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Residents of Wita, a small rural community three hours south of Addis Ababa, Ethiopia's capital, examine infrastructure that will be used to improve the reliability of their water supply. Photo credit: Triple Bottom Line (3BL) Enterprises

Can Mobile Tech Lower the Cost of Household Water in Rural Ethiopia?

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The wait for water sometimes felt endless. "When the water point, pump, and generator faced difficulty, it took a long time to fix," recalls Feleke Abera, a resident of Wita, a rural *kebele* (village) in south-central Ethiopia. "Sometimes it took up to three months."

During these stretches, obtaining enough water to meet daily needs for Feleke's household became an endurance contest. "We queued up two to three hours to get water," he recalls — and even that wasn't enough. "We were getting water by shift, so the supply of water was not compatible with our demand."

Today, the situation is much improved, and access to safe water has become more reliable. For the past few years, Feleke and his neighbors have been quietly experimenting with a water supply improvement effort that may one day become a revolu-

tionary solution for water-stressed rural communities across Ethiopia and beyond.

The concept driving this innovative pilot project is relatively straightforward: Harness the power of community engagement and mobile technology to guide the construction, operation, and maintenance of water supply infrastructure to lower costs for consumers and bring safe, piped water directly into their homes. Sound ambitious?

Well, it is. But the reduced water anxiety Wita residents have been experiencing these days suggests the creative minds and software designers behind this water-supply model, known as Flowius, may be on to something. Already, thanks to support from USAID's Development Innovation Ventures (DIV), Flowius has facilitated the installation of about 25 kilometers of water pipes throughout the community, connecting some 500 households to a water distribution system, with each home paying about $50 to connect to the system.

In Wita, 600 community households have become active participants and partners in the implementation of Flowius to reduce the time and effort required to obtain water. Created by Triple Bottom Line (3BL) Enterprises with support from USAID DIV, which seeks to invest in evidence-based innovations with the potential to make an impact at scale, Flowius relies upon robust community engagement, as well as proactive infrastructure maintenance and wireless technology.

Rural Areas Face Unique Water Challenges

Rural areas often face different water-supply challenges than cities. Funding, constructing, and maintaining water infrastructure is more difficult to achieve in areas that are sparsely populated, and therefore, clean water piped directly into the home becomes a luxury available only to those with financial means. Too often, rural households must rely on unsafe surface water sources, such as lakes or rivers or polluted wells to meet their daily needs.

"In most rural areas, women typically spend a lot of time and energy fetching and carrying water for their household needs," points out Kathrin Tegenfeldt, USAID/Ethiopia's Climate and Water Advisor. "By having water available at the household, when the family needs it, we would expect an increase in positive hygiene behaviors as well as to see the impact time savings has on women and girls."

The mind behind Flowius is 3BL Cofounder Chris Turnbull-Grimes, who moved to Ethiopia in 2015 to focus on rural water supply improvements. The country, he says, provides an excellent testing ground for the Flowius concept and model because not only do nearly 80 percent of Ethiopia's more than 100 million people live in rural areas, the government also has the geographic reach and ambition to aggressively combat rural water insecurity. "Since we are building micro-utilities, we need to partner with governments wherever we go," he says. "Since Ethiopia has a much stronger government presence across the country than most others in the region, it will allow us to build our reputation through existing government linkages."

The Government of Ethiopia's long-term strategic objectives for improving water, sanitation, and hygiene (WASH) access under the OneWASH National Program, launched in 2013, also help create a political environment at the national and local

levels conducive to Flowius' implementation. This "allows us to have the security of a standard to which we can operate by as we aim to grow," Turnbull-Grimes says.

"We only work in communities with existing infrastructure," says Turnbull-Grimes, which might ideally include either an existing borehole, or a spring with a storage tank that can facilitate distribution of water to nearby public taps. Wita met those criteria, and the community's homes are also located close enough to facilitate one of the core components of the Flowius model — linking existing infrastructure to area homes via newly laid pipes.

A Community Affair: In Pursuit of "Radically Affordable" Water

The resulting hybrid system, which combines pre-existing infrastructure with new infrastructure, is community-owned. "Since the communities we work with end up owning the water systems we build, we avoid a question of ownership between our systems and theirs," says Turnbull-Grimes. Training the community to operate and fix the system as needed fuels further community buy-in.

"By developing locally managed, affordable solutions that include a focus on operations and maintenance, we are supporting communities to take ownership over managing their water supply needs," says Tegenfeldt.

Beyond piping water into homes, the Flowius model appeals to cash-strapped households because it significantly reduces water costs. "The biggest issue for most community infrastructure projects is the often overwhelming cost," says Turnbull-Grimes.

After earlier stints working on rural water supply projects in El Salvador and Kenya, he "began to understand that people just want water in their homes — and they are willing to pay to get it there."

Once implemented, the Flowius model supports a "medium level" of water service delivery that is not necessarily as convenient as the "unlimited level of water supply seen in most cities and towns," he says, but far more convenient than the only option that exists today for many — walking to a distant surface water source or well. To ensure supply meets demand, "we work with communities to determine the amount of water that they'll typically need, and limit the amount of daily supply that each home gets, allowing for a certain amount of flexibility between homes and the inevitable need for variations in demand over time. This allows us to drastically reduce the size of our infrastructure and pass those cost savings along to the customer."

