Photo by CRS Ethiopia staff

Enhancing Sustainable Production at the Landscape Level

SYNOPSIS

In Resilience through Enhanced Adaptation, Action-learning, and Partnership (REAAP) areas, community-led initiatives are channeling water through integrated water and soil resource management interventions. Micro-catchments, used to harvest water in highland areas in East and West Hararghe zones, perform a particularly important function during periods of erratic rainfall or drought. Even the smallest rainstorm results in runoff that is collected in the micro-catchments, and the water stored in the soil under the micro-catchment is sufficient to sustain trees or plants during a dry spell.

Within highland areas, REAAP disperses trees within communities and undertakes other agroforestry measures to help with soil reclamation. REAAP community members have observed that water management helps reduce soil erosion, increase rainwater infiltration, increase stream flows, raise the water table, and reduce crop loss even in dry years—including the 2015–2016 El Niño drought.

Farmland- and landscape-level restoration is important to REAAP households and communities because of community-identified problems such as population pressures, land shortages, inefficient water use, over-farmed lands, deforestation, drought, poverty, and food insecurity. Improving the management of natural resources vital to food production (such as soil and water) strengthens the resilience of REAAP communities by reducing food insecurity. Farmland- and landscape-level restoration also contributes to resilience through asset building, food production, and income.

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Improving rain-fed agriculture systems is important to building resilience in East and West Hararghe. In highland areas, increasing population, decreased land size, and increasing climate pressure has resulted in degraded land and pasture areas for crop production and the rearing and fattening of livestock. Ethiopia needs improved watershed management, especially in East and West Hararghe, in order to mitigate soil erosion, deforestation, reduced soil fertility, and increasing levels of siltation in rivers and streams. If not properly undertaken, watershed management interventions, particularly on hillsides, can lead to the removal of natural cover, which increases soil erosion and vulnerability to flooding.

OVERVIEW OF WATERSHED RESULTS IN REAAP

- **31 miles** of hillside terracing built, and 27 hectares (ha) of gully sides rehabilitated
- **106 ha** of degraded watershed area enclosed for rehabilitation, 23 ponds maintained, and 55 ha closed for pastoralist communities
- **898 ha** of land under spate irrigation using runoff water
- **909 miles** of stone and soil bunds built; 324 miles of physical soil water conservation maintained; and 180 miles of trench excavated
- **20 community nursery sites** established, with 177,162 trees seedlings raised and planted

Weighing the costs and benefits of adopting technologies. Best practices for soil and water conservation interventions, agroforestry interventions, and construction of water conservation or water catchments in Ethiopia are subject to guidance from the Government of Ethiopia (GoE) Ministry of Agriculture Regulations on Water Conservation and Water Catchments.

However, the table on page 3 demonstrates how REAAP interventions contribute to increased yield, increased revenue, improved soil fertility, increased water retention/soil moisture, and climate change adaption.

In REAAP areas, watershed treatments include physical structures built by community members, including continuous contour trenches, water trenches, check dams, and micro check dams to slow down water flow. In addition, tree and grass plantings hold soil in place and enrich it, while social fencing prevents overgrazing or harvesting of forest products. Water management helps communities become more drought-resilient by reducing runoff and erosion, improving water infiltration, increasing soil moisture, and increasing agricultural productivity even in dry years. The improved techniques and practices included:

- Stone bunds placed along contours to slow water runoff and enhance absorption
- Water harvesting structures and systems, including water ditches that collect water from a surface area for irrigation or improved filtration
- Small-scale irrigation and improved management of water from ground, runoff, and water sources
- Crop residue mulching (leaving crop material on the field after the harvest to improve soil texture, prevent erosion, and encourage water filtration)
- Livestock manure collection and storage for future use on farmers' fields
- Composting by first allowing crop residue and manure to decompose and then adding them back to the soil to improve soil fertility and texture, and allow for improved water filtration

