



Homestead agroforestry and storage of animal feed in Hawzen.
Photo: Relief Society of Tigray (REST)

Contributions of homestead agroforestry during the war in Tigray, Ethiopia

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Introduction

Forest and land degradation is among the major problems in Ethiopia's Tigray Region. Forest degradation is caused by conversion of natural vegetation to agricultural lands; this is driven by rapid population growth and unplanned settlement and resettlement. Land degradation contributes to the decline of agricultural productivity and to food insecurity and rural poverty. It also affects the type of plants grown, the availability of surface and subsurface water, and biodiversity.

To address these problems, governmental and non-governmental organizations over three decades have established exclosures (closed off areas) in degraded forests and communal grazing lands to allow natural regeneration. The aim of the exclosures was to minimize human



Homestead agroforestry activities with trees at Abreha We Atsbeha, Ethiopia. Photos: Relief Society of Tigray (REST)

activities through implementing a range of physical and biological soil and water conservation structures and by mobilizing communities for massive tree planting in various watersheds. These concerted efforts significantly enhanced environmental recovery and the greening of degraded landscapes, reduced soil erosion and increased the recharge of surface and subsurface water. Despite such measurable and verifiable achievements, however, several challenges remain. They include low survival and growth of transplanted seedlings, minimal economic gain and scarce equity, with biased benefit sharing and ownership. These factors undermine landscape restoration success in Tigray. And in addition to these challenges, the war that began in Tigray in early November 2020 has created human catastrophe and massive destruction of forest resources for firewood and for military purposes (Deckers et al. 2020).

As a result, it was not possible to implement watershed-level communal plantations in Tigray. As an alternative option, farmers established homestead agroforestry in the area near their residences. Homestead agroforestry is an integrated tree-crop-animal production system that is established on small parcels of land surrounding homesteads and managed by family labour (Kumar and Nair 2004). In Tigray, several farmers who practise agroforestry have been traditionally managing their homesteads through various efforts, such as planting trees, cultivating naturally growing trees and shrubs through farmer managed natural restoration (FMNR), improving soil management through soil and water conservation, planting vegetable and fruit gardens,

keeping livestock, and beekeeping. Most of these farmers have benefitted from the products from their homestead, such as firewood, construction wood, nutritious food, animal feed and cash income. However, there is no strategy document, guide or manual for homestead agroforestry available to farmers.

Assessing homestead agroforestry

The Relief Society of Tigray (REST) established a team of experts from Mekelle University's College of Dryland Agriculture and Natural Resources, Tigray Agricultural Research Institute and REST to conduct an assessment of farmers' experience with homestead agroforestry practices. Financial support to conduct the assessment was provided by the Development Fund of Norway. The team was provided with a terms of reference prepared by REST. Project coordinators gave an orientation to team members on the objectives of and ways to conduct the assessment.

A desk study by the team members reviewed literature on homestead agroforestry and developed a survey questionnaire. The questionnaire covered issues such as the contributions of homestead agroforestry, including income, food and energy. It also covered the strengths of and challenges to the implementation of homestead agroforestry, and the remedies to address these challenges. A checklist was also developed for group discussions with farmers and experts. To build consensus, validation of the questionnaire and checklist was conducted by the relevant sectors within REST. To gather

the required information, 32 beneficiary households, including model farmers, were included in the assessment survey. Model farmers are those who introduce new crops, techniques and technologies to other farmers in the village. Model farmers were included in the assessment because they are believed to have the most experience with homestead agroforestry in the region.

Contributions of homestead agroforestry

If farmers' crops are looted or damaged and their livestock are looted or slaughtered, it is difficult for them to maintain their livelihood. Farmers needed to search for other sources of livelihood. Homestead agroforestry has greatly contributed to addressing this problem. The various types of tree species found in homestead agroforestry provide a range of benefits that include food, charcoal, firewood, construction material and farm implements; they also provide ecosystem services, supporting soil health and soil fertility and reducing soil erosion. Homestead agroforestry can contribute to improving the microclimate and enhancing beautification, and has the potential to increase carbon sequestration. It also promotes agrobiodiversity. Some contributions of homestead agroforestry are specific to times of war, such as shelter from shelling and to hide valuable household items from looters. However, this article focuses on the contribution of homestead agroforestry to income, food and energy during the war in Tigray.

