# Land restoration requires a shift from quantity to quality: lessons from Tigray, Ethiopia

*Niguse Hagazi, Aster Gebrekirstos, Emiru Birhane, Frans Bongers, Rob Kelly & Achim Bräuning*

Farmers prefer good-quality seedlings. Photo: Gebrehiwot Hailemariam

*"Poverty is the result of an inability to work hard, rather than God's will" [local Tigray saying]*

## Introduction

Land degradation is not new in Ethiopia, and many dryland restoration efforts aim to improve local livelihoods and landscapes while building resilience in the face of climate change. Tree planting is one of the most common restoration techniques to improve livelihoods and keep the environment healthy. However, evaluations of previous efforts (Tigray Bureau of Planning and Finance 2018; Tafere et al. 2019) showed that relative to these gigantic initiatives, restoration through plantations was not very successful. Exclosures also did not yield the expected benefits and services. This article shares lessons and experiences from Tigray Region and elaborates the emerging shift from quantity to quality in restoring degraded lands.

**Niguse Hagazi**, National agroforestry project coordinator. ICRAF, Addis Ababa, Ethiopia; **Aster Gebrekirstos**, Scientist, ICRAF, Addis Ababa, Ethiopia; **Emiru Birhane**, Professor, Mekelle University, Mekelle, Ethiopia; **Frans Bongers**, Professor, Wageningen University and Research, Wageningen, the Netherlands; **Rob Kelly**, Food security and resilience advisor, World Vision Australia, Melbourne, Australia and **Achim Bräuning**, Head, Institute of Geography, Friedrich-Alexander University, Erlangen, Germany.

## Tigray: a learning place for dryland restoration

Tigray is widely known for its attempts to address land degradation. This region in northern Ethiopia is a predominantly rugged and undulating dryland zone, creating niches for diverse vegetation forms ranging from Afro-alpine to desert types. Forest cover has been constantly depleted, mainly due to human factors (Birhane et al. 2017). This reduces the resilience of smallholders who depend on natural resources, leaving them more vulnerable to droughts and famines such as those of 1974, 1984 and 2003 and to the recent El Niño (Tafere et al. 2019). This has encouraged the government to invest in and contribute to massive soil and water conservation interventions, including stone bunds, gully reclamation, and exclosures on steep slopes, accompanied by reforestation and afforestation over the past 30+ years.

Importantly, community members have also been contributing up to 40 days of free labour per year to restore degraded landscapes, in addition to their contribution through government initiatives such as the Public Safety Net Program and Sustainable Land Management Program. These approaches have made the region unique in implementing effective mass mobilisation campaigns. Moreover, support from international development partners through various programmes has been instrumental in complementing efforts made by the people and government, and these collective actions have brought success stories for others to learn from.

- Tigray won the World Future Council's 2017 Future Policy Award for its restoration policy and achievements, and the farming community of Abreha We Atsbeha received the Equator Prize Award in 2012 from UNDP "in recognition of their outstanding success in promoting local sustainable development solutions for people, nature, and resilient communities." More than 2 million *Faidherbia albida* trees have regenerated naturally in a few years in response to the "1 billion *Faidherbia albida* seedlings" planting programme initiated by the late Prime Minister Meles Zenawi.
- Tigray is now much greener, with an increase in forest cover from about 3% in the 1990s to 17% in 2019 (Tigray BoARD 2020).
- The people of Tigray were mobilized to invest their labour in restoration, and over a 15-year period they have moved at least 90 million tonnes of soil and rock by hand.
- About 1.87 million ha have been restored using physical soil and water conservation (646,321 ha), exclosures (232,368 ha), plantations (171,482 ha), state forests (454,012 ha), natural forest (260,721 ha), and agroforestry (104,837 ha) (Tigray BoARD 2020).
- Groups from other parts of Ethiopia and other African countries have visited Tigray to see and learn. The efforts have also contributed to the Ethiopian commitment to restore 22 million ha as part of the Bonn Challenge and the African Forest Landscape Restoration Initiative (AFR100).

Achievements to date are very encouraging, but still not enough to meet growing community demands. The scale of restoration investments seems to be smaller than the scope and complexity of the problem (Gebreselassie et al. 2016). Concerns were raised by the Tigray government, Tigray think tank groups, NGOs and the community regarding why forest cover in Tigray has increased to only 17% (Tigray BoARD 2020). How to improve the effectiveness of reforestation and afforestation was debated, as all sides agreed that achievements are underwhelming when compared to the efforts made. The review did result in a change in mindset from quantity to quality, institutional arrangements, and the strengthening of extension services.

Farmer managed natural regeneration (FMNR) as a tool for restoration of degraded landscapes and improved management of exclosures: the case of Abreha We Atsbeha and many other parts of Tigray: Photo: Niguse Hagazi

## Transforming the forest sector

The Forest Development, Protection and Utilization (FDPU) unit within the Tigray Bureau of Agriculture and Rural Development (BoARD) took an important step in deciding to transform the forestry sector in 2018. The focus was on what could be done differently during and after plantation establishment, exclosure management, enrichment planting, natural forest protection, and soil and water conservation to support reforestation and afforestation. The emerging shift in approach during this transformation came about from asking key questions.

