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Sustainable Agriculture In Ethiopia

Ethiopia is a nation of high potential and huge challenges. With a population of 139 million people, the second largest population in Africa, Ethiopia's economy, food security, and survival from day to day is tied to the land. Around 80 percent of the population depends on agriculture for their livelihood, and yet the agricultural system that sustains this large nation is under serious and growing threat (Food and Agriculture organization of the United Nations). Soil erosion is a large portion of the crisis that Ethiopians face when it comes to sustainable agriculture that affects both the food that goes onto Ethiopian tables, and the land itself. The mission of this essay is to examine the current state of sustainable agriculture in Ethiopia, the factors that are driving this decline, its impact on different populations, and a recommended path forward that stays culturally grounded, practical, and sustainable.

Ethiopian agriculture relies on small farms of about two and a half to five acres, worked mostly by hand or by oxen. The average American farm spans close to 445 acres and runs on diesel machinery. About 77 percent of Ethiopians live in rural communities, where farming is not a choice, but a necessary way of life that is passed down through generations (Central Statistical Agency of Ethiopia). Roughly 79 million Ethiopians are food insecure, and land degradation is the leading cause as to why (FAO, "State of Food Security"). Forest cover has grown from 17.2 percent to 23.6 percent in recent years, and deforestation has slowed from about 227,000 to 67,000 acres annually, which is real progress from government reforestation programs (World Resources Institute). Conflicts in the Tigray, Amhara, and Afar regions have caused millions to

be displaced and wrecked agricultural infrastructure. While food inflation topped 22 percent in 2024 (FAO, “State of Food Security”). None of these numbers can show the whole picture by themselves. Behind every number there is a household that is deciding whether its land can still support the family working it.

Take for example the Alemu family, who farm just over two and a half acres of hillside land in the South Wollo Zone. Bekele Alemu and his wife Amsale grow a mixture of teff and maize, two cereal grains that grow well in Ethiopia, on a slope that has been thinning as the years pass. The plot that had produced two full sacks of maize now can barely produce even one. Every plowing season, Bekele tills a seedbed with a single ox-drawn maresha, the same method that his father had used before him, unaware that the loose soil it leaves behind will wash downhill when the first heavy rainfall comes. They have never built a soil bund or planted a cover crop between seasons, since they have not been shown how, and the labor of building and maintaining one on top of an already exhausting workload is not something that they can easily add onto their already full workload. Their income, like most small farms, rises and falls with just the harvest alone. In a good year, the family eats three meals a day and is able to sell some of their surplus to help cover school fees. In a bad year the soil slowly thins from below them, they are only able to eat two meals a day if they're lucky, and their teenage children leave school to help stretch the family’s labor. None of this is what shows up when a GDP report is written up. This is the reality behind every statistic, a family whose fortunes rise as well and fall with the health of a few acres of soil.

Ethiopia loses an estimated 1.5 billion tons of topsoil to erosion every year (“Unconvering the Drivers”). Nearly half of the country’s highland area, about 34.6 million acres, is significantly degraded, and the average soil loss on areas that are cultivated is estimated

to be about 16 to 18 tons per acre each year, which is climbing towards 80 tons per acre on the steepest, most exposed slopes (Desta etal.). The ideas are straightforward. Tilling a fine seedbed for teff or wheat leaves soil loose and exposed, deforestation for fuel and farmland removes the tree cover that would otherwise help to anchor the soil, and overgrazing on strips of vegetation from already fragile hillsides that damages them further ("Soil Erosion and Sediment Export"). Every storm that comes through takes away a little more of the highlands downhill.

The cost is not unknown. Soil erosion cuts into the agricultural GDP by an estimated 3 percent, which is worth about 1.9 billion dollars a year (Uncover the Drivers"), and the World Resources Institute puts the broader cost of the land degradation, including lost ecosystem services and water availability, at 4.3 billion dollars every year (World Resources Institute). Left unaddressed, soil erosion alone could be a driving factor in losing 10 percent off of Ethiopia's GDP by 2045 ("Uncovering the Drivers"). Climate change adds more on top of it all, with rainy seasons growing shorter and less predictable, farmers must work the land that has lost its capacity to hold water. The rural and poor, who did the least to cause global climate change, end up carrying the biggest burden.

This burden falls unevenly. Women farmers, who make up about 50 percent of the agricultural labor force, often lack the land tenure to justify investing their labor into a soil bund or compost pit on ground that they may not keep. Additionally they attend fewer training sessions because those sessions run during hours when women also manage households (UN Women Africa; "Analyzing Gender Gap"). Pastoralist communities in the lowlands watch as climate driven desertification stops grazing land through the same decline. Landless youth, a rapidly growing share of the population in a country with just an average age of 19, are frequently excluded from conservation programs built around existing landholders

(Worldometer). Urban Ethiopians feel the consequences through means that aren't directly connected to them, as food prices rise and the arrival of rural migrants whose land could no longer support them.

