



# A Guide to Landscape Restoration Initiatives

## Planning, Implementation, Monitoring and Evaluation with Evidence and Lessons from Tigray, Ethiopia

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# A review

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### *Planning, Implementation, Monitoring and Evaluation with Evidence and Lessons from Tigray, Ethiopia*

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**Addis Ababa, Ethiopia, 2023**

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Hagazi N, Hadgu K, Tafere B, Mokriai M, Birhane E, Abiyu A, Hailemariam G, Aynekulu E, Gebrekirstos A, Kassa H, Garrity D, Bourne M, Winowiecki L, Vågen T, Minang PA and Bräuning A. 2023. *A Guide to Landscape Restoration Initiatives: Planning, Implementation, Monitoring and Evaluation with Evidence and Lessons from Tigray, Ethiopia*. Bogor, Indonesia: Center for International Forestry Research (CIFOR) and Nairobi: World Agroforestry (ICRAF).

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## Foreword

The Center for International Forestry Research (CIFOR) and the World Agroforestry (ICRAF) merged in 2019 as CIFOR-ICRAF to conduct research-in-development on the most pressing challenges facing the world’s forest and agroforestry landscapes – a global research partnership for a food-secure future – and share its focus on poverty reduction, increased food and nutritional security and sustainable natural resource systems. The CIFOR-ICRAF work is aligned with the Sustainable Development Goals, the Paris Climate Agreement and the three Rio Biodiversity Conventions.

CIFOR-ICRAF delivers actionable evidence and solutions to transform how land and renewable resources are used, and how food is produced. In general, CIFOR-ICRAF works towards improving people’s lives while preserving environmental health mainly through providing actionable, game-changing solutions to five major global challenges including Deforestation and biodiversity loss; A climate in crisis; Transforming food systems; Unsustainable supply and value chains; and Extreme inequality. To deliver actionable, game-changing solutions to the five global challenges, CIFOR-ICRAF organized the research teams into six themes including Trees and forest genetic resources & biodiversity; Livelihood systems; Sustainable value chains and investments; Governance, gender, justice and well-being; Climate change, energy and low carbon development and Soil and land health. In line with this, CIFOR-ICRAF Ethiopia has been working for more than a decade with several partners. The main program/project areas include landscape restoration; agroforestry; climate-smart agriculture; forest conservation and development; forest policy and governance; food and nutrition security, integrated watershed management, drylands development, climate change, provision of adequate tree seed portfolios, rural job creation through agroforestry and tree-based value chains, women empowerment, development of innovative and learning platform for enhanced economic opportunities and resilience and other associated programs.

The project titled, “Enhancing Integrated Watershed Management with Climate Smart Agriculture and NRM Practices in Gergera Watershed” was implemented to rehabilitate the region. This area was seriously degraded and affected the livelihoods of more than 150 households who began demanding to be resettled. With the help of an Irish Aid-supported project, inclusive and context-specific integrated watershed management activities were planned and implemented across the landscape (i.e., hillsides and mountain landscapes, the bottom farmlands, and river course). The aim was to improve livelihoods and establish resilient landscapes and ecosystem services with four key objectives: i) to make quality germplasm and inputs accessible to farming communities by establishing and/or

privatizing public nurseries using the Rural Resource Centre (RRC) business model; ii) to convert gullies from threats to opportunities through effective gully reclamation and rehabilitation works; iii) to add value to degraded hillsides and area enclosures for sustainable management, benefits and services; and iv) to diversify and transform the treeless farming and grazing systems by integrating high-value and multi-purpose tree and shrub species. The key activities implemented in these landscapes include trenches and hillside terraces (in the uplands), broad base terraces and trenches (in the farmlands), and the river course and embankments treated with gabion check dams and gabion lining to control side collapse. More importantly, these physical structures were supported by planting trees, shrub and grass species which provided an opportunity for farmers and landless youth and women groups to earn additional income. In conclusion, this project was successful in that the livelihoods of more than 150 households, youth and women groups were secured through effective transformation of degraded and marginalized landscapes into productive land. Finally, the collective efforts put towards the restoration of the Gergera watershed is rewarding; development institutions can learn from the process and scale up restoration activities across the regions.

This review work is critical. It documents the lessons and learnings in the Tigray region of Ethiopia as a case study so that development practitioners can learn from and develop their site-specific intervention programs. This publication has synthesized lessons and experiences by responding to the following questions: i) *What successful lessons did we learn from the restoration/rehabilitation works?* ii) *How can one define the lands that need to be restored,* iii) *What kind of arrangement is needed to accelerate and upscale restoration efforts and lessons?* iv) *What steps should be followed in restoring degraded landscapes?*

In conclusion, the synthesis and evidence presented in this review document will support and guide restoration program planners, managers, development practitioners and many other individuals and groups who engage in restoration of degraded landscapes now and in the years ahead.

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## The purpose and basis of the review work

The purpose of this review is to establish a common background and a knowledge base on **what** and **why** restoration is required. The **how** issue from the social, economic, environmental, and institutional aspects and contexts is also discussed. From this document, development actors can learn from and use various techniques and technologies during restoration program design, implementation, monitoring, evaluation and the learning process.

The target groups for this publication comprise sector-level executors, policy makers, local administrators, NGOs, development experts, extension workers, researchers and academics.

This review work is based on field-level observations, lessons from both local and external sources, review of all pertinent documents and materials, plus the authors' extensive experiences in the subject matter. In this regard, due effort is made to assess the overall perception and understanding of different communities (both user groups and service providers) and relevant grassroot-level institutions, including the experiences of restoration programs run by research and higher learning institutions. For detailed understanding and learning, two Tabias – *the smallest administrative unit*, namely *Hayelom* (where the *Gergera* watershed is located) and *Abreha-we-Atsbeha* were selected. However, the overall restoration efforts in the region have also been taken into consideration. This was complemented with a review and assessment of the experiences of the international community (such as the Republic of Korea, China and the Philippines), and some working standards (produced by FAO, the EU, WB) to assess and evaluate the scale of the restoration work in Tigray.

The review work also describes the approaches and techniques that need to be followed during program design, planning and implementation in the restoration and management of degraded hillsides and all other forms of degraded landscapes in Ethiopia in general, and in Tigray region in particular. This is because, if appropriately managed, these lands can support the livelihood demands of rural communities and maintain the environmental health sustainably. In the protection of these areas, it is possible to ensure socioeconomic and environmental benefits. For instance:

- *It ensures environmental safeguarding in terms of genetic conservation and, soil moisture enhancement.*
- *It forms part of the broader goal of Forest Landscape Restoration (FLR) to regain the productive potential of the land for livelihood and biodiversity conservation.*



- *It provides diversified livelihood opportunities for the community: irrigation, apiculture, fuel wood, plus feed and fodder (in the form of bush and grass).*
- *It promotes aesthetic value with the potential for development of the tourism industry.*
- *It supports many other ecosystem services (e.g., carbon sequestration potential, soil conservation).*

This review examines the institutional arrangements of the regional forest development, protection and utilization sector, and its emerging shift in restoration and rehabilitation planning, plus implementation approaches along with its implication for land restoration activities.

In summary, this review work constitutes key experiences, lessons and tools that will help different actors implement effective interventions: *in the design and planning of programs, projects, or all forms of interventions to restore and rehabilitate the different types of degraded landscapes in the region and beyond; ensure the most effective and efficient implementation, and the land use system.* Moreover, based on the lessons and synthesis of this review work, the authors have tried to detail the best-fit monitoring and follow-up systems, including the forms of institutional arrangements needed, and all other effective forest governance issues that are of common concern to hillside and exclosure area management.



## Acknowledgements

The authors and the Center for International Forestry Research-World Agroforestry (CIFOR-ICRAF) would like to thank the Irish Embassy (Irish Aid) in Ethiopia and the people and government of the Republic of Ireland for the financial support during the whole process of this review and synthesis work which formed part of the Irish Aid-supported project titled “*Developing an Innovative and Learning Platform for Enhanced Economic Opportunities and Resilience in Gergera watershed: An action research program*”, located in the Eastern Zone of Tigray region, Ethiopia. This project was a continuation of the first phase of the Irish Aid-funded project titled “*Enhancing Integrated Watershed Management with Climate Smart Agriculture*”.

The authors and CIFOR-ICRAF would also like to acknowledge and appreciate Mr Belete Tafera and the Tigray Bureau of Agriculture and Rural Development, Tigray Agricultural Research Institute and Mekelle University for supporting this initiative. They also provided support in the review and documentation. We are also grateful to Mr Gebrehiwot Hailu (Chairman of Tabia Hayelom), the Gergera watershed communities, Mr Gebremichael Gidey (former chairman of Abreha-we-Atsbeha) and the community of *Abreha-we-Atsbeha* for taking the time to discuss all the successful restoration and natural resource management achievements, as well as past and emerging challenges in their respective localities.

