Soil erosion has caused permanent damage to agriculture in many areas of Ethiopia resulting in poverty and food insecurity.

After decades of massive conservation efforts, the erosion rates are still high.

The combination of poor farmers, steep slopes and torrential rainfalls makes lasting solutions difficult to attain.

Soil conservation has become very severe on steep slopes of the highlands of Tigray as well as other regions and represents the greatest threat to continued agriculture. Virtually all topsoil, and in some places even most of the subsoil, has been removed by the action of water and wind.

Past conservation efforts
In some parts of Tigray and surrounding regions, sloping terraces have been constructed for many years by local farmers without external intervention. Typically, the walls of traditional terraces in Tigray have a height of about 1/3 of the vertical interval, leaving 2/3 of the interval for the sloping terrace. These terraces have, therefore, limited ability to retain soil and water. However, the construction of contour bunds has not been part of the mainstream farming practices in most areas with dryland farming.

The government of Ethiopia has made a series of interventions to arrest land degradation. From 1971 to 74 reforestation and bench terracing was started in Tigray under the auspices of a USAID food-for-work program. The UN/FAO World Food Program took over in 1974. Following the drought in 1974/75, the newly installed government intensified the conservation work through the assistance of donors. However, the work largely lacked the necessary commitment from both the government and peasants. Local people participated primarily to obtain food for their survival and less to build a new future.

The strategy followed was six-fold:
1. Save farmland with more than 5 % slope by building stone bunds, soil bunds, and check dams on the most degraded farms in each farmers’ association;
2. Treat uncultivated areas with conservation structures provided their effect on the cultivated land would be high;
3. Involve the community at all levels of program identification, planning, implementation, evaluation, and leaving the benefit to the people;
4. Establish demonstration centers in different parts of the region and train farmers in the techniques of conservation and making contour lines;
5. Implement the work through campaigns; and
6. Use food aid as a facilitation for conservation activities and provide tools for the program.

Soil conservation in Tigray
Yibabe Tilahun, Kjell B. Esser and Mitiku Haile

Ethiopia has the most extensive highland in the tropics. The great tableland is bisected by the Great Rift Valley and dissected by numerous deep valleys. Most of the central plateau is located at an elevation between 1 500 and 3 000 meters above sea level. The highland with its 20 000 square kilometers extension accommodates most of the inhabitants of Ethiopia. It has a favorable climate, generally fertile soils, and not too long ago, it had a dense vegetation.

Soil conservation in Tigray is an information series whose purpose is to disseminate the findings of research and related activities.
The area that was terraced between 1988 and 1995 in Tigray amounted to approximately 418,500 ha while 800,000 ha of land were terraced in the country as a whole during 15 years of soil conservation. While the area covered by soil and water conservation structures is impressive, the benefit of the structures and their maintenance is not well known.

**Awareness among farmers**

Most farmers are aware of the seriousness of soil erosion on their land. The apparent apathy is partly caused by the fact that they live at the subsistence level and cannot perceive how to take action to correct the situation. The labor needed is simply too high and the benefit too far into the future. The construction of appropriate soil and water conservation measures is not a realistic option without external assistance. Hence, they tend to push the issue to the back of their minds and hold on to the belief that God will provide for them.

After being assisted by aid programs, 80% of farmers in the Gununo area reported in 1988 that the construction of soil bunds had increased crop yields. The knowledge among farmers about land degradation due to soil erosion could easily be detected from the land capability classification made within farmers’ associations (tabia) during a reallocation of land in 1989. Farmers delineated their land as suitable for cultivation, grazing, and enclosure. They further classified their arable land as degraded, medium, and fertile. The distribution of the three classes were on an average 0.5:0.7:1.0. The terms “degraded” and “fertile” are, of course, used here in a relative sense.

**Farmer participation**

In our studies from the Degua Tembien area in Tigray, all families contacted had participated in soil and water conservation programs. Each family had contributed an average of 130 person-days annually when the programs were running. Among 33 farmers, 31 would not have been engaged in the construction of bunds if the food-for-work campaign had not come to the village. About 70% of the cultivated lands were considered severely or moderately degraded by the farmers. Farmers are generally informed that soil erosion cause reduction in soil productivity, more difficult land preparation, and need to change crop type. The cause of accelerated erosion is commonly considered to be deforestation, over-cultivation, steep slopes, intense rainfall, and removal of the protective layer of surface stones.

Soil erosion is a threat to new generations (photo: K. Esser)

The construction of erosion measures may not be a straightforward exercise. After the construction, farmers found erosion to be aggravated on 35% of the land, whereas only 55% of the land showed reduced erosion. The construction work does, in fact, include digging trenches, removing stones from the soil surface, and creating new channels for run-off flow. All the activity can, in the short run, easily increase erosion—not decrease it. Level terraces can cause problems by accumulating water that may suddenly burst through a barrier and start gully erosion. Given the torrential rainfall pattern, it is equally important to secure safe run-off as it is to secure ample infiltration. Contour bunds and terrace walls are not perceived as purely beneficial structures. They may also have serious negative implications, such as harboring pests (burrowing rodents), causing temporary waterlogging, making land preparation difficult, and aggravating erosion on steep slopes due to the removal of surface stones. The general conclusion made by farmers was, nevertheless, that soil erosion causes degradation and reduced yield and that conservation measures are necessary. Other conservation measures usually practiced are contour plowing and provision of grass strips.

Physical conservation measures have little impact unless soil fertility measures are included as well. Unfortunately, very little of the plant nutrients removed through crops can be replaced by fertilizer or organic matter under the current conditions. Rotation between cereal and legume crops is about the only method to maintain the nitrogen levels. Monoculture is possible and in fact practiced in the home gardens due to the availability of organic wastes and a little manure.

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