Global Water Initiative / East Africa Cluster-Running Dry

Multiple use of water through the construction of small scale irrigation and cattle trough at water points

Action Against Hunger (ACF-USA) Uganda

A vegetable garden in Barbenyo small scale irrigation scheme

April 2012
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1. BACKGROUND

Since 2007, ACF International has implemented water and sanitation projects in over 150 villages in Otuke district in Northern Uganda. This region was affected by the 20 year long civil war that led to displacements of communities into camps. The war affected deeply communities who lost source of livelihoods and capacity to meet the basic necessities.

After cessation of hostilities in 2006, people began to return to their original homes where a limited number of basic infrastructures were present. Since then, ACF has implemented WASH and FSL projects to assist returnee communities. The access to safe water has been improved by the provision of water points but the high poverty and illiteracy levels have slowly hampered development in these areas and with the limited funding mainstreaming poverty and vulnerability have become a component of the programming.

These high poverty levels in the communities can be attributed to:

- The abject poverty levels of the water users as result of displacement and lack of capacity to conduct manageable income generating activities (IGA).
- People still practicing rain fed agriculture and the prolonged droughts that have hampered their harvests.
- Security incidences like the rustlers and land conflicts which have escalated over these years as people return and settle.
ACF initiated and up scaled multiple uses of water to effectively increase harnessing of water for production by piloting small scale irrigation and construction of troughs at water points in order to manage risk associated with the drought, to improve household income, and to allow communities to maintain their livestock leading to increase in asset ownership.

Beneficiaries of small scale irrigation schemes would grow crops and use the proceeds part of the income generated to pay for the operation and maintenance (O&M) of the water point, and also save or share the remaining proceeds among the groups as alternative source of income during especially dry season. The use of treadle pump was piloted as an alternative for watering horticultural crops during dry seasons. Regarding cattle troughs, livestock would be watered nearby to avoid cattle rustlers and impoverishing the households when the livestock is stolen. The time taken to move far distances looking for water for animals would be used by the cattle owners for other productive and constructive activities such as farming, attending meetings, trainings, etc.

The project was funded by the GWI project by Howard Buffet Foundation and is overseen by the ACF WASH team and the extension workers from the local government. At community level, the project is monitored by a group’s heads selected to oversee the schemes that have since been trained.
2. SMALL IRRIGATION SCHEME

2.1. Principle

A small irrigation scheme consists in (1) a borehole as source of water for irrigation, (2) a reservoir for storing the water for irrigation, and (3) a treadle pump with a nozzle or sprinkler for pumping and spraying the water respectively in the garden.

Wasted water (grey water) from the borehole gets collected into the reservoir during the day. In the evening and the following morning, the water inside the reservoir is pumped with a treadle pump for watering crops. Sometimes clean water would be pumped directly into the reservoir in event of little wasted water stored in the reservoir during day time.

![Figure 2: The principle of small irrigation scheme](image)

2.2. Collection tank (reservoir)

The reservoir has a capacity of 8m³ (2m x 2m x 2m). It is constructed with bricks and the average cost is 220 USD (see Table 1). Loss of water in the reservoir by evaporation is minimized by covering the reservoir with roofing/shade. The roof shade also minimizes the growth of fungi in the waste water by preventing direct sunlight which favors fungal growth. The opening into the reservoir for the hosepipe is provided with mosquito screen to minimize entry and breeding of mosquitoes in the stagnant waste water in the reservoir. A layer of oil on the water surface also prevent mosquito breeding which would otherwise be dangerous for human health.
Table 1: BOQ for the construction of a reservoir

<table>
<thead>
<tr>
<th>Material</th>
<th>Qty</th>
<th>Unit</th>
<th>Unit cost (UGX)</th>
<th>Total cost (UGX)</th>
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<td>Pickup</td>
<td>100,000</td>
<td>100,000</td>
</tr>
<tr>
<td>Sand</td>
<td>2</td>
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<td>10,000</td>
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<td>Pcs</td>
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<td>16,000</td>
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<td>4x 2&quot; Timber</td>
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<td>Pcs</td>
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<td>Metres</td>
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<td>8,000</td>
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<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td><strong>551,000</strong></td>
<td><strong>220 USD</strong></td>
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</tbody>
</table>

Figure 3: Reservoir construction – masonry works
Multiple use of water by small scale irrigation and cattle trough – ACF Uganda (2012)

Figure 4: Completed reservoir (without roof and plastering)

Figure 5: Collection tank at the end of drainage channel
2.3. Treadle pump technology

There are different types of treadle pumps that are currently being used all over the world, but ACF Uganda piloted the pressure irrigation treadle pump type. This pump, also known as *Super Money-maker*, is a human-powered pump designed to lift water from a depth of 7m or less. The total maximum pumping height is 14m (maximum suction depth below the pump is 7m and maximum pressure head above the pump is 7m). It has irrigation capacity of 2 acres and ‘push water distance’ of about 200m. The technology does not need much technical knowhow and just little O&M requirements. The pump needs a minimum of two people to operate and irrigate garden. Even school age going children can conveniently operate the pump.

