



# Exclosures for Ecosystem Restoration and Economic Benefits in Ethiopia: A Catalogue of Management Options

Wolde Mekuria, Jennie Barron, Mengistu Dessalegn, Zenebe Adimassu,  
Tadele Amare and Menale Wondie



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RESEARCH FOR DEVELOPMENT (R4D) LEARNING SERIES 4

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## Project

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Front cover image: Sheep fattening in Alekt-Wenz.

Back cover image: Landless youth are feeding livestock in Birakat watershed

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*Acacia decurrens* ready for harvest in Awi zone.



## INTRODUCTION

Exclosures are land plots that have been closed off to protect against interference from people and domestic animals, allowing a process of rehabilitation of degraded lands. Establishing exclosures has become common in Ethiopia, especially in the central and northern highlands, where they serve as a response to persistent soil, vegetation and water degradation, affecting forest resources, agricultural biodiversity and ecosystem services. The Ethiopian government supports such interventions, as multifaceted benefits can be obtained from exclosures (see Box 1).

**Box 1: Studies in Gomit watershed, northwestern Ethiopia<sup>1</sup> and in the northernmost part of Ethiopia<sup>2</sup> have demonstrated that existing exclosures have contributed to the following outcomes:**

- Increase in incomes and improved livelihoods of smallholder farmers
- Improved native vegetation composition and diversity, above-ground biomass, land cover and soil quality
- Increase in livestock feed (e.g., grass)
- Increase in ecosystem carbon stock (below- and above-ground carbon stock)
- Increased dry season flow
- Reduced runoff and sediment load
- Increased groundwater recharge

<sup>1</sup> Mekuria et al. 2015, 2016; Anwar et al. 2016; Dessalew et al. 2016

<sup>2</sup> Girmay et al. 2009; Mekuria et al. 2011

However, the establishment of exclosures is mainly driven by a conservation agenda, rather than a livelihoods agenda. Local communities are led to question the worth of exclosures due to the current lack of focus on the potential economic benefits of exclosures. Without expectations of short-term, economic benefits, local communities have little incentive to adopt exclosures. Therefore, developing and implementing management plans that serve local communities' needs and interests will be critical to ensuring sustainable and wider adoption of exclosures in Ethiopia.

### Why this catalogue?

The success of an exclosure depends on it being designed to fit locally specific factors, including environmental features such as the composition of vegetation, soil quality and climate;

specific community concerns; and potential uses of the exclosure. Therefore, management of an exclosure requires the development of a plan that addresses these challenges and that involves all relevant stakeholders, including government, non-governmental organizations (NGOs), private sector actors and local communities.

This catalogue provides an overview of management options that can enhance the ecological and economic benefits of exclosures, promote local ownership and support communities to adopt exclosures. Particularly, this catalogue discusses management option that can be implemented during the regeneration of phase of exclosure land management. This catalogue of options can provide guidance in the establishment and rehabilitation phases of exclosure management.

### Who can use this catalogue?

This catalogue is intended for use by regional and district-level practitioners, of both government and non-governmental institutions, involved in restoration of degraded lands and establishment or management of exclosures. Researchers may also find this catalogue useful.

### How was this catalogue developed?

This catalogue was prepared based on action research by the International Water Management Institute (IWMI) and its partners. The partners include local communities and local communities' representative such as a local Community Watershed Team (CWT), universities, agricultural research systems and local administrative bodies. The research focused on investigating the benefits and trade-offs of exclosures and was conducted in the northwestern part of Ethiopia.

### What is in this catalogue?

This catalogue offers the best available knowledge on practices and technologies that can be integrated in an exclosure management plan. It also assists users in addressing different considerations when developing or implementing a management plan.

Specifically, this catalogue contains:

- Information on relevant stakeholders, their roles and responsibilities
- Nine management options, their relevance, benefits and risks
- Guidance on implementing management options

## KEY CONCEPTS AND DEFINITIONS

### Community watershed team:

A CWT is a committee that represents the watershed community. It is responsible for the management and use of exclosures and other participatory integrated watershed management approaches. The CWT should be actively involved in the planning and implementation of the watershed development activities, such as exclosure establishment and protection as well as construction of soil and water conservation (SWC) structures.

### Exclosures:

Exclosures are areas closed off or otherwise protected from interference from people and domestic animals, with the goal of promoting natural regeneration of plants and reducing land degradation in formerly degraded communal grazing lands. Natural features such as large gullies and man-made features such as roads usually demarcate the boundaries of exclosures. Because exclosures are not

fenced, guards are hired by the local administration on a food-for-work basis (Yayneshet et al. 2009). The size of an exclosure ranges from as small as 1 hectare to 700 hectares (Nedessa et al. 2005).

### Exclosure management plan:

An exclosure management plan is a document that guides the day-to-day and long-term management of an exclosure. The intended end result of an exclosure management plan is to enhance the economic benefits local communities obtain from exclosures (i.e., both short- and long-term benefits), while restoring degraded lands.

### Sustainability:

In the context of the management of exclosures, sustainability refers to enhancing the short-term economic benefits of exclosures to incentivize local communities to adopt, manage and protect exclosures in the long term.