Many thanks to the district offices of agriculture in Atsbi-Wonberta (Mr Hailay Gebr) and Kilde Awlaelo (Mr Gebre Egziabhere G/Silasse from NRM), for taking time to share their views about restoration. Likewise, the authors also had the privilege to collect all pertinent laws and regulation materials from the Tigray Region Environment, Land Use and Administration (Mr Berhe Fisseha and Mr Michael). Mr Tsegaberhan Woldegiorgis took the time to review and comment on earlier drafts of the document, particularly in relation to the Tigray region, and for that we are grateful.

Finally, we would like to express our appreciation to the CIFOR-ICRAF staff: Mekdes Sime, Samuel Hailu, Eyob Getahun, Bekele Achame, Daniel Yitbarek, Susan Onyango, Rose Onyango and Joyce Kasyoki for their support in the review and editing of the publication.

***“The contents and views of this review work are the sole responsibility of the authors and neither represent nor reflect the views of Irish Aid or CIFOR-ICRAF”.***

## Acronyms and abbreviations

ADLI	Agricultural Development Led Industrialization
AFR100	The African Forest Landscape Restoration Initiative
ANR	Assisted Natural Regeneration
BoANR	Bureau of Agriculture and Natural Resource
BoARD	Bureau of Agriculture and Rural Development
CBO	Community-Based Organization
CIFOR	Center for International Forestry Research
CRGE	Climate Resilient Green Economy of Ethiopia
CSO	Civil Society Organization
E.C.	Ethiopian Calendar
EU	European Union
FAO	United Nations Food and Agriculture Organization
FDRE	Federal Democratic Republic of Ethiopia
FLR	Forest Landscape Restoration
FMNR	Farmer Managed Natural Regeneration
FPC	Future Policy Council
GCF	Green Climate Fund
GGW	Great Green Wall
GHG	Greenhouse gases
GIZ	German cooperation for international cooperation
GTP	Growth and Transformation Plan
ICRAF	World Agroforestry
ILRI	International Livestock Research Institute
INRM	Integrated Natural Resource Management
KfW	Kreditanstalt für Wiederaufbau (Reconstruction Credit Institute) or German Development Bank
LDSF	Land Degradation Surveillance Framework
M&E	Monitoring and Evaluation
MERET	Managing Environmental Resource to Enable Transition to More sustainable livelihood
MoA	Ministry of Agriculture
MRV	Monitoring, Reporting and Verification
MSE	Micro and Small Enterprise
MU	Mekelle University
NGO	Non-Governmental Organization
NILUP	National Integrated Land Use Planning/Policy
NMA	National Metrology Agency
NRM	Natural Resource Management
PASDEP	Plan for Accelerated and Sustained Development to End Poverty

PES	Payment for Ecosystem Services
PSNP	Productive Safety Net Program
REST	Relief Society of Tigray
RRC	Rural Resource Centre
SLM	Sustainable Land Management
SLMP	Sustainable Land Management Project
SMP	Strategy Management Plan
TARI	Tigray Agricultural Research Institute
TFAP	Tigray Forestry Action Program
UNCCD	United Nations Convention for Combating Desertification
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
WB	World Bank
WFC	World Future Council
WFP	World Food Program

## About the publication

In different parts of Ethiopia, including Tigray, population growth is a major driving factor in the expansion of agriculture, a source of livelihood for millions of people in the region. 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. Tigray had made substantial gains in agriculture and natural resource conservation using strategies of soil and water conservation, genetic conservation and reforestation. Strategic programs have been designed and implemented using the integrated watershed development approach.

This publication shares lessons and experiences from Tigray Region and elaborates on the emerging shift from quantity to quality in restoring degraded lands. It was developed by reviewing various resources of published and unpublished materials. More importantly, the review work utilized site-specific project documents as well as knowledge and experiences of authors on integrated watershed development programs. Moreover, while conducting this review work, a field visit was conducted at Gergera watershed to collect photographic evidence and valuable information on social, environmental and economic benefits, plus restoration impacts.

The findings were summarized in six chapters. The **first chapter** deals with the general background, objective, scope and approach. **Chapter two** discusses the Tigray region experience in integrated watershed development, while **Chapter three** deals with planning restoration/rehabilitation, NRM and land-related programs. Here, an effort is made to detail the step-by-step procedures for restoration program design, planning, implementation and monitoring. This is further supported by learnings and experiences from the Tigray region, taking some specific cases like *Abreha-We-Atsbeha* and the *Gergera watershed*. **Chapters four to six** deal with the mode of implementation in degraded landscape-related projects and programs.

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# SECTION I

Photo by ICRAF-Ethiopia

## CHAPTER ONE

### 1.1. Background

The economy of Ethiopia is **agrarian-based**; almost all farming tools are indigenous. Despite its long history, the agricultural system still maintains the **two-oxen plough practice**. Based on historical sources and archaeological findings (available in the Axum Museum) the Tigray people were among the first to adopt the technology, and still practise it to this day: as the saying goes, *Qurdid's Ya Haqegna Kiblewo Ab-Korbet Tetabiqu mote* (the bug assumes loyalty and honesty by remaining stuck on the skin, even when the animal has died).

Similarly, the practices of **soil and water management** both for fertility and moisture conservation, and even disease and pest management were predominantly manual: manuring, composting and picking pests by hand. Thus, agricultural production (both **crop yield and livestock**) and its productivity declined over time, making the community among the least resilient and dependent on aid for most part of the year.

In the last four decades, the region has experienced rapid population growth followed by unprecedented land-use changes. In an effort to meet the increasing food demand of this growing population, people were forced to utilize all other available land: grazing areas, lowland forests, parks (in the form of Mofere-zemte<sup>1</sup>), and even wetlands<sup>2</sup>. As a result, it is now common to see degraded lands in vast parts of the country (mainly the north and north-eastern part). The landscapes in these areas are bare and devoid of vegetation cover. Thus, people are facing serious animal feed, fuelwood and construction material shortages. This is evident by the rocky hillsides and mountain areas in most of northern Ethiopia (Tigray and Amhara regional states). It is also one of the main reasons why the country

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<sup>1</sup> Mofere-zemet - Seasonal farming practice in the far lowlands of Tigray and Amhara region

<sup>2</sup> The risk of encroachment to the wetlands of Tigray (including Lake Hashenge) is seen to have aggravated since 2002. This is because, during this time, the regional government of Tigray and even the federal government has decided and give high focus to irrigation. Thus, a direction was given to all parties (the bureau of agriculture and rural development, bureau of water resource development, to the relief society of Tigray, etc.) to assess all potential areas that can be used for irrigation. It is during this time that the household and/community pond (Horeye) and the shallow well works were introduced and massively implemented. There was also a motto given to "every farmer has to have a water resources that can be used to irrigate its farm plot (s). Therefore, the woredas were also advised to optimize all what they have in their localities. Hence, the scanty wetlands in each woreda and even the region, were aggressively converted to irrigation areas, thereby destroying the biodiversity and water-storage potential of these lands.

experienced some of the most notorious and destructive famines (in 1974<sup>3</sup>, 1984, 2003 ... 2010, 2014 and 2016).

The regional **land use system** is predominantly traditional – where people simply let their livestock roam freely on open land (including crop fields after the yield is collected); collect wood (for fuel, construction and other purposes) from all forms of forest lands (including protected forests); and establish settlements anywhere, including in the wetlands. Moreover, the major sources of energy for the rural community still comes from natural vegetation and cow dung. This has a potential to hinder natural soil fertility management.

Traditionally, there are several festivities (*Merea, Teskar, Kusmi* and many others). The culture is also highly dependent on nature – especially **forest and grass products**: for food production, shade or *Das in Tigrigna* and even the ground spread (in Amharic, *Qetema mantef* and in Tigrigna *Seti mensnas*). Many of the traditional foods (*Injera, Kicha, Geaat, Kollo, Titiko*) are all high biomass energy demanding, which have also contributed to vegetation degradation and deforestation in the region.

Topographically, the region and northern parts of Ethiopia are predominantly mountainous, resulting in a fast **downward water movement** of both surface and underground water, especially when the vegetation cover is scant and degraded. This has result in fast drainage of all water forms, thereby contributing to the poor soil moisture status in all land use systems in the area. This has also contributed to the continued decline in the region's production and productivity capacity, thus making the population more vulnerable to all kinds of human and natural calamities.

**Climate change** has also played a role in landscape degradation and loss of agricultural productivity, despite the fact that the Tigray region has contributed little to the global emissions. Even though the region may have its own shortcomings, like lack of technology,

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<sup>3</sup> All years, unless specified, refer to the Gregorian Calendar

poor land governance and lack of social security, it is clear that climate change has exacerbated the drought and famine problems in the last two to three decades.

Given all the facts above, it is easy to understand why the region has suffered from an expansive and severe land and environmental degradation problem. Thus, any effort to overcome these challenges, and thereby improve the lives of the people, must have a clear understanding of all the contributing factors in order to design appropriate programs. In effect, since 1991, some strategies and programs which have had a positive impact were designed and implemented in all parts of the country, including ADLI, PASDEP, GTP and CRGE. However, the scale of intervention and achievements vary from location to location.

