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SUCCESS STORIES 24



REVOLUTIONIZING SMALLHOLDER IRRIGATION IN AFRICA

Intensifying small-scale irrigation is an especially urgent imperative for sub-Saharan Africa, where scarce or variable rainfall severely handicaps agriculture, curbing productivity and resilience. The International Water Management Institute (IWMI) and its partners have taken bold steps to tackle this challenge, developing business models for irrigation technologies and exerting a positive influence on government policies and on-farm-practices. As a result of these efforts, the time is ripe for major investment.

RENEWED

COMMITMENT TO IRRIGATION

Across sub-Saharan Africa, erratic weather threatens the viability of small farms, the vast majority of which depend exclusively on rainfall for crop production. Only 6% of the region's agricultural land is irrigated, far less than anywhere else in the world. As part of a wider effort to boost agricultural productivity in the face of worsening climate change impacts, experts are urging governments to invest more in irrigation.

In 2014, African leaders committed themselves to reducing the number of hungry people by half within 10 years. A recent study by the Malabo Montpellier Panel – a group of agricultural experts guiding policy to accelerate progress towards food security and improved nutrition in Africa – argues that irrigation development can double yields and boost food security, guaranteeing more income and jobs. Africa has the potential to irrigate an additional 47 million hectares, according to the study.

Although large-scale public irrigation schemes can realize some of this potential, the performance of such initiatives has often proved disappointing, primarily as a result of shortcomings with local water governance. In the meantime, growing numbers of smallholder farmers have taken matters into their own hands, purchasing pumps to irrigate their crops with groundwater from wells or surface water from small reservoirs.

POTENTIAL BENEFITS OF

SMALL-SCALE IRRIGATION FOR SUB-SAHARAN AFRICA

- Increasing the number of small reservoirs in the region could help meet the irrigation and other water needs of nearly 400 million rural people, generating net revenues of USD 20 billion annually.
- Investments in dry-season smallholder irrigation could improve rice yields by 70% to 300%.
- Investments in motorized pumps could benefit 185 million people and generate net revenues up to USD 22 billion per year.¹

¹ Giordano, M.; de Fraiture, C.; Weight, E.; van der Blik, J. (Eds.). 2012. *Water for wealth and food security: supporting farmer-driven investments in agricultural water management. Synthesis report of the AgWater Solutions Project.* Colombo, Sri Lanka: International Water Management Institute (IWMI)

OVERCOMING THE

BARRIERS TO EXPANSION

While offering large potential benefits, irrigation technologies remain beyond the reach of many smallholder farmers due to high investment costs, lack of financing tools, poorly developed supply chains, a lack of knowledge about irrigation management, and power imbalances in rural society. These barriers are particularly prohibitive for women and the poor. There are signs, however, of growing resolve to overcome these barriers. The Alliance for a Green Revolution in Africa (AGRA), for example, has made a commitment to promote irrigation technology for small-scale farmers, with support from the World Bank, which has pledged to provide African governments with up to USD 9 billion for irrigation improvement, in collaboration with the African Development Bank (AfDB) and other organizations.

IWMI has decades of experience in supporting irrigation development through research. Our approach is to develop options for sustainable soil and water management, while advising on policy options and identifying incentives for the spread of new solutions. This work contributes importantly to the efforts of the IWMI-led CGIAR Research Program on Water, Land and Ecosystems (WLE) to improve agricultural water management in pursuit of sustainable agricultural intensification.



Solar-powered irrigation in Ethiopia.

AGWATER SOLUTIONS PROOF OF CONCEPT

Past and current initiatives amply demonstrate the effectiveness of IWMI's approach. The AgWater Solutions Project, for example, examined agricultural water management technologies in Africa and India during 2009-2012 to determine the factors influencing adoption. The aim was to identify high-potential opportunities for improving the livelihoods and food security of poor farmers. In Tanzania, for example, researchers found that investments in community-managed irrigation schemes led to income and yield improvements on a par with government-managed irrigation schemes but at lower cost. Several business models were developed related to motorized pumps, manual drilling and rainwater harvesting.

Some of the changes resulting from AgWater Solutions research:

TANZANIA

The 2012-2013 budget of the country's Ministry of Agriculture was increased by USD 6 million to accommodate community-managed irrigation schemes for smallholder farmers. Tanzania's deputy permanent secretary, Ministry of Agriculture, Food Security and Cooperatives, confirmed that the project's research and dialogue process were important factors in the government's decision to substantially increase national investment in agriculture.

INDIA

Based on IWMI's recommendations, the West Bengal state government relaxed the electric pump licensing process and introduced a flat electric connection fee in 2011. The new policies led to improved irrigation for about 1.3 million smallholder water users. A state water department official praised IWMI's research as being "crucial in bringing the policy changes."