## MULTI-STAKEHOLDER APPROACH NEEDED FOR EXCLOSURE MANAGEMENT

### The importance of collaboration

The long-term sustainability of exclosures requires support from a wide range of stakeholders, including government agencies, local and international NGOs, national and international research institutes and private sector actors. No single agency can effectively implement any of the different management options presented in this catalogue on its own.

Because different stakeholders have different roles and mandates, integration and cooperation among them is key to achieving the end result of successfully managing exclosures. In addition, stakeholders must cooperate to exchange information about which management options are relevant or best suited in different areas. For example, integrating exclosures with beekeeping can only be appropriate in areas where exclosures generate sufficient bee forage. It will often be the case that no single option fully addresses a local community's concerns on exclosures and that a combination of management options is required. Therefore, the goal is for all relevant stakeholders (e.g., local communities, government bodies, NGOs and private sector actors, as listed below) to work together, each using their specific expertise and mandate, to accomplish a management plan that combines the options that best serve the local community, while reversing environmental degradation.

### Stakeholders' roles and responsibilities

#### Local communities:

The local communities are mainly responsible for implementing the management plan as well as for developing and implementing informal institutions, such as bylaws.

#### CWT and local (village level) administrative bodies:

The CWT and Kebele (village level) administrative bodies will typically be responsible for raising awareness on exclosures, identifying and providing information on concerns of local communities, implementing the management plan as well as developing and implementing informal institutions, such as bylaws.

#### Ministry of Agriculture (MoA):

The MoA has mandate to provide technical support when developing a comprehensive management plan for an exclosure, and it could also provide training of trainers on improved land management practices.

#### Ministry of Environment, Forestry and Climate Change (MoEFCC):

The MoEFCC has expertise to provide input on laws and standards related to the management of exclosures. The ministry could also provide technical support for regulatory



bodies and implementers as well as undertake monitoring and evaluation of the management of exclosures.

#### **Sub-national regional agricultural bureaus as well as zonal and district agricultural offices:**

Sub-national regional agricultural bureaus as well as zonal and district agricultural offices typically raise seedlings of economically important species (e.g., fruit trees, fuelwood, timber, medicine, fodder production), which can be used for enrichment plantations and establishment of woodlots in exclosures. The Bureau of Agriculture (BoA) can also play a critical role in coordinating efforts to build capacity of farmers and extension workers on modern agricultural practices, including livestock fattening and dairy production. Further, the BoA has mandate to coordinate the support that local and international NGOs provide to offset some of the negative impacts of exclosures on livelihoods (e.g., limited short-term benefits and reductions in fuelwood availability).

#### **Sub-national regional environmental protection and land administration bureaus and district offices:**

The sub-national regional bureaus and respective district offices could play a critical role in administering exclosures and in designing strategies for distributing exclosures to landless youth and women's groups. The Ethiopian government has stopped redistribution of agricultural lands in the highlands of Ethiopia due to the current fragmentation of land. Instead, the government has begun to distribute degraded lands, including that of exclosures, to landless youth and give them user rights. The landless youth usually benefit from exclosures by practicing beekeeping and livestock fattening. However, designing effective policies and strategies will be critical since distributing exclosure land could raise conflicting tenure claims.

#### **Local and international NGOs:**

Local and international NGOs maintain technical expertise and experience in addressing sustainable land management concerns as well as financial means for such interventions. The primary roles of these organizations would be to serve as consultants, give technical advice and provide financial support, for example in the form of long-term credit to purchase modern bee hives and improved livestock breeds. Also, these organizations could take part in building the capacities of farmers and extension workers on modern agricultural practices, including livestock fattening, dairy

production, woodlot establishment and horticultural development in exclosures.

#### **National and international research institutes:**

The Ethiopian Institute of Agricultural Research and international research institutes (e.g., IWMI, the International Center for Agricultural Research in Dry Areas (ICARDA) and the World Agroforestry Centre (ICRAF)) have technical expertise and experience in enhancing the benefits of exclosures. They can also provide alternative technology options for managing exclosures.

#### **Higher academic institutes:**

Higher academic institutes could play a crucial role in capacity building and in developing qualified professionals who can support the sustainable management of exclosures.

#### **Private sector actors:**

The private sector could provide support to increase the supply of inputs, such as beehives and energy-conserving stoves.

### **Stakeholder engagement strategies**

Stakeholders can be engaged through organized processes of interactions such as meetings and workshops. Such engagement strategies help to inform the different management options that can enhance the short-term economic benefits and the sustainability of exclosures. In addition, such workshops could be used to collect feedback from stakeholders, to update the content of the exclosure management plan and, potentially, to share this catalogue with other stakeholders.

Existing natural resources management platforms can be used to strengthen the collaboration among the different stakeholders. Using the existing platforms, all relevant stakeholders can come together and define the objectives and processes of exclosure management as well as the responsibilities each stakeholder carry for managing exclosures and achieving the ultimate goals. All stakeholders participating in natural resources management platforms share a common goal (i.e., restoring degraded ecosystems), which could serve as an incentive for them to work together. Such platforms can also be used to conduct stakeholder analyses and develop a shared agenda among stakeholders.