In conclusion, owing to the widespread natural resource management (integrated watershed management and plantation) practices and the enhanced extension support, the region's agricultural production and productivity was improving. However, the achievements are not commensurate with the actual investment made in the area, including the people's labour (social mobilization<sup>4</sup>), and government-initiated projects (e.g., SLM, PSNP). Therefore, the issue of concern that any genuine citizen should raise is: the main challenges at policy and implementation level from the national to project level (i.e., temporal scale – from initiation to completion and scaling up of success story); ***project level constraints includes technical (skill and knowledge, implementation, monitoring, reporting, evaluation and verification capacities), social, economic and even political level; what should be done to overcome such challenges***; and what should be done to avoid inconsistent reporting on rehabilitation efforts.

### **1.2. Objective of the review work**

The objective of this review is to document lessons, experiences and learning from the restoration activities in Tigray region, so that lessons learned would benefit farmers/communities, extension workers, governmental and non-governmental

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<sup>4</sup> Referring to the annual reports of the Bureau of Agriculture and Rural Development (1984 onwards), the region has managed to mobilize an average of 1.3 million persons on a daily basis. They worked for 30 days per annum (on average) over the last three decades.

development partners, and the private sector at all levels that are directly involved in the implementation of restoration projects and programs.

- I. Investigate level of awareness of the community of landscape restoration schemes
- II. Discuss the development potential of restored landscapes
- III. Document widely adopted restoration approaches and technologies in designing and implementation of development interventions
- IV. Define the potential social, organizational, and institutional arrangements for better implementation of designed activities
- V. Suggest better knowledge management systems (monitoring, reporting and verification) and documentation of learning and evidence generation
- VI. Introduce the rural resource centre (RRC) business model to increase access to quality planting materials while creating new jobs opportunities for landless or unemployed youths and women

### 1.3. Scope and target of the review work

This publication is targeting all actors involved in the development of hillsides and area enclosures, and those working to restore degraded lands in Ethiopia and beyond. In general, the government and non-government-led restoration programs and other development practitioners, the regional sector offices as well as restoration-based user groups (*the youth, women, landless and rural communities*), experts, planners and program managers will benefit from this publication.

The review provides lessons and experiences to facilitate effective planning and implementation of projects involving degraded hillside **landscapes** and enclosure areas, with a focus on **youth, women and the landless**. In general, the publication is an analysis of:

- *The issues and concerns on the choice of technologies, and mode of practice to be followed in the:*
  - *Rehabilitation and management of upland degraded landscape*
  - *Integrated farmland management*



- *Gully rehabilitation or riparian landscape management that can ensure an enhanced and sustainable livelihood support and environmental safety for user groups and beyond.*
- *Need to define the **institutional arrangement** needed to carry out the task in an effective manner – at government level and among social organizations (including civil society).*

#### **1.4. Principles adhered to during the review activity**

Degraded land restoration through enclosure and hillside management is all about helping people to access sustained benefits – **economic, social and ecological values** – by developing the necessary technical knowhow and understanding the bio-physical characteristics of such areas (Yigremachew et al. 2015; Gebreselassie et al. 2016; Birhane et al. 2017; Hagazi et al. 2020). It also involves understanding the state of risk and damage it may cause in the absence of proper care. Hence the importance of defining the most appropriate systems and technologies that need to be introduced and implemented effectively.

Planning and decision-making need to be fully decentralized. It is also important to involve all user groups, the community at large and all other stakeholders in the process. This is because it is ***the community and local government that fully understand their own interests and the actual problems in their area. They know “what to do” and even “how to do it” and “when to do it”. What is required is technical advice and facilitation.*** Therefore, the community and local government need to be at the centre of the planning and implementation of such programs and take full responsibility for realization of the designed objectives. The community and all other pertinent social groups must be equipped with the necessary information to assist them make informed decisions.

The process or approach in the design and implementation of rehabilitation mechanisms (technologies) of degraded hillside and enclosure area management need to be technically **integrated** and **participatory**. In this way, the process can guarantee an ecologically **effective**, economically **efficient** and socially **acceptable** program implementation.

- **Integrated natural resource management** is a scientific and resource management paradigm uniquely suited to managing complex NRM challenges in densely populated landscapes, where people are highly dependent on local resources for their livelihoods, thus heightening the tension between livelihood and conservation. The explicit effort to *bridge the productivity enhancement, environmental protection, and social wellbeing* (Sayer and Campbell 2003b) herefore makes INRM strategically relevant in such situations (German et al. 12).
- Different people follow different approaches in engaging user groups and communities in the planning and implementation of any program objective. By **participatory approach**, we mean “... *the process by which the users define the problems and priorities, set criteria for sustainable management, evaluate possible solutions, implement programs, and monitor and evaluate impacts* (Johnson et al. 2001)”.





### **1.5. Approaches implemented in the review work**

This review work has benefitted from extensive local resource (knowledge and site- and context-specific experiences of authors, published and unpublished materials, plus restoration/rehabilitation project/program reports) and internationally-accepted concepts and technical standards. It is also essentially based on an intimate understanding of the socioeconomic and agro-ecology of the case study areas, the underlying socioeconomic and environmental causes of the region's environmental degradation problem, efforts made so far, achievements attained, and the gaps, constraints, limitations and challenges experienced in implementation of the introduced technologies and regulatory tools in the regional state in particular, and the country at large. The review work has benefitted from federal- and state-level secondary data sources. Pertinent documents and information at federal, regional and district/woreda levels were collected and reviewed. These include: the environmental and agricultural policies of the country, relevant strategy materials, various legislative documents, and progress reports from districts and regions.

In addition, a field visit was conducted to the Gergera watershed in Tabia Hayelom, Tabia *Adekisandud* and Tabia *Abreha-we-Atsbeha* – often considered “best story” areas in the region. Activities covered during the field mission include:

- A reconnaissance survey of the watershed and assessment of their biophysical status, state of management, socioeconomic changes achieved, and potential challenges and problems in implementation of the initiatives. In some cases, this was also supported by a transect walk and overview drive observation along important landscape elements, such as river and spring areas.
- Discussions held with communities on the overall state of the environment in the watershed. The points covered include, among others: the perception of community members and leaders on the state of the environment and land resource of the watershed, the impact of the different efforts made to date, challenges and limitations, and their future expectations.
- In the same manner, extensive discussions were held with district/woreda sector offices (Bureau of Agriculture and Rural Development) in Atsbi and Kilde Awlaelo

districts, on their perception of the achievements so far, challenges and opportunities, plus future plans.

- Consultations were also held with various actors during the recent crisis in Tigray. The team examined the ongoing rehabilitation/restoration works.

Finally, in addition to the extensive experiences of the authors in the subject matter and the region, references were also made to several international experiences, like the Republic of Korea, China and the Philippines which have implemented successful restoration and reforestation programs.





**SECTION II**



## CHAPTER TWO

### 2.1. Current practices and challenges in the management of degraded hillsides and exclosures in Tigray

Tigray region is located in northern Ethiopia. A large part of the area's land mass is part of the **Ethiopian highlands** and hence, is primarily mountainous. Variations in the altitudinal gradient over short distances are extremely high, and slopes are mostly very steep.

Majority of the population resides in these landscapes. They have long depended on subsistence agriculture, and their major sources of energy comprise biomass resources – fuelwood, charcoal, twigs and cow dung. Thus, the region's **mountain areas and hillsides** have suffered from severe and expansive land and environmental degradation problems (Hagazi et al. 2019, 2020) (**Fig. 1**). This in turn has exposed the community to drought- and famine-related problems, almost on a recurrent basis.

As a response to these problems and challenges, the regional government decided to focus on the rehabilitation and management of the degraded lands and natural resources. Therefore, in line with the “**Agricultural Development-Led Industrialization, ADLI**” (a flagship strategy of the country), the region further refined this strategy to include “**Natural Resource Management-Based Agricultural Development-Led Industrialization**”. Thus, programs included soil and water conservation, reforestation (afforestation), exclosure area management and integrated watershed management. The natural resource management and specifically, the integrated watershed management programs, adopted the following approaches: i) Mobilizing the community for volunteer activities; ii) Optimizing any support from the international community; and iii) Promoting enhanced degraded landscape management through exclosure management.



**Figure 1.** The state of land degradation and free grazing on degraded landscapes in Tigray, Ethiopia (Photo by Belete Tafere)

#### **2.1.1. Mobilizing the community for volunteer activities**

The notion behind this thinking was that the region was experiencing *monetary and technology constraints*. On the other hand, labour is easily available and could be mobilized to restore the degraded landscapes. Thus, a strategic **social mobilization program** was developed, where the people (mainly rural communities) were considered major actors and committed their labour and resources to the rehabilitation and management of degraded lands in the region. The people, through their communes, discussed the issues in detail and made a decision to contribute an average of **30 days of free labour** on an annual basis to rehabilitate these degraded landscapes through physical soil and water conservation and plantation activities. This mobilization continued for 30 years (**Fig. 2**). During community mobilization, the following checklist was used for planning and implementation purposes:

- How and when the mobilization should be done.
- Who is leading the mobilization and who should provide the free labour?
- What time or during which season is the mobilization conducted?

