Water and Sanitation,” UNICEF Malawi, accessed May 17, 2017, https://www.unicef.org/malawi/media_7140.html.
- 86 “Issue,” UNICEF Malawi, accessed May 17, 2017, https://www.unicef.org/malawi/wes_3975.html.
- 87 Sydney Byrns and Genevieve Hughes, “Making systems work: Local government approaches to improving WASH service delivery in Malawi” (paper presented at the 7th Rural Water Supply Network Forum “Water for Everyone,” Abidjan, Cote d’Ivoire, 29 November–2 December 2016), https://rwsnforum7.files.wordpress.com/2016/11/full_paper_o223_submitter_o283_byrns_sydney.pdf.
- 88 Ibid.
- 89 Eleanor Elizabeth Chowns, “The Political Economy of Community Management: A Study of Factors Influencing Sustainability in Malawi’s Rural Water Supply Sector” (doctoral thesis, University of Birmingham, 2014), <http://etheses.bham.ac.uk/5014/1/Chowns14PhD.pdf>.
- 90 Government of Malawi: Ministration of Irrigation and Water Development, *Integrated Water Resources Management and Water Efficiency (IWRM/WE) Plan*, August 2007, <http://www.gwp.org/globalassets/global/toolbox/about/iwrm/africa/malawi-iwrm-and-water-efficiency-plan.pdf>.
- 91 Kenneth Odiwuor, “In Africa, corruption dirties the water,” *Irin News*, March 14, 2013, <http://www.irinnews.org/analysis/2013/03/14>.
- 92 Charles Mpaka, “Corruption in Malawi,” *The Times*, September 17, 2016, <http://www.times.mw/corruption-in-malawi/>.
- 93 Ibid.
- 94 Baumann and Danert, *Operation and Maintenance of Rural Water Supplies in Malawi*, 4.
- 95 Hansen, *Statistical Bulletin Malawi: Water*, 1.
- 96 Odiwuor, “In Africa, corruption dirties the water.”
- 97 Ibid.
- 98 Ibid.
- 99 Joseph DeGabriele, *Improving Community Based Management of Boreholes: A Case Study from Malawi*, University of Wisconsin-Madison (March 2002), http://pdf.usaid.gov/pdf_docs/Pnacp702.pdf.
- 100 DeGabriele, *Improving Community Based Management*.
- 101 Mkondiwa et al., “Poverty—Lack of Access.”
- 102 “Malawi,” Water for People, accessed September 15, 2017, <https://www.waterforpeople.org/where-we-work/malawi>.
- 103 Ibid.
- 104 Swithern Matamula, “Community Based Management for Sustainable Water Supply in

- Malawi” (paper presented at the 33rd WEDC International Conference, Accra, Ghana, 2008).
- 105 Ellie Chowns, “IS COMMUNITY MANAGEMENT AN EFFICIENT AND EFFECTIVE MODEL OF PUBLIC SERVICE DELIVERY? LESSONS FROM THE RURAL WATER SUPPLY SECTOR IN MALAWI” Public Administration and Development, 2015, <http://onlinelibrary.wiley.com/doi/10.1002/pad.1737/full>.
- 106 Robert Dreibelbis, Matthew C. Freeman, Leslie E. Greene, Shadi Saboori, and Richard Rheingans, “The Impact of School Water, Sanitation, and Hygiene Interventions on the Health of Younger Siblings of Pupils: a Cluster-Randomized Trial in Kenya,” *American Journal of Public Health* 104, no. 1 (2014): 91–97, doi:10.2105/AJPH.2013.301412.
- 107 “Water for People,” Skoll Foundation, accessed September 17, 2017, <http://skoll.org/organization/water-for-people/>.
- 108 Ibid.
- 109 Peter G. McCornick and Douglas J. Merrey, “Water Users & Their Relevance to Water Governance in Sub-Saharan Africa” (paper presented at the Water District Management & Governance Conference, San Diego, California, March 20–April 2, 2005), <http://publications.iwmi.org/pdf/Ho38821.pdf>.
- 110 Chowns, “The Political Economy of Community.”
- 111 W. Mulwafu, C. Chipeta, G. Chavula, A. Ferguson, B.G. Nkhoma, and G. Chilima, “Water Demand Management in Malawi: Problems and Prospects for its Promotion” (paper presented at the WaterNet/Warfa Symposium “Water Demand Management for Sustainable Development,” Dar es Salaam, Tanzania, October 30–31, 2002), <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.547.6970&rep=rep1&type=pdf>.
- 112 Khumbo Kalulu, Zvikomborero Hoko, Save Kumwenda and Aloyce Mayo, “Sustainability of Community Based Water Management in Mulanje District, Malawi,” *Journal of Basic and Applied Scientific Research* 2, no. 3 (2012): 2481–2488, [https://www.textroad.com/pdf/JBASR/J.%20Basic.%20Appl.%20Sci.%20Res.%202\(3\)2481-2488.%202012.pdf](https://www.textroad.com/pdf/JBASR/J.%20Basic.%20Appl.%20Sci.%20Res.%202(3)2481-2488.%202012.pdf).
- 113 James Willard, “Using Project-Level Information to Determine Impact: A Closer Look at Malawi’s Aid,” AidData, March 26, 2014, <http://aiddata.org/blog/using-project-level-information-to-determine-impact-a-closer-look-at-malawis-aid>.
- 114 “2016 Malawi: Evaluation of the Water and Sanitation (WASH) Programme in Malawi (2007–2013),” UNICEF, accessed 17 September 2017, https://www.unicef.org/evaldatabase/index_93025.html.
- 115 Hassing et al., *Integrated Water Resources Management*.
- 116 Ibid.
- 117 Theresa W.Mkandawire and Wapulumuka O. Mulwafu, “An analysis of IWRM capacity needs in Malawi,” *Physics and Chemistry of the Earth, Parts A/B/C*, 31, nos. 15–16 (2006): 738–744, doi:10.1016/j.pce.2006.08.034.
- 118 Government of Malawi, *IWRM/WE Plan*.
- 119 Ned Breslin and Marcia Lacey, “Up Close With Ned Breslin and Marcia Lacey: Bringing Water to the World,” *Journal (American Water Works Association)* 104, no. 5 (May 2012): 43–49.
- 120 “WASH Catalysts,” Engineers Without Borders, accessed September 15, 2017, <https://www.ewb.ca/en/venture/wash-catalysts/>.
- 121 Ibid.
- 122 “Evaluation of the Water and Sanitation (WASH) Programme in Malawi.”
- 123 Sydney Byrns and Genevieve Hughes, “Making systems work: Local government approaches to improving WASH service delivery in Malawi” (paper presented at the 7th Rural Water Supply Network Forum “Water for Everyone,” Abidjan, Cote d’Ivoire, 29 November–2 December 2016), https://rwsnforum7.files.wordpress.com/2016/11/full_paper_o223_submitter_o283_byrns_sydney.pdf.