## MANAGEMENT OPTIONS FOR ENCLOSURES

# 1

### INTEGRATION OF PHYSICAL SOIL AND WATER CONSERVATION MEASURES WITH BIOLOGICAL MEASURES

#### Benefits and recommended steps

Constructing physical soil and water conservation (SWC) measures, such as terraces, trenches, and soil and stone bunds, can support the regeneration of native plant species. These can improve the quality and quantity of livestock feed that can be harvested from the enclosure. This, in turn, improves livestock production and increases the benefits obtained by local communities.

In addition, physical SWC measures can be made more effective by integrating them with biological conservation measures, such as by sowing grasses and planting forage trees on banks of bunds, which can stabilize existing physical SWC measures and contribute to reducing soil erosion, increasing above-ground biomass and carbon as well as improving soil fertility, mainly through nitrogen fixation.

**To implement this management option, first construct the physical SWC measures, then plant grasses and trees on the banks of bunds. Other necessary steps include identifying grass varieties and fodder trees appropriate for the area, raising seedlings of fodder tree species, sowing grass species and planting fodder trees.**

To help ensure equal benefit sharing and to prevent conflicts, it is recommended that the CWT determine the total amount of yield, the total number of beneficiaries, the amount of yield per beneficiary, and the schedule for harvesting and distributing yields.

#### Social, environmental, institutional and economic considerations

Local communities should participate in selecting grass and fodder tree species to be planted on the banks of physical SWC measures. To maximize the benefits, the CWT should work closely with district agricultural offices to decide when to harvest grasses and fodder trees planted on the banks of for example bunds. The CWT should also consult experts at the district agricultural offices to learn how to manage fodder trees, including when and how to prune fodder trees and when and how to harvest fodder and feed the livestock. Close collaboration between the CWT and experts at district agricultural offices will help ensure better management of the enclosure and maximize the benefits.

#### Stakeholders

District agricultural offices and the CWT can be expected to be the lead stakeholders, while local communities, the BoA and NGOs should also participate. District agricultural offices have mandate to raise seedlings of forage trees and provide seeds of different grass varieties. The CWT is responsible for mobilizing local communities when sowing grasses and/or planting forage trees on the banks of bunds. Local communities can provide free labor to plant forage trees and protect conservation measures from the interference of people and domestic animals. NGOs can be expected to be keen to provide technical and financial support, while the BoA has mandate to coordinate the support provided by local and international NGOs.

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**Opportunities and assumptions**

Information on available grass species and fodder trees can be obtained from the BoA or from respective district agricultural offices. Facilities for raising seedlings of fodder trees are also available in each district, which could make this option practical and effective.

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**Costs**

The costs of implementing this option could be low, as bund stabilization with grass and fodder trees costs about US\$40 per kilometer of bund (i.e., the costs for labor and seed).

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**Timing**

This option can be implemented immediately or starting one year after the establishment of the exclosure, depending on the availability of resources and other logistics. Results can be expected in the short term.

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**Trees have been planted on the bank of a soil bund to help stabilize it.**



## 2

## ENRICHMENT PLANTATION OF ECONOMICALLY IMPORTANT PLANT SPECIES

**Benefits and recommended steps**

Conducting enrichment plantation of economically important plant species such as fruit trees and trees that can be used for fuelwood (e.g., *Acacia decurrens*) could help improve the short-term benefits of the enclosure. Allowing communities to harvest for example fruits and fuelwood can contribute to increasing their incomes and diversifying their livelihoods.

The effectiveness of this option depends on environmental factors, such as rainfall, soil quality and quality of land management practices. Thus, this option requires regional agricultural bureaus, district agricultural offices as well as local and international NGOs to regularly provide support for and follow up on management of planted trees and estimation of total amount of yield.

**To implement this option, identify economically important plant species, raise seedlings, plant seedlings and carry out intensive cultivation during the first year.**

**Social, environmental, institutional and economic considerations**

The local community, in consultation with the district technical staff, should decide which tree species to plant in the enclosure. To ensure control of soil erosion and to meet the diverse needs of the community (e.g., for fuelwood, construction materials, fodder, medicine, food, etc.), it is recommended to establish a mixture of tree species, which have been selected to ensure short-term benefits of the enclosure.

For the first year, intensive management is needed to enhance the survival chances of economically important plant species. The CWT should work closely with experts at district agricultural offices to get technical advice, while managing and harvesting products. The CWT should consult the beneficiaries to decide on benefit-sharing mechanisms, and the interest of the majority of the beneficiaries should be respected. To maximize the benefits, it is crucial to match economically important plant species with the agro-ecological specifics of the site, such as soil quality, expected rainfall, etc.

**Stakeholders**

District agricultural offices and the CWT can be expected to be the lead stakeholders, while local communities, the BoA, private sector actors and NGOs should also participate. District agricultural offices and NGOs have mandate to raise seedlings and provide technical and financial support; the CWT can mobilize local communities and follow up on activities week-to-week; and local communities can take care of planted trees. Local communities and private sector actors could also be involved in raising seedlings.



