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Putting research knowledge into action

Enhancing community and environmental resilience through landscape management in Ethiopia

Key messages

- Maximizing the overall contribution of participatory forest management (PFM) to improve livelihood assets and reduce land degradation requires strengthening forest protection through a better institutional structure, diversifying livelihoods of forest-dependent people, implementing strategies for controlled and sustained extraction of forest products, expanding on-the-job training in forest resource management, and designing PFM for both conservation and economic benefits.
- The sustainability and benefits of freshwater ecosystems require an integrated and systematic approach, comprehensive management throughout the watershed, and meaningful engagement and collaboration between stakeholders. These should be supported by developing policies on buffer zone management and designing policies or strategies to capacitate local-level practitioners through on-the-job training and knowledge coproduction.
- Safeguarding and maintaining protected areas, as well as the benefits of these ecosystems require addressing the 'park-people conflict' by developing strategies for inclusive planning and management, implementing policies and strategies to address the additional costs incurred by local communities due to restrictions on resource usage, building trust between actors, and developing policies and strategies that guide benefit-sharing.
- Ensuring sustainable and adaptive management of soil and water conservation practices requires investing in data, instrumentation of upland watersheds, and capacitating local-level practitioners in monitoring impacts, establishing learning sites, and promoting evidence-based decision-making.
- Addressing changes in ecosystem service values (ESVs) due to land use and land cover changes requires bringing together diverse stakeholders and co-planning and managing the resources collectively, investing in data to establish national-level ESVs, and promoting context-specific conservation measures and trade-off analysis.
- Promoting continuous evidence-based policy dialogue and supporting the use of flexible planning templates at lower-level structures of government sector offices could facilitate the adoption of the ecoregional framework for sustainable natural resource management.

This brief summarizes key recommendations from a decade of research to help overcome some of the governance challenges that hinder the effective implementation of landscape management practices. This study was supported by projects, such as the European Union's Supporting Horn of Africa Resilience (SHARE) I and II projects, and the Nature-Based Solutions for Sustainable and Inclusive Development (NSSID) program which is built on the outputs of the Growth for Future (G4F) project. At the onset, the brief describes the concepts of landscape and landscape management. Thereafter, the context, policy actions and gaps in agricultural landscape management in Ethiopia are explained followed by the findings on landscape management practices such as PFM, freshwater ecosystem conservation, protected area management, hydro-sediment monitoring, and changes in ESVs due to land conversion relating to the ecoregional development framework are detailed. Lastly, the brief provides recommendations for policymakers and other stakeholders to build community and environmental resilience, giving due consideration to diverse practices that benefit both humans and nature.

Instrumentation of streams for discharge measurement following the implementation of landscape management intervention in Ethiopia (*photo:* Desalegne Tegegne / IWMI).

Concepts of landscape and landscape management

Agricultural landscapes can be described in terms of three elements: (i) **structure**- concerning the interaction between environmental features, land use patterns and human-made objects; (ii) **function**- which is the provision of environmental services for farmers and society; and (iii) **value**- which society places on agricultural landscapes, as well as the costs of maintaining and enhancing landscape provisions by agriculture (FAO 2013; Haileslassie et al. 2020). Since the underlying human and natural processes are subject to evolution, landscapes are 'dynamic systems'. A review by Haileslassie et al. (2020) indicated that Ethiopia's agricultural landscapes can be considered as a mosaic of farmers' fields, infrastructure (e.g., terraces and micro dams), and occasional natural habitats which is a result of interactions between farming activities and the natural and socioeconomic contexts in an area.

People modify the landscape by changing its structure (e.g., by implementing soil and water conservation measures, planting or cutting trees, building micro dams, extracting groundwater, changing land use, etc.), to achieve improved landscape functions and support their livelihoods (Hermann et al. 2011; Haileslassie et al. 2020). In many cases, human-induced processes are focused on increasing provisioning ecosystem services (e.g., food production). Furthermore, in poor communities, the incentive to extract short-term economic returns from land and natural resources often outweigh the perceived benefits of investing in long-term environmental restoration and associated economic and ecosystem returns (Mekuria et al. 2020). Therefore, investments in land and natural resource restoration require a balance between short-term economic returns, long-term sustainability and environmental goals. Individuals, households and communities are more likely to accept or invest in activities enabling land rehabilitation over a long period if immediate economic incentives are available. These complex challenges require integrated landscape management (ILM) and relevant policy support to make effective and sustainable investments in landscape restoration beyond current public investments.