Reversing this decline does not require inventing brand new technology. Ethiopia already has the knowledge and people to restore the degraded soil, the task is just scaling what is already working and fixing what has held it back. Three regenerative practices anchor the recommendation in this essay: physical soil and water conservation structures such as terraces and stone bunds, agronomic practices such as composting, cover cropping, and crop rotation with legumes used in the soil to fix the nitrogen levels, and the institutional support, land tenure, cooperative membership, and education, that all determines whether or not farmers stick with these practices for long enough to see results.

The evidence for this idea is already inside of Ethiopia's own records. The government's Sustainable Land Management Program, which has been running since 2008 in partnership with the World Bank and the Global Environment Facility, has brought more than 2.2 million acres under conservation practices and benefited 2.4 million people (World Bank, "Enviroment"). On top of that, farmers in treated watersheds saw crop yields rise by 10 percent, vegetation cover increase by 9 percent, and household income climb by 161 percent, with more than 100,000 households receiving land certificates that gave them a legal reason to invest in the ground beneath them (World Bank, "Restoring the Landscapes"). A separate cost benefit study in southern Ethiopia found that farmers who had already adopted soil and water conservation measures spent about 69 dollars per acre to establish them, and were able to earn a 28 percent higher crop yield in return, a net value of nearly 610 dollars per acre over the life of the investment ("Returns of Sustainable Land Management Interventions"). A wide review of 84

studies across the country had found that mixing physical structures along with agronomic practices, keeping soil covered and adding organic material rather than relying on terraces alone, cut soil loss by 40 to 74 percent and had raised yields by 25 to 75 percent, depending on the practice (Desta et al.).

The record of these practices are not all positive, and a serious recommendation has to account for that. Some studies have shown that stone barriers reduce the area that is available for cultivation enough to lower total yield. This is especially true in high rainfall parts of western Amhara. The farmers in those areas have torn out structures they felt cost more in lost cropland than they were able to return in conserved soil ("Household Determinants"). Terrace maintenance is very physically demanding, and without a local institution to monitor and support upkeep, poorly built or abandoned structures fail to help control erosion at all ("Effectiveness of Sustainable Land Management Initiatives"). Research consistently points to the same conditions needed for success, with farmers needing to adopt and maintain these practices when they belong to cooperative, have contact with a trained model farmer, hold secure tenure over the land, and receive real training rather than a one-time demonstration ("Determinants of Smallholder Farmers' Choice"). Take any of those away, and the adoption rate drops dramatically.

Ethiopia's path forward is to scale what works, and to fix the conditions that make it fail. That means favoring the recyclable agricultural practices, such as composting, cover cropping, and legume rotation, while also preserving physical structures like terraces and bunds for the steepest slopes where they are necessary. Additionally pairing every structure with the agronomic practices that the research shows make combined approaches most effective. It means expanding the Sustainable Land Management Program (World Bank, "Enviroment"), into the highland districts it has not yet reached, and building local kebele level institutions with real

capacity to monitor and support terrace maintenance rather than leaving it entirely to individual households. This means finishing the rollout of land certificates, since farmers with secure tenure are consistently more likely to invest in their soil. This means that the training that is delivered through cooperatives and model farmers, since that is where the evidence is showing these techniques adoption is sticking, while paying particular attention to reaching women as well as youth that don't have land, with the two groups conservation programs most often overlooked.

Funding sources already exist and can be expanded. The World Bank and the Global Environment Facility have backed the Sustainable Land Management Program for Results, already scaling the same approach to 500 additional watersheds (World Bank, "Environment"). The World Bank's BioCarbon Fund has committed 40 million dollars for sustainable land management specifically (World Bank BioCarbon Fund). USAID's Feed the Future program and other NGOs already active in Ethiopia's agriculture sector add further capacity for community level rollout (USAID Feed the Future). A national push would draw on all of these while requiring a matching contribution from Ethiopia's own agricultural budget, a sign of government commitment that donors tend to reward with further investment.

Real limitations remain. Conflict in northern Ethiopia is keeping some regions temporarily out of reach for any national program that would provide assistance. Terrace and bund construction is highly labor intensive work in households that are already stretched thin, and some farmers will come to the conclusion that new infrastructure might not be worth the effort to install. A single bad drought is able to undo years of soil progress no matter how well the watershed has been managed. These argue for a program that starts in stable, accessible regions, tracks its results honestly, including the cases where structures fail, and expands based on evidence rather than assumption.

Ethiopia has already proven, across more than two million acres and millions of farmers, that degraded land can be brought back. What remains is reaching the households the program has not yet found, and being honest about the practices that need fixing before they are able to be scaled any further. For the Alemu family, soil restoration will not arrive as an abstraction. It will arrive as a compost pit that sits behind the house, a contour line of grass and stone that runs across the slope, a legume planted in between rows of maize, and a land certificate that makes the labor of building all three feel worth their time and energy.

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