NEWS

Getting More Drops To the Crops

Wet wealth. Stored water has helped lift villagers out of poverty and into commerce.

RAJ SAMADHILYIA, INDIA—The arid lands around this tiny village in Gujarat don't look promising for profitable farming. But even Raj Samadhilyia's poorest farmer routinely reaps generous harvests and owns a sturdy brick house with a flower-filled garden. The picture is quite different in nearby villages, however: Farmers struggle to produce just one harvest a year and rely on government handouts.

The difference is water.

Thanks to a little help from researchers equipped with satellite imagery, Raj Samadhilyia's farmers have been able to do a better job of capturing, managing, and using the precious water provided by scanty rains. As a result, they are achieving a goal that scientists say will be essential to achieving food security worldwide: getting more crop per drop, particularly in areas where water could become scarcer due to climate change.

"Successful water management means never being satisfied—every drop is sacred," says Hardevsingh Jadeja, the village chief who catalyzed Raj Samadhilyia's water-saving scheme. It's a rare achievement, however, as water management remains a major challenge in dry parts of India and elsewhere. In Africa, for instance, most farmers still depend on unpredictable rains. Just 10% of Africa's farmland is irrigated, compared with 26% in India and 44% in China.

Eye in the sky

Raj Samadhilyia shows how melding space-age tools with a few low-tech approaches can dramatically increase water availability.

In 1984, while searching for a better map of his region, Jadeja ended up talking with specialists at the India Space Research Centre in Ahmedabad. They showed him satellite images and maps that revealed the geology underlying his village. The maps highlighted some hidden lineaments—joints or fractures—that run through the rocks. Those cracks, the scientists noted, probably channeled the annual monsoon runoffs to the aquifer beneath. With some careful planning, they added, the town could capture and store some of that water so that it provided a year-round supply to replenish both the aquifer and town wells.

The chief mobilized his villagers. At one promising lineament, they dug down to expose the natural channel. Then they dug a 20 meter by 30 meter reservoir to capture the seasonal flow—high enough so that gravity would slowly channel the water down to the aquifer rather than running off. Perhaps most importantly, Jadeja used his political skills to pass some new community rules. Farmers adopted irrigation techniques that don't waste water, such as pipes that deliver tiny drips directly to plant roots. And nobody is allowed to draw directly from the precious reservoir, which is also used for watering cattle.

It worked. Long after the annual monsoons ended, the stored water helped maintain groundwater levels during dry spells. Wind-, hand-, and oxen-driven pumps distributed the water through the drip tubes to about 100 hectares of fields. Ultimately, even the village's more than 100 households got piped water and toilets. And the government water tankers that once made routine deliveries during the dry season no longer stopped at the village.

Now, Jadeja is moving to make the system even more efficient. Recently, as he showed off a drip-fed bean field planted with its third crop of the year, he discussed plans to reduce the reservoir's surface area by making it deeper, in order to cut losses from evaporation. "Saving those drops means the difference between a hungry child and one that is educated and ready to help improve the country," he says.

Drop by drop

In other poorer or dryer parts of the world, farmers are also learning to make the most of meager rains. In arid eastern Uganda, for instance, government researchers are teaching ground nut (peanut) farmers to place their plants in raised ridges or earthen mounds so that the rainwater soaks into the roots rather than running off. Other approaches include piling rocks around crop plants to help hold in moisture and teaching farmers that they can withhold water from some crops during certain growth stages without harming yields.

Some aid organizations, meanwhile, are drawing on their experience helping villages build simple drinking water systems to bring more water to farmers. In Kihonda, Uganda, for instance, last October the Busoga Trust, a U.K. nonprofit, helped villagers install a hand-powered pump. Some villagers are already watering their gardens, although it's an arduous process because they have to carry the water in plastic "jerrycans," the ubiquitous 20-liter yellow canisters seen across Africa. In communities that don't have access to well-drilling machinery, villagers are hand-digging wells if the water table is high enough.

Such approaches may be less effective than direct irrigation. But they reflect the reality that although larger-scale water diversion schemes have worked well in places like India, they are still out of reach for many African communities. "We can tell them to use channel irrigation," says Patrick Rubaihayo, a crop scientist at Makerere University in Kampala, Uganda. "But irrigation systems are very expensive to maintain by an ordinary farmer." Ultimately, he says farmers will need government help to expand irrigation, particularly in sub-Saharan Africa. There, just 4% of land is irrigated, and scholars say irrigation has actually decreased over the past 30 years because projects built during the colonial era have fallen into disrepair.

In Uganda, the government hopes to reverse that trend. It recently announced plans to rebuild dozens of crumbling "valley dams" that were built in several dry regions in the 1970s to trap rainwater for farmers raising cattle.

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