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**Opportunities and assumptions**

Information on available economically important species and their environmental requirements can be obtained from the BoA or respective district agricultural offices. Facilities for raising seedlings are also available in each district, which could make this option practical and effective.

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**Costs**

This option has varying initial and operational costs. For example, pit preparation and plantation might cost US\$300-400 per hectare, while the first and subsequent years of cultivation might cost on average about US\$200 per hectare.

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**Timing**

This option can be implemented starting one year after the establishment of the exclosure, as at least one year is needed to identify appropriate economically important plant species and raise seedlings. Results can be expected in the medium to long term.

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**Producing charcoal in the *Acacia decurrens* belt (awi zone).**

## 3

## BEEKEEPING

**Benefits and recommended steps**

Integrating beekeeping with the enclosure is another way to create short-term economic benefits for communities. Giving members of the community the opportunity to sell honey and related products can increase their incomes and resilience. The key beneficiaries are landless youth and women.

**To implement this option, consult the local community on whether they prefer managing modern beehives on an individual basis or in a group. Train community members on beekeeping, and approach local and international NGOs to mobilize financial support for purchasing beehives, such as in the form of long-term credit.**

Finally, establish a formal agreement between the government, the individuals or groups of people to be engaged in beekeeping and the entire group of beneficiaries or members of an enclosure. This agreement should clearly describe the size of land within an enclosure allocated for beekeeping, duration of the contract, benefits of all members or beneficiaries, benefits sharing mechanisms in case of groups, etc.

**Social, environmental, institutional and economic considerations**

Integrating beekeeping with an enclosure can be appropriate for areas where plant communities generate sufficient bee forage. Creating market opportunities for the local communities is crucial to realizing the benefits of honey production.

**Stakeholders**

The BoA can be expected to be the lead stakeholder, while district agricultural offices, local communities and NGOs could also participate. The BoA, in collaboration with district agricultural offices, has mandate to form landless youth and women's groups, which are the main intended beneficiaries for this option. NGOs can be expected to be keen to provide financial and technical support.

**Opportunities and assumptions**

It can be assumed that this option will receive strong support from government and local administrative bodies because it benefits vulnerable and marginalized groups.

**Costs**

The initial costs of implementing this option can range from low to high, depending on the approach used to provide beehives (i.e., individual or group) and types of beehives (modern ones cost about US\$80-90 per beehive, transitional ones US\$40-55 per beehive and traditional ones US\$20-30 per unit). Providing beehives to groups of landless youth and women's groups could help ensure that more people benefit from this option.

**Timing**

This option can be implemented starting two to three years after the establishment of the enclosure, provided that bee forage has already been established in the enclosure. Results can be expected in the short to medium term.

Landless youth in Gomit are involved in beekeeping.





## 4

## CUT-AND-CARRY FODDER SYSTEM

**Benefits and recommended steps**

In a cut-and-carry fodder system, local communities harvest grass within the enclosure and carry it to their homestead areas where livestock is kept. A cut-and-carry fodder system increases the quantity and quality of fodder, limits livestock movements and reduces grazing pressure.

In addition, keeping livestock out of the enclosure will enable the regeneration of indigenous tree species, which have ecological and economic importance, and will protect any physical or biological SWC measures. However, the success of this option requires strict protection of the enclosure from the interference of livestock and unsanctioned users.

**To implement this option, harvest grass after the seeding stage, starting two to three years after enclosure establishment. The main reason for postponing grass harvesting is to restore the soil seed bank.**

This option is most suitable for highland and midland agro-ecological zones, as lowland areas are mainly inhabited by pastoral and semi-pastoral communities. These communities usually move from one place to another, depending on the availability of resources such as water. Thus, a cut-and-carry system might not be suitable for these communities, unless resources such as water are available throughout the year, allowing them to settle in one place.

**Social, environmental, institutional and economic considerations**

Successfully implementing and sustaining a cut-and-carry system depends on establishing the right governance frameworks. It is recommended that appropriate government bodies allocate or strengthen communal usufruct rights over the enclosure by considering existing community practices, grazing land use dynamics and local negotiations to reduce conflicts over resource uses. At the community level, bylaws should be created to govern (a) harvesting procedures and harvesting of grasses, (b) harvesting schedules including period and frequency of harvesting and (c) quotas for harvested grass and sharing of the harvested grass.

**Stakeholders**

The CWT and local administrative bodies can be expected to be the lead stakeholders, while district agricultural offices, the BoA and NGOs should also participate. The CWT and local administrative bodies have mandate to identify beneficiaries, arrange harvesting schedules and ensure that harvested grass is shared equitably. The main roles of the BoA and NGOs will be providing inputs such as seeds and harvesting equipment.

**Opportunities and assumptions**

It can be assumed that this option will receive strong support from government and local administrative bodies. This option also hinges on the assumption that NGOs are willing to supply improved seeds of different grass varieties.



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**Costs**

This option does not have costs, except salary for guards who protect the enclosure from the interference of people and domestic animals. The costs for guards is estimated at US\$400 per hectare per year.

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**Timing**

This option can be implemented starting three years after the establishment of the enclosure. Results can be expected in the short term.

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A farmer is piling livestock feed in Gomit watershed.