According to Verburg et al. (2022), ILM refers to long-term collaboration among different groups of stakeholders to achieve multiple objectives required from the landscape. Five key characteristics, all of which facilitate participatory development processes and characterize ILM are (i) management objectives that are shared or agreed-upon encompassing multiple landscape benefits; (ii) field practices designed to contribute to multiple objectives; (iii) management of ecological, social and economic interactions to realize positive synergies, and mitigate negative trade-offs; (iv) collaborative, community-engaged planning, management and monitoring processes; and (v) the reconfiguration of markets and public policies to achieve diverse landscape objectives.

Agricultural landscape management in Ethiopia

Land resources in Ethiopia face intense degradation due to multiple drivers and pressures, such as poor land management practices, deforestation, soil erosion, agricultural land expansion and overgrazing (Haileslassie et al. 2020; Mekuria et al. 2024). Addressing land degradation has become a major policy objective in Ethiopia, where agricultural growth is an important element of economic and social development (Haregeweyn et al. 2015). About 75% of Ethiopians work in agriculture, producing 80% of Ethiopia's exports and 40% of the gross domestic product (Neglo et al. 2021). An 8.35% growth in agricultural value since 2014 has contributed to reduced poverty. In line with this, implementing ILM practices has led to the restoration of degraded landscapes in the country, since the 1980s (Woldeamlak 2006; Adimassu et al. 2016).

According to several studies (e.g., Kassa et al. 2022; Moges et al. 2023), the most important state-led ILM initiatives and policy actions to support landscape management in Ethiopia include: (i) Ethiopia's community-based participatory watershed development program implemented by the Ministry of Agriculture with support from the World Bank and TerrAfrica. This is an effort to reduce land degradation and improve agricultural productivity for smallholder farmers in watersheds within six regions of Ethiopia through capital investments, technical assistance, and capacity building for farmers and government institutions at national and subnational levels; (ii) engaging communities in the management of state-owned natural forests through PFM; (iii) excluding human and animal interference to assist natural regeneration of degraded land by establishing exclosures and mobilizing communities to engage in soil and water conservation works and tree planting campaigns through programs such as the sustainable land management programs I and II, the recent Green Legacy Initiative and Climate Action through Landscape Management; and (iv) planning to restore 15 million ha of degraded land as part of the African Forest and Landscape Restoration Initiative.

A review by Haileslassie et al. (2020) indicated that the ILM practices and policy actions implemented provide numerous environmental and economic benefits. However, this review suggested numerous gaps in using adaptive management approaches to manage uncertainties. These included: (i) inadequate evidence-based contextualization of interventions; (ii) lack of monitoring of biophysical and socioeconomic processes and changes post-implementation; (iii) lack of trade-off analyses; and (iv) inadequacy of local community engagement and provision of feedback. Given the many uncertainties, tailoring future investment in landscape management to specific needs and contexts would help to achieve the goals of sustainable agricultural landscape transformation. Success depends, among other things, on the ability to learn from the knowledge generated and to apply the learning as implementation evolves (Haileslassie et al. 2020).

Monitoring soil moisture in agricultural landscape in Ethiopia (*photo:* Desalegne Tegegne / IWMI).

