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Water-Smart Agriculture in Uganda

The TOPS Agriculture and Natural Resource Management Case Study Series

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Water Management in Uganda

From 2013 to 2015, CARE and a consortium of partners[1] in the Global Water Initiative in East Africa[2] (GWI-EA) worked to spread water-smart agriculture[3] using champion farmers and farmer-led participatory research and learning to improve the policy environment.

The goal of the program was to develop demonstrations and build evidence for the impact of water-smart agriculture on smallholder farmers' production and income. Although the program ended earlier than expected, initial data indicated that water-smart agriculture had positive impacts on smallholder farmers' production. This evidence was used to increase local government interest and investment in water development activities.

In 2013, GWI-EA conducted a baseline in Otuke, Uganda. The study found that farmers in Otuke typically obtain only 15-20 percent of potential crop yield,[4] largely due to water constraints. Evaporation loss was high and farmers didn't practice conventional irrigation due to the high initial cash outlay and the low return on an expensive system when growing low-value crops like cereals and tubers. Additionally, less than 10% of farmers used conservation agriculture methods because of inadequate support services and lack of information.

Champion Tomato Farmers
Photo Credit: CARE International

Global Water Initiative — A Partnership Funded by the Howard G. Buffett Foundation — Supporting water resources for sustainable agriculture

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Along with farmers' low capacity to adopt water-smart agriculture, there was a strong need for the government to support less-costly and more effective water use systems, particularly for smallholder farmers. However, there was a lack of locally-validated evidence to support water-smart agriculture and prompt government action. At the time, the National Water Policy and Draft National Irrigation Policy had little focus on water-smart agriculture and a strong emphasis on large-scale irrigation. To address the disconnect between farmer needs and government priorities, GWI-EA promoted an integrated water resource management (IWRM)[5] approach—a coordinated effort among all stakeholders to manage water effectively, including water for increased agricultural production. This approach was carried out through demand-responsive activities with Learning Practice Alliances (LPA). The LPA was comprised of local government actors, local universities or research institutions, local NGOs, entrepreneurs, active community members, and champion farmers.

[1] Partner organizations include Catholic Relief Services (CRS), Action Against Hunger (ACF), and Welthungerhilfe.
[2] Learn more about the Howard G Buffett Foundation funded GWI-EA project here: http://www.gwieastafrica.org
[3] Water-Smart Agriculture includes agriculture techniques and technologies that increase the amount of water in the soil.
[4] Food Security, Water for Agriculture and Farming Practices Baseline Study in Otuke District, 2013
[5] Learn more about integrated water resource management here.

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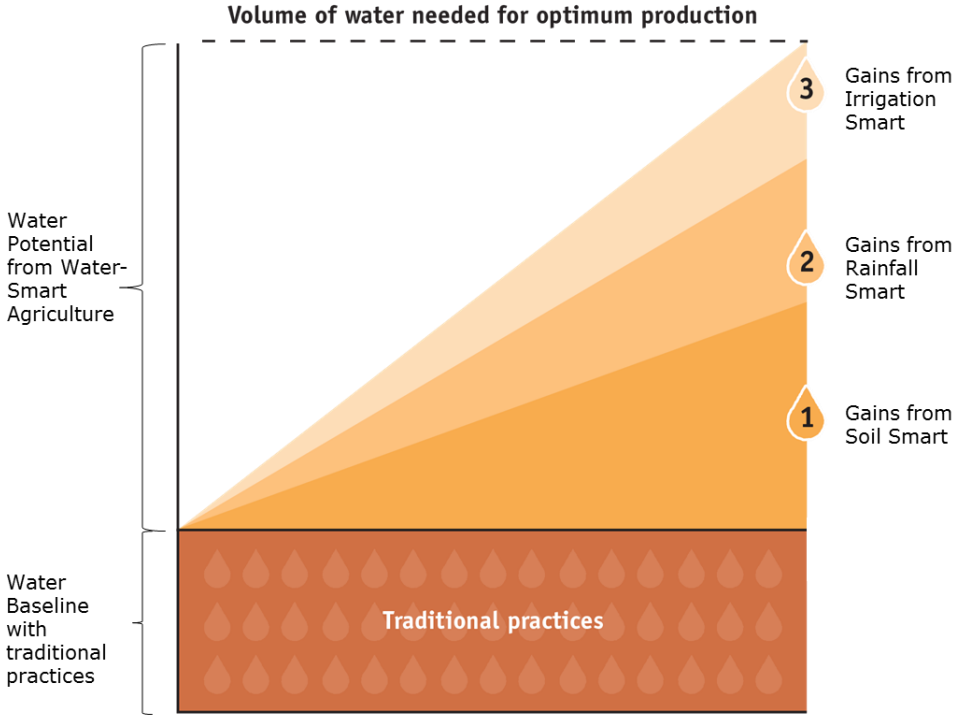
Water-Smart Agriculture