## 5

## LIVESTOCK FATTENING OR DAIRY PRODUCTION

**Benefits and recommended steps**

This option can further underpin the benefits of a cut-and-carry system and reduce free grazing. Optimizing the use of produced feeds can improve livestock productivity and smallholders' income, thereby further incentivizing farmers to adopt and sustain exclosures.

**To implement this option, identify women and men to be engaged in livestock fattening or dairy production and consult them on whether they prefer to carry out the activities individually or as a group. Then mobilize financial resources for purchasing improved livestock breeds from government and non-governmental organizations.**

Financing could be sourced from NGOs in the form of long-term credit. This option could be more effective in midland agro-ecologies, as livestock lose only minimal energy on adapting to weather conditions.

**Social, environmental, institutional and economic considerations**

It is recommended that this option be supported by continuous training, follow-up and technical support. If groups of people carry out these activities, a clear description of the responsibilities of each member is required. Also, a signed agreement on benefit-sharing mechanisms is necessary.

**Stakeholders**

The BoA can be expected to be the lead stakeholder, while district agricultural offices, local communities, the CWT and NGOs should also be involved. The BoA, in collaboration with district agricultural offices and the CWT, has mandate to identify groups or individuals interested in this activity. Also, the BoA is responsible for coordinating the financial support from local and international NGOs, who can also provide technical support.

**Opportunities and assumptions**

This option may receive strong support from the government and local administrative bodies. This option also hinges on the assumption that NGOs are willing to provide financial support, for example in the form of long-term credit.

**Costs**

The implementation cost of this option is estimated at US\$800-1,200 per head of livestock for improved breeds. This might be high, considering the financial capacities of farmers. To reduce cost and ensure wider implementation, strategies for revolving funds could be explored. Such strategies could involve the distribution of initial animal stock to a number of individuals or groups, who are selected according to criteria determined by the community. These individuals would then be required to give the first offspring from their animals to others in the community, and so on, until full distribution throughout the community has been achieved.

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**Timing**

This option can be implemented starting four years after the establishment of the exclosure. Results can be expected immediately or in the short term.

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**Sheep fattening in Alekt-Wenz.**



## 6

## WOODLOTS

**Benefits and recommended steps**

A woodlot is a section of a woodland or forest capable of small-scale production of forest products such as firewood, timber and non-timber forest products. When establishing woodlots in the enclosure, the focus should be on serving local communities by providing income diversification mechanisms and alleviating problems that arise due to enclosures, such as shortages of fuelwood and construction materials.

**Establishing woodlots requires a multi-step process. First establish small user groups, no larger than the typical number of households in a village and demarcate an area for the woodlot within the enclosure. Then, members of the group need to agree on the purpose of the woodlot, whether timber management, firewood production or wildlife habitat. Once the purpose has been agreed upon, identify appropriate tree species and establish a nursery. Finally, prepare a management plan that includes information on nursery establishment and management, planting, harvesting, marketing and different silvicultural practices, before establishing the woodlot.**

**Social, environmental, institutional and economic considerations**

Once a woodlot is established and a management plan is prepared, it is recommended that the district agricultural office work closely with the CWT and beneficiaries to design benefit-sharing mechanisms. The benefit-sharing mechanisms should align with the agreed purpose of the woodlot and take into account the interest of the majority of beneficiaries.

**Stakeholders**

District agricultural offices can be expected to be the lead stakeholders, while the BoA, local communities, CWT, private sector actors and NGOs should also participate. District agricultural offices can be expected to lead the overall activities, while the CWT can facilitate discussions with communities to decide on the goals of woodlot. The BoA and NGOs can provide technical support. Private sector actors could provide financial support through contract farming mechanisms.

**Opportunities and assumptions**

It is assumed that strong support can be obtained from the government, as this option can further the government's objective to sustain enclosures and restore degraded ecosystems.

**Costs**

The implementation cost of this option could vary depending on the size and purpose of woodlots, but the estimated per hectare cost ranges from US\$2,000-3,000.

**Timing**

This option can be implemented starting one year after the establishment of the enclosure, and results can be expected in the medium to long term.



Cultivation of plant species to integrate with exclosure management in Debre Yakob watershed.



## 7

## HABITAT MANAGEMENT

**Benefits and recommended steps**

The goal of habitat management is to improve the restoration of degraded ecosystems and regeneration of native plant species. This option could involve all kinds of forest management practices, such as thinning, pruning, taking care of planted seedlings and constructing water-harvesting structures. It could also improve tree growth and productivity as well as curb adverse impacts of invasive species, as invasive species could be identified and removed while implementing the above forest management activities. Potential short-term benefits include increased supply of fuelwood and construction materials.

**Before establishing a habitat, consider available scientific information on vegetation and wildlife in exclosures as well as site-specific conditions, letting this information guide your goal setting for the habitat. Similarly, consider a range of management strategies that meet such specific goals and use adaptive management to modify strategies to match objectives, aiming to maximize the benefits. Finally, manage invasive species to minimize unacceptable changes to the structure of the exclosure.**

**Social, environmental, institutional and economic considerations**

It is recommended that this option be supported by continuous training, follow-up and technical support.

