

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 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Africa's abundant renewable water resources, the UN Food and Agriculture Organization reported that only 3 percent are withdrawn for agriculture.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 4 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.

One 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.

"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."

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