The treadle pump needs priming with clean water for it to operate effectively. If the treadle pump is not primed, it cannot pump water from the reservoir with ease. The figure below illustrates how to prime the treadle pump.

*Figure 6: Women priming before operating treadle pump*
Multiple use of water by small scale irrigation and cattle trough – ACF Uganda (2012)

Figure 7: Priming the treadle pump

Figure 8: Watering seedlings in nursery beds
2.4. Implementation / Methodology

1. Advocacy for small scale irrigation farming at water point
The advocacy for small scale irrigation or multiple uses of water from a particular water source was started during mobilization of community for cost contribution towards O&M of boreholes. The need to start small scale irrigation at water point as alternative source of income for user fee collection towards O&M were stressed during mobilization. Interested people were advised to organize themselves into groups of between 15 to 30 members. The group was supposed to be water users of the borehole where the scheme would be practiced.

2. Selection and formation of the irrigation groups members
The organized irrigation group was registered for small scale irrigation scheme. The group was managed by the management committee comprising of 1 chairperson, 1 secretary, 1 treasurer, 1 caretaker and the remaining 26 people are committee members of the group. The management committee members were selected by the members themselves. This was done to instil the sense of ownership and sustainability of the small scale irrigation project.

3. Training and technical support to group members
To improve their capacity on small scale irrigation and governance, training was organized for all the 30 members. Treadle pump, horticultural seeds, and some selected agricultural inputs were given to the group members to support the group since it was a pilot project. The government extension staff participated in the training of the members.

4. Monitoring
Regular field visits and meeting with the group’s members were held. Routine onsite training and demonstrations were also conducted.
3. CATTLE TROUGH

Cattle trough is a low cost and simple technology that ACF opted for watering of animals at the borehole (water) points. The trough is especially used during dry season when the alternative surface water sources for watering animals have dried out and household cattle keepers have to move long distance for water for watering their animals.

![Cattle trough](image)

*Figure 9: Cattle trough*

Wasted water (grey water) from the borehole gets collected through the channel into the cattle trough from where the animals are watered. The average total cost of the trough is about 200 USD (see Table 2).

<table>
<thead>
<tr>
<th>Material</th>
<th>Qty</th>
<th>Unit</th>
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<th>Total cost (UGX)</th>
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<td>Re-bars 12mm</td>
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<td>6,000</td>
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<tr>
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<td>8,000</td>
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<td>Pcs</td>
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<td>13,500</td>
</tr>
<tr>
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<td>Ls</td>
<td>100,000</td>
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<td><strong>TOTAL</strong></td>
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<td></td>
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<td></td>
<td><strong>USD</strong></td>
<td><strong>200</strong></td>
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</tbody>
</table>
Multiple use of water by small scale irrigation and cattle trough – ACF Uganda (2012)
NOTES
1. Trough size internally is 3m x 0.5m x 0.35m
2. Wall thickness is 100mm wide
3. Concrete mix to be 1:2:3
4. Mortar in cement:sand of 1:5 mix
5. Internal plaster is 1:3 mix while external render is 1:5 mix
6. Top of vertical walls to be finished by coping them
7. Hard core layer is 150mm
8. Bottom of trough shall have a slope of 1:10
9. Surrounding planted with natural grass
10. Inlet pipe/drainage shall be perpendicular to trough
11. Crushed stones to be placed around the Trough to facilitate percolation of splashed water

Figure 12: Cattle trough design
Figure 13: Cattle drinking from a new constructed trough
Otuke district is a semi-arid area. There is one long dry period from mid November to mid March and one short dry period throughout June every year.
To manage risk associated with the drought, promote multiple uses of water, and improve household income as alternative for operation and maintenance of water point, small scale irrigation was piloted in the village of Barbenyo.
In 2011 a borehole was drilled in Barbenyo village which greatly improved the lives of the community members since it provided them with plenty of safe water throughout the year and they didn’t have to move long distances searching for water.
Firstly, a discussion was held with the community members regarding the project since it involved a new technology and it also required a lot of community contribution in terms of land and time to be devoted to the scheme. This was done in February 2011. The community members accepted the scheme whole heartedly and offered close to 2 acres of the land next to the borehole in order to implement the scheme. Proceeds from the sale of the harvests would go to the borehole cash box.
The group selected a team of 28 people to oversee the day to day management of the scheme but on the overall 312 people from 43 HHs will benefit from this scheme. ACF constructed in March 2011 a water reservoir at the end of the borehole slab where the soak pit is usually located. During meetings with the community, it was agreed that ACF will provide a treadle pump, hosepipes, sprinkler/nozzle, water cans and seeds for the beginning of the project. This was to be done only after the community members ploughed the land and also prepared a nursery bed to receive the seeds. In June 2011, the community members completed ploughing the land and the preparation of the nursery bed. In the same date, ACF handed over to the local leaders (LC I and VHTs) in the presence of the community members, 1 treadle pump, 100 meters hosepipe, 2 water sprinklers, 4 tins of cabbage seeds, 4 tins of sukuma wiki seeds, 4 tins of pepper seeds, 2 tins of tomato seeds, 2
tins of onion seeds and 2 kgs of vegetable seeds (greens). Later, 2 watering cans and an eight litre pressure pump for pesticides were also given.

