Farmer innovations in water harvesting

Deborah Duveskog, Charles Mburu and Åsa Forsman

The farm of Alex Ole-Pere is often described as an oasis in the desert. From afar you can see a large Bluegum (Eucalyptus) tree, which would not normally survive in this dry climate. As you approach his farm, there are trees visible on the plains where typically the only vegetation is Acacia bush. Alex is one of the farmers identified as an innovator in the "Promoting Farmer Innovation in Farmer Field Schools" (PFI-FFS) programme in Kenya. His simple yet ingenious idea of a rainwater reservoir to capture run-off water from the surrounding mountains has been spread to other farmers in the area. In addition, his plot now serves as a water reserve for surrounding farmers and pastoralists in the dry season.

Spreading innovations

Africa has enormous resources of rich traditions, untapped knowledge and promising innovations relating to soil and water management. A large number of farmers experiment with soil and water conservation techniques on their own and spontaneously try out new practices, without the direct support of formal research and extension. Like the invention of Alex Ole-Pere, many of these small-scale initiatives have the potential to benefit other smallholders if they are applied on a wider scale. Farmers in drylands often suffer from extension systems that do not function well because of the large distances involved and the marginal nature of arid areas. This often leads to the failure of recommended technologies. Instead of relying on technologies that are often inappropriate and introduced from the outside, there is a real possibility in dryland Africa to build on local resources of knowledge and traditions, and the inventiveness that comes from necessity.

In East Africa in recent years, increasing attention has been paid to capturing local knowledge and initiatives and disseminating this information to other farmers. For example, UNDP and FAO have been working since 1997 to increase the recognition given to indigenous knowledge in agricultural extension by supporting farmer-to-farmer knowledge sharing and the identification and dissemination of local innovations (see Box).

Innovation initiative in East Africa

The Promoting Farmer Innovation (PFI) process is a 10-step guideline to identifying and disseminating farmer innovations. It was developed by a UNDP supported project in 1999. The project was piloted in Kenya, Tanzania and Uganda with the aim of identifying farmer innovators. The ideas of these innovators were disseminated through farmer-to-farmer extension and farmer exchange visits. In Kenya, an ongoing initiative supported by UNDP and FAO known as the "Promoting Farmer Innovation in Farmer Field Schools (PFI-FFS)" project has merged the PFI process with the Farmer Field School (FFS) approach to participatory extension. The objective of the initiative is to facilitate increased interactions between innovators and FFS groups and in this way to stimulate the process of innovation and discovery among farmers. Innovators are identified by FFS extension staff and are often included in the FFS as group members, guest speakers or resource persons. Alternatively, the FFS groups go on study visits to see the innovations.

About 250 farmer innovations have now been identified within the Kenyan PFI-FFS project. Around 40 percent of innovations are related to the efficient use of water resources, including water harvesting, small-scale irrigation and other ways to use surface water efficiently.

Dam building

Alex Ole-Pere is a Maasai who lives in a semi-arid area in southern Kenya. Although the district receives up to 600 mm of rainfall per year, this rainfall is highly erratic and unpredictable. The risk for crop failures due to drought is high. People in the area traditionally depend on livestock, but as it gets harder to sustain large cattle herds on grazing land that is gradually shrinking, more and more people have started to turn to crop production. Alex realised that every rainy season a lot of water from the nearby mountains seemed to be wasted as it raced towards the rivers. He came up with the idea of collecting this rainwater by building a dam. He built a reservoir close to his homestead and constructed a diversion from a local waterway. The diversion directed the flow of water from the stream into the reservoir. The dam, which is about 20 by 30 metres wide, was built by digging out the earth and putting it on the outside of the reservoir.

Alex Ole-Pere next to his reservoir. Photo: Åsa Forsman.

Water collected in this way is used for irrigating vegetables and tree seedlings. While most of the area around Alex's farm appears barren because trees and bushes are continually being cut for firewood, Alex plants more and more trees every season on his plot. Apart from sustaining the crops and trees on Alex's farm, the reservoir also serves the larger community. *"My neighbours normally come to fetch water from my dam in bad times. They can take both for their families and for their livestock. I have enough"*, he says proudly.

Earth banks

Agnes Mughi is a farmer in a very dry zone of Mwingi district. Her farm was suffering from water scarcity and she decided to do something about it herself. The area where Agnes lives is often affected by drought and the soil is compacted and eroded. However, her farm now appears green and productive all year round, in sharp contrast to the surrounding area. By using her own creative ideas, Agnes tamed the floods from a nearby seasonal stream by digging a series of earth banks across the direction of flow in the valley bottom above her plot. The banks, which were about 30 metre long and about 2 metres wide, slowed the floodwater down, giving it more time to infiltrate into the ground. This meant that there was an increase in soil moisture on her farm and the water level rose in the well she had dug in the centre of her plot. The well now provides clean drinking water for Agnes's family and neighbours as well as water for irrigating vegetables.