REAAP's engagement of the community in implementing these plans has contributed to environmental transformation at scale (e.g., 761 miles of stone and soil bunds have been built, 247 miles of physical soil water conservation have been maintained, and 94 miles of trench have been excavated), reversing degradation and improving

REAAP – SOIL AND WATER MANAGEMENT TECHNIQUES					
Crop and soil management techniques	**Increased yield**	**Increased revenue**	**Improved soil fertility**	**Increased water retention/soil moisture**	**Short cycle crops adapted to climate change**
Micro-catchments based Natural Resource Management (NRM)	X	X	X	X	X
Stone bunds	X	X	X	X	
Compost	X	X	X	X	
Mulch	X	X	X	X	
Adapted/ improved seeds, planting materials, or inputs	X	X			X
Keyhole gardening	X	X			X
Pump technology	X	X		X	

biodiversity, crop health, and livestock productivity in West and East Haraghe. REAAP is using a number of community-led initiatives to provide shade to livestock and annual crops, and to support better soil and water management. Trees provide fuel for energy and some fruit for food. Within watershed areas, community members cut grass and sell it as livestock fodder, and set aside areas for small ruminant fattening.

Community members began to observe positive changes in their landscapes after investing in community forests, and their observations changed the community's behavior surrounding deforestation and watershed management. Participants in focus group discussions, held during a field visit in June 2016, frequently mentioned water management as a fundamental problem, noting the strong relationship between water availability (through either rainfall or irrigation) and land productivity. Where farmers had access to watershed management infrastructure, those in watershed catchment households recognized and appreciated how these projects helped to recharge water basins, especially during the El Niño drought.

AVOIDING CONFLICT IN RECLAIMED WATERSHEDS

Cattle, sheep, donkey, goats, poultry, and other livestock are integral to rural livelihoods and local cultures in Hararghe's communities. They provide food, materials, income, and traction power for pulling carts or transporting goods to markets. Properly managed, livestock production can enhance economic well-being. However, improperly managed, it has the potential to increase environmental harm to watersheds. Potential impacts include overgrazing of cleared or converted land (which reduces the density of vegetation and amount of organic matter generated), leading to increased soil erosion from wind and water and decreased soil fertility through loss of nutrients. These impacts can contribute to diminished water quality and availability in highland areas. Due to these factors, one of the watershed management principles promoted in REAAP communities is ensuring people and livestock do not disturb any measures put in place to achieve soil and water conservation. To ensure compliance, communities developed bylaws on how to manage reclaimed watersheds, while youth helped to maintain enclosed areas.

Photo by CRS Ethiopia staff

REAAP has helped lay a foundation to transform farmer livelihoods through a sufficient investment of time and resources, allowing for sustainable gains to the natural resource base. Regenerating degraded land enables more water capture in the field, greater increases in the water table, and the return of perennial streams and rivers. These water and soil management approaches also result in the reforestation of hillsides, which reduces flooding and soil erosion, thereby increasing food production.

Learning to-date: REAAP communities mobilize their own resources to restore the landscape through the implementation of short- and long-term community action plans. The cost of building resilience is sometimes difficult to measure, since it is not always apparent what negative outcomes have been prevented. However, REAAP community feedback and results to-date suggest that, despite the relatively high cost of public works in vulnerable communities, the costs are significantly outweighed by the broad benefits observed by community members.

Linking public works and livelihood activities to watershed activities has helped recharge water basins in the East and West Haraghe zones, even during the El Niño drought. These interventions provided effective means to manage shocks and climate-related risks, and improved crop production and the natural resource base. As a result of these soil and water management investments, REAAP community members have observed more moisture retained in the soil, recharged riverbeds even during dry periods, and less prevalent flood damage due to check dams.

REAAP communities are aware of the need to work together toward afforestation to restore precious forests and the biodiversity contained within them, and to mitigate conflict through social fencing and collective action.

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