

## Healing the Gullies: Farmer Research Networks Answer the Call for Transformational Agriculture and Climate Adaptation in Kenya



*FRN Drylands, Photo by Carlos Barahona*

In Kenya's West Pokot County—3,000 kilometers (2,000 miles) south of Sharm El-Sheikh, Egypt where world leaders are gathered for COP27—deep, jagged gullies carved by water and intensified by climate-change-fueled drought ravage the landscape, threatening sustainable food and pasture production. The situation is dire: 1.4 million tons of soil have washed away over 45 years in West Pokot alone. In one area, soil erosion has formed gullies that measure a staggering 15 kilometers, roughly 9 miles, long.

This treacherous landscape has caused the loss of over 100 cattle, the lives of four people, and the health of several others injured due to accidental falls. To make matters worse, gullies have lowered the water table, which accentuates water scarcity during the dry season, increases the physical separation of neighbors, reduces the amount of arable land, and impacts farm productivity—increasing food, nutrition, and income insecurities. Kenya is facing its worst food crisis in decades, with [4.4 million people](#) across the country experiencing high levels of acute food insecurity.

Hunger and climate change are inextricably linked—they both demand an urgent reshaping of food and agricultural systems. That's why gully prevention and rehabilitation has become a top priority for farmers in reclaiming their lands, and also why adapting to climate change has moved to the center of Kenya's national plans and international negotiations.

## Nationally Determined Contributions – A Call for Transformation

Eighty percent of Kenya’s rural population relies on household production for their primary source of food. Climate change puts agriculture particularly at risk, threatening the food security of most of the country. The ongoing energy crisis has amplified insecurity, as surging prices disproportionately impact farmers. Alongside inflated costs of food and fuel, the cost of fertilizer has tripled, forcing smallholder farmers to make difficult decisions and explore alternatives.

A key part of building resilience is strengthening natural systems and reducing reliance on external imports like fertilizer. To this end, farmers are collaborating with researchers in western Kenya to improve the formula for bokashi, a compost made from food waste, and in the arid Maradi region of Niger, the Women’s Fields project is [testing the efficacy of readily available fertilizers](#)—including human urine—and teaching women in other regions how to do the same.

Creative and cost-effective adaptations like these, alongside proven mitigation measures, will be central to helping farming communities overcome current and future climate-related crises, and national and international support is needed to reach broad adoption and success. Kenya’s 2020 climate plan (called a Nationally Determined Contribution, or NDC, a key component of countries’ participation in the Paris Climate Agreement), calls for “transformation of the agricultural sector.” But the country’s—and the world’s—ability to achieve ambitious emissions goals hinges on the quality and scale of these transformations.

In a recent report about untapped opportunities for climate action, the Global Alliance for the Future of Food found that food systems account for a third of all global greenhouse gas emissions, but [receive just 3 percent of climate finance](#), and that over 70 percent of countries are missing specific details on food systems reform in their NDCs. The Alliance calls on all countries to produce ambitious plans to improve their food systems, in ways that are rooted in the needs of local farmers and food networks.

Kenya provides a model for other nations in integrating food systems measures into NDCs, clearly identifying strategies and funding needs for their implementation. [Kenya estimates](#) its finance needs until 2030 are \$60 billion, 13 percent of which will be funded by domestic resources. That means the remaining 87 percent will require international support. This includes mitigation measures like scaling up nature-based solutions and climate-smart agriculture, and adaptation approaches like building the resilience of agricultural systems through sustainable management of land, soil, and water.

In an [analysis of Kenya’s NDC](#), the report recommends greater inclusion of underrepresented groups, “in particular women, smallholder farmers, Indigenous Peoples, and other marginalized groups,” and the introduction of agroecological and regenerative farming practices.

As it so happens, in 2014 a small group of farmers in Kenya began a research endeavor that anticipated these priorities by six years. Within this project is a promising model of what bold agricultural transformation in Kenya can look like.

## Farmer Research Network – Radical Collaboration

The Drylands Farmer Research Network (FRN) in West Pokot County, Kenya, a grantee partner of the McKnight Foundation’s global Collaborative Crop Research Program, began with a community-first approach. Seed researcher and core team member Bonface Alkamoi explains,

“Prior to receiving the grant, even, the question was: ‘How do we help communities, whose priorities are livestock, to think soil and water conservation?’”

An FRN is a radically collaborative union of smallholder farmers, academic researchers, and other organizations that pursue a shared goal of seeing smallholder farmers thrive. The concept of the FRN was developed through the CCRP out of their conviction that smallholder farmers’ essential wisdom and insights have been overlooked. It therefore flips the script on a traditional “top-down” approach in which researchers tell farmers what to do. Instead, the networks rely on a participatory model in which every member has a voice in every step of the research process. The Drylands FRN stands out as an exemplar of this model, according to Dr. Linnet Gohole, a professor of entomology at University of Eldoret in Kenya and representative for the CCRP. She ascribes its continued growth and success not only to its impressive results, “seeing crops where none existed before,” but to its “strength of relationships.”