In addition to the gaps in using adaptive management approaches to manage uncertainties in the governance of natural resources, a review by Bantider and Desta (2020) indicated some key policy gaps. For example, most policies and laws were not adequately implemented or properly disseminated to actors at the grassroots level. The legal frameworks that provided cross-sectoral and cross-institutional collaboration, were rarely pursued. Similarly, Dejenie and Kakiso (2023) indicated that fundamentally, most policies and strategies focused on economic growth. Policymakers did not pay adequate attention to the environmental effects of agricultural systems in national development policies and strategic plans. Policies do not consider integration of development and environmental sustainability. Simply put, the multidimensional links between economic growth and environmental sustainability were not adequately articulated in development policies and programs. Furthermore, key policies, such as land use policy, payment for ecosystem services, management, and protection of buffer zones for freshwater ecosystems and water abstraction tariffs are lacking. The review by Bantider and Desta (2020) suggested an urgent need for a comprehensive review of the natural resource management policy, and the vertical and horizontal harmonization of inter- and intra-sectorial policies and laws, accounting for ILM and sustainable land management. There is also an apparent need to improve policy implementation, for example, by building implementer capacity and joint implementation, monitoring, and periodic policy review. Additionally, Dejenie and Kakiso (2023) suggested both economic and environmental effects of agricultural systems should be adequately addressed during the preparation of development policies and strategic plans.

Key findings of case studies and implications for policy recommendation

Participatory forest management

PFM contributed to improving the five livelihood assets of forest-dependent people: (i) natural (e.g., wood and non-timber forest products, regeneration of degraded indigenous trees and access to water); (ii) financial (e.g., household income, job opportunities, livelihood diversification); (iii) physical (e.g., household furniture, access to school); (iv) human (e.g., knowledge and skill in forest management); (v) social (e.g., reduction in conflict over resource use, participation); and (vi) mitigating land degradation (Girma et al. 2023). However, the overall contribution of PFM to livelihood assets was not proportional across all types of assets, suggesting that diversifying the livelihoods of forest-dependent people by integrating income-generating activities within PFM is crucial to ensure proportional accumulation of livelihood assets and sustainability.

Conserving freshwater ecosystems

Freshwater ecosystems, such as lakes, are important to ensure various benefits and services that support local livelihoods, and help to mitigate climate change. However, freshwater ecosystems are threatened by anthropogenic and natural pressures that affect the ability to provide these services sustainably. Freshwater ecosystem management is mainly challenged by the complexity of degradation drivers, and the difficulty in balancing the need for short-term socioeconomic development against protecting and restoring ecosystems to support long-term sustainable development. Addressing these

Local livelihoods and wildlife reaping benefits from freshwater ecosystem services in Central Rift Valley, Ethiopia (*photo:* Amare Haileslassie / IWMI).

challenges requires an integrated and systematic approach, comprehensive management throughout the catchment of the freshwater ecosystem, and meaningful engagement and collaboration between stakeholders. A study by Mekuria et al. (2024) indicated multiple management options ranging from tree-based forest and landscape restoration measures to integrated soil and water conservation, and multiple buffer zone management practices.

Management of protected areas

A study was conducted targeting the Bale Mountains National Park (BMNP) in Ethiopia (Gulte et al. 2023; Tadele et al. in review) to gain a deeper understanding of local community opinions about the benefits and drawbacks of protected areas, and benefit-sharing mechanisms, to suggest policy directions for future developments related to managing protected areas. Planning the management of protected areas requires a better understanding of the underlying causes of existing park-people interactions and conflict. The study by (Gulte et al. 2023) suggested that the 'park-people interaction and conflict' in the BMNP arises mainly from the dominance of the free grazing system in livestock management practices, restriction on the use of resources within protected areas, food insecurity, and the high level of dependence of local communities on natural resources, the inadequate contribution of the park to income generation and job creation, limited access of communities to generated economic benefits, crop and livestock damage caused by wildlife, and relocation of communities with insufficient consultation.

The study on benefit-sharing mechanisms in the BMNP (Tadele et al. in review) indicated that the park has significant potential to employ a range of benefit-sharing mechanisms but is currently limited to accessing benefits through ecotourism and non-timber forest products. Respondents prefer the collective benefit-sharing scheme over individual payments focused on community development projects. They associated the failure to effectively implement benefit-sharing mechanisms with the lack of transparency and clearly defined benefit-sharing mechanisms.

