WAHARA - Report Series

POLICY NOTES

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Deliverable 6.3: Policy Briefs

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Introduction

Task 6 of the WAHARA project was dissemination to stakeholders at all levels. Policymakers were a key target demographic for dissemination, as were the multitude of other stakeholders that inform/affect policies related to Water harvesting Technologies. Therefore, 3 policy briefs were prepared showcasing select problems, solutions, and policy advise that they implied.

The policy briefs were prepared by Work Package 6 members in close collaboration with Study Site Coordinators, who selected the topics for the policy briefs based on discussions they had with stakeholders in their study sites in the framework of WAHARA. In this way, it was ensured that the policy briefs were relevant to local concerns, which improves their prospects of uptake. This way, the local partners in Zambia, Ethiopia, Burkina Faso, and Tunisia also own the policy briefs and will continue to disseminate the among policy shapers in their region well beyond the project cycle of WAHARA. All local partners have working relationships with policy makers at regional to national level in their countries, and are thus in a good position to make sure that the briefs do reach the intended audience.

The topics selected are:

- Bench Terraces in Tigray, Ethiopia: Creating cultivable land to ensure Livelihoods
- Burkina Faso: Can 'ripping' boost small-scale farmers' productivity? This brief is about the use of the Magoye ripper, which was developed in Zambia, in the WAHARA study site in Burkina Faso. Both study sites contributed to this brief.
- Check Dams: Managing silt to keep groundwater recharge going. This brief is about Tunisia

The 3 policy briefs follow in the following sections of the document.

WAHARA Policy Note 01

Bench Terraces in Tigray, Ethiopia: Creating cultivable land to ensure livelihoods

As El Nino underscores the need to further strengthen the resilience of rural communities, Tigray's Bench Terraces offer a viable solution in hillside terrain—creating new livelihoods by creating new cultivable land.

Nearly 62% of Ethiopia's northern Tigray region's 41 thousand square kilometres is categorised as 'hillside.' It is home to 80% of the population, which is largely agrarian. The hillside land is susceptible to erosion, which the region suffered severely in the run-up to the infamous famine of 1984. Hillsides have therefore been a focal point of Soil Water Conservation and Re-greening programs implemented ever since.

Since the mind-1990s, degraded hillsides have been allocated to landless farmers for tree-planting. Starting 2007-08, the regional government started testing a number of technologies to convert some of the rehabilitated hillsides into productive land. One of the technologies was Bench Terraces, a series of level strips of land running across hill sides.

The first bench terraces were constructed by the Tigray Bureau of Agriculture and Rural Development in 2013 in the Zata watershed. Since then, 4300 hectares of new cultivable land have been created across the state, most of them integrated with water sources such as hillside cisterns, developed springs ,

Local community members working on construction of a set of Bench Terraces in Tigray, Ethiopia, during a mass mobilization campaign. *(Image Courtesy: Dr. Kifle Woldearegay, Mekelle University)*

Bench Terraces under construction (left) and under cultivation (right) (Images Courtesy: Mekelle University)

pumps drawing from rivers/streams, hand-dug wells, etc. Central to this effort has been the targeting of landless youth, especially young women (they are allocated 50% of the rehabilitated land).

Under the EU-funded WAHARA project, performance of a number of bench terraces in different geohydrological and agro-ecological zones in Tigray was monitored between 2013-15. Their soil quality, stability of the slopes, and sediments transported off them were observed during the period. Results show that bench terraces can be key to income generation among the landless youth. As of 2015, a total of 17,200 landless youth have got such land (0.25ha each; half of them women). Most of them used the land to grow vegetables and permanent fruit trees with small-scale irrigation. Initial observations over the two-year period show this helped them supplement their income and tide over dry spells.

Evidence from the monitoring also revealed the following:

- Considering the limited amount of land that can be created through bench terracing and the relatively high costs of construction and maintenance, high-value crops (such as fruit trees and vegetables) should be chosen and soil improvements (e.g. fertiliser) should be carried out.
- For the same reason, water use should be economical. So efficient irrigation methods such as drip irrigation should be incorporated.
- The design and construction of bench terraces needs to be adapted from one area to another, taking into account terrain characteristics (slope angle and shape), soil/rock types and their hydraulic and geotechnical properties, and the possibility of slope instability during and after the construction of the benches.
- The construction of bench terraces is labour-intensive. To increase its viability and its spread, small machinery needs to be introduced to aid the construction process.