The inaugural team comprised five local smallholder farmers, who collaborated with the Kenya Ministry of Agriculture, local administration, local schools, and the University of Eldoret, and was led by principal investigators Professor Wilson Ng’etich, Dr. Ruth Njoroge, Dr. S. Kebeney, Dr. Fred Wamalwa, Bonface Alkamoi, Harrison Churu, Mumo James, Mr. Denis Mugaa. To mitigate the impacts of gully erosion, the Drylands FRN adopted integrated Gully Rehabilitation Trusts (GRTs) that comprised 385 households spread across five soil and water conservation groups. These groups [implemented a multi-faceted plan](#) to mitigate and rehabilitate gullies through adoption of sand dam construction, cut-off drains, terracing, afforestation, gabions, check dams, stone bunds, and enclosures.

### **A Natural Calamity or Solvable Problem?**

West Pokot County is an arid region that experiences frequent and prolonged droughts and famine. Climate change only exacerbates these challenges.

“The worst problems arising from climate change are interrelated,” says Dr. Beth Medvecky at Cornell University’s International Institute for Food, Agriculture and Development, who has a longstanding relationship with the Drylands community. “Soil degradation, together with increasingly erratic rainfall, makes rain-fed agriculture incredibly problematic. Degraded soils are also low in nutrients. They grow weak plants that are more susceptible to pests and diseases.”

This domino effect of land degradation took its toll on the Drylands community. Prior to forming the Drylands FRN, Bonface Alkamoi shared: “In this area there used to be wildlife—buffalo, leopards, lions. The community couldn’t figure out why the [wildlife] were moving...they were moving due to [land] degradation.” The delicate relationship between soil and farmer was upset as farmers had to implement unsustainable farming practices to ensure adequate crop yields, further accelerating land degradation. This turned into a vicious cycle, where farmers experienced food shortages in as little as three months after harvesting their crops, and women had to walk up to 5 kilometers (3 miles) for water. The community overwhelmingly considered the situation irreversible and beyond repair.

### **Bringing Back Soil Health**

The Drylands FRN sought to challenge this underlying assumption. It contended that the community *could* restore soil health.

An early site visit to neighboring farmland in Tigray, Ethiopia demonstrated that this goal was within reach. Their land had been even less arable than that of the FRN members, but now flourished as a result of implementing evidence-based agroecological practices. The hosting farmers encouraged them to let go of the notion that land degradation was outside of their control, telling them: “The land is not dry—only your mind is dry.”

Alkamoi explains that this site visit represented a crucial turning point for the FRN members, changing their mindsets from resigned to inspired. “When the question becomes ‘Now what?’, that’s where farmer innovation comes in. The FRN approach allows farmers to test what they believe in.” Harnessing water emerged as a top priority. Water is a precious resource in an arid climate. Ironically, water runoff is a significant cause of land degradation, as irregular, heavy rainfall carries away newly planted seeds and topsoil down into the gully, taking away the community’s drinking and irrigation water as well. Building sand dams can divert runoff, and capture and store rainfall.

The FRN’s implementation of sand dams exemplified their collaborative approach. A neighboring county had designed and installed a sand dam using a typical “top-down” approach. It cost 2 million Kenyan shillings (about \$20,000 USD), and was soon after swept away by floods. By contrast, the Drylands FRN created their own sand dam design, chose the location, and distributed materials. The total cost per sand dam was between 20,000-40,000 Kenyan shillings, a fraction of the cost of the county-implemented dam, and they have remained stable. Most importantly, they delivered results. Women [now travel less than a kilometer for water](#). Increased irrigation means that farmers can now support a second harvest of their crops and tree nursery, addressing food insecurity. The sand dam also acts as a bridge, creating a passable road across the gullies, reconnecting neighbors and acting as a thoroughfare for livestock.

### **A Scalable and Adaptable Model for Change**

The Drylands project began with just five farmers in 2014, and by 2022 the FRN has grown to 385 farmers whose collective action impacts over 3,000 community members. The participatory nature of the FRN model allows for equity, inclusivity, and social justice, meaning its impact will never be restricted to a few isolated benefactors, but will always ripple out to benefit many.

Taking their impact a step further, the Drylands FRN groups are now a registered entity, and therefore have negotiating power to work with businesses, local governments, and ultimately influence policy change.

Thanks to the innovation of the Drylands FRN collaborative, the gullies are healing. Streams have returned. Vegetables are growing on farms for the first time. The food is more nutritious. Families have more reliable sources of income. These initial results signify the exciting potential of collective action to achieve impressive results—and the power of smallholder farmers to create healthy, sustainable food systems that feed families and improve the livelihoods and resilience of entire communities in the face of climate change.