- Why are increases in forest cover and its economic contributions not larger, despite efforts spanning more than two decades? And why is the contribution of (mostly eucalyptus) plantation forestry to regional forest cover only 17%, which seems too small an impact for the investment and low value for money? (However, this number does not include the many eucalyptus trees grown in compounds in Tigray, which represent a high value source of income to smallholder farmers.)
- Despite Tigray being well known for using exclosures as a tool for forest and landscape restoration, why are communities not benefiting more from them? Why are the results from some successful exclosures even backsliding? What is missing?

The main changes that occurred in response to this shift were related to institutional arrangements, tree establishment practices, and management of exclosures.

The local community, together with development partners and government staff, celebrate the successful completion of free labour contributions in 2019 to soil and water conservation to create zero runoff.
Photo: Gebrehiwot Hailemariam

## Institutional arrangements

In 2018, the region decided to reorganise the FDPU unit, which used to be an experienced case team but with very limited decision-making powers or planning and implementation capacity. The reorganization resulted in the following changes.

- The FDPU team was upgraded to a directorate, which helped improve planning and implementation and allocation of budgets, with three sub-teams (forest development, forest protection and utilization, and agroforestry) established to execute them.
- A forest/tree seed centre was established to coordinate tree seed systems and build capacity, including the private sector. The centre identifies and maps tree seed sources and buys and supplies quality tree seeds that have undergone testing and certification. It also monitors the quality of all seeds, including imports, before distributing them to public and private nurseries.
- Private-sector involvement in raising seedlings has increased from 15% to 27% in the past three years. Government tree nurseries are also being privatized. This brings forestry services closer to farmers, with new arrangements moving from top-down and quota-based to a demand-driven tree seedling production system.
- Evidence-based planning and decision-making is now in place. Once the directorate was established this raised accountability questions, such as those related to the Tigray government investing millions in restoration, what happened and how much land has been treated and restored. A study team was established to answer these questions and to document evidence (Tigray BoARD 2020).

- The Mountain Development and Research Institute, the first of its kind in Ethiopia, was established in 2017 at Mekelle University in Tigray to build capacity in the region and country to support the sustainable development of mountain areas.

## Tree establishment practices

Farming communities in Tigray are predominantly engaged in crop and livestock production, and extension services were aligned to that (Hagazi et al. 2019). However, based on learning from the shortcomings in achieving the expected economic, social and ecological benefits and services, the forestry sector extension approach was revised.

- Top-down decision-making for seed and seedling distribution was changed to bottom-up and context-specific distribution to help people plant the right tree in the right place for the right purpose. A strategic shift was made towards plantations, with each district divided into five plantation clusters and planting systems based on these clusters or on commodities, e.g., commercial/industrial, energy, construction, etc.
- The previous approach of mass mobilization for tree-planting without prior training was transformed to include training of key community members beforehand, with technical backstopping and assistance on hand for community groups and individuals during tree planting.
- Tree ownership was transferred to the groups and individuals who planted the trees, even trees in communal areas. An immediate result was a significant improvement in seedling survival rate: to 65–75% by 2019, with a five-year (2015–19) average of 56% (Tigray BoARD 2020). Before 2018, the average survival rate three to four months after planting was less than 50%, declining to less than 30% after 12 to 15 months. The FDPU directorate now aims for greater than 80% survival in the next five years.
- The approach moved from partial packages (i.e., with attention only to planting) to full packages, including post-planting care. A full extension package should also match species with intended objectives and purposes and include a management plan to be followed from pre-planting to aftercare. When establishing plantations, water availability must be considered in order to improve survival rates and growth performance.
- The approach changed from poor seedling production (measured in billions) to high-quality, demand-driven and objective-oriented production (in millions). Tree planting plans for 2015–17 included an estimated 3 billion seedlings, which was significantly reduced to 180 million in 2018, 120 million in 2019, and 100 million in 2020 – an annual rate that will be continued until 2025 for restoring more than 200,000 hectares (Tigray BoARD 2020).

*Acacia decurrens* seedlings exceeded 6 metres in height 18 months after planting when supported by improved management practices that included fencing, watering, mulching and composting. Photo: Niguse Hagazi.

On a restored hillside using exclosures, Tigray has become a place for beekeeping enterprises and youth employment. Photo: Niguse Hagazi.

- Improved support must be made available to private and community plantations and agroforestry, acknowledging that costs will increase if extension agents visit more individuals.

## Management of exclosures

The way exclosures were implemented as a tool for forest and landscape restoration had its limitations. Silvicultural practices and assisted natural regeneration strategies that could have improved management and increased benefits were not permitted. Biomass production, biodiversity enhancement, carbon sequestration, reduction of runoff, beekeeping, etc., were other key benefits that were not pursued or measured. To enhance benefits and services, management and extension services for exclosures were changed.