- Method or system of mobilization and knowing what to do and what not to do in case any taboo issue arises.
- Any sensitization or incentive activities to promote mobilization such as music or any other cultural events.
- Organizational structure of the mobilization.
- Possible penalties for those who do not respect the by-laws.
- Definition of how much free labour each household should contribute.
- Identify any major challenges and barriers during mobilization.
- Propose mitigation measures to overcome the identified challenges during mobilization.







**Figure 2.** Social mobilization in action (*Photo by Belete Tafere*)

### **2.1.1. Optimizing support from the international community**

The land degradation problem in the region is expansive and severe. Thus, it is obvious that all the rehabilitation and management work demanded by these landscapes cannot be fully covered by the community or even the local government. Despite these limitations, there has been high interest from the international community to support the region's efforts. Thus, a decision was made by the regional government to make the best use of donor resources obtained from international development partners in the establishment of demonstration sites that could serve as learning centres. Consequently, projects supported by the Irish government (*in Gergera Watershed*); WFP MERET (*in Tabia Abreha-we-Atsbeha, Midimar catchment, Inabered catchment*), KfW (GIZ) in (*Tabia Abreha-we-*

*Atsbeha, Mai Berazio, Adeki Sandid*), have all effectively implemented and served the designed objectives: sustaining the ecology, ensuring enhanced economic benefits among different user groups and promoting transfer of knowledge in the region.

### **2.1.2. Promoting enhanced degraded landscape management through area closure or exclosure management**

**Area closure** or **exclosure** is not a new measurement and has been and is currently being practised in many parts of the world and at different scales. In Tigray, especially in the last three decades, it has become one of the widely used techniques, practised in restoring degraded landscapes in the region (**Fig. 3**). Reasons for choosing this technical tool include the following:

- ✓ The land degradation problem in the region is severe and widespread. Thus, it would be impossible to commit commensurate investment across the entire region (all in good time for the rainy season).
- ✓ The degree of environmental degradation is severe, thus subjecting the region to acute moisture stress and poor soil fertility, which in turn depresses the rate of regeneration. Under such circumstances, it is obvious that the plantation of improved varieties meant to rehabilitate and regenerate degraded areas had a limited success rate. Thus, protecting these fragile lands from any kind of disturbance (i.e., direct human and animal intervention) and giving the local biotic resources a chance to regenerate was considered.
- ✓ Indeed, there have been encouraging responses experienced within a very short period of time. The **Acacia families** (especially *Vachellia ethylica*, locally known as **Seraw**), and some native **grass species** (*Rhodes* or *Tihag* grass) provided a glimpse of hope. Over time, surrounding communities enjoyed indirect benefits, e.g., increased accessibility to honey and fodder, an increase in ground water recharge and of the river base flow, which provided an opportunity for irrigation development. However, there was an increase in the number of **rodents** which was not well received by the communities.

Numerous actions have been taken by the government and community to overcome the observed and interlinked socioeconomic and environmental problems, thereby ensuring the ecological, social and economic welfare of the people. However, the efforts made to improve the landscape is not commensurate with the improvement observed, both in terms of quality and quantity. There are indeed several reasons given by researchers and government bodies for this. Some of these include:

- **First**, the absence of “**integrated and participatory land-use policy and planning**”. The result has been different stakeholders competing for the same piece of land. Each sector is looking to meet its own goals and mission and does not take into consideration the consequences of their decisions/actions. As a result, a lot of haphazard decisions have been made on many of the potential land resources, which could otherwise have been more productive if used differently. In this regard, it is common to see prime agricultural land being converted for settlement and infrastructure development. Subsistence farming has been encroaching, to a large extent, on wildlife parks, forest lands and even potential wetlands, thus compromising the development potential of the region. Moreover, the tradition of grazing and collecting wood products for domestic use (for fuel wood and other purposes), has worsened the problem of environmental and land degradation in the region.
- The **second** point is that, owing to the facts mentioned above and poor management, the genetic potential of the region has already been lost to a significant extent. As well, the effort to introduce new bio-genes that are productive, adaptive and of multi-purpose nature were seriously challenged by the aridity and lack of appropriate management.
- **Third**, due to an overall lack of knowhow and awareness by the community, various efforts in natural resource management (integrated watershed management and the enclosure areas) are threatened by defaulters: it is common to see people encroaching these areas for stone quarrying, to collect construction materials (specially in peri-urban areas and construction sites) or allow their animals to graze.
- **Fourth**, lack of experience and technical capacity among experts in the region, and sometimes, lack of commitment to stick with the mission to the end and prove that it works. It is often considered an achievement once the vegetation cover has been restored; instead, experts should strive to get to the stage where the vegetation can be of actual benefit to the people and the rural community.



**Figure 3.** Exclosure practices in Tigray, Agulae area (left), and Tabia Abreha-we-Atsbeha (right) (Photos by Belete Tafere).

### **2.1.3. Extent and context of area closure and exclosure management in Tigray**

There is indeed serious confusion regarding the definition of “**enclosure areas**”, “**area closure**” and “**exclosure areas**” in Ethiopia. It is common to see researchers and field officers heatedly debating on these issues (Aerts et al. 2008). However, at least in the case of Tigray, regardless of these discussions and the literal definition given in the Oxford English dictionary, the term “**area closure**” is still commonly used to mean *protection of severely degraded landscapes from any kind of human and animal interventions*. This does not necessarily include any form of fencing but is simply an accepted norm by the communities. Areas put under “area closure” or dubbed “exclosure areas” in principle, are closed and restricted from any kind of direct human and animal intervention. However, after some time, when these areas are assumed to have undergone an appreciable biomass change (after conducting a technical review), then the community could be allowed to utilize the resources (grass and branches) in the form of cut-and-carry. Otherwise, any scale of farming, direct grazing by domestic animals, cutting of standing trees for fuel wood and other purposes is not allowed. In effect, this is also how different actors in the field understand and implement the terminology. Thus, in this guideline, the term “**area closure**” (*kelela* in Amharic and *kelela*, or *etsuw kbabi* in Tigrigna) also means “exclosure areas”, to ease the work of field-level operators (extension agents).



Extensive area closure practices have been carried out in Ethiopia in the last three decades. Progress reports from the Bureau of Agriculture and Rural Development of Tigray indicated that about **one-fifth** of the land mass of the region (~**23.5 % or 1,318,870 ha**) including the Kafta Sheraro National Wildlife Park is part of the area closure (Belete 2010). Sections of these are indeed assumed to overlap with the **integrated watershed management** intervention areas in the region.

These closed areas are also displaying encouraging biophysical changes (in terms of improved vegetation cover, soil fertility and soil moisture); and hence ensuring that communities will experience **diversified livelihood opportunities** without directly interfering with the system. These include *apiculture management, fodder management (when the grass is mature) and practising bottom land irrigation, (Figs. 4 and 5)* (Arya et al. 2011; CAT 2018; Dagar 2017; Hagazi et al. 2020; Haile and Gebregziabher 2020; Mekuria et al. 2022)



**Figure 4.** Typical benefits of an area enclosure in Tigray (Photos by Belete Tafere)

However, all these benefits (i.e., environmental and socioeconomic) have not met the expectations of the community. Taking into account the enormous **social mobilization** (i.e., nearly 1.3-million-person days on the 30 days per annum basis for almost three decades) deployed for this work and the different government-initiated donor-supported projects (like PSNP, SLMP), the magnitude of restoration benefits should have been much higher. For such unsatisfying outcomes, there are several reasons for the gap between actual performance and expected targets. These include lack of objective-based enclosure

establishment, management, benefit-sharing, and monitoring and evaluation. More specifically:

- a. **First**, despite the good intentions and decisions to close the degraded and deforested landscapes, the tradition of free grazing and free collection of fuel wood and other vegetation (for farm tools, construction, festive shades and ground spread) has continued to compromise the performance of enclosures in the region. Not enough effort is put into raising overall awareness and understanding of the community regarding the risks of environmental degradation.
- b. **Second**, although closure areas are usually respected by the communities (though at a cost), the lack of **appropriate technologies** (both physical<sup>5</sup> and biological<sup>6</sup>) that could enhance the productivity level of the closure areas limited the success and hence led the community to question the benefits from these closed lands. Indeed, there were some efforts made by the bureau (BoARD) to introduce some improved tree crops (such as *Leucaena leucocephala*, *Sesbania sesban*, *Desmodium spp*, *Treculia africana*) and grasses (such as *alfa*, *Rhodes*) – both for conservation and livestock feed – even by purchasing or in the form of technical exchange with other countries (Kenya). The problem here, too, is that the care and follow-up by experts was limited and therefore success was not achieved.
- c. **Third**, lack of **water points** for cattle and **shortage of biomass** for animal feed in general has been a challenge for the communities. Owing to this, some groups in the community (often large cattle owners) deliberately flout government laws and community by-laws and let their livestock graze in the closed areas. Furthermore, biomass is sometime the only energy sources for rural poor community. Thus, communities continue to collect fuel wood from protected areas or exclosures. Under such conditions, regulations, directives, and by-laws have not been fully respected. The fact that initial defaulters got away scot free, motivated the rest of the community to violate the rules. In fact, there is a local saying: *Adi Aboka ya entwirer's Edka hiweselu* (If you cannot protect the invasion and looting of your father's land (property) then become one of the looters).