A source of cash income

In addition to their home consumption of agroforestry goods, homestead agroforestry practitioners generate significant income from selling firewood, charcoal, irrigated crops, vegetables, spices and fruits (irrigated and not). *Eucalyptus camaldulensis* and *Eucalyptus globulus* are the well-known introduced species used for generating income from the selling of firewood and charcoal. Fruits from *Mangifera indica* (mango) and *Ziziphus spina-christi* (known as *geba*) are consumed by farmers and sold to generate income at the farm gate or in nearby markets. Most of the farmers visited during the assessment were growing fruits and vegetables at their homesteads for earning cash income. Income was also generated from selling the leaves of *Rhamnus prinoides* for local beverage making and social gatherings. The income generated from these products ranges from none (i.e., farmers use them only for home consumption) up to ETB 455,000 (Ethiopian birr; USD 9,100) per year, in the case of a model farmer. The average yearly income of the surveyed households who practise homestead agroforestry was ETB 33,882 (USD 678).

The tree that saved lives

In times of war, coupled with sieges and blockades, communities are displaced, or move to protect themselves from attack. By the time they come back to their residence they do not find what they left. Goods have been looted, burned or taken away. As a result, it becomes difficult to sustain a livelihood in the original



Homestead agroforestry activities with vegetable crops and livestock at Abreha We Atsbeha, Ethiopia.
Photos: Relief Society of Tigray (REST)



Homestead agroforestry products include firewood. Photos: Relief Society of Tigray (REST)

residence. Farmers had two options: either to move to another area to find food, or if they remained in their residence, to depend on food items considered as famine food or wild food. Items not commonly eaten before, such as the fruits of *Ziziphus spina-christi* (*geba*), can become staple foods. This tree species can thus be considered a risk management option for individuals affected by war. For many people who were forced to remain in their residence because of uncertainties if they moved to another place, the fruit of *Ziziphus spina-christi* saved their lives. It was also frequently given as a gift to relatives elsewhere. As a result, people named it “the tree that saved lives.”

Many stories are available about the tree. A farmer from Seharti Samre District who was displaced from his residence came back when the place became safer. However, his house was damaged, and three tonnes of maize and sorghum had been looted. Fortunately, his house was surrounded by an area of homestead agroforestry with many *Ziziphus spina-christi*. His entire family could be fed, and their lives saved.

A source of energy

The effects of war resulted in extreme poverty for many farmers. This forced farmers to sell firewood and charcoal as a coping strategy. In addition, urban residents who relied on electricity were frequently cut off from the electricity grid. This forced them to shift to biomass energy sources such as firewood and charcoal. Eucalyptus trees, which are commonly grown in homestead agroforestry,

became one of the major sources of biomass energy for urban dwellers.

The conflict in Tigray has created human devastation and massive destruction of forest resources for firewood (Deckers et al. 2020). Moreover, despite local bylaws and regulations against cutting vegetation in exclosures, communities that were greatly affected by the war and cut off from alternative energy sources such as electricity for cooking turned to local sources of wood. Remote satellite sensing images confirmed the pressures that this energy crisis put on trees and shrubs (Schulte to Böhne et al. 2022). However, a large part of this biomass energy came from trees grown in homestead agroforestry gardens, thus reducing the pressure on forests.

Major supports for homestead agroforestry

Homestead agroforestry is not new in Ethiopia. It is a well-known practice in several regions of the country. This means the development of homestead agroforestry in war-affected Tigray can rely on several positive factors:

- government’s previous experience with homestead agroforestry;
- support from NGOs;
- committed leaders and community members;
- availability of research and higher education institutions;
- availability of roads and electricity;
- extension support through skilled experts;
- experience of farmers with homestead agroforestry;

- a suitable agroecological zone;
- existing linkages with microfinance providers; and
- availability of private nursery sites.

