

**Integrated water supply project, Zimbabwe
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Background

The Nyamarimbira integrated water supply project is situated in the Eastern Highlands of Zimbabwe. The area benefits from a favourable climate, good soil and is rich in water resources (**natural capital**), but these could not be tapped easily. The Tangwena people, who initiated this project, see it as a route out of a highly **vulnerable context**. During the liberation struggle in Zimbabwe, most of the people sought refuge over the border in Mozambique. Returning after the war under a resettlement scheme, they were settled along with those who had stayed in Nyanga District, Manicaland province, but soon after they found themselves affected by the civil war in Mozambique.



Nyamarimbira Community Energy Project Digging Channel

The drought of 1992 had a profound impact, and it inspired the community leaders to look for external support to improve access to water. Food handouts remained crucial to the livelihoods of many, though women toiled to grow food in gardens. It was only when people saw the micro-hydro scheme nearby that they realised that there could be technology to exploit the natural capital. Credit was not available to build infrastructure from existing financial institutions, because of the lack of collateral - so they approached ITDG to find a way of financing the development.

The project was really conceived in 1995, after local leaders noticed ITDG's involvement in the Nyafaru micro-hydro scheme about 6km away. They approached ITDG's energy specialists, and out of this a truly cross-sectoral project began, with plans for water supply for consumption (60 litres per capita per day), for agriculture (total 30 ha) and energy supply for the school and other public buildings including a community-owned mill. But the entry-point, after the participatory community survey, was water supply.

Technology

Given the gradient of the Nyamarimbira River, technology provides three times the yield on the use of the water resource; extracting energy as well as using the water for consumption and agriculture. Feasibility studies indicated that the flow from the river would be enough to install two mini-hydro schemes along the water line. A rock dam has been constructed across a perennial stream in the hills above the scattered settlements of the Tangwena. One 6.5km pipeline runs straight from the dam to the village, and will be used purely for water supply. Another pipeline feeds into a narrow concrete canal that runs along the side of the hill for almost a kilometre, at a shallow gradient. The canal ends at a settling tank, which serves as an intake for a nine-inch steel pipe, which then runs 300m down a steep hillside into a powerhouse. The 45kW plant will provide power for the school in the first instance, and then to shops, the church and a grain mill, and probably for battery charging and welding. It is expected that individual households will pay for connections.

The water coming out of the powerhouse is directed to the settlements via a PVC pipe, which passes through a valley and continues for another 8km. Along this mainline, pressure-reducing valves will ensure that the pressure does not exceed the rating of the pipes. Four storage tanks will be built, and here, as the water flows in through float valves, it will be treated. Treatment technology, used successfully by the Mvula Trust in South Africa, involves chlorine production through electrolysis. From the tanks, a distribution network of smaller pipes will supply 40 tapstands. Water for irrigation will come from a separate network.



Nyamarimbira school children using m-h power

Training for operation and maintenance has already started for committee members chosen for their skills, and the committee is working on the financing plans. The investment is as much in human as in physical capital.

Other technologies with which ITDG has had much experience will come into play with the use of energy for the grain mill, for battery charging or other end-uses. and of course in the use of water for agriculture.

Assets and vulnerability
Use of existing assets

Trust is all-important for a venture like this to take off. Existing institutions and **social capital** have been used and built on to manage and keep momentum for the project. What impresses visitors to the site is the use that the community has made of its labour assets (**human capital**). The scale of the physical works in this inhospitable area is astonishing; a diversion weir over mountainous, rocky terrain took 52 days to build, used more than 300kg of pipes and material which had to be carried up, and 14 km of pipeline for which trenches had to be dug - sometimes ten feet deep. But it is the fact that this has been done without compensation that proves the level of commitment. As if this commitment were not sufficiently demonstrated, the rains caused

by a recent cyclone washed away a kilometre of pipeline, and all the backfill had to be brought up from elsewhere.

Vulnerability context - environment

As the cyclone demonstrated, the villagers are vulnerable to floods as well as drought. The gully formed increases the vulnerability of the infrastructure.