<sup>5</sup> This refers to the design and construction of **appropriate soil and water conservation measures**, such as terraces, deep trenches, etc.

<sup>6</sup> This refers to the availability of **improved germplasm** and appropriate agronomic management (including composting).



**Figure 5.** The different efforts and state of change achieved in different landscapes at Weree Leke and Atsbi plateau, respectively (Photo by Belete Tafere)

Therefore, for **hillside protection** and **exclosure area management**<sup>7</sup> to be effectively implemented, there is need for:

- a. Comprehensive preparation and readiness by the community and local government to propose **solutions** to the feed, fuelwood, agricultural tools and water demand.
- b. **Site-specific and purposive intervention**: need to identify productive physical and biological technologies, plus systems of management and effective market linkages (both local and distant markets) to enhance positive and constructive relationships between the community and corresponding closure areas.
- c. **Consistent and effective technical support** and follow-up with the community to ensure effective implementation of the designed objectives for each exclosure or closure areas.
- d. A **common guiding framework in terms of the share of responsibility** of various actors (including user groups) and benefit-sharing mechanisms which will be respected by all groups (implementing institutions, social or civil societies, and user groups). With such measures, good land governance can be realized.
- e. Mechanisms for **sustained self-resource generation** and a management that is well established and respected by all actors and user groups.
- f. Community-based awareness-raising, or sensitization and capacity building, on a regular basis, for all social groups.

<sup>7</sup> The bureau of agriculture and rural development of Tigray, in its effort to ensure the sustainable management of the degraded landscapes or hillsides of the region has introduced a number of programs: PSNP, SLM, community base forest closures, etc. Furthermore, efforts were also made to restrengthen this program through developing all needed **regulatory tools (laws, directives, and technical standards)**, organizing trainings and experience sharing visit to best story areas (in the region and elsewhere), and sensitizing the communities on the trend of environmental degradation and the risks: using all communication means. Nonetheless, its achievement and particularly, its continuity, is questionable.





Photo by ICRAF-Ethiopia



## 2.2. Case studies

### 2.2.1. The approach and state of integrated watershed management practice in Gergera watershed

Gergera watershed is located in *Tabia Hayelom* and partly *Michael Emba* in Atsbi Womberta woreda/district of Tigray region. This watershed is one of the most highly degraded landscapes in the area. It is also the first watershed to be considered a pilot area for integrated watershed management with the support of the Irish Government through the Irish Aid development program. Though there were some similar projects and initiatives undertaken by Relief Society of Tigray (REST), the WFP's Food for Work program and others, this project was supposed to be more integrated in terms of the approach it followed, including all the different physical and biological conservation activities in all landscapes (uplands, riparian areas and farmlands). Following the successful achievement in the watershed, with continuous support from Irish Aid, the area became a learning centre, and the initiative has been replicated in many parts of the region. It later became a national program and approach where watersheds became an entry point for any NRM and development interventions across the country.

A good part of the Gergera watershed not only has very rugged topography, but is also seriously degraded, filled with deep and wide gullies, with low agricultural production and productivity (Fig. 6). According to FAO, (1976, FAO Soils Bulletin No. 32), these landscapes, particularly the uplands, could be more suitable for forestry and related activities. Despite this fact, many parts of the watershed (all categories of landforms) had been commonly used for agriculture (under the traditional system), while the remaining was utilized as grazing land, contributing to the expansive land degradation problem in the area. Moreover, the watershed had been unable to support the increasing food and energy demands of the community. On the other hand, the population continued to mine the land through their traditional farming practices, fuelwood collection, further aggravating the problem. Owing to all these problems and challenges, the watershed became one of the most severely degraded areas in the region in the mid-1990s. During this time, the communities became desperate and began pressuring the government to resettle them in some other areas where they could establish better lives.



**Figure 6.** The problem of gullies and erosion as threats in the Gergera watershed and other downstream areas (*Photo by Niguse Hagazi/ICRAF*)

However, after the rehabilitation program supported by the Irish government (The Eastern Tigray Development Program) was launched in the Gergera watershed during the late 1990s<sup>8</sup>, the demand for resettlement began fading. Rather, people began appreciating the encouraging ecological changes in the area, and started looking into how to optimize the change and to rebuild their livelihoods in partnership with the regional government and other development and research partners.

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<sup>8</sup> To be more specific, the Irish support program in the area has started in 1998 and continued up to 2000 and again has continued from mid-2014 together with the World Agroforestry (ICRAF) till mid-2018 with a project dubbed, “Enhancing Integrated Watershed Management through Climate smart and innovative practices” as the 1<sup>st</sup> phase and then till 2022 with a project entitled, “Developing an Innovative and Learning Platform for Enhanced Economic Opportunities and Resilience in Gergera watershed: An action research Program” as the 2<sup>nd</sup> phase (mid-2018-2022).

Through this rehabilitation program, intensive integrated watershed management activities were planned and implemented in the hillsides and mountain landscapes, farmlands, and stream (river) course. Positive impact was evident from year one of the implementation period (Fig. 7). The activities implemented in these landscapes included trenches and hillside terraces (in the uplands), broad base terraces and trenches (in the farmlands), and river course and embankments treated with gabion check dams and gabion lining, respectively, in order to control side collapse (which actively eats into the most fertile agricultural lands) and the meandering problems.



**Figure 7.** Gully development using biological and biophysical approaches in Gergera watershed (Photo by, Niguse Hagazi/ICRAF)

A number of diversion weirs were also constructed along River Birki, involving different development partners (such as IFAD) and NGOs (such as REST). Following this, an opportunity was created to introduce irrigated farming in a good part of the plain agricultural land (extended along River Birki). Moreover, in just a few years, these different catchment treatment works resulted in an encouraging biophysical change. Improved vegetation cover in the upper catchment reduced surface runoff and contributed to ground water enhancement of the catchment. Treatment of the gully sides also, not only protected the farmlands from destruction, but also stabilized the river water system, thus enhancing

water supply. These results gave the farming communities a glimmer of hope that the rehabilitation work could still help them realize further benefits.

To re-strengthen these different physical conservation works, plantation of multi-purpose trees (animal feed, fruit trees, fuel wood and biological conservation materials) was carried out in all types of landforms: the uplands, plain farmlands and riparian lands (Fig. 8). For areas that could not be covered through such efforts (involving some investment), further discussions were held with the community on whether it would be possible to set them aside as enclosure areas. An agreement was reached, and thus significantly degraded areas were also put under protection, including all those treated with different soil and water conservation activities and plantation areas. Furthermore, for years, the uplands or hillsides had been treated with different soil and water conservation activities (both physical and biological measures), and various check dams (gabion, dry rock) were constructed in the gullies and stream sides. In addition, farmlands were planted with a variety of fruit and fodder trees.

The positive restoration outcomes were observed within one year of implementation. The biophysical response was impressive (Fig. 7, 10-12). Almost all the protected areas had vegetation cover, significant enough to convince the farming community and even scholars that change was possible. These outcomes changed the mindset of the communities, extension officers, experts and decision makers as the project demonstrated that “gullies can be treated and contribute to livelihood improvement and rural employment opportunities. Among other outcomes, > 1000 cubic metres of silt was retained, > 45 ha of land restored, and > 96 farmers managed to get back some part of their lost farmland. In addition, sand dams stored water and increased access to water, and 40,000 stocks of fodder biomass (mainly elephant grasses) were harvested every year by farmers from the rehabilitated gully and sold in the market. Value addition works in the rehabilitated gullies resulted in fruit and vegetable production, and animal feeds were harvested by farmers 3-4 times a year, thus serving as an alternative livelihood option and income source. Learning hubs were set up for various actors both within and outside the region. However, fruit varieties like Avocado planted in the watershed were not able to produce fruits right away,



since it took eight years or more. This and other related problems were observed and became a lesson for later interventions, where various varieties of Avocado were introduced; these produced fruits within three years.