Ethiopia has pledged to restore 15 million hectares of degraded and deforested land into productivity by 2025. That's a sixth of its total land area. As the country's very own successful Soil Water Conservation programmes have demonstrated, this is not possible unless the local rural communities participate in the endeavour, and their participation cannot be secured unless restoration efforts have the potential to strengthening their livelihoods-- potential that can be clearly demonstrated to them.

At the same time, the federal government has undertaken to empower women and youth in the course of agricultural development. The need to target them arises as much because lifting them out of poverty is a key objective, as it does because of the potential shown by young men and women to farm profitably.

The potential shown by Bench Terraces in Tigray can also be harnessed in other parts of Ethiopia with hillside land. The recent El Nino (2015) has underscored the need to strengthen the resilience of rural communities further. Tigray's bench terraces have shown a possible pathway to resilience—through the creation of new lands and new livelihoods.

The WAHARA Project

The WAHARA (Water Harvesting in Rainfed Africa) project aims to contribute to a better understanding of the possibilities presented by Water Harvesting by identifying and field-testing promising technologies; assessing the potential of their biophysical, socio-economic and political uptake; and outlining a strategy to promote their scaling-up. While the research project's activities are located in four countries-- Tunisia, Ethiopia, Zambia and Burkina Faso-- the findings and deliverables are pertinent to the broader context of Africa. This has been ensured through the choice of research questions and design of the research methodology.

WAHARA analysed the options and enabling conditions for the spread of WHTs in Africa by identifying key WHTs in each of the four countries and tracing the pathways of their spread. It identified good ideas and bad ideas, effective interventions and unsuccessful projects, various stakeholders and their roles. The picture that emerges reveals upscaling as a multi-level process that takes place horizontally (geographical spreading among one stakeholder group), as wells as vertically (spreading across various levels of stakeholder groups). WAHARA research also highlights that the process of upscaling of WHTs is often not driven by governments or NGOs who consider it their responsibility to do extension unto farmers, but unfolds organically through the agency of farmers who constantly try to innovate in an effort to increase their productivity. This document is informed heavily by these two key findings.

WAHARA has a pan-Africa focus, in keeping with the pan-Africa relevance of water harvesting. However, key variables such as biophysical conditions, governance structures, extension systems, technical capacity, and socio-economy vary greatly from country to country. WAHARA research was carried out in Tunisia, Ethiopia, Zambia, and Burkina Faso. An overarching objective behind the framing of research questions and design of research methodologies was to identify biophysical and social elements of water harvesting that are also applicable over the broader region (Africa).

This Policy note was prepared by Abraham Abhishek, MetaMeta and Dr. Kifle Woldearegay, Mekelle University.
Visualization and Design was carried out by Lenneke Knoop, MetaMeta.

WAHARA Policy Note 02

Burkina Faso: Can 'ripping' boost small-scale farmers' productivity?

Ripping (a land preparation method used in Conservation Farming) promises to cut down labour costs to a tenth of current practices in northern Burkina Faso, while conserving soil moisture.

Burkina Faso: Erosion, Desertification and Innovation

Located at the frontlines of the Sahara desert, desertification has been a perennial threat in northern Burkina Faso. The threat perception is based on recurring droughts (1910-14, 1969-75, 1980-85, 1987-88, 1998, and 2002). Over the past 50 years, the region's environment has had to contend with reduced rainfall, diminishing vegetation, and disappearance of several species of plants and animals. Erosion has completely removed the top soil in some areas. Farmers are up against hard, dry soils to work with.

A bright spot has been the increasing adoption of Water Harvesting Technologies (WHTs) by small-scale farmers, catalysed by farmer-farmer learning systems and champion farmers. Thanks to these technologies, (most notably Zaï planting pits, stone lines, etc.), farmers have been known to increase yields to up to 1200 kilograms/hectare, from the 0-300 kilograms/hectare possible without WHTs (based on yam, cotton and cassava).