The heavy rains convinced people to undertake extra work to reduce vulnerability. Exit waterways have been created at all peaks and troughs on the pipeline profile to ensure efficient drainage of all surface flow during the rain season. Where the trench has crossed natural drainage such as streams, gullies and other waterways, concrete structures, steel pipes and reclamation of gullies have been used to reduce interference. The physical capital has thus been planned to maintain natural capital and minimise environmental vulnerability.

Vulnerability context - political and economic

Recent political instability has been highly disruptive. In this political climate, holding public meetings at all is difficult. It also hampered links with local government and ITDG staff, along with the fuel crisis. The high cost of fuel held back construction. On the other hand, with the dramatic increase in the cost of the paraffin (kerosene) currently used for lighting, the appeal of alternative energy sources has increased. The community-managed sources of energy should reduce vulnerability for those able to afford private connections.

AIDS has directly affected the community. It was noted that participation in construction was affected because of the obligation to attend funerals - which takes from 3 days to a week for family members. This will obviously affect the potential for productive activities increased by the project, and the project does not directly address the issue.

Whose livelihood outcomes will be improved?

The Tangwena community are not all alike, nor will all benefit equally from this project. (Stakeholder Analysis) Currently, it takes most women and children about an hour to make the trip to collect water, and they walk on average 6km a day to do it. A stakeholder analysis has shown that all should benefit from the treated water supply to 40 tapstands. No one should have to walk more than 200m to reach water for domestic use. For many this will not reduce the journey to the 3-minute threshold which delivers the highest level of health benefits, but it is still a great improvement (and in line with WHO guidelines). Most important to the women is the time saved for other labour and it will be important to investigate this once the network is functioning. Water for irrigation will come from a separate network of hydrants and the project management committee is developing tariffs to ensure that the poorest can access benefits. Again, this will need watching.

For many, and especially for household heads - mainly men, it is the hope of producing two crops a year instead of one, or at least providing greater security against drought, which constitutes the key outcome. It will be important to investigate the consequences for women's labour. Again there are divisions within the community, as it is the local people, not those who were resettled here, who own most of the land, and only some among them who are placed to exploit the supply. The project management committee has resolved that each member may irrigate only 0.1 hectare of land and that there will be trading of irrigable with non-irrigable land to ensure wide distribution of benefits.

Nearly 500 schoolchildren are expected to benefit from the electricity supply. The teacher, a key project leader, saw benefits not just from the lighting, but also from children learning about the technology.

Women are expected to benefit from reduction of drudgery (and timesaving for other labour) in milling once the community mill is available for use, whereas currently mills are distant and expensive. There is currently only one diesel mill in the area, and prices are rising. ITDG has experience of setting costs to allow for credit, while providing income. Entrepreneurs within the community are already developing ideas for using the energy for agro-processing enterprises.

Everyone should benefit, though to different degrees, from the empowered project management committee, with its networks, which could be a powerful force for the development of the village.

At the moment, only 108 households (192 people) out of the total 300 households have registered with the project. According to the committee. This is because not everyone is yet convinced that all the hard work will be worth it. This number has increased over the three years of the project life. The plan is that others can pay the equivalent amount of money to the labour contributed, if they decide to reap benefits later. When asked about single mothers or disabled people, who might not be able to contribute labour, the committee replied that those who had shown an interest were offered lighter work.

In the private sector, the main beneficiaries are local contractors (male) with certified skills. It is worth noting that there were disputes about which work constituted specialised (and therefore paid) labour. Turbine manufacturers (and indirectly) employees in Harare will also benefit from the order of turbine parts.

Early Lessons?

Given that construction work is not yet complete, and before water flows and electricity is generated, it is early to draw lessons from the project about improved livelihood outcomes. Yet there are important issues emerging which can contribute to thinking about how water, energy or agro-processing technologies can contribute to improved livelihoods.

Project was conceived by the community

The first key point is that the project was conceived by the people of the beneficiary community, who made the initial approach to ITDG and took part in the participatory survey. They chose the entry point. This meant that the project was not in the end so much an energy project, as the nearby ITDG-supported Nyafaru scheme, in its end-uses. Nor was it a standard water supply project, focusing on consumption.