Studies (Gulte et al. 2023; Tadele et al. in review) also indicated multiple management options to address conflict between the park authority and local communities in the BMNP. These include: (i) improving the livestock farming system with higher productive animals, and shifting free grazing to a 'cut and carry' system through improved livestock feed development within the park; (ii) improving agricultural productivity and food security by introducing improved crop and land management; (iii) establishing good communication and explaining the BMNP goals, intentions and interests through multistakeholder platforms; (iv) minimizing vulnerable people's dependency on forests through skill-based training programs, and integrating income-generating activities within the park while maintaining the ecosystem and ecosystem services; (v) enhancing access to generated benefits through targeted infrastructure development, such as water points for local communities; and (vi) introducing buffer zone management to reduce crop and livestock damage by wildlife.

Monitoring of hydro-sediment

The study supported by the SHARE II project evaluated hydrological dynamics in different agroecological zones, and the effectiveness of soil and water conservation (SWC) practices in reducing runoff and sediment yield in the Bale Ecoregion (BER) of southern Ethiopia (Berhanu et al. in review). The watersheds investigated in the BER showed differences in their hydrological characteristics, suggesting the need to prioritize interventions and intervention areas. It was observed that the implemented SWC measures were effective in reducing runoff and sediment yield, as well as increasing base flow. The positive changes observed in reducing runoff and sediment yield after implementing SWC measures could reduce the impact of natural disasters, such as floods in downstream areas, in addition to on-site effects, such as improving soil fertility and increasing agricultural productivity.

Changes in land use and land cover and associated changes in ESVs

Land use and land cover (LULC) in the BER were changed for decades affecting forest ESVs. A study supported by the SHARE II project (Haileslassie et al. 2024) quantified these changes and found that between 1992 and 2022, forest land has declined by 3% in the highlands, 63% in midlands, and 22% in lowlands. These changes in LULC within the study area have considerable impacts on ESVs. The highest annual loss of water ecosystem services specifically, was recorded in agroecological zones of the midlands and the lowlands. The study also found that significant losses in ESVs relating to water flow regulation in the midlands and highlands can impact livelihood activities in drier lowland areas since they depend on midlands and highlands for the provision of water-related ecosystem services. A study in the BER (Kefale et al. 2021) demonstrated

that local communities are willing to spend a substantial amount of resources and time (measured in terms of money) to improve ecosystem services. This suggests that there is an opportunity to initiate payment processes for ecosystem services in the BER where local communities in Ethiopia could contribute to rehabilitating ecosystem services.

Ecoregional development framework for sustainable landscape management

A study was conducted in the BER to gain a deeper understanding of how the Bale Eco-Regional Development Framework (ERDF) contributed to ensuring changes in community perception and practices, and governance of community-based natural resource management (Leta et al. in review). The study found that the ERDF contributed to ensuring changes in perception and practice by improving knowledge, skills, attitudes and behavioral changes in managing natural resources. The ERDF also supported to improve governance of community-based natural resource management through increasing participation and inclusiveness of interventions that stimulate trust building, and development of a sense of ownership and accountability. However, the wider adoption of the framework was constrained by budget limitations, lack of continuous follow-up, less flexible government planning templates, and local-level staff turnover.

Policy recommendations

Participatory forest management

To maximize the benefits of PFM for people dependent on forests and forest resources, the following future actions are suggested.

- The existing institutional structure, including the bylaws, greatly contribute to strengthening PFM. However, it is crucial to strengthen forest land protection by improving the enforcement of the rules and the commitment of formal and informal institutions to the management of forest resources.
- Putting strategies for controlled and sustained extraction of wood and non-timber forest products from forestlands and integrating interventions, such as the provision of improved cooking stoves and solar panels within PFM areas could help reduce forest degradation, improve the sense of ownership among local communities, and sustain PFM activities.
- Expand on-the-job training to improve the skills and knowledge of local communities in forest and forest resource management.
- Facilitate or work toward improving market access for local products.
- Designing PFM initiatives for both conservation and economic benefits.