**Figure 8.** Fruit tree on the farm in Gergera watershed (*Photo by Niguse Hagazi/ICRAF*)

Moisture conservation measures introduced to the watershed created a good opportunity for the planting niches/areas to facilitate growth, i.e., soil moisture was improved, and the seeds that had remained in the soil and resistant crops got the chance to germinate and regenerate very easily (Fig. 9). Therefore, this showed the community that even minor management practices can have a positive impact:

- Soil fertility improved and was able to support cultivation.
- Plants (especially the grass family) easily covered the ground, creating further opportunities – provided a good source of livestock feed, reduced runoff, increased ground water recharge.
- The farmland soil moisture and river base flow was enhanced and provided an opportunity for further crop production and other water use systems.

In general, owing to all the different efforts made in the catchment, it was clear that some encouraging ecological, social and economic benefits were achieved. In addition, the community benefitted from diversified livelihoods: irrigation, apiculture and cattle fattening. Nonetheless, there was lack of continuity and hence there was some reversal action that took place, especially in the area of pastureland management.

Regardless of all these numerous efforts and the achievements so far:

- ✓ A large part of the upstream catchment remains bare and degraded.
- ✓ Farming practices in the catchment are still cereal-based and there is lack of technology, hence contributing to aggravated soil erosion and land degradation.
- ✓ The once protected rangelands are now commonly used for grazing. Moreover, a large part of the uplands (steep lands), although closed, do not have substantial tree cover<sup>9</sup>. There are some pockets of forest lands in parts of the slopes, but most of it is largely bare.
- ✓ Some parts of the river course is continuously eroded by flooding from upstream areas and potential farmland is collapsing in all directions.

Generally, despite the massive efforts made with the support of Irish Aid between 1998 and 2000 and then by the regional government through the Productive Safety Net Program, there were several unsustainable NRM indicators in the watershed. Following this, Irish Aid provided further support through a project entitled, “Enhancing Integrated Watershed Management with Climate Smart Agriculture and NRM Practices in Gergera Watershed” in partnership with the World Agroforestry (ICRAF) from 2014. The goal of the project was to capitalize on the preceding success and practice-oriented solutions to enhance food security, community livelihoods and ecosystem resilience. This required in-depth understanding of the root causes of NRM degradation in order to propose effective remedies and solutions. ICRAF, with its local partners, conducted a series of consultations

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<sup>9</sup> On individual bases, low-level plantation activities are indeed observed, especially along home yards. These plantations are mainly Eucalyptus, and according to the commune leader (Mr. Gebrehiwot Hailu), the communities in Tabia are using it to meet their different wood demands: fuel wood, construction wood, etc. He has further stated that there is no use of natural forest products for any of the different wood demands that the Tabia people may have.

and field-level assessments to understand the key constraining factors and respond to the primary demands of the watershed communities in the short-, medium- and long-term.

To make the interventions holistic and inclusive, joint vision mapping was conducted by various community members, extension officers and decision makers (Fig. 9), taking the homogeneity of each group into consideration. This approach was important in setting up the intervention building blocks, which all the groups agreed upon. During the vision mapping experiences, the groups were tasked to formulate their own vision (what they wanted to see in the watershed in the short-, medium- and long-term) and to translate their vision into a map, including a list and type of interventions.



**Figure 9:** Vision maps of Gergera watershed prepared by different groups during the project planning phase, 2014.

The project aimed to achieve community-based adaptation for improved livelihoods, resilient landscapes and ecosystem services with four key objectives set and agreed upon during the vision mapping and planning phase. These were: **i)** To make quality germplasm and inputs available to farming communities by establishing and/or privatizing public nurseries using the Rural Resource Centre (RRC) business model; **ii)** To convert gullies from threats to opportunities through effective gully reclamation and rehabilitation works; **iii)** To add value to degraded hillsides and area enclosures for sustainable management, benefits and services; and **iv)** To transform the treeless farming and grazing systems by integrating high-value and multi-purpose tree and shrub species. The results and outcomes were successful and rewarding, and it was clear that the planning process was critical to the success of the restoration program. Some of the learnings from this pilot project include:

- The RRC business model was able to create jobs and become an income source for landless or unemployed youth and women, while creating access to quality planting materials and bringing inputs closer to farming communities. It also became a training hub for farmers and an alternative option to reduce out-migration of rural youth and women (<https://www.theguardian.com/global-development-professionals-network/2016/aug/03/ethiopia-restored-drylands-migration-eroded-deforested>)
- The option-by-context approach and inclusive and participatory approach were applied to transform degraded landscape through innovative and context-specific restoration approaches such as the introduction of conservation-based bench terraces in the hillsides, promotion of Assisted Natural Regeneration (ANR), introduction of tree-based farming and grazing systems by integrating high-value trees, shrubs and grasses along the farming systems, and converting gullies from threats to opportunities through appropriate gully-reclamation techniques. These measures all improved the livelihoods of watershed communities, while making the area more resilient to climate change-induced shocks



[\(https://www.foreststreesagroforestry.org/news-article/landscape-restoration-in-ethiopia-brings-watershed-to-life/\)](https://www.foreststreesagroforestry.org/news-article/landscape-restoration-in-ethiopia-brings-watershed-to-life/)

- The watershed has become a learning hub for integrated watershed practices. It was visited by numerous decision makers, development practitioners and scholars. This has also resulted in the establishment of the National Watershed and Agroforestry Multi-stakeholders Platform, which is functional and is being used as a tool for the scaling up of good agroforestry and watershed practices across the country  
 [\(https://www.worldagroforestry.org/blog/2021/06/28/cascading-national-watershed-and-agroforestry-multi-stakeholder-platform-regions\)](https://www.worldagroforestry.org/blog/2021/06/28/cascading-national-watershed-and-agroforestry-multi-stakeholder-platform-regions)



**Figure 10.** The community participating in construction of conservation-based bench terraces, FMNR and enrichment planting in hillsides and exclosures at Gergera watershed (*Photo by Niguse Hagazi/ICRAF*)





**Figure 11.** Gully reclamation – converting gullies from threats to opportunities at Gergera watershed (Photo by Niguse Hagazi/ICRAF)





**Figure 12.** Regular visits by district and regional experts and decision makers (upper), and experience-sharing visits by faith leaders (below – left, May 2017) and AFR100 conference participants from 19 nationalities (below - right, 2016) at Gergera watershed (*Photos by Yemane Gebru*)





PARTIAL VIEW OF GERGERA WATERSHED (Photo by Niguse Hagazi)





PARTIAL VIEW OF GERGERA WATERSHED, Prof. Achim Braeuning (Left), Niguse Hagazi (Right)





PARTIAL VIEW OF Abreha-We-Atsbeha Watershed (Photo by Niguse Hagazi)

### **2.2.2. Approach and state of area closure and integrated watershed management practices in Abreha-We-Atsbeha**

Abreha-We-Atsbeha village is located in Kilte Awlalo district of Tigray region. The Tabia is surrounded by a chain of mountains and hillsides with a valley plain in between. Most of the hillsides and mountains have steep slopes. Owing to the long-standing traditional land-use system (free grazing, free collection of fuel wood and expansive farming practices), the sandy nature of the land and rugged topography, the Tabia had been experiencing severe natural and environmental degradation. The fertile valley was usually inundated with heavy sediment load, transported from the degraded uplands and hence destroying its production potential. Indeed, before the project intervention, in the early 2000s, the community living in the catchment, just like those from Gergera were desperate and sought to be resettled elsewhere within the region.

In 2002, the then Bureau of Agriculture and Natural Resources (BoANR), with the support of the World Food Program (WFP) introduced an integrated watershed management project (MERET WFP) in one part of the Tabia (western flank known as Mendae). In the same period, an integrated food security project, supported by the German agency for international cooperation (GIZ) and the German development bank (KfW) was also introduced in another part of the Tabia (north-eastern flank, on the side of the Abreha-We-Atsbeha monastery or church). Through these two projects, quite a number of conservation activities were implemented in the upland catchments. Similarly, sizable work was also done in most of the gully areas (both physical and biological) – dugout ponds at the bottom of the hillsides (Mendae area), and shallow wells in the plain farmlands. Later, a comprehensive capacity building program supported by the establishment of demonstration plots for Farmer Managed Natural Regeneration/Assisted Natural Regeneration, with special emphasis on *Faidherbia albida*, was implemented by the Tigray Agricultural Research Institute in partnership with ICRAF and World Vision (Hagazi et al. 2019). Following this, more than 2 million *Faidherbia albida* trees regenerated naturally within a few years, mainly in the farm and grazing lands of Abreha-We-Atsbeha (Fig. 13)





*Figure 13. The dugout ponds supported by plantation activities (Upper photo by Belete Tafere) and degraded grazing area under restoration through FMNR (Lower photo by Niguse Hagazi/ICRAF) in Abreha-We-Atsbeha.*



The Tabia is known for its history of lack of water. However, thanks to the relentless efforts by the community, the different ground water harvesting techniques (shallow wells, small ponds, gabion check dam ponds) are productive and are usually full of water in just one season of rain. These have therefore given hope to the farming community and encouraged the people to practise irrigation. They have also been encouraged to mobilize more labour



for treatment of all the remaining uplands and put more expanses under area closure or exclosure management.

