Water Catchment management through a 3R approach- Case of RWAMBU Catchment-Western Uganda

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Abstract/Summary

This paper is demonstrates a case in which environmental landscaping through a 3-R approach which is an acronym for Retention, Recharge and Reuse can result into regeneration and restoration of ground water resources and increasing access to water whilst improving the natural environment. This landscaping was done on the Rwambu catchment a trans-boundary water catchment bordering the districts of Kamwenge and Ibanda in Western Uganda; it's made up of a wetland situated in the valley and surrounding hilly areas. The 3R approach in essence is to manage natural recharge and to store water within the landscape so that it becomes usable in periods of water scarcity. This is done via: **Recharge i.e** optimizing the infiltration of rainfall and runoff water and improving groundwater recharge for example by planting trees, **Retention i.e** keeping water in the area and slowing down the outflow, for example by creating stone barriers and **Reuse i.e** making the recharged and retained water available for consumption, production or ecologic services, for example through recycling water multiple times.

Rwambu catchment is faced a multiplicity of ecological challenges, uphill of the wetland there is visible soil loss through erosion/surface run off and lack of viable sources of water given that the water table dropped drastically. The existing water sources mainly shallow-wells and boreholes were drying rapidly, in the downstream there was high rate of water contamination as a result of surface run off from poorly constructed and maintained pit latrines and open defecation in the rocky uphill around the wetland. The wetland itself was under constant threat of encroachment by the nearby community for purposes of agriculture and settlement. JESE in partnership with Rain Foundation, Kamwenge district local government and the local community piloted out a 4 year (2012-2015) environmental landscaping and sustainability program that emphasises integrating 3R approach (recharge, retention and reuse) and wetland management in a catchment and placing WASH interventions in the wider context of the natural environment and implementing an approach of integrated and sustainable management of water and waste(-water) flows and resources. The program was implemented in the Rwambu catchment, a trans boundary wetland covering the districts of Kamwenge and Ibanda Districts in Western Uganda. It was implemented in 5 communities and the wetland covers 5kilometres in stretch. A total of 300 households/1200 people (small holder farmers) participated and benefited in this program.

Introduction

Uganda's "National Policy for the Conservation and Management of Wetland Resources" was launched in 1995 to promote the protection of Uganda's wetlands in order to sustain their ecological and socioeconomic functions. Despite the formal policy, wetlands continue to be drained and converted.

However, a policy is only the first step in successful environmental management. In order for a policy to become a reality, it must be implemented.

In Uganda wetlands cover 13% of Uganda's surface area[1]; Wetlands are an integral part of Uganda's geography and constitute an important resource for development. Their ecological functions include the maintenance of the water table, prevention of erosion, flood control, micro-climate regulation, toxin retention, sediment traps and water purification. Wetlands provide habitats for wildlife, notably waterfowl. In addition, wetlands help regulate the micro-climate. Wetlands also provide socio-economic benefits to the community. Plant products, such as papyrus, are used for handcrafts and roof thatching. Wetlands provide: fish for consumption and sale, clean water and grass for cattle-grazing, areas for beekeeping, sitatunga (waterbuck) for hunting, and opportunities for tourist enterprises. Wetlands contribute to the nation's health by purifying water. In rural areas, the economic valuation of this natural water purification is approximately US$25 million a year[2].

This short paper introduces a case in which local environmental landscaping approaches piloted on Rwambu wetland in Western Uganda resulted into regeneration and restoration of ground water resources as well as a general appreciation of the importance of wetland resources to the social economic wellbeing of the community surrounding the wetland.

Context, aims and activities undertaken

Initially, JESE commissioned an investigation purposed to have a better insight into the hydrological balance in the area, relevant socio-economic aspects, such as population size, local income generating activities, water needs and access to WASH, this helped design and develop appropriate technologies, structures and interventions.

JESE facilitated the building of cascade check dams, valley dams and sand/stone bands to control water run-off. The bands help reduce on evaporation and retain soil moisture. Bands were placed in vicinity of the boreholes to check evaporation as to allow the water to sink into the ground for recharging. As a result boreholes that had dried have been put back to functioning through reparation and in combination with increased water table in the area, they are now serving water to the community around the catchment. The borehole management has been let out to an entrepreneur as a water as a business initiative.

JESE has also promoted multiple use of water through construction of cattle troughs and tapping run-off water from constructed water points. Because of the rocky nature of the landscape, JESE piloted the construction and use of ecological sanitation as an option to controlling surface and underground water contamination. We also constructed fanya ju's and Fanya chini's to prevent run off and retain soil moisture with in banana and coffee plantations.