ETHIOPIA

The Ethiopian government adopted a 2017 policy to make agricultural water technologies – such as solar irrigation – tax exempt. In an email, the director of household irrigation with the Ethiopian Agricultural Transformation Agency stated that IWMI's review of irrigation technology adoption and a review of the national pump supply chain (under WLE) influenced this change in policy. Ethiopian agencies at federal, state and local levels are now adopting WLE-designed landscape interventions, aimed at restoring 15 million hectares by 2025.

BUILDING MOMENTUM

Building on the AgWater Solutions Project, IWMI is working with the Feed the Future Innovation Lab for Small-Scale Irrigation (ILSSI) project, now in its second phase, to identify opportunities for expanding small-scale irrigation in Africa. During its first phase (2013-2018), the project focused on the identification of promising small-scale irrigation technologies, practices and strategies for Ghana, Ethiopia, and Tanzania. In partnership with smallholders, IWMI scientists tested a wide range of water-lifting options in farmers' fields, addressing constraints to wider adoption, such as gender issues as well as access to credit and the technology supply chain. IWMI also carried out capacity development and engagement activities to open pathways from research to outcomes.

IWMI's research under the ILSSI project yielded a major conclusion: solar-powered pumps offer an inexpensive and effective irrigation solution. They can

reduce labor costs and overcome key constraints, such as limited energy access, while also reducing greenhouse gas emissions. Women farmers tend to prefer solar pumps to other water-lifting technologies, because they reduce the labor required to extract water for domestic and other uses. To help harness these benefits, researchers developed a methodology for mapping the suitability of solar irrigation across a particular country. The method relies on geographic information system techniques to determine a range of factors, such as landscape features and the availability of adequate water and sunlight. The final product provides solid guidance on areas where solar pumping is a viable option, and where it could be risky or counterproductive.

A first of its kind, the mapping method was devised and tested in Ethiopia and is now being used in Ghana and Mali. The tool can be applied in any country or region, providing vital support for large-

scale rollout of solar pumps. In connection with this work, researchers also developed business models for improving smallholder access to solar-powered irrigation pumps. In the second phase of the ILSSI project (2018-2022), IWMI together with Texas A&M University, USA, and other partners will pilot some of the most promising business models in Ethiopia and Ghana, in collaboration with private companies.

A recent IWMI study on mechanisms to finance the purchase of water-lifting equipment also revealed several promising approaches. The study called on African governments to strengthen incentives for financial institutions to provide farmers with better services and products, with emphasis on women and young people.

DONORS AND PARTNERS

The AgWater Solutions Project was funded by the Bill & Melinda Gates Foundation. The Feed the Future Innovation Lab for Small-Scale Irrigation (ILSSI) project is supported by the United States Agency for International Development (USAID). Work on irrigation scheduling receives support from the Food and Agriculture Organization of the United Nations (FAO). The TAAT Project is funded by the

To build momentum behind Africa's revolution in smallholder irrigation, IWMI has undertaken various initiatives in addition to the ILSSI project. A project in Ethiopia, for example, has introduced irrigation-scheduling technologies to 1,000 farmers. Meanwhile, the Technologies for African Agricultural Transformation (TAAT) Project is scaling up irrigation technologies by means of demonstrations in five African countries. In addition, IWMI is working with Wetlands International (WI) and its partners in Ethiopia and Mali to assess the ecological footprint of agricultural intensification in watersheds. Under another project, IWMI is scaling out the use of an online interactive tool for solar suitability mapping throughout sub-Saharan Africa. The Institute is also mapping smallholder irrigation initiatives led by the private and public sectors in Ethiopia and Ghana.

African Development Bank (AfDB). The Swiss Agency for Development and Cooperation (SDC) supports the WI-led project. Efforts to scale out solar suitability mapping are funded by Germany's Federal Ministry for Economic Cooperation and Development (BMZ). The mapping of irrigation initiatives forms part of the CGIAR Research Program on Water, Land and Ecosystems (WLE), supported by the CGIAR Trust Fund donors.

ABOUT IWMI

The International Water Management Institute (IWMI) is a non-profit, scientific research organization focusing on the sustainable use of water and land resources in developing countries. IWMI works in partnership with governments, civil society and the private sector to develop scalable agricultural water management solutions that have a real impact on poverty reduction, food security and ecosystem health. Headquartered in Colombo, Sri Lanka, with regional offices across Asia and Africa, IWMI is a CGIAR Research Center and leads the CGIAR Research Program on Water, Land and Ecosystems (WLE). www.iwmi.org

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