Apart from the technical interventions, by-laws were also developed and introduced with the consent of the community. These aim to prevent free grazing and fuel wood collection. Instead, the community is allowed to cut and carry grass from the pasture areas and even the degraded uplands. They are also allowed to cut trees from these closed areas when their case is approved by the commune. After all these rigorous efforts by the government, NGOs and the community, the Tabia has made encouraging progress. The ecology of the Tabia began showing a remarkable change, and the community began enjoying more livelihood opportunities: practising irrigation and apiculture management. Biomass production in the form of grass (for livestock feed) and shrubs (for fuel wood and other purposes) – both in the uplands and the valley – also increased significantly.

After all these changes and experiencing significant improvement in their lives, the community began saying, “It is not land that is degraded, it is the human mind. When we neglect the land, we will suffer from the effects of our inaction”. Thus, they continued to work on the treatment and management of their land intensively and consistently, and were considered a model community for ecology management. They won the Equator Prize Award (Rio 2012) from the United Nations Development Program (UNDP). Other communities from the continent and beyond have visited the Tabia to learn from their experiences. However, at present, some of the development has been destroyed due to the war.



**Figure 14:** Partial views of successful restoration (upper & below) in Abreha-We-Atsbeha due to effective grazing management supported with enrichment planting and Assisted Natural Regeneration in previously degraded and freely grazed areas (Photo by Niguse Hagazi/ICRAF)







Partial view of water pond following successful restoration in Abreha-We-Atsbeha





In conclusion, these benefits achieved so far, taking the two cases (*Gergera watershed and Abreha-We-Atsbeha*) as examples, can only be described as positive (Birhane et al. 2017; Hagazi et al. 2019). However, when compared to the achievement of some countries with similar stories – such as the Republic of Korea and China – the achievement highlighted above is insignificant and the program gaps and challenges need to be studied and used as learning for future restoration initiatives.

In effect, the mode of intervention that Korea (*the Sumuel Dong movement*) and China followed, and even their socioeconomic conditions, was similar to that used in Tigray – social mobilization. However, within nine years the Koreans had managed to transform their ecology and achieved a 64% vegetation/forest cover from only about 10%. The same is true in the case of China and even the Philippines.

*Why then is this change not possible in Tigray and Ethiopia? Why is the region and even the country making some serious investment (in the form of productive safety net, sustainable land management and massive social mobilization) in the treatment of these degraded landscapes almost consistently for over three decades, and yet change remains limited?* Indeed, there is need to critically look into the design of the programs/projects, the extension approach and follow-up support given, the system of rules and technical guidelines introduced, and the level of research involvement.

To just give an insight into the experience of the Korean people<sup>10</sup>, the effort was seriously owned and managed by the government and directly by the then president, Park Chung Hee. Responsibilities were appropriately cascaded or distributed to the respective sectors, and closely monitored and discussed in regular forums. Each and every stakeholder was expected to apply all the latest technologies and systems for the benefit of the users.

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<sup>10</sup> The success factors in the Korean experience includes:

- 1) High political commitment: that it is the president himself that is taking care of and manages the program. the activities of each sector have been monitored and evaluated on regular bases.
- 2) As the country was also known to have serious financial and material constraints, the government has then worked hard to mobilize the people (Sumuel Dong movement) and commit for all purpose (especially the watershed and forest management).
- 3) Serious effort is also made to establish a proper knowledge and information all about the biophysical and socioeconomic information of the country; to realize a dependable development planning and implementation.
- 4) Each sector (stakeholder) is made to have a clear mandate and made responsible for its effective implementation.
- 5) Etc...

In this regard, the Tigray region is also considered a role model: all the different communities and many people from Africa visited the area to learn and share their experiences. Thus, Tigray won the 2017 **Future Policy Award** in Ardos China organized by UNCCD and the World Future Council (WFC). The region is now much greener, with an increased forest cover – from about 3% in the 1990s to 17% in 2019 (Tigray BoARD 2020), about 1.87 million ha of land has been restored using physical soil and water conservation (646,321 ha): 232,368 ha exclosures; 171,482 ha plantations; 454,012 ha state forests; 260,721 ha natural forests; and 104,837 ha agroforestry systems (Tigray BoARD 2020). Case studies from northern Ethiopia have also demonstrated the importance of exclosures in restoring degraded landscapes with a considerable ecosystem service (Mekuria 2019). These ecosystem services can be sustainably maintained when due attention is given to identification of the best community organization to effectively manage exclosures with a well-defined rehabilitation goal (*including the short-, medium- and long-term objectives*) supported with appropriate strategies and implementation modalities (Mekuria 2019).



**Box 1: Is there a better experience in sustainable management of enclosures and natural resources in Tigray region?**

Natural resource development was one of the main pillars in the regional development policy of Tigray. The policy was natural resource-based agricultural development. The main implementation strategies were through community mobilization which combined both free and paid labour. The lion's share was free labour. Every farmer was expected to spend 20-40 days providing free labour for natural resource rehabilitation, mainly on soil and water conservation. Tree planting during the rainy season was mainly done through free labour. The main rehabilitation activities were soil and water conservation, reforestation and enclosure management. This policy was implemented for three decades.

The policy resulted in greener landscapes and regional vegetation cover improved from 3% to 16.6% within three decades. It also resulted in significant change in food security and provision of ecosystem services. Different studies confirmed that the rehabilitation and conservation of natural resources in Tigray enabled households to increase crop productivity, livestock feed, access fuel wood (agroforestry at household level), ecosystem services, carbon credits and irrigation water (Hagazi et al. 2020; ICRAF 2018). A good example is the Abreha-We-Atsbeha village where restoration activities enabled the community to create a green village; the outcome was even visible at household level. The achievement of this policy was recognized and integrated into the curriculum of universities in the country, and has been a good model for restoration. This effort was also recognized internationally, and the 2021 World Agriculture Prize went to Professor Mitiku Haile, who was leading and supporting restoration efforts in the region.

Despite all the positive changes achieved, there is still concern by the Tigray regional government that the level of efforts are not commensurate with the investments made. Thus, in 2018 there was a paradigm shift in the region as reviewed by Hagazi et al. (2020). This review revealed that the collective action from the community and the government with support from international development partners resulted in success stories from which others could learn. The regional government evaluated its restoration programs and

concluded that the achievements, to date, were very encouraging, but still not enough to meet growing community demands. The **how** to improve the effectiveness of restoration activities like reforestation and afforestation was debated. From 2018, the regional government began putting emphasis on quality rather than quantity, institutional arrangements, and strengthening extension services as key instrumental factors for successful restoration and degraded lands' rehabilitation.

One practical example by the forestry development section of the region in forest extension is the approach of managing exclosures or area closures (Tigray BoARD 2020 cited in Hagazi et al. 2020). The way exclosures were managed as tools for forest and landscape restoration had 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 and beekeeping were other key benefits that were not pursued or measured.

To enhance benefits and services, management and extension services of exclosures were revised in 2018. The changes include, but are not limited to, applications for silvicultural practices in exclosures such as pruning and thinning by communities to earn direct benefits while improving exclosure performance. 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.

**Box 2: What happened in the restored areas after conflict erupted in 2020? What was the value of the decade's restoration efforts?**

The effort and outcome by the community was partially affected following the conflict which erupted in November 2020. It was an opportunity to observe the role of land restoration and tree planting in buffering anthropogenic shocks. Researchers also gathered important lessons for future program design and development. During the energy and livelihood crises, everyone, including those in the big cities, urban and semi-urban and