Like many other farmer innovators, Agnes Mughi is experimenting with a number of different approaches to enhance the productivity

Agnes Mughi's productive farm.

of her land. Her second innovation is a bio-pesticide made from dried chilli peppers, neem leaves and local aloe.

Agnes is a part-time social worker, and a role model for other local women. She has great strength of character and believes strongly in what she has to offer. In Mwingi district she has frequently been invited by Farmer Field Schools to explain her innovations to other farmers.

Rainwater harvesting

Peter Olochoki Letoya's first innovation came when he moved to a much drier area in East Mau. He realised that he needed to do something about the water shortage that was distressing his crops and threatening the livelihood of his family. Three years ago, he had the idea to collect rainwater runoff from his rooftop and store it in underground reservoirs. Since then, his reservoirs have been full. Today, it is clear that his idea has been a success but in the beginning he was afraid it would not work.

"When I first started to dig the holes for the reservoirs, I was hiding behind the house so that the neighbours would not see me. I did not want people to think I was crazy", he recalls.

Now that Peter Olochoki Letoya's rainwater harvesting technique has proved to be functional and efficient, his neighbours are no longer suspicious and some of them have started to adopt his method on their own farms. Working together with other farmers in the PFI-FFS project, Peter has been able to spread his ideas to other farmers and families outside of his community. He often gets visits from other farmers and farmers groups who want to learn how to harvest rainwater from rooftops. He has also benefited from visiting other innovative farmers and has been inspired by their ideas.

The tank that Peter Letoya invented is built underground by excavating soil and lining the sides of the pit with plastic sheets to avoid seepage. The top of the tank is covered with cedar posts. He chose cedar as a covering material because it does not rot easily and is not damaged by insects. Peter's tanks have attracted much attention in the area because in comparison with the common tank structures recommended by district engineers that are made out of concrete, they are very cheap to construct. *"My tank is about 10 percent of the price of the normal tanks found in this area"*, he says.

Peter Olochoke Letoya now has three underground rainwater reservoirs. These range in storage capacity from 1000 to 2500 litres. His family uses one for drinking water and the other two for watering trees and bushes on their land. At present he is thinking about collecting rainwater in an elevated tank so that he can start working with drip irrigation.

Another of his ingenious ideas is to use banana trees as nurseries for sugar canes. Peter discovered that the layers of spirally arranged, overlapping leaf bases in the stem of the banana tree form "pockets" that contain water. He placed some sugar cane cuttings in the pockets in the stem and these grew very quickly. In addition to the water from the banana tree, the improvised sugar cane "nursery" also receives moisture every morning from the dew that condenses on the banana leaves. Once they have grown roots, Peter plants the sugar cane cuttings in his fields.

Conclusions

Today, a significant proportion of poor people who depend directly upon the natural environment live in water scarce regions. All over the world, smallholders need water for their agriculture, livestock and households. Small-scale water solutions seem to be a key for enhancing food productivity for poor farmers and pastoralists in dry areas. Local innovators like Alex Ole-Pere, Agnes Mughi and Peter Olochoki Letoya can be found everywhere in Kenya and many other countries too. The challenge is to find ways of encouraging their inventiveness and originality so that their ideas can be developed and shared with other land users.

Peter Olochoki Letoya's rainwater harvesting system. Photo: Åsa Forsman.

Findings from the PFI-FFS project show that there is a real possibility for bringing together external and indigenous sources of knowledge in agricultural extension activities. Initial results of the PFI-FFS programme suggest that farmers show a higher level of adoption when new technologies are introduced by fellow farmers rather than by extension workers and outsiders. East African farming conditions are very diverse and therefore require solutions appropriate to the local context. By capturing local innovations and promoting indigenous knowledge in extension and development activities, sustainable solutions can be found and scaled up. ■

Deborah Duveskog and Charles Mburu. FAO Kenya, PO Box 30470, Nairobi, Kenya. E-mail: dduveskog@faonairobi.or.ke

Åsa Forsman. UNDP Drylands Development Centre, PO Box 30552, Nairobi, Kenya. E-mail: asa.forsman@undp.org

A full paper of on the PFI-FFS initiative is available at www.eseap.cipotato.org/upward