Major challenges to homestead agroforestry

Nevertheless, some challenges will have to be faced by farmers and other stakeholders when developing homestead agroforestry:

- trauma at all levels as a result of war;
- shortage of water and free grazing areas;
- shortage of agricultural inputs such as seeds, fertilizer and chemicals;
- shortage of an active labour force in some households;
- insufficient technical support, monitoring and evaluation;
- shortage of funds for private homestead agroforestry; and
- absence of a strategy document, guide or manual for homestead agroforestry.

Remedies to address the challenges

These challenges can be addressed with the following initiatives:

- provide training in war trauma healing at all levels;
- improve the supply of agricultural inputs to farmers;

- together with stakeholders, develop a strategy document, guide or manual for homestead agroforestry;
- develop alternative water-harvesting structures such as water tanks, and harvest rainwater;
- strengthen technical support, monitoring and evaluation; and
- plant drought-resistant seeds and seedlings.

Recent advancements

Homestead agroforestry has been practised in the region for many years. During two years of war, it was impossible to implement soil and water conservation or watershed-level seedling plantations in areas distant from homes, mainly because of security problems. Homestead farming was considered not only an option, but mandatory. As part of this, REST implemented the Food Security and Livelihood Recovery Support for War-affected Communities in Tigray project, funded by the Development Fund of Norway. The project was implemented in five districts affected by war. One of the options was establishing a homestead woodlot plantation as an alternative livelihood strategy. Compared to the previous watershed-level communal plantation, this practice has contributed to resolving the ownership problem (i.e., farmers did not own the trees in the plantation) because in this project, tree seedlings were chosen and selected by the farmers and were planted in their homesteads. This practice, coupled with proper pit preparation, moisture-conserving structures,



Adjacent households with (left) and without (right) homestead agroforestry in Hawzen, Ethiopia.
Photos: Relief Society of Tigray (REST)

post-planting management (such as fencing, manuring, watering, continuous monitoring and other measures), contributed to improved growth of the multipurpose seedlings.

As part of the project, two cluster workshops were organized with district leaders, natural resource management experts, researchers and farmers. These workshops enabled farmers to share their experience. The district leaders clearly supported homestead agroforestry and showed their commitment to consider it as their priority agenda. Moreover, the concept was presented to the regional Agricultural Task Force at the Bureau of Agriculture and Natural Resources. The presentation focused on the importance of homestead agroforestry and the need to support it by developing a good strategy document and a guide or manual, together with stakeholders.

Conclusions

No household should fail to adopt agroforestry practices. There are several reasons why this should be a priority among stakeholders engaged in homestead development in Tigray:

- Through homestead agroforestry, households can meet their energy needs, enhance food production, generate cash income, produce animal feed, and enhance agrobiodiversity, thereby improving their livelihood.
- It is important to develop a regional strategic document on family-based integrated homestead development in order to contribute to policymaking.
- Practising homestead agroforestry can reduce pressure on communal forest resources and curb deforestation.

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These efforts could be assisted through providing technical support, appropriate financing and capacity strengthening, as well as enabling legal, institutional and policy frameworks. The strategic document (or a guide or manual) should be disseminated to the stakeholders in homestead agroforestry in order to support successful implementation.

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References

- Deckers S, Nyssen J and Lanckriet S. 2020. Ethiopia's Tigray region has seen famine before: Why it could happen again. *The Conversation* November 17, 2020. <https://theconversation.com/ethiopias-tigray-region-has-seen-famine-before-why-it-could-happen-again-150181>.
- Kumar BM and Nair PKR. 2004. The enigma of tropical home gardens. *Agroforestry Systems* 61:135–152. <https://www.scribd.com/document/91657666/The-Enigma-of-Tropical-Home-Gardens>.
- Schulte to Bühne H, Weir D, Nyssen J and Weldemichael T. 2022. Tigray in Ethiopia was an environmental success story – but the war is undoing decades of greening. *The Conversation* April 27, 2022. <https://theconversation.com/tigray-in-ethiopia-was-an-environmental-success-story-but-the-war-is-undoing-decades-of-greening-181665>.