GWI-EA recognized that traditional agriculture practices used by smallholder farmers in Otuke were not capturing the necessary amount of water needed for optimum production. The program identified that, in order for smallholder farmers to capture enough water, they needed to integrate several water- capture approaches into a farmer's strategy. GWI-EA's water-smart agriculture method is comprised of three key areas:

Water-Smart Agriculture = Soil Smart + Rainfall Smart + Irrigation Smart

1. **Soil smart:** Increase infiltration, absorption, and retention of moisture in soils through conservation agriculture[6] practices
2. **Rainfall smart:** Increase efficiency of rainfall utilization, through capture and storage of rainfall, and planting appropriate crop varieties
3. **Irrigation smart:** Increase productive potential further (e.g., in arid geographies) by applying small-scale and precision irrigation.



Water-Smart Agriculture Model
Credit: Stephanie Ogden, CARE International

Water-smart agriculture is a balance of the above practices and maximizes water availability for optimum production potential. Soil-smart practices, comprised largely of conservation agriculture techniques, can yield large gains in production potential for low capital investments, and in some climates, are sufficient to optimize production. However, water harvesting, water storage, and small-scale irrigation may be necessary in more arid geographies, and can further increase smallholder production potential, though oftentimes with higher capital requirements.[7]

GWI-EA established an action research plan through LPAs to build evidence on the impacts of water-smart agriculture and to use the evidence as an advocacy platform for good water governance. To encourage broad ownership of the research, GWI created the Research Oversight Committee (ROC) which included members from the National Planning Authority, National Environment Management Authority, and the Parliamentarians Forum on Food Security, Population and Development.

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[6] Conservation agriculture is a concept for resource-saving agricultural crop production that strives to achieve acceptable profits, together with high and sustained production levels while, concurrently conserving the environment (FAO definition).

[7] *Global Water Initiative - East Africa Secure water for smallholder Agriculture*. After Action Report. September 2014. CARE International

Farmer-Driven Research in Uganda

Farmers, academic researchers, and project staff from the LPA worked together to identify the key water problems and to test practices that could solve these issues, including which practices made the most sense for each farmer's fields. GWI-EA worked with 24 champion farmers—15 women and 9 men—to create tomato demonstration plots showcasing water conservation techniques. They used the demonstration plot data to support advocacy efforts around sustainable water use and to promote local adoption. On each site, GWI-EA and the champion farmers led action research initiatives to influence the local government action.

Farmers kept demonstration plots with the new techniques—ridges, pruning, mulching, compost manure, and proper spacing—next to control plots with traditional methods. Farmers and project staff recorded impacts on the fields. The project staff—with oversight from academic partners—conducted surveys to collect feedback on the farmers' experience, noting the relative difficulty and reward for the new techniques.

On average in the trial, tomato yields increased 229%, from 1,340 kg/acre to 3,079 kg/acre, and farmer income increased from $375 to $862 per acre.[8] In addition, results from approximately 20 months of trials indicated that soil- and rainfall-smart practices increased the amount of soil moisture available to crops during extended dry spell periods, improving the health and outputs of crops with minimal external inputs. Long-term, this leads to healthier and more productive soil, lower costs for farmers, and more sustainable farming practices. The cost effectiveness analysis of water and soil conservation practices indicated that soil water retention practices were more cost effective than small-scale irrigation practices.[9] Farmers were able to recover the costs of conservation agriculture practices—such as labor, tools, and inputs—by selling 10% of the tomatoes harvested on a 600m^2 field.