Conservation of freshwater ecosystems

Recently, there was an initiative to develop a policy to manage the buffer zone of freshwater ecosystems. To move this initiative forward, and to implement management options that were suggested and validated effectively, the following are recommended:

- Realize the policy for buffer zone management to guide the planning and implementation of buffer zone management options in the vicinity of freshwater ecosystems.
- Design a policy for buffer zone management in such a way that it supports the integration of income-generating activities within suggested options to balance short-term economic losses with long-term environmental goals.
- Implement a continuous learning approach to monitor the functioning of management options with evidence and adapt them to changing environmental, social, economic and political conditions.
- Start with a pilot site and use it as a demonstration to raise community awareness of freshwater conservation.

Agricultural landscape in the central highlands of Ethiopia (*photo:* Wolde Mekuria / IWMI).

- Design policies or strategies to capacitate local-level practitioners through on-the-job training and knowledge coproduction, particularly on the importance of payment for ecosystem services and water abstraction, as well as the need to modernize irrigation practices.

Management of protected areas

Protecting and maintaining protected areas, and the benefits obtained from these ecosystems are crucial to building a resilient community and environment. With this consideration in mind along with the causes of the 'park-people conflict', the study suggested the following recommendations for policy and development:

- Develop strategies for inclusive planning and management of protected areas, and for evaluating long-term strategic plans, avoiding the focus on associations or groups that directly benefit from protected areas.
- Put policies and strategies in place to address the additional costs incurred by local communities due to the restriction of using natural resources within the park.
- Establish local-level platforms for awareness campaigns, and account for multiple interests and agencies, while building stakeholder trust.
- Develop strategies to expand funding sources to help implement a wide range of economic and social incentives, and benefits for improving livelihoods.
- Develop a guide for resource utilization, for example, using non-timber forest products obtained from the park.
- Develop policies and strategies that guide benefit sharing and related activities.
- Prioritize collective/communal benefit-sharing schemes focused on development projects that benefit surrounding communities, especially those in buffer zone kebeles, to address limited community services surrounding the park.

Monitoring of hydro-sediment

The land in the Ethiopian Highlands is experiencing intense degradation. This often leads to biodiversity loss and a reduction in ecosystem services. Several initiatives, among others, were implemented by the Ethiopian government to restore degraded ecosystems. However, the greatest challenge is ensuring such interventions are sustainable and adaptive. With this consideration and maximizing the benefits of SWC measures, the following policies and development recommendations are provided:

- Develop strategies to support data investments and evidence-based adaptive management.
- Consider policy actions such as community-based watershed development programs that integrate the regular maintenance of the implemented soil and water conservation measures.
- Capacitate local-level practitioners in monitoring hydrological impacts of policy actions.
- Establish demonstration sites or watersheds to promote evidence-based decision-making.
- Promote or initiate policies or strategies that support the instrumentation of upland watersheds to quantify the impacts of multiple policy actions in the governance of natural resources.

Changes in ESVs due to land conversion

Addressing changes in ESVs due to land use and land cover changes requires bringing together diverse stakeholders, co-planning and managing the resources collectively. It also requires developing local-level ESVs for improved quantification of changes in ESVs due to changes in land use and land cover. With this consideration, the following policy and development recommendations are provided.

- Support investments in data to establish national-level ESVs for the changes in ecosystem services due to land use and land cover changes.
- Strengthen existing efforts to restore forest-related ecosystems by expanding initiatives and policy actions.
- Promote context-specific conservation measures and trade-off analysis.
- Coordinate between upstream and downstream communities for co-planning and management of the resources in an ecoregion.

Ecoregional development framework for sustainable landscape management

To maximize the ERDF contributions to address the degradation of natural resources, the following future actions are suggested:

- Promote continuous evidence-based policy dialogue and mainstream the ERDF at scales.
- Familiarize the ERDF to policymakers to facilitate the adoption and institutionalization of the framework.
- Support using flexible planning templates at a lower level to ensure the planning of integrated landscape management interventions and promote effective integration and collaboration between stakeholders.

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