

## **Rural Water Infrastructure in South Western Uganda:**

### **Simple Technology but Complex Projects**

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Access to clean drinking water is a basic human need, yet to many people in the developing world, access to clean water is considered a luxury. The lack of clean water in under developed countries has prompted first world government international development agencies, non-governmental organisations, and international service organisations to spend considerable time and financial resources on projects working to provide access to clean water, with limited success.

The landscape of south western Uganda with its lush green vegetation and rolling hills, is not the arid desert image of “Africa” that many associate with the continent. While government infrastructure is lacking in the region, local community led water initiatives such as gravity-flow water systems have been implemented over the last decade and have had some success at increasing access to clean water.

Gravity flow water systems (GFWS) are a popular form of water infrastructure in the developing world as they can be a reliable method of water supply for communities that do not have electrical infrastructure. The principle of GFWS is capturing water at a natural source, and conveying the water in pipelines to the community, located at a lower elevation.

The Rubingo region in south western Uganda is an example of a GFWS water success story. Prior to the installation of the GFWS infrastructure, the Rubingo community relied on local

streams as a water source, however while the water may have looked clean and pristine, it was in fact contaminated with microbial agents, and a large source of this contamination was runoff from the subsistence cattle farms that were scattered over the region.

The technical aspects of the Rubingo project are simple, when compared to municipal infrastructure projects in Canada. Water is captured at its source in the hills of Rubingo, and conveyed via HDPE pipeline to a break pressure tank. The break pressure tanks serve as storage tanks for the system, however their primary purpose of the break pressure tank is to reduce the pipeline pressure by allowing the water to flow to a tank at atmospheric pressure, rather than continue flowing through the pipeline where the static head would be much higher. Break pressure tanks allow for cost effective pipeline materials to be used, since pressure rated HDPE pipe costs increase for higher pressure ratings. Without break pressure tanks in the system, the static head for the pipe could be quite large given the grade elevations of the Rubingo area which would require costly high pressure rated HDPE piping.

In addition to break pressure tanks, storage tanks are also included in the Rubingo design. The location and size of the storage tanks are optimized to allow for maximum water availability during the peak usage hours.

The end of the Rubingo conveyance lines are tap stands, strategically located throughout the region, to ensure that each cluster of homes is in reasonable proximity to clean water supply.

The GFWS that was implemented in the Rubingo area was a multi-year project with the support of the Canadian International Development Agency and private donations. ACTS, a

Canadian non-governmental organisation (NGO) was responsible for the technical design and managing the construction of the project. A local work crew was retained for the specialized construction activities (pipe fitting, tank construction, commissioning, etc) and the Rubingo community supplied the labour for trench digging.

While there is much debate surrounding effective tools for monitoring and evaluating international development projects –this discussion is beyond the scope of this paper-, one way of evaluating the success of the Rubingo project is a review of local health records. Prior to the GFWS system in Rubingo, local health records show that annual cases of intestinal worms that presented at the local health clinics were 407, and the number of intestinal worms cases dropped to 9, once the GFWS system went into operation.<sup>1</sup>

In addition to the very important health benefits of GFWS implementation, the societal improvements that result from the implementation of a safe and easily accessible water supply should also be considered when evaluating the success of a GFWS project. In the case of the Rubingo community, prior to the GFWS system, residents (almost always women and/or children) would spend several hours per day collecting and transporting water from one of the area streams. As part of the GFWS infrastructure, tap stands were installed across the area, which reduced the travel distance required to collect water. The labour saving from transporting water large distances on a daily basis is a significant improvement on daily life in Rubingo, as residents now have more time during an average day to spend on farming and/or income generating activities.<sup>2</sup>

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<sup>1</sup> <http://acts.ca/attachments/article/69/ACTS%202010%20fall-web.pdf>

<sup>2</sup> <http://acts.ca/attachments/article/69/ACTS%202010%20fall-web.pdf>

While the Rubingo project is a great example of a GFWS success story, it should be noted that the project is designed for a 25 year lifespan, and a more realistic evaluation of the success of the project would be the operational performance over the next several years. As with many international development projects, maintenance of infrastructure systems is crucial for success, and maintenance requirements will likely increase over time, while support from the Canadian design team decreases.

With a successful project such as Rubingo, there is a risk that this type of technology would be recommended for other communities struggling with access to clean water, however the complexities of international development projects are immense. Piloting a technology in the hopes of scale up across multiple regions in Uganda would be overly optimistic, as each community is different and the local physical, cultural, and socio-economic conditions play a massive role in the success of a technical project such as GFWS.