Nevertheless, the problem of hard, dry soils persists. Farmers have adapted to this with Zaï planting pits, which capture runoff and improve its infiltration into the soil, focussing it at the root zone of the plant. As mentioned

Land being prepared with a Magoye Ripper at a WAHARA field trial in Ziga, Burkina Faso
(Image Courtesy:MetaMeta)

A field prepared using a 'Ripper' (Image Courtesy: Piet Stevens, ACA Technologies Zambia)

before, this has helped improve yield. However, as a land preparation method Zaï pits are quite labour-intensive. It takes 8-10 people to prepare 1 hectare of land in a day. Also quite demanding is the maintenance that needs to be done every winter, to make sure that the pits' shape, size, and organic content are optimum.

Ripping: A Land Preparation Alternative

Under the EU-funded WAHARA (Water Harvesting in Rainfed Africa) project, the Magoye Ripper, a land preparation implement developed and used in Zambia, was trialled at 30 small farms in northern Burkina Faso. The animal-drawn implement is used to create rows of linear grooves in the soil in which seeds are planted and inputs applied. Spaced 80-90 cms apart, the same rip lines are refreshed every year, so that the soil between them stays undisturbed and moisture loss to evaporation is minimized.

In all the 30 farms, part of the land was prepared with the Magoye Ripper, alongside parts with Zaï pits, and unprepared parts that served as control plots. Various combinations of different crops and fertilizers were tried out within this setup.

The experiment was carried out over a 3-year period. The results show that:

- The Magoye Ripper could be used feasibly with draft animals commonly available in the northern Burkina (horses and donkeys)
- Yield from ripped land was comparable to yield from Zaï pits. With certain crops (such as Maize) ripping provided higher yields than Zaï pits.
- Ripping required 8-10 times less labour than making Zaï pits.

The Magoye Ripper was developed by Zambia-based Golden Valley Agriculture Research Trust and ACA Technologies. Both organizations are partners in the WAHARA project. In course of the project, they collected feedback on the Ripper from the Burkinabe farmers who participated in the field experiments. Based on that, they made changes to the design and adapted it further to the harder, drier soils of Northern Burkina. This new version is called the 'Kapandula.' In February 2016, the Burkinabe farmers were provided several Kapandulas to try out in their fields.

Ripping: Building upon the promise

Ripping is a common land preparation method in Zambia. It was adopted and spread there in response to land degradation, increasingly frequent dry spells, labour shortage, and dwindling of livestock that provide animal draft power. Northern Burkina (and indeed many other parts of the country) faces some of these issues perennially.

Data collected over three years from the WAHARA field trials shows that ripping can make significant contributions as Burkina Faso looks to boost its farmers from subsistence to productivity. This insight is an invaluable lead; pursuing it is an opportunity that should not be missed.

The field trials were coordinated by Institut de l'Environnement et de Recherches Agricoles

(INERA)-- Burkina's premier public-sector agriculture research organisation-- with close involvement of local farmers. The data, insights, and capacities generated from the trials lie with them, which can inform any future efforts to further adapt ripping and spread it more widely in Burkina Faso.

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META

GART
Promoting Sustainable Agriculture

INERA

WAHARA
WATER HARVESTING FOR RAINFED AFRICA

This Policy note was prepared by Abraham Abhishek, MetaMeta; Hamado Sawadogo, INERA Burkina Faso; and Silenga Wamunyima, GART Zambia. Visualization and Design was carried out by Lenneke Knoop, MetaMeta.

