



Farmer-led irrigation schemes could transform food security in sub-Saharan Africa and South Asia

New study shows potential for smallholder water management innovations to boost crop yields and household revenue





Supporting farmer driven investments in agricultural water management

Millions of smallholder farmers struggle to grow food with little water.

Often, this is not because water is scarce, but because they lack the means to harness what is available.

Without access to water smallholders are limited to crop production during the rainy season. This can make it hard for them to make a living.



However, smallholder farming can and should be an engine for economic growth, poverty reduction and food security.

Better water management can help make this happen. Many farmers are already leading the way.

The scale of this new trend has now been comprehensively documented for the first time by a consortium of researchers.

The three-year **AgWater Solutions Project** has confirmed that, in some areas, smallholder agricultural water management is now supporting many more households than large public irrigation schemes. The project has shown that water management in smallholder farms:

- provides income when farmers need it most. Large-scale water management schemes often do not provide the farmer with the flexibility of accessing water when they need it;
- comprises a vibrant and growing sector. In many African countries, the smallholder private sector is more important for irrigation than the public sector in terms of the number of farmers involved, the area affected and the value of production;
- has the potential to impact millions: In sub-Saharan Africa, investments in motorized pumps could specifically benefit millions, generating net revenues up to USD 22 billion per year in the region; and
- leverages an existing, farmer-driven trend largely ignored by investors.

However ...

- It poses several risks if its spread is unchecked. The uncoordinated nature by which small private irrigation is currently spreading may aggravate many existing issues.

Better water management in smallholder agriculture leads to:

- enhanced crop and livestock production;
- increased farm incomes; and
- improved food security.

These include exacerbating inequities, increasing resource conflicts and creating environmental problems.

What technologies can farmers use to improve their water access?

Many poor farmers live in regions with pronounced wet and dry seasons, which greatly restrict when they can grow many types of crops. However, water could be made available year-round if it can be stored in tanks, reservoirs or as groundwater. It can then be accessed using pumps or other simple extraction tools.

Small reservoirs

A well-designed reservoir can support multiple water uses from livestock watering, fisheries, domestic and small business water use to brick-making and handicraft activities. They are most commonly managed by communities.

Rainwater harvesting structures

Structures that can harvest rainwater can be built and owned by individuals or communities, and can be of any size and shape. Individual structures include small ponds, shallow wells or tanks.

Tube wells



Farmers have relied on well water for centuries, but were limited in how deep they could dig due to the effort involved and the difficulty of extracting large amounts of water from far below the ground. New tube wells, sustainably managed and serviced by simple pumps, can transform dry-season agriculture enabling the production of high-value crops.

However, over-pumping can deplete water tables and lead to water-quality issues.



Motorized pumps

The smallholder private irrigation sector is growing thanks largely to cheap, motorized pumps from China and India. Farmers may buy or rent pumping equipment and draw water from nearby sources.



Why don't more farmers use these technologies?

Several factors influence the ability of a farmer to make use of water management:

- Market access. There is little point in a farmer increasing their productivity if there is no market for their produce. Many poor farmers have limited access to information about market trends, such as the items that are most in demand and the best time to sell their produce.
- Taxation policies often hinder the importation of motor pumps and irrigation equipment.
- Farmers have difficulty finding accurate information and advice on what technology or materials would make most sense for their cropping systems.
- Smallholder agricultural water management lacks an institutional 'home'. Existing governing bodies are often not adapted to handle the challenges posed by this alternative mode of irrigation development.



Water at work

Veronica Sianchenga farms a small plot of land in rural Zambia, where rainfall and surface water are only available for a few months of the year. The non-governmental organization, iDE, encouraged Veronica to invest in a simple pump and irrigation kit which allowed her to access groundwater all year-round. It has transformed her life. "My income grew substantially. The first tomato crop I harvested netted me over ZMK 6 million (USD 1,330)! With that income, I could begin the project of building a new house," says Veronica. She now plants tomatoes, peppers and aubergines, as these can fetch high prices at the local cooperative. "All of my children are now going to school," she says. "We women are no longer relying on our husbands. We are able to do our own projects. We now eat better and grow better."



Purushottham Patel is a farmer in the Anand District of India's Gujarat State. Groundwater is 20 meters below his farm, so he needs a pump to get access to it. He uses the dung from his eight cows to generate biogas.



This is then fed into a pump that runs partly on diesel and partly on gas. Using this innovative arrangement has saved him USD 400 a year in fuel costs. At the same time, improved water supply has enabled him to double his crop production and the cow-dung slurry makes valuable fertilizer. He has also started to sell water to adjacent farms, further boosting his profits.

Edward Kofi Ahiabor farms land alongside the local beach in Keta, Ghana. He has improved the sandy soil using organic fertilizers, including local bat guano. However, what has really transformed this unpromising piece of land has been the introduction of petrol-driven pumps.



"We brought in the tube well systems to take away the tedium associated with bailing out water from open wells," recalls Mr. Ahiabor. "Plus, the maximum you can irrigate in a day from a well is an acre (0.4 hectares)." He now farms eight hectares by pumping water from the well. "All my fields are now irrigated," he says. "We sunk out tube wells down to just 9 meters to avoid saltwater intrusion." He uses overhead irrigation from sprinklers because the salty spray from the sea would damage his crops if not regularly washed off. Mr. Ahiabor's farm has been a huge success. He now employs five people and supplies vegetables, maize and cassava to local market traders.



A plan of action

The implications for donors and private investors seeking to improve agricultural water supply and enhance livelihood opportunities are profound. Rather than invest in large-scale irrigation systems alone, they will get more return on their investments if they can also find ways to support and expand the grassroots, bottom-up approaches that farmers in some of the world's poorest countries are already successfully using. How can smallholder AWM be scaled-up? We have identified four key areas:

- **Increase access to water.** We need to rethink the design of water storage, promote low-cost drilling and develop multiple-use water services.
- **Catalyze smallholder value chains.** We can ensure technology access for all through improved access to finance and better marketing. We should also address market inefficiencies by giving farmers and dealers the information and incentives they need.
- **Create policy synergies between sectors.** This includes promoting coherence in trade, agricultural and energy policies.
- **Take a watershed perspective** to help resolve potential user conflicts, improve the environment and promote community water management.

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