**Stakeholders**

District agricultural offices can be expected to be the lead stakeholders, while the BoA, local communities, the CWT and NGOs should also participate.

**Opportunities and assumptions**

It can be assumed that this option will receive strong support from the government.

**Costs**

The implementation cost of this option might be low as maintenance, such as thinning and pruning, only has to be done every three to five years.

**Timing**

Habitat management can be done in five-year intervals after the establishment of the exclosure. Results can be expected in the long term.



Farmers are treating gully heads in Denbia district, North Gonder.



## 8

## ALTERNATIVE ENERGY SOURCES

**Benefits and recommended steps**

One of the main concerns local communities express regarding exclosures is that they reduce the availability of fuelwood and the number of useful tree and shrub species in the remaining communal grazing lands. This is a critical concern, as more than 90% of people in these communities depend on bio-energy sources, such as wood and dung, for household energy demands. Therefore, providing alternative energy sources can help make exclosures more acceptable to communities, thereby making them more sustainable.

**When considering this option, first identify areas where women are facing critical fuelwood shortages. Then consult them on whether they prefer to get energy-conserving stoves, biochar stoves or solar panels. Finally, mobilize financial resources for purchasing and introducing alternative energy sources, such as solar panels as well as energy-conserving and biochar stoves.**

Providing women with alternative energy sources can improve their health and free up time previously spent collecting fuelwood, while reducing the encroachment into exclosures.

**Social, environmental, institutional and economic considerations**

Support from NGOs and private sector actors, especially for financing, is required to implement this option. NGOs, for example, could offer women access to long-term credit.

**Stakeholders**

The BoA can be expected to be the lead stakeholder, while district agricultural offices, local communities and NGOs should also participate. The BoA, in collaboration with district agricultural offices and local communities, can help identify women in need of alternative energy sources. The role of NGOs would likely mainly be to provide financial support.

**Opportunities and assumptions**

It can be assumed that several NGOs working at the local level would be interested in such activities.

**Costs**

The implementation cost of this option might be beyond the financial capacities of women and marginalized groups, and therefore support from for example NGOs is required. The costs for energy-conserving stove could reach up to US\$25, while the costs for solar panels exceed US\$100.



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**Timing**

This option can be implemented anytime (i.e., before or after) the establishment of the enclosure. Results can be expected in the short term.

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Women use energy-conserving or biochar stoves for cooking in Gomit.



## 9

DISTRIBUTION OF EXCLOSURE LAND TO  
LANDLESS YOUTH AND WOMEN'S GROUPS**Benefits and  
recommended steps**

Distributing some of the land that makes up an enclosure to landless youth and women's groups can help empower such marginalized groups. It can also create a sense of ownership over the management of the enclosure. Assigning land to marginalized groups can help them diversify their livelihoods and increase their incomes.

However, implementing this option requires caution and may only be a viable option in areas where none of the social groups customarily entitled to the enclosure exists, because it might otherwise create conflicts between competing claimants.

**Prior to distributing enclosure land to landless youth and women's groups, conduct discussions with local community members to identify eligible claimants, based on hitherto tenure practices, and assign beneficiaries. Also, work with communities to determine the proportion of an enclosure to be allocated for these marginalized groups, the duration of the contract and any benefit-sharing mechanisms.**

**Social, environmental,  
institutional and economic  
considerations**

It is essential to develop a legal document that outlines the arrangements agreed upon by government agencies, landless youth and women's groups, and the community. Allocating enclosure land to landless youth and women's groups without consulting all members of an enclosure could erode the community's trust in the government, especially regarding the ownership arrangements of the enclosure. Failing to include local communities in the process may make them less willing to establish enclosures in the future.

This option should be integrated with provision of incentives such as modern beehives and improved livestock breeds. Providing technical support to the groups is also key for the success of this option.

**Stakeholders**

A regional or sub-national environmental protection and land administration bureau can be expected to be the lead stakeholder, while the BoA, district agricultural offices, local communities, the CWT and NGOs should also be involved. The Environmental Protection and Land Administration Bureau can lead the overall activities and prepare appropriate laws and agreements. The BoA and CWT can provide support to effectively implement the day-to-day activities. NGOs can provide financial support.

**Opportunities and  
assumptions**

Strong support from government and local administrative bodies can be assumed, as redistribution of agricultural land has been stopped due to land fragmentation. It is also assumed that NGOs can provide financial and technical support.

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**Costs**

The associated costs are related to the provision of incentives. Such costs are discussed under management options on beekeeping; livestock fattening and dairy production; and cut-and-carry system.

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**Timing**

This option can be implemented starting two to three years after the establishment of the exclosure. Results can be expected in the medium to long term.

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Landless youth in Gomit drawing the map of their exclosure area on the ground.