WAHARA Policy Note 03

Check Dams:
Managing silt to keep groundwater recharge going

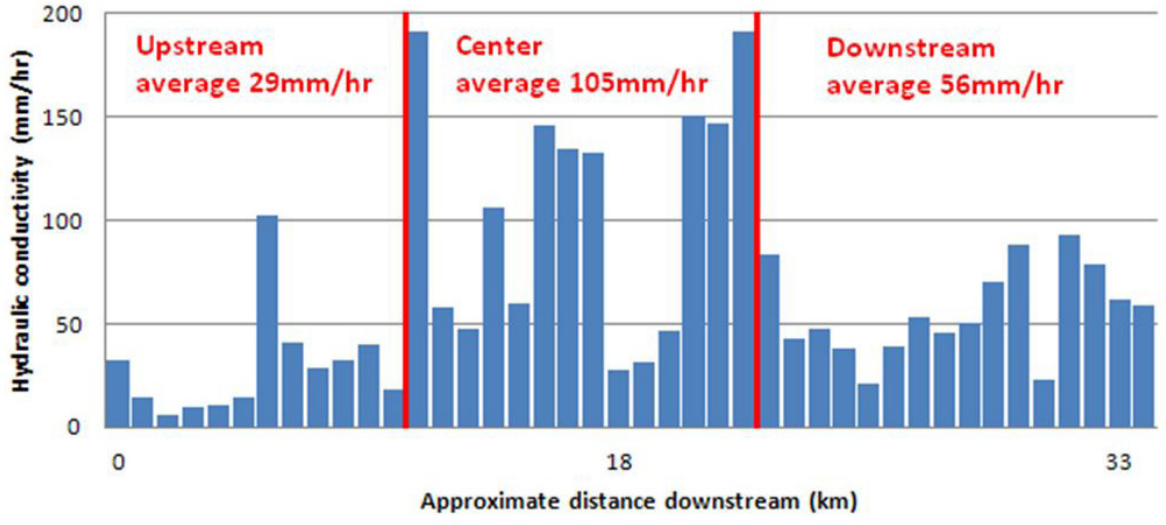
In southeast Tunisia, siltation is driving down the capacity of gabion check dams to harvest floods and recharge groundwater. To keep them efficient, the focus should shift from constructing new structures to maintaining existing ones.

The Zeuss-Koutine region in Tunisia's southeast is a water-stressed part of the country. The annual rainfall is a paltry 170 mm. Groundwater, a key water source, is extracted much faster than it is recharged. This has led to continuous lowering of the water table and salinization of groundwater.

To combat this problem, a national government program has supported the construction of over 300 small gabion check dams in the region, since 1990. The check dams are constructed in wadi beds (riverbeds) perpendicular to flow of ephemeral rivers. They are between 0.6 and 2.6 metres in height depending upon local hydrological conditions. The check dams block riverflow, slowing down its speed and retaining the water in their retention basins/reservoirs. Additionally, about 10 recharge wells have been dug over the years to recharge aquifers directly using floodwater harvested by the check dams.

However, floodwaters are always charged with silt which accumulates in the retention basins/reservoirs (upstream) as well as downstream. This diminishes both the capacity of the check dams to store water, as well as the rate at which the water infiltrates

A gabion check dam with a recharge well, Medenine. *(Image courtesy: Mohammed Ouessar, IRA)*



Differences in hydraulic conductivity between the upstream, middlestream and downstream of the wadi bed in Zeuss-Koutine.

down into the aquifers.

Research and Evidence

Under the EU-funded WAHARA (Water Harvesting in Rainfed Africa) project, 62 check dams in the region were studied for the hydraulic conductivity of the soil in their reservoirs-- or the ease with which water can infiltrate through the soil, down into the aquifer, and recharge groundwater. The evidence collected establishes that siltation has brought down infiltration rates significantly, especially in the upstream part of the 33-kilometre wadi course. This is because of higher levels of siltation upstream. The figure above shows that the rate of infiltration of water in the upstream section can be as low as a fourth of the average rate in the midstream, and half of that in the downstream. Overall, this paints a picture of the checkdams operating sub-optimally, and groundwater sources in the region recharging at much lower rates than they could.

Conclusions and Recommendations

Based on these findings, the next steps should include:

- Maintaining existing check dams rather than building new ones: With many of the check dams operating below their capacity, much impact can be made by simply investing in their maintenance through measures like de-silting of the reservoirs and de-clogging of gravel filters.

- Developing more recharge wells: Recharge wells are used to recharge the aquifers directly. They supplement the recharge that takes place through water infiltrating down to the aquifers through the soil layers. Developing more of them in addition to the current 10 will help achieve higher recharge rates in the short/medium term.

- Encouraging farmers to farm upon the highly silted patches: The silt contains sediments that can be nutritional to plants. This should be taken advantage of. Farmers can be encouraged to grow short-cycle varieties of high value crops, to earn extra income that can serve as a buffer during dry spells.

Desertification is continuing to unfold in the Zeuss-Koutine region. A combination of rapid population growth and urbanization are only increasing the stress on its groundwater resources. Timely action to rejuvenate its depleting aquifers will be critical to helping its communities, and will hold important lessons for some of the other parts of the country grappling with water scarcity.

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