- **Application of silvicultural practices in exclosures**: Practices such as pruning and thinning allow communities to earn direct benefits while improving exclosure performance. In 2019–2020, some 25,000 ha of exclosures received silvicultural treatments; in 2021–2025, it is planned to expand this to a further 125,000 ha (Tigray BoARD 2020). This was a strategic policy shift from "fully closed" to "allowing for limited inclusion of communities" and creating a sense of ownership by allowing limited harvesting of wood and forest products for livelihood support.
- **Strengthening bylaws for exclosures**: Enforcement of bylaws was not consistent, leading locals to say, "if you cannot protect the invasion and looting of your father's land or property, then be one of the looters" (Tafere et al. 2019). Formulation of bylaws should involve the consent of all segments of society, with clear equity in participation and benefit-sharing mechanisms.

Local communities constructing conservation-based bench terraces in an exclosure: the case of Gergera watershed in Atsbi district. Photo: Niguse Hagazi

- **Hillside exclosures with bench terraces**: This also serves as an employment opportunity; for example, for 1,116 landless youth and 647 women who were engaged in restoring 1,270 ha (Tigray BoARD 2020).
- **Exclosures as corridors to connect remnant natural forests and church forests**: This is valuable for conserving biodiversity and counteracting adverse "island" effects; for example, by linking *Desea* and *Hugumbrda* dry Afromontane forest remnants.
- **Establishment of firebreaks**: Due emphasis is now given to establishing firebreaks and related infrastructure in state and natural forests that are highly susceptible to fire.

## Conclusions

Dryland restoration should be facilitated and enhanced through dynamic and participatory decision making processes. Progressive and reflective learning drive change in decision makers (in communities and in government) towards a better understanding of why institutional arrangements, seedling quality and management matter to successful dryland restoration. Restoration attempts should be evidence based, and rigorous research is needed in: (i) tree planting techniques, including private sector participatory models and community engagement; (ii) sustainable and affordable tree establishment techniques to improve tree survival rates; (iii) drastically increasing post-planting care to improve plant development and their longer-term functions to people and the landscape; and (iv) how best to manage the trade-offs between locking up land and forest in exclosures and providing sustainable livelihoods for nearby communities.

Exclosures should be managed in ways that increase economic benefits to local communities and generate more information that can influence decision-making processes. The lessons from Tigray need to be well documented and shared with other parts of Ethiopia and other African countries for scaling up. For effective dryland restoration, support from development partners — including donors and governmental and non-governmental organisations — is crucial and must be continued in order to realize social, economic and environmental impacts as quickly as possible.

## Acknowledgements

The authors appreciate with thanks the Tigray Bureau of Agriculture and Rural Development, the Natural Resources and Food Security Sector, and the Forest Development, Protection and Utilization Directorate, particularly Muez Haile and his team for providing the data, information, and reports used in this article. Special thanks also to Gebrehiwot Hailemariam for providing valuable pictures.

## References

Birhane, E., T. Mengistu, Y. Seyoum, N. Hagazi, L. Putzel, M. Mekonen Rannestad and H. Kassa. 2017. "Exclosures as forest and landscape restoration tools: lessons from Tigray Region, Ethiopia." *International Forestry Review* 19(S4): 37–50.

Gebreselassie, S., O. Kirui and A. Mirzabaev. 2016. Economics of land degradation and improvement in Ethiopia. In: Nkonya, E., J. von Braun and A. Mirzabaev (eds.), *Economics of Land Degradation and Improvement – A Global Assessment for Sustainable Development*. Springer International Publishing, Switzerland, pp 401–430.

Hagazi, N., A. Negussie, K.M. Hadgu, E. Birhane and Z. Hadush. 2019. Restoration of degraded landscapes: Lessons from northern Ethiopia. In: Hadgu, K.M., B. Bishaw, M. Iiyama, E. Birhane, A. Negussie, C.M. Davis and B. Bernart (eds.), *Climate-Smart Agriculture: Enhancing Resilient Agricultural Systems, Landscapes, and Livelihoods in Ethiopia and Beyond*. ICRAF, Nairobi, Kenya., pp. 61–74.

Tafere, B., N. Hagazi, G. Hailemariam and K.M. Hadgu. 2019. *Guidelines for sustainable degraded hillsides and exclosures management and utilization in Ethiopia taking Tigray region as a case*. ICRAF, Addis Ababa, Ethiopia.

Tigray BoARD. 2020. *Natural resource management geospatial database report*. Tigray Bureau of Agriculture and Rural Development, Mekelle, Ethiopia.

Tigray Bureau of Planning and Finance. 2018. *Socio-economic baseline survey report of Tigray Regional State, Regional State of Tigray, Mekelle*. Tigray Bureau of Planning and Finance, Mekelle, Ethiopia.