## GUIDANCE ON IMPLEMENTING MANAGEMENT OPTIONS

### Processes for establishing exclosures

Establishing an exclosure requires undertaking a number of activities:

1. Putting the idea of establishing exclosure onto the government's agenda, namely by including it in the annual plan of the relevant district agricultural office. Local communities, a CWT, district agricultural offices or NGOs can bring forward this initiative, while the implementation can mainly be achieved through continuous discussion between stakeholders.
2. Identifying priority areas for establishing exclosures through a joint initiative that involves local communities, a CWT, government agencies, and NGOs
3. Raising awareness of local communities on the importance of exclosures, using religious leaders and other local institutions and leaderships
4. Conducting community consultations to garner local communities' support for exclosure establishment, typically led by the district agricultural office and the CWT
5. Getting a signed letter from beneficiaries that testifies that the community is in favor of exclosure establishment
6. Demarcating areas to be protected
7. Establishing the exclosure
8. Assigning the responsibilities of the day-to-day management and use of exclosures to the CWT
9. Establishing a management plan that includes a combination of the options discussed in this catalogue and that details the management, use and protection of exclosures as well as benefit-sharing mechanisms

### Awareness raising

Some of the concerns local communities express about exclosures arise from a lack of understanding of land degradation's negative consequences and exclosures' positive effects. It is not widely understood that exclosures have the potential to restore degraded ecosystems and make degraded land productive. Therefore, raising local communities' awareness of the benefits of exclosures is a critical part of implementing exclosure management options.

The BoA can take the lead on carrying out awareness-raising activities, but national and international research institutes and NGOs working on sustainable land management issues could also contribute. Such activities should be designed to better inform and educate the community, to get feedback from local communities as well as to address commonly expressed concerns related to the management of exclosures.

Awareness-raising activities could include study tours and exchanges with other communities and farmers that have successfully implemented this approach as well as films and

other interactive types of action research. This activity could also include synthesizing and repackaging science-based information on exclosures, such as in brochures (in local languages); in annual newsletters to district agricultural offices, extension service centers, NGOs and local administrative bodies; and via local media, such as radio. Offering local community members educational programs through district agricultural offices could also increase awareness. Such educational programs could include information on processes of exclosures establishment, importance of local community participation and use, management and protection of exclosures as well as benefits of exclosures and benefit-sharing mechanisms.

### Governance systems

In Ethiopia, land is owned by the government, and the people have only user rights. At the moment, exclosures in Ethiopia are governed in different ways: 'communal', 'governmental' and 'governmental-communal' governance systems. The key difference between these governance systems is that different entities are responsible for leading the day-to-day activities of managing exclosures. Communal management assigns full responsibility to the local communities, and the management, use and protection of exclosures is carried out by the CWT. Other exclosures are governed by government bodies (e.g., district agricultural offices), which manage and protect the exclosure. Finally, a 'governmental-communal' mode of governance involves both government bodies and local communities, and the two parties share the responsibility of governing the exclosure.

Governing exclosures on an individual basis is also a possibility, but it carries a number of risks: it can lead to fragmentation of exclosures, poor control of free grazing, lack of labor to manage exclosures and exclusion of marginalized groups. Governing exclosures on an individual basis could result in the informal conversion of common property into private property, where those with influence can appropriate the land, while marginalized groups are excluded. Once the land in an exclosure has been divided into individually governed plots, it will be difficult to achieve the intended goal of exclosures (i.e., to restore degraded lands). Individual management also needs more labor input compared to communal management, in that each household would have to be responsible for protecting their plots. Finally, as exclosures are established on areas used for free grazing, it would be difficult to control free grazing if communal arrangements for management are not in place.

Therefore, governing exclosures on a communal basis, in collaboration with government actors, is recommended. Organizing small groups, no bigger than the equivalent of the number of households in village, works best. To establish a sound, communally based governance system, each community should assess the advantages and



disadvantages of the different management options and choose the mix that is most appropriate.

Finally, it is important that the management and user rights of exclosures be clearly defined and that formal agreements are made between government agencies and communities regarding their respective rights and responsibilities. The communities themselves should also establish clear bylaws for managing, using and protecting exclosures.

### Community participation

To date, most exclosures in Ethiopia have formally been initiated either by the state or by communities, but their establishment has been driven mainly by aid agencies and NGOs (Mulugeta and Habtemariam 2014). Further, the establishment of exclosures has been focused on physical aspects and on the protection of natural resources. The sites for exclosure establishment have generally been selected by government agencies, and the process has been dominated by development agents of the district agricultural offices and by Kebele administrators.

The management of exclosures also remains largely top-down. In most cases, the participation of local communities is limited to consultation, including on ideas for the establishment of exclosures and target setting.

Such poor participation of local communities in the establishment and management of exclosures affects the outcomes and sustainability of exclosures. To sustain exclosures, communities should experience the benefits of exclosures and feel ownership over their management. Therefore, local communities should participate in goal setting, planning, site selection, implementation, protection and definition of benefit-sharing mechanisms. Furthermore, the participation of local communities should not be limited to participating members of the exclosure, the CWT and/or local administration bodies; rather, all members of the community should be involved in each phase of exclosure establishment.

