



Kenya

Total population: 35.6 million people

Employment in agriculture: 80%

Share of women in the agricultural labour force: 49%

Official Development Assistance for agriculture (2003-05): US\$112.4 million

% of total ODA for agriculture: 10.4%



Sand Dams in Kenya

Organization: Mennonite Central Committee

Livelihoods in Kenya's semi-arid region are under increasing stress as a result of unpredictable rainfall patterns and increasing desertification. In the face of climate change, indigenous technologies in the form of sand dams are increasing the adaptive capacity of smallholder farmers.

Sand dams in eastern Kenya are designed to help farmers gain access to water for domestic and agricultural use during the region's long dry seasons. The dams are concrete weirs built across seasonal river beds. They capture sand carried in torrid river water during the short intense rainy seasons. The captured sand stores millions of liters of water upstream of each dam. When mature, the stored water rehydrates local aquifers, enhancing biodiversity and agricultural livelihoods.

Country Context

Natural resources form the foundation for much of the Kenyan economy. Agriculture in particular is a cornerstone of the country's economy employing over 80 percent of the

population. More than 50 percent of export earnings are attributed to agricultural products with cash crops of coffee, tea, tobacco, cotton, sisal, pyrethrum, and cashew nuts leading the way. Exports of fruit, flowers, and vegetables are also attracting an increasing amount of foreign investment. Tea continues to create the largest agricultural profit for Kenya. The primary food crops are beans, cassava, potatoes, maize, sorghum, and fruit. These crops are mainly grown by smallholder to mid-size farmers. The majority of Kenya receives less than adequate rainfall needed to support crop cultivation.

MCC and Sand Dams in Machakos

The project area includes the vast semi arid region south east of Nairobi within a radius of 200 km of the town of Machakos. This is generally a hilly area with weathered and highly eroded volcanic soil. Stones and rocks in river beds were removed by British colonialists to build towns and cities. The area was not generally used for colonial agriculture because of the difficult topography and climate. The landscape is dominated by smallholder farmers (2 – 5 acres) whose families have farmed the region for generations. Maize has been the dominant crop, but with diminishing returns due to the weathered soil.



Joshua Mukusya of Excellent Development.

Water Harvesting for Resilient Agriculture

By drawing on an indigenous technology, MCC partners are increasing resilience by strengthening biodiversity and drawing on the knowledge and mutual trust of community participants.

Local knowledge and innovation

Sand dam technology draws on the innovation of local farmer, Joshua Mukusya, who began experimenting with rainwater harvesting about 30 years ago. Today the spread of the technology (over 500 dams have been built so far) is also led by Mukusya and staff of a local development agency called Excellent Development.

Excellent Development grew out of a locally spawned farmers' collective or "Community Self Help Group". Today Excellent encourages this same model of social organizing in over four dozen farming communities expressing an interest in sand dams. Self Help Groups facilitate knowledge transfer across scales (from household to community) and Excellent facilitates a broader knowledge transfer regionally by connecting Self Help Groups with each other and internationally through their consultancy services.

Working with local partners, MCC has also sought to transfer sand dam technology across the region to semi-arid regions in Tanzania and Mozambique.

Maintaining Diversity

Survey data reveals that smallholder farmers are benefiting from increased livelihood diversification through the expansion of agricultural productivity in the vicinity of mature sand dams.

Cultivation prior to the construction of sand dams was

normally restricted to the wet-season. As a result of greater water availability the diversity and intensity of agricultural activity has increased substantially. Some farmers have chosen to diversify crop production including the growing of vegetables such as spinach, onions, kales, tomatoes, spices like coriander, tubers like arrow roots, cereals such as maize, and fruit trees.

Animal husbandry practices have also changed due to the increased access to animal feed. The seeding of grass alongside stream beds and on farm terraces has increased the food security of smallholders, particularly women, who have purchased dairy producing livestock.

Sand dams have also enhanced local biodiversity by recharging aquifers and rehabilitating riparian ecosystems. Local farmers have noticed that birds and beneficial insects have returned to the area due to increased water and vegetation. This rejuvenation of natural flora and fauna has buffered farmers from the otherwise negative effects of natural habitat loss. Bees are pollinating farmer's crops

and birds are eating crop destroying insects. Tree planting on farms has also replenished the soil by increasing soil nutrients and preventing soil erosion and increasing soil nutrients.

As ecological systems are restored, farmers are able to grow food using lower external input methods.

Sand dams build the resiliency of farmers to maintain an income by providing a consistent water supply from otherwise ephemeral sources. This has vastly improved the resilience and well-being of farm families in the area.

Sand dams build the resiliency of farmers to maintain an income by providing a consistent water supply...

Building social trust through collective action

The first sand dam, built over 30 years ago, is still being used today and continues to be valued by the community. This innovation is sustainable because it relies on collective action by local community members. Dam building is a social activity in Kenya relying on the contribution of various community members drawing on activities traditionally undertaken by women (water hauling), men, (masonry work) and children (gathering stones).

Women are central players in this social organization and in the actual building of dams. The sand dam results in significant labour savings for women who are able to spend more time on income-generating activities such as growing and selling vegetables.



“So when you grow too old to work, will you pass the land on to your children? Already I am giving the land to my children because I have to train them on how to [farm] for themselves. And when we grow old, we will have some of the things that can keep us in old age, like trees we have planted with Excellent and sand dam water that we will be able to sell. We will not depend completely on our children. There are some families where people do not know what they will eat, they don’t have money, they don’t have assets to sell. They will be a burden to their children. That’s what needs to be taught to communities, they have to think of old age, not [just] present age.”

—**Phyllis Mutio**, wife of one husband, mother of 5 children and a leader in her church community

Farmer’s Voices

“I started planting tomatoes because I saw my neighbors paying school fees with the profits from [selling] tomatoes. So I started growing tomatoes because we now have water from the sand dams. I have paid a lot of school fees and you can see how this has helped my children. A pound of tomatoes goes for 300 shillings and people come for them, so I do not need to transport them to the market. People come here and demand the tomatoes.

“Another thing that has encouraged me is the community [Self Help] group because of the commitment and unity they have. They come here and see that I have planted tomatoes and they go back on their farms and they do the same.”

—**Titus Silu**, husband of one wife, father of 6 children and local Self Help group leader





Sand dam building work party near Kola, Kenya. *All photos: Dan Wiens*

Resilience in a Changing Climate

Climate change will continue to affect hydrological systems across Africa. In particular, the Intergovernmental Panel on Climate Change projects that climate change will further reduce water availability in already water-scarce regions. Sand dams present one possible adaptation strategy for smallholder farmers living in semi-arid regions where livelihoods are dependent on rain fed agriculture. The presence of sand dams allows communities to build resilience by promoting livelihood diversification, community mobilization and ecological restoration.

