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Water at the Bottom of the Well

By [Christopher Bartlett](#), August 28, 2012

Farmer-Led Irrigation Schemes Could Transform Food Security in Sub-Saharan Africa, South Asia

Amid dire warnings, there are rays of hope emanating from around the world. People, not governments, who through ingenuity and hands on experience are creating productive farmland from arid land, fuel this hope.



A [report](#) by Malik Falkenmark and colleagues at the Stockholm International Water Institute (SIWI) states there will not be enough water available on current croplands to produce food for the projected population of nine billion people in

accomplished through smallholder water management innovations that would boost crop yields and household revenue by tens of billions of US dollars

According to the report “Water for wealth and food security: Supporting farmer-driven investments in agricultural water management,” released before [World Water Week](#), expanding the use of smallholder water management techniques could increase yields up to 300 percent in some cases, and add tens of billions of US dollars to household revenues across sub-Saharan Africa and South Asia.

“We’ve witnessed again and again what happens to the world’s poor—the majority of whom depend on agriculture for their livelihoods and already suffer from water scarcity—when they are at the mercy of our fragile global food system,” said Dr. Colin Chartres, director general of IWMI. “However, farmers across the developing world are increasingly relying on and benefitting from small-scale, locally-relevant water solutions.”

Local Community Solutions

The assessment quantified the potential reach and possible additional household revenue for a number of different

on-farm and [local community](#) water solutions, summarised in the table below.

The three-year [AgWater Solutions Research Initiative](#) unearthed the scale at which enterprising smallholder farmers themselves are driving this revolution by using their own resources innovatively rather than waiting for water to be delivered. “We were amazed at the scale of what is going on,” said IWMI’s Meredith Giordano, the initiative co-ordinator. “Despite constraints, such as high upfront costs and poorly developed supply chains, small-scale farmers across Africa and Asia have moved ahead using their own resources to finance and install irrigation technologies. It’s clear that farmers themselves are driving this trend.”



Petrol and diesel powered pumps give farmers who have no access to electricity an efficient means of lifting water. Photo: Joe Ronzio/IWMI

In Ghana, small private irrigation schemes already employ 45 times more individuals and cover 25 times more land than public irrigation schemes. The majority of farmers, who said they presently use buckets or rely on rain-fed cultivation, expressed the strong desire to buy a motorized pump, but lacked resources, knowledge or access to suppliers to do so.

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 our 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.

Partners in the AgWater collaboration believe the implications of the work could be profound, especially for donors and private investors committed to boosting incomes and livelihoods in the world’s poorest countries by improving farmer access to water resources. The research—a collaborative effort involving several international and national partners and funded by the Bill & Melinda Gates Foundation—provides the best evidence to-date on the scale and potential economic benefits of smallholder water management in sub-Saharan Africa and South Asia.

Water a Major Constraint on Food Production

Water is a major constraint on food production for millions of smallholder farmers. While water resources are often sufficient, farmers lack the means to harvest it, which limits crop production to the rainy season and diminishes income opportunities.

Of sub-Saharan Africa’s abundant renewable water resources, the UN Food and Agriculture Organization reported that only 3 percent are withdrawn for agriculture. Approximately 3 percent of arable land is equipped for irrigation, of which less than 6 percent is serviced by groundwater.

Experts believe that improving water management capabilities could unleash smallholder farming and it could become a major driver of economic growth, poverty reduction and food security.



In Ethiopia muscle power is the only option for many farm pumps, but even these can drastically improve farm yields and incomes. Photo: Karen Conniff/IWMI

“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.” — Veronica Sianchenga, Smallholder, Zambia

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 nongovernmental 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.”

An example of an innovative farmer is Purushottam Patel, in Gujarat, India. He uses the dung from his eight cows to generate biogas. This fuel is then fed to a pump that runs partly on diesel and partly on gas. The novel arrangement has saved him USD 400 per year in fuel costs. It also has improved the water supply for his farm, which has enabled him to double his crop production. Mr Patel now sells water to adjacent farms—further enhancing local food production.

Technologies are Available



Solar powered pumps like this one in Ethiopia are good option when other sources of power are not available. Photo: Karen Conniff/IWMI

“The technologies for smallholder water management are already with us,” says Giordano. “Cheap pumps and new ways of powering them are transforming farming and boosting incomes all over Africa and Asia. Simple tools for drilling wells and capturing rainwater have enabled many farmers to produce more crops in the dry season, hugely boosting their incomes.”

There are risks to unchecked expansion of smallholder water management, however. The poorest farmers, especially women, still struggle to find the resources needed to access new technologies, which may lead to greater inequities. And if farmers engage in a water free-for-all, supplies in some areas could dwindle past sustainable levels.

AgWater partners believe new institutional arrangements are needed to address these challenges. They also are focusing on innovative business models that could help improve water access, such as pump-on-a-bike hire schemes, where cycling entrepreneurs tour rural areas, renting out pumps strapped to their bicycles.

The research has already influenced government policy in at least two places. In West Bengal, India, the state government has removed small pump licenses and introduced a flat electrical connection fee for farmers in water-abundant areas to encourage smallholders to use the available water to boost agricultural productivity. In Tanzania, the project research has also been a factor in the government’s decision to increase national investment in agriculture by USD 6 million.

“There are huge investment opportunities for unlocking the potential of this farmer-led approach,” says Chartres. “AgWater Solutions has identified where investments can be targeted for maximum impact at the country, state and local level. We now know which ‘levers’ need to be pulled to capitalize on the up-swell of farmer-led innovations.”

Source: [International Water Management Institute](#), Stockholm International Water Institute

Christopher Bartlett, Ecology Global Network’s [Water Science Adviser](#) is a nomadic soul who was led to water and drank it in avidly. From a teenage spear-fisherman in Brittany’s Atlantic Ocean, to ten years teaching at faculties in France, and travels to many parts of the world as an underwater photojournalist, a combination of wanderlust, curiosity, and deep-rooted desire to understand drives Christopher. He has lived in France, South Africa, the UK, and the Netherlands. Christopher is also a qualified field guide and leads expeditions and safaris to Africa several times a year. He organizes tailor-made dive and safari trips to his favorite parts of the world