Figure 15: Transplanting onion seedlings

Tomato, cabbage and pepper seeds were put in the nursery bed in June 2011. The tomatoes, cabbages and pepper were then transplanted from the nursery bed into the garden. The group watered the seedlings every morning using the treadle pump and 2 watering cans. A roll call was done each time the watering is done to ensure that all people participate. Children particularly enjoy using the watering can.

With frequent watering/irrigation, the pepper and cabbages blossomed and with the spray pressure pump that was given to the community members, they were able to fight any pests and diseases that may attack the crops.

The tomatoes have since been harvested after 3 months sold and shared proceeds amongst themselves and the WSSCs which is a big achievement.

Figure 16: ACF staff giving technical advice to members on nursery bed management during monitoring visit
5. LESSONS LEARNT

Negative belief by the community
For so long, most of these communities have not been practicing small scale irrigation during dry seasons. The few who believe in crop growing during dry seasons used to do it in swampy areas or wetland using bucket to irrigate. The use of improved irrigation technique was not practiced and only specific horticultural crop (e.g. tomatoes and onion) were grown. Therefore there is always great need to open a demonstration site and involve the community as much as possible to make them see and believe that these things can really work. Also field visits and exchange field visit should be organized as experimental learning visits among the group’s members. This will remove the negative belief among the community of the workability of the treadle pump for irrigation and would motivate the community to start practicing small scale irrigation.

Demand driven approach
The continued drop out of some group members affected the sustainability of the small scale irrigation scheme at the water point. For sustainability purpose, the community should demonstrate that they really need the project. The project should be initiated by the group. A binding document in term of agreement should be signed at initial onset of the project. A membership fee should be paid by each member and the group should fully organize themselves. The group members should provide adequate land before the start of the project. This would also minimize drop out of members. There has been a problem of who would provide the land among the group and for how long would the group use the land.

Regular field visit and technical support
Regular field visits are necessary to monitor the progress and identified areas of weakness that need immediate action. Improvement in members’ participation was realized as a result of continued field visits by the project technical staff. Onsite training and field demonstration is preferred to classes because it enable the members to get hand on skills training.

Figure 17: ACF technical staff advising the irrigation group members to mulch the entire garden
Inadequate waste water for irrigation
The design of the technology encourages the use of waste water that gets collected in the reservoir for irrigation. It was learnt that the waste water is not enough and community were forced to pump clean water from the same borehole which is used by the community for domestic purposes into the reservoir to supplement waste water. This had sometimes led to conflict between the water users and irrigation group’s members struggling for same water. This mean that more time than usual would spent in water collection than the time the water user would spent if there was not irrigation scheme at the water point. This was experienced during dry season when the other alternative surface water sources have dried up. During dry period, there is also crowding of people at the water especially around mid morning when the community have just come back from the garden and in the evening. And yet water is supposed to be done twice a day (i.e. in morning and afternoon).

High dropout rate of group members
High rate of drop out of members were registered in the group. More than one quarter of the members dropped out and this were attributed to conflict among the members and inability of the management committee to properly allocate task, and failure to perform the task allocated to each member and mismanagement of the groups resources (fund). The high drop rate was experienced when there was severely drought. During drought, a lot of water is required for watering crops and this meant people had to work extremely hard to sufficiently watering crops.

Promotion of wetland cultivation
It was also learnt that some members used the seed provided and opened up their individual horticultural garden in the swarm (wetland) in a very small scale. The garden registered successes since there is always adequate water in the swarm for watering and even the swarm have adequate soil moisture to support plant growth during drought.
But this practice of cultivating in the wetland is against the national environment management authority policy in Uganda.

Sustainability of the project
For sustainability purpose, the project should be demand driven. Need assessment should be done to establish what kind of crops, seeds etc that community prefer or need. The community should demonstrate that they really need the project. A binding document in term of agreement should be signed. The community should also make in-kind contribution such as land and among others. Government technical staff and other development partners should also be involved right from the onset of the activities in the planning, implementation, follow up and technical support visit. This will paved a way for the community members and the government to take over the project.

Conflict resolution among group members
To resolve conflict among irrigation group members, proper division of labour and proper time allocation especially for watering crops should be clearly done and understood by the group members. This has been one of the main reasons of conflict and high dropout rate of members and conflict. A daily roaster should be prepared so that 3-6 members work once or two times in a week. Working in shift has worked best in Barbenyo irrigation scheme. A team comprising of 3-5
members would water the garden in the morning and another in the evening. This would allow the other group members also to actively participate in other productive activities.
6. CONCLUSIONS AND RECOMMENDATIONS

On the overall the MUWP has been successful and should be up scaled to communities who demonstrate a real need and requested for it. MUWP is well adapted for arid or semi-arid areas where water is not easily accessible for part of the year. However, to ensure the sustainability of the project, the implementation should be done cautiously, noting past failures like using manageable groups to run the schemes and build their capacity. These include using the proceeds to purchase seedlings and also evolve into bigger income generating activities that can be linked to financial institutions.