The importance of cross-sectoral planning and implementation, mirroring the way poor people plan for and achieve sustainable livelihood outcomes, rather than the more limited sectoral vision of many intervening agencies appears to be illustrated.

The extremely high level of investment evidenced in community labour is possible because there is a clear expectation of returns from productive activity, whether through irrigated agriculture, or agro-enterprise, or labour opportunities saved by reduced time for water collection and milling.

A supply led project, as often seen in the water or energy sectors, could easily have limited itself to its own sector vision, thereby failing to meet people's own objectives. This is an indication that **physical and financial assets might be sustained better, with a link to productive activities** - something often ignored in standard water and sanitation projects.

Policies, institutions and processes

From the start, there has been as much (if not more) focus on institutions than on technology, with the emphasis on **building on existing assets and institutions**. Although the Project Management Committee was a new institution, it was elected at a general meeting within the existing framework and with existing human capital. It has been the main focus of support, and its aim is to **build the local capacity to manage** a complex construction project with minimal support and to devise its own systems and processes to ensure sustainability. The project management committee carries out revisions of the community action plans every six months and reports to the main funder, with minimal support from ITDG. They draft and enforce contracts for the physical works involving skilled construction. Now that other villages are interested in similar schemes, they are referred to the committee, not to ITDG.

Major challenges arose when the democratically elected project management committee appeared to threaten the traditional leadership. The impasse was only bridged with leadership training, which focused on bridging the divide, **acknowledging the importance of traditional institutions**. The importance of building bridges with existing institutions is a lesson which needs continually reinforcing for intervening agencies, but does of course, bring with it challenges to development values.

Additionally, there has been an effort to **engage local government**, which should be an important route for broadening learning from this project. This has been challenging. Although the District Development Fund and Agritex (Agricultural Technical and Extension Service) have been supportive, all stakeholders at six-monthly reviews agree that participation could be improved with more site meetings. The Rural District Council and the District Administrator's office have had limited involvement, though represented at reviews. Local government staff want subsistence and help with transport, especially challenging with the fuel crisis, but this is seen as unsustainable. The judgement has been to focus on what the community can manage, while keeping up links with government as far as possible.

Connections have also been made with the district office of ZESA, the national energy supplier. Now that the policy has changed, being more enabling for private sector involvement in energy services, the project could sell energy to the grid, depending on price and opportunity costs. As yet, it is not clear how similar projects could be developed without grants or highly concessionary lending.

Links have been made **with existing local institutions** such as the District Water and Sanitation Sub-committee. With strong support, a member of the project committee was elected on to the District Water Catchment committee, ensuring transfer of knowledge of any changes in the legal and regulatory environment. This initiative is very unusual, in that it allows a project supplying domestic water to take account of water resources issues; it is even more rare for a project to have a stake in decision making about them. The project contributes to supporting local stakeholders - although a much larger institutional project or sector support programme would be needed to develop the participation of poor stakeholders, especially women, in decisions about water resource allocation. A larger initiative would also be needed before district level planners systematically incorporated projects of this type. In the current political climate, national level policy work is problematic.

Gender

The Tangwena's conservative tendencies in relation to gender roles may have been exacerbated by the running battles with commercial farmers before independence, and then exile. At the beginning of the project, women were very reluctant to speak at public meetings. The traditional leadership gave women no public role. In the household, women's autonomy has been limited.

Unsurprisingly, it has been much easier to gain women's participation in labour than in project planning. In fact, there is a concern that men, who still play the main role in decision-making, have mainly offered the huge contribution in women's labour (70% of community labour). There has been an attempt to ensure that women are enabled to play a strategic role. A woman was elected as the project chairperson, to replace the man who left the village. At least one other woman takes part in reviews. Single mothers have been considered in project planning. However, it is acknowledged that the project management committee has not really worked out indicators of success, which are differentiated by gender.

Many questions remain from the stakeholder analysis, which can only be answered by investigation at least a year after the water and energy are in use.

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