The action research design was intended to influence perceptions of water-smart agriculture and initiate behavior change among the farmers, to ultimately result in the adoption of soil- and rainfall-smart practices. To help achieve this goal, over 550 people (68% female) from 22 farmers groups visited the demonstration sites. Farmers were encouraged to share their experiences during the LPA, which influenced the perceptions of the decision makers and practitioners, helping to increase interest in and, subsequently, investment in water-smart agriculture.

Influencing Policy through Engagement

Within the lifespan of GWI-EA, the program was able to raise awareness and increase commitment to water for agriculture and to integrate GWI-EA evidence into National Water Policy and Draft National Irrigation Policies.[10] Using the results of the action research, the project engaged the Ministry of Water and Environment and successfully encouraged the ministry to write their policies about micro-dams in Otuke as part of their strategy to reduce flash-flooding and increase access to water for agricultural production. The ministry also used GWI-EA's champion farmer model to shape their approach: setting up demonstration plots and forming water user associations and farmer groups to use the available water through two-hectare plots.

[8] *Ibid*
[9] *Global Water Initiative East Africa (GWI EA) Final Program Report.* March 2015 CARE International.
[10] *Global Water Initiative East Africa (GWI EA) Final Program Report.* March 2015 CARE International.

Lessons Learned From Integrated Water Resource Management Approach

Using the IWRM approach meant bringing together all of the relevant stakeholders in order to achieve coordinated development and effective water resource management. This experience provided key lessons:

- **Soil-smart practices are cost effective**—the research in Otuke demonstrated that soil-smart practices (e.g., conservation agriculture) were very beneficial and cost effective for smallholder farmers.[11]
- **Examine underlying problems**—the baseline showed that a lack of evidence and capacity for water-smart agriculture was leading to low adoption rates and uninformed policy decisions. This information directed which key intervention points would have the greatest impact.
- **Build ownership, don't claim it**—rather than presenting research findings to any one party, GWI-EA engaged many actors to shape, conduct, and disseminate research. This engagement increased the likelihood that research findings would be relevant, understood, and used by those actors.
- **Leave lots of time for coordination**—a demand-responsive approach requires abundant time, as it requires significant changes in the roles and responsibilities of many sectoral stakeholders.
- **Be deliberate about working at all levels to maximize impact**—coordination mechanisms at the national level should be linked with district and community levels by effectively engaging IWRM actors in conservation-friendly activities.
- **Focus on incentives**—one of the challenges with natural resource management work is aligning activities with long-term results (such as tree planting) to short-term needs (such as needing to fill food security gaps).

Conclusion

The GWI-EA program was unable to complete the research it began due to an unexpected, premature closure of the program. However, the program provides a base of evidence for water-smart agriculture and integrated learning and practices alliances for future programs.

In order to improve production in arid and semi-arid regions, it is important to capture as much water as possible. This requires a joint effort between smallholder farmers and local government authorities to implement micro- and macro-level water-smart agriculture. Organizations and programs can increase their impact through effective coordination among all stakeholders.

To learn more about water-smart agriculture, please read the Water-Smart Agriculture in East Africa sourcebook. To learn more about GWI-EA activities, please contact Stephanie Ogden or Emily Janoch.

The TOPS Program

The Technical and Operational Performance Support (TOPS) Program is the USAID/Food for Peace-funded learning and knowledge management initiative, bringing the highest quality information, knowledge, and promising practices in food assistance programming to implementers and donors around the world to ensure more communities and households benefit from the U.S. Government's investments to fight global hunger.

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[11] *Global Water Initiative - East Africa Secure water for smallholder Agriculture*. After Action Report. September 2014. CARE International