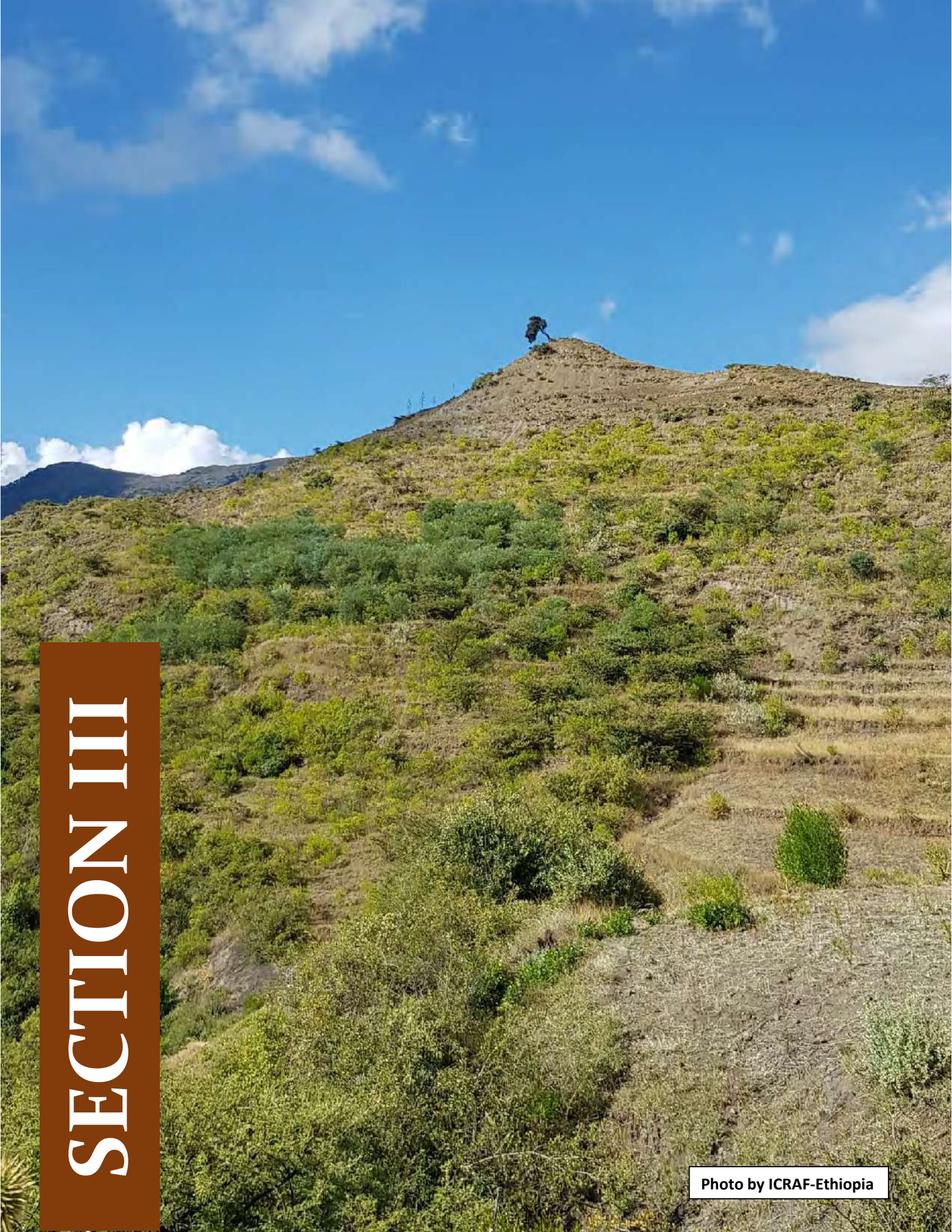
rural areas had no access to electricity and were fully dependent on biomass energy to support their livelihoods. Power has come back intermittently in a few of the big cities, but those living in towns, semi-urban and rural areas continue to use biomass energy – firewood and charcoal. Biomass energy is sourced from the restored and rehabilitated area closures, farm enclosures, hillsides, protected forest areas and of course from their own plantations in the form of woodlots. Even though biomass energy sources are limited, “the people in the region perceived that their decade-long efforts in land restoration and rehabilitation is like putting something valuable in the bank and using it during seasons of crises to save the lives of people”.

Rural communities are also earning income from the sale of firewood and charcoal. This allows them to purchase important food and other items from town for their survival. Those living in cities and towns can access firewood and charcoal, and are thus able to cook and feed their families. Of course, this is true for many other Ethiopian communities who are living without electricity, and many other people in developing countries in Africa and elsewhere in the world. Thus, the lesson here is that restoration in the urban-rural landscapes matters for all citizens.

However, we also need to reserve our resources or genetic pools in a given niche both for planting materials (as seed banks, seed sources, cutting sources) and natural stands. These must not be cleared during crises. In this regard, there could be some problems as all community members might not be aware of the technical requirements during firewood collection and charcoal production. These types of challenges and other related issues including the degradation level that occurred due to conflict in the region, might require further investigation and evaluation.

Taking all the aforementioned learnings, lessons, experiences and evidence, as well as the authors’ extensive experiences in the region and in the subject matter of this review work, a step-by-step approach that indicates where to start and where to end while designing and developing restoration and other related programs is suggested for wider use by various stakeholders in Tigray region, Ethiopia, and beyond as depicted in the following chapters.





**SECTION III**

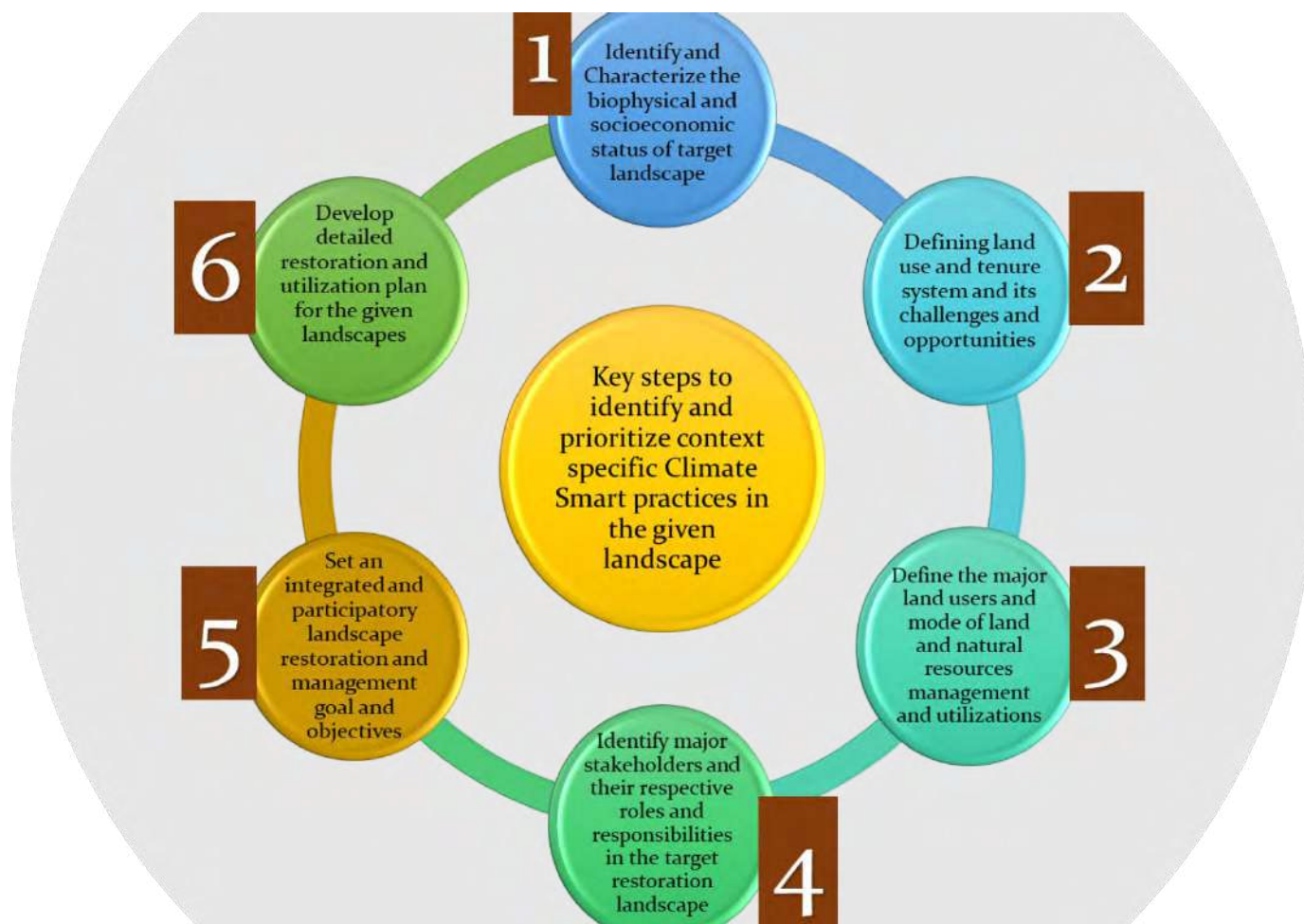
Photo by ICRAF-Ethiopia



## CHAPTER THREE

### 3.1. WHERE TO START: Step-by-step approach for inclusive and sustainable degraded lands restoration intervention programs

#### 3.1.1. Step One: Identify and characterize the biophysical and socioeconomic situation of the target landscape



**Figure 15.** Steps in project implementation design and approach followed in restoration of degraded landscapes

The first step in the definition and planning for an inclusive and sustainable natural resource management, and particularly for hillsides, exclosures and other landforms within a given watershed and landscapes begins with:

**A. Establishing or adoption of internationally-accepted (standardized) criteria of definition for the state of land degradation in the intervention area.**

**Land degradation** is the reduction or loss of biological or economic productivity and complexity of rainfed cropland, irrigated cropland, or range, pasture, forest and woodlands resulting from land uses or from a process or combination of processes arising from human activities (UNCCD 2016). Similarly, the definition by FAO (1980) also states: land degradation is the deterioration or total loss of productive capacity of soils for present or future use. Major indicators for land degradation include:

- Loss of vegetation cover
- Changes in vegetation structure and composition
- Increase