### Gender issues

To ensure that all members of a community benefit, it is important to ensure that all groups participate in the exclosure establishment and management processes, including women, youth and other marginalized groups. The following measures can help ensure diverse participation:

- Providing gender awareness training in the conceptualization and planning stage
- Developing a mechanism that ensures equal opportunity for the different groups in local communities to participate in and benefit from the management options
- Designing modes of ownership and management that take into consideration the situation of the different groups
- Clearly stating how vulnerable households, which may not be able to participate fully in all activities, can be supported by local communities and be involved in benefit sharing
- Ensuring that establishment of exclosures does not lead to an increase in tasks or workload for women and children

### Protection of exclosures

Currently, most exclosures are protected by hired guards, and the government is responsible for paying the guards. However, in some cases, the government has stopped paying the guards, assuming that the communities would pay, which means that the guards are not paid regularly and illegal harvesting of grass has increased.

To amend this situation, it is recommended to give local communities greater responsibility for the design of strategies and norms for the protection of exclosures. One promising option is to implement a 'turn system', where each household in the community is responsible for taking a turn guarding. Initiating such a system hinges on a process of dialogue with the communities, exploring their interest in and wishes for such a system.

Empowering local communities to protect exclosures will build a sense of ownership and ensure that protection of exclosures can be sustained.

### Risks and mitigation

Implementing the management options included in this catalogue comes with certain probable risks, including inadequate technical support from regional and district-level experts due to over commitment; lack of professionals working in natural resources management and/or lack of access to such expertise; risk of conflicts over resource use; and lack of financial support from NGOs. These risks can be mitigated by mainstreaming management options into government plans and providing training to practitioners.

## MANAGEMENT OPTIONS BEYOND THE RESTORATION PHASE

This document discusses mainly options that can maximize the economic benefits of exclosures during the restoration phase, while maintaining the original conservation goal. However, other intensive management options can be considered once the degraded soil has been restored and reached the point where it

can support agricultural crops. Such options include constructing bench terraces in the foot- and mid-slope position and converting those parts of an exclosure into agricultural land and converting the foot-slope position into fruit orchard. Controlled collection of fuelwood can also be considered at this stage.

## RESOURCES LIST

- Anwar, A.; Dessalew, W.; Seifu, A.; Mekuria, W.; Mulugeta, A.; Tammo, S. 2016. *Effectiveness of land and water management interventions in reducing runoff and soil erosion in the northwestern highlands of Ethiopia*. First African ESP conference. Nairobi, Kenya. 21-25 November, 2016.
- Dessalew, W.; Anwar, A.; Seifu, A.; Mekuria, W.; Charles, F.; Tammo, S. 2016. *Enhancing ecosystem services in the upper Blue Nile Basin, Ethiopia through the implementation of soil and water conservation measures*. First African ESP conference. Nairobi, Kenya, 21-25 November, 2016.
- Girmay, G.; Singh, B.R.; Nyssen, J.; Borrosen, T. 2009. Runoff and sediment associated nutrient losses under different land uses in Tigray, northern Ethiopia. *J. Hydrol* 376:70-80.
- Mekuria, W.; Veldkamp, E.; Corre, M.D.; Mitiku, H. 2011. Restoration of ecosystem carbon stocks following exclosure establishment on communal grazing lands in Tigray, Ethiopia. *Soil Science Society of America Journal* 75: 246-256.
- Mekuria, W.; Langan, S.; Johnston, R.; Belay, B.; Amare, D.; Gashaw, T.; Desta, G.; Noble, A.; Wale, A. 2015. Restoring aboveground carbon and biodiversity: the case study from the Nile basin, Ethiopia. *Forest Science and Technology* 11(2): 86-96.
- Mekuria, W.; Langan, S.; Noble, A.; Johnston, R. 2016. Soil restoration after seven years of exclosure management in Northwestern Ethiopia. *Land Degradation and Development*. doi: 10.1002/ldr.2527.
- Mulugeta, L.; Habtemariam, K. 2014. Re-greening Ethiopia: History, challenges and lessons. *Forests* 5: 1896-1909.
- Nedessa, B.; Ali, J.; Nyborg, I. 2005. *Exploring ecological and socio-economic issues for the improvement of area enclosure management: A case study from Ethiopia*. Oslo, Norway: Drylands Coordination Group.
- Yayneshet, T.; Eik, L.O.; Moe, S.R. 2009. The effects of exclosures in restoring degraded semi-arid vegetation in communal grazing lands in northern Ethiopia. *J. Arid Environ* 73: 542-549.





## Management Options for Enclosures

In Ethiopia, enclosures are becoming increasingly common. An enclosure is a piece of degraded land that has been closed off to prevent interference from people and animals, allowing it to recover and become productive again. Establishing enclosures has been proved to strengthen incomes and livelihoods of smallholders, while revitalizing the ecosystem.

However, the success of an enclosure hinges on support from the local community. Community members have incentive to participate in and protect enclosures only when they can expect to gain short-term benefits, such as access to additional livestock fodder or other assets. Addressing some of the challenges that establishing an enclosure creates, such as fuelwood shortages, can also help garner support from local communities.

This catalogue presents nine management options that generate increased short-term benefits for communities, while still contributing to the enclosure's long-term goal, namely regeneration of degraded land. These nine management options can be used in developing and implementing enclosure management plans, and they can be combined in whichever manner is most fit for the local context.

This catalogue is directed at regional and district-level practitioners involved in restoration of degraded lands and establishment or management of enclosures.

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