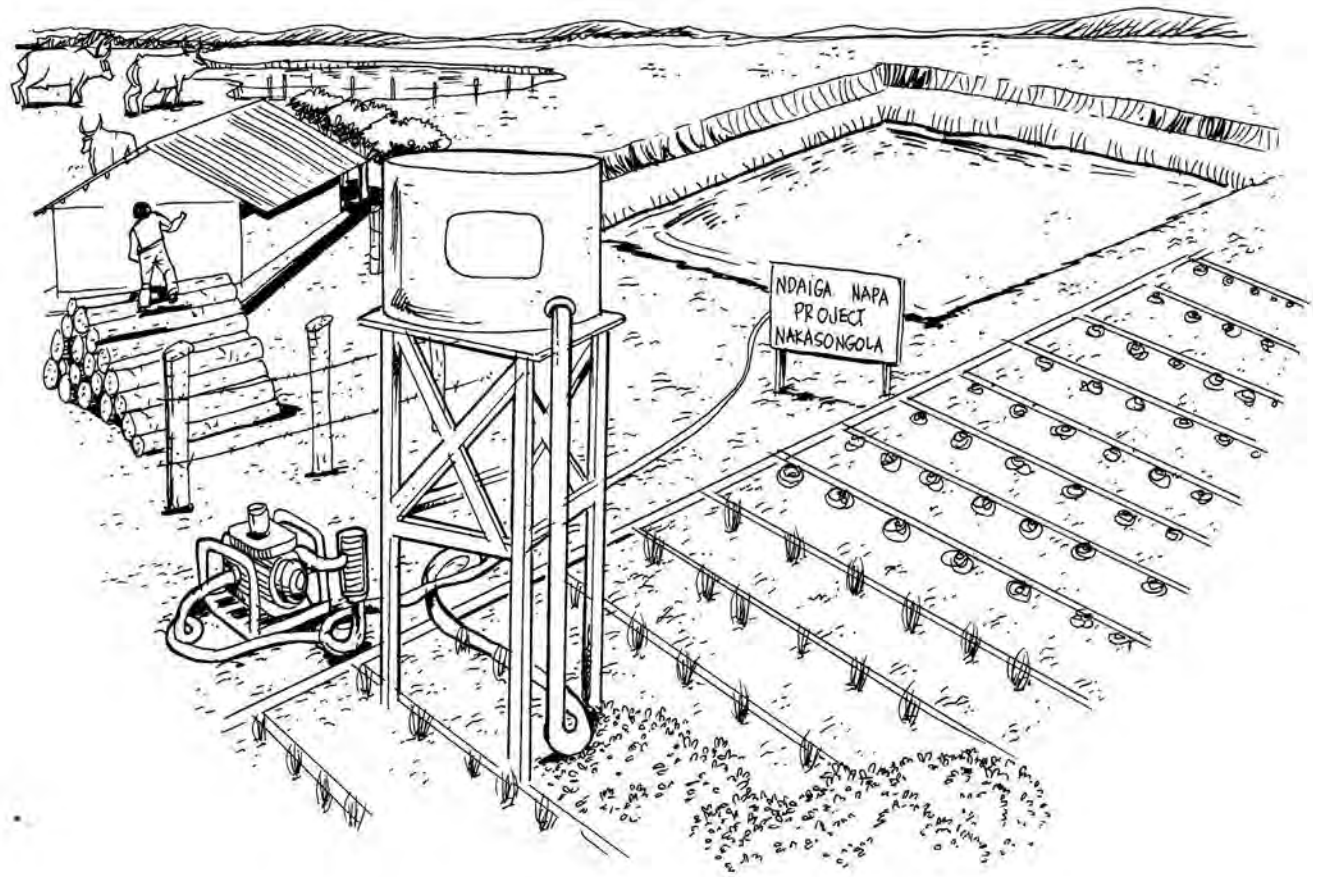


Exploring the Potential of Micro-irrigation in Promoting Food and Income: The Case of Nakasongola



Water security (be it the challenge of too little water over long periods of time or too much water all at once) is one of the most tangible and fastest growing social, political, and economic challenges the world faces today (World Economic Forum, 2012). Nakasongola, a cattle corridor district, usually faces water stress challenges, and therefore, interventions involving water harvesting will always produce results. The national adaptation programs of action (NAPA) pilot project sought to address this gap through harvesting water not only for production but also for household use. The project aimed at enhancing crop production and productivity using drip irrigation as a water-efficient technology in this semi-arid farming ecosystem. Good lessons under the project would be replicated and scaled up in areas with

similar agroecological zones under a public-private partnership (PPP) arrangement. The NAPA pilot intervention was community-driven and based on what people have. It also promoted the use of indigenous knowledge.

Prolonged dry spells and droughts, occasionally, severely affect farmers, leading to unsustainable coping strategies such as sale of household assets and unsustainable charcoal production (which degrades the environment), reducing the number of meals per day and, in extreme cases, migration. Sometimes, crop failure is so severe that up to 92% of yield losses occur; in such scenarios, farm families totally become food-insecure (Nakasongola Production Department Statistics, 2013).

Nakasongola has bimodal rainfall, with the main season occurring between March/April and June/July and the second one between August-October/and November. Rainfall amount ranges from 500 mm to 1,000 mm per annum, which is inadequate and generally unreliable.

Topography is flat, between 3,400 and 3,800 ft above sea level. Much of the low-lying areas are drained by seasonal streams into Lake Kyoga with tributaries to rivers Sezibwa, Lugogo and Kafu.

The soils are very old and generally of low fertility (Buruuli and Lwampanga soil catena). Vegetation is dominantly open deciduous savannah woodland with short grasses.

Maximum temperature ranges between 25°C and 35°C and the minimum diurnal range is 18°–25°C. The total area of 3,424 km² represents about 1.4% of the country's total surface area and 32.6 km² is occupied by swamps, wetlands, and Lake Kyoga.

Nakasongola has a total population of 181,863 (92,957 males and 88,906 females). Of these, 24,816 are urban and 157,047 are rural dwellers (NPHC, 2014). Average household size is five per household, which is higher than the national figure (4.7 persons per household). Sixty-eight percent of the households are crop farmers, 21% livestock keepers and 12% in fisher folks (Nakasongola DDP, 2013). However, it is important to note that many households practice mixed farming.

Problem statement

Farming is the major source of livelihood in Nakasongola. However inadequate precipitation has always caused frustration to many a farmer. Interventions in the agriculture sector should address supplementary moisture requirements through irrigation to enable crop farming in Nakasongola become a worthwhile business.

Objectives

The Nakasongola NAPA pilot project was run under the overall objective of enhancing resilience of the most vulnerable communities to adverse impacts of climate change.

1. To promote water harvesting (surface run-off and roof-top) for irrigation, livestock, and household use.
2. To encourage alternative sources of livelihood by promoting diverse sources of income-generating activities.
3. To encourage re-vegetation and build capacity of communities to sustainably manage the environment.

Methodology

The NAPA pilot project was based on the assumption that community empowerment promotes sustainability. The district technical team used secondary data and experience to purposively sample the most vulnerable communities to impacts of climate change. These acted as demonstration centers for best practices, and the good lessons would later be scaled up to other communities. The project was hosted by the Ndaiga community in Lwabyata subcounty and the Kyangogolo community in Nabiswera subcounty from February 2012 to June 2014.

Communal nursery beds for assorted vegetables were hosted by selected farmers for better raising of seedlings. These later supplied part of the seedlings for planting at the main community field, and the rest were distributed among interested community members. However, priority was given to women because they determine the rural household food basket. In both communities, the project worked with 462 farmers (281 females and 181 males).

As to irrigation issues, the following questions are raised:

- ◆ What method of irrigation is appropriate for which crop?
- ◆ Which is the most efficient and reliable type of irrigation?
- ◆ Which crops give higher returns with irrigation?
- ◆ How and at what stage can a water-deficient plant be detected?
- ◆ How can soil properties be manipulated best to balance between water absorption/percolation and retention?

Whereas harvested water in valley tanks had multiple uses, the major focus was to promote small-scale irrigation using the drip method, which was judged the most efficient.

Results

Preliminary results after two seasons gave an interesting story of increased production and income through vegetable farming. The entire cost for an acre irrigation kit was UGX 12,500,000 (about \$5,000), inclusive of installation costs. The initial inputs of vegetable seeds and agro-chemicals cost UGX 120,000. Labor was provided by group members, as community contribution. In one of the irrigation sites, a farmer's group managed to get a gross margin of UGX 1,300,000 (about \$520) from an acre of tomatoes and onions in season one, when all inputs were procured by the NAPA project. In the subsequent season, the same plot yielded a gross margin of 800,000 UGX (about \$320) when inputs were procured by the community. All the produce was sold locally within the community and in the neighborhood.

However, it is important to note that profitable and sustainable irrigation has many facets, which have to be harnessed by the farmers. These include but are not limited to soil fertility management, soil and water conservation practices, use of quality seed, pest and disease management, and other related agronomic practices. These were achieved through community training by district technical staff. It is worth noting that water is required more at critical stages of plant growth like at flowering and at the right time of the day, preferably in the early morning and late evening when evaporation rates are low. This minimizes wastage, in addition to reducing incidences of salinity, capping, and leaching.

It should also be observed that, to break even, irrigation should target high-value crops and, preferably those with of shorter gestation periods such as vegetables in order to recoup both sunk and variable costs.

Farmers within the NAPA pilot communities were encouraged to use the cheapest method of rooftop harvesting. This is where water from the tanks constructed under the pilot project or otherwise was used for backyard farming using equipment such as watering cans, empty mineral water bottles, and other rudimentary methods to maximize production.

Lessons learned

- ◆ Adoption is a process. However, the major driver of technology uptake among farmers is profit.
- ◆ Many farm families are reluctant to keep production records; this makes it hard to calculate gross margins. Farm labor and domestically consumed food (intrinsic cost) are rarely factored in as farmers calculate their gross margin levels.
- ◆ The agriculture sector in Uganda has enormous potential if it could only be fully exploited with irrigation and soil and water conservation.
- ◆ Co-investment (co-funding) should be promoted in all projects because it creates a sense of ownership and responsibility.
- ◆ Communities can manage and own projects if they could only be properly guided.
- ◆ Community procurement is cheap, efficient, and time-saving. This should be promoted as much as possible.

Challenges

There were capacity gaps within the communities as far as operationalization and maintenance of irrigation equipment are concerned. Expertise in the calculation of the amounts of irrigation water required is also lacking, hence leading to wastage, which is contrary to water-smart agriculture principles. The above have been partly solved through hands-on capacity building, including training, and mentoring.

Conclusion

Amidst seasonal changes, rainfall unpredictability, and water stress as a result of climate variability/change, water harvesting for irrigation is inevitable if sustainable and profitable crop production were to be realized. Therefore, all stakeholders in farming should ensure that resources are directed towards water-smart agriculture as an ecofriendly approach to boost farm production.

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