To avert sustained encroachment of the Rwambu wetland, JESE facilitated a process of demarcating the wetland through consultation and participation of the local community and the local government. 15 meters from wetland were reserved as a buffer zone and all households affected by the zoning exercise were compensated with alternative livelihood options; in this case they were granted environmental friendly enterprises such as zero grazing cows, fish ponds, coffee and bee hives. At the uphill, JESE engaged the community to plant environmental friendly tree to act as carbon sinks as well as holding soils against uncontrolled erosion.

Main results, outputs and lessons

- Regeneration of the catchment boundaries that had been encroached upon, 5Km of Rwambu wetland restored and demarcated,
- Restoration of the ecological functions of the Rwambu Wetland, animal such as monkeys and rare birds have regained their habitats. 12 different species of birds, 3 species of monkeys have returned to the wetland,

[1] Sector performance report ministry of water & environment 2014

[2] Enhancing Wetlands' Contribution to Growth, Employment and Prosperity in Uganda, Environment and natural resources series report, UNDP 2009

- The water table is stabilising, and the water recharge rate for boreholes and shallow wells in adequate as evidenced increase in water table for shallow well in Kinagamukono village from 37m to 34.6m (2.4 m rise), yield at 0.51m^3/hr, draw down at 21.51m, dynamic water level after 120 minutes at 56.40m.
- Promotion of environmental friendly enterprises has boosted household incomes and improved livelihoods. As a result of the empowered communities, 04 wetland management groups have established commercially viable apiary units of 100 bee hives, a 1000 m^2 fish pond with a carrying capacity of 2000 catfish and 1000 tilapia fish, coffee cultivation and heifer project for diary milk production.
- Incidences of crop failure due to prolonged droughts have reduced as a result of improved soil moisture. From field testimonies, it was seen that in-situ water harvesting caused a 40 – 66 % increase in crop yields and productivity.

Pictorial;

1. **Increased water table:** This borehole in question was rehabilitated after so many years of non functionality due to low water tables. The 3R approach was integrated to Retain and Recharge water upstream so that it could be Re-used downstream. Indeed monitoring tests showed an increment of about 1.6m depth in ground water tables! The borehole that had never pumped water for years, now supplies the community with water throughout the year. This technology created employment for the caretaker who is paid 10% of the proceeds, O&M Improved and community started perceiving water as an economic good. When this borehole is compared to a similar one about 10km away, the other one still dries up at some seasons of the year. If this case is taken as a control, it is a sure way to think that the 3R interventions are a success for Rwambu

Pic 1: Recharged Borehole

2. **Stone lines**: This labor intensive intervention is worth the effort. The once abandoned infertile land regained its productivity. Communities which had resorted to encroaching on the wetland in search for fertile land downstream, once again started cultivating on their previously infertile hill slopes. This intervention checks soil erosion and improves soil depth by creating "soil benches" allowing time for water Retention and Recharge.

Pic 2: Stone Piles

3. **Fanya chini**: Fanya Chini" is a word from the Kiswahili dialect to mean "working down" This intervention is best suited in steep slopes. The soil dug from the trench is thrown on the lower side of the slope as opposed to its counterpart "fanya Juu" to mean working up which is best suited in gentler slopes where the soil is dug and thrown up hill. Both are intended to check the speed of runoff and hence increase water Retention and Recharge.

Pic 3: Fanya Chini

4. **Check dams**: This is a more permanent structure built of stone and concrete-the check dam. It was constructed to close up the V-shaped Gulley that was created as a result of an advanced stage of soil erosion. Aside rehabilitating degraded hill slopes, it also reduces the speed of runoff hence, increasing water Retention and therefore encouraging water Recharge.

Pic 4: Check Dams

Key Lessons;

- Water recharge is long term and difficult to predict, this sometimes discouraged community participation however, through various 3R trainings, the community came to appreciate the benefits of recharge to their water needs for both domestic and agricultural production.
- During project implementation, it was learnt that community members are dynamic once sensitized about an intervention and its advantages. They are willing to adopt, for example the willingness to take up the pay as you fetch model on their water points as way of sustaining them using the collected fees, the use of available stones to construct stone bunds for soil conservation, the excavation of a fish pond to boost their household incomes and the construction of a community access bridge to ease communication and enhance development.

Conclusions and Recommendations

Its possible to implement wetland related laws, but this should be done in comprehensive and participatory manner and developing sustainable solutions that addresses community's social and economic needs.

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