Harnessing the Power of Mobile Technology

3BL's four interconnected mobile apps have helped lay the groundwork for Flowius' success and set the project apart from other rural water supply initiatives. Customized for use in Ethiopia, the apps are accessed via mobile phone and "provide a dramatic improvement on existing methodologies and tools," Turnbull-Grimes says. But with the exception of smartphone-equipped members of the local WASH committee, community households do not typically use the apps, since smartphones

remain relatively rare. Instead, he says, "our rurally-based franchises will be provided smartphones and trained on using our full suite of mobile tools."

First, an easy to use mapping platform helps build communities' capacity for data collection and management. "We built our own GIS mapping tool called Flowius Maps, which allows us to gather data about houses and existing infrastructure locations, while also helping communities begin to manage their own data," he says. Previously a data-scarce community, Wita utilized Flowius Maps to map every household, compiling names and contact information in the process; beyond its relevance to Flowius, this information can now be linked to other initiatives related to education and health.

Second, an app called Flowius Connect helps local partners manage infrastructure construction, allowing the implementation team to "input our system design, including material components and labor expectations, and develop a construction schedule with it. Flowius Connect also serves as a significant organizational tool, keeping tabs on inventory, facilitating coordination of material drop-offs at work sites, and establishing a timeline for the completion of key project deliverables," he adds.

Once the infrastructure has been installed, the locations of that infrastructure are added to Flowius Maps, and two other apps, Flowius Manage and Flowius Pay, enable community members to more effectively operate and manage the infrastructure and collect revenue. Flowius Manage gives users technical tools for maintaining water supply infrastructure and uses instructional videos to promote proactive maintenance, while Flowius Pay assists customers in managing the financial aspects of their water service by facilitating invoicing, for example.

The overarching goal of these apps is to increase community engagement with — and ownership of — its new water infrastructure and incentivize regular maintenance of the system.

Partners Help Manage Challenges and Expectations

Seifu Saide is a team leader with the Meskan Woreda (district) Water, Mining, and Energy Office and has been actively involved with the Flowius pilot project since its inception.

The project's initial implementation has not been without its challenges, Saide concedes, but the Flowius model has proven resilient and durable in the face of logistical and bureaucratic headwinds. It took time to raise awareness about the model and to collect the money and labor required to initiate construction for water pipes.

"We addressed these challenges by creating community awareness and by working with our partners from the region to kebele administrators." To that end, community meetings organized throughout the planning process helped glean information about residents' water demands and concerns, and help manage their expectations for the project. Subsequently, community residents were hired to help build the system to familiarize themselves with its operations and maintenance. Residents also helped test out the mobile apps vital to Flowius' success.

"For us, the biggest issue for expansion is the density of the communities that we're working with," says Turnbull-Grimes. "If a community doesn't have enough homes in a small enough area, the capital costs become so high that they are not affordable to the members there."

Making a Difference

For Feleke, gone are the days of long waits or walks for water. He has taken on a leadership role as a member of the seven-person WASH committee for his kebele. In that role, he helps the community manage its water supply by overseeing and maintaining infrastructure, collecting monthly fees, coordinating with the regional water office in nearby Butajira, and rallying his neighbors to be good stewards of their kebele's most vital intrastructure and equipment — its water point, pump, and generator. Since Flowius' implementation, the WASH committee has seen its water management responsibilities increase, and members have either directly participated in building the system or helping manage revenue collection using the Flowius Pay app.

Feleke recognizes that Flowius has played an important role in recent years in elevating the public's shared understanding of the importance of a well-maintained water supply. And it has made quite a difference in his family's life. "My wife," he says, "now gets relief instead of carrying water on her back. Previously, we lined up for a couple of hours to get water, but now accessing safe water in our home saves us time and energy for other tasks." Most importantly, he said, the next generation of his family is benefitting: "In the past our child faced diarrhea because of unsafe water, but now accessing safe water in our home is improving our health."

Beyond Borders

The pilot is projected to build on its successes to date. "Flowius' model is expected to demonstrate how a private sector approach can address some of the challenges rural communities face when it comes to sustained water supply," says Tegenfeldt. "I particularly hope that by modeling a successful private sector approach for water service delivery, the project will generate opportunities for replication throughout Ethiopia. I am excited to learn how this pilot project will help inform and shape the dialogue around household water supply and what that can look like in rural areas."

There are millions of rural Ethiopians who face water challenges similar to those that Feleke and his neighbors have been tackling. While Turnbull-Grimes acknowledges capital financing remains a significant hurdle, he adds "we have received requests from people across the continent and world to establish a franchise of Flowius in their countries. While we're not ready for this step yet, it has shown us the global demand for water piped into homes."

As Flowius matures and works out some of the kinks in its initial implementation, the sky may be the limit in terms of demand for safe water piped directly into rural homes. "We have a product and service that people want," he says. "Most countries across the globe will have enough densely populated communities that we can go anywhere."

By Russell Sticklor

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Additional Resources:

- USAID Ethiopia
- USAID Development Innovation Ventures
- Triple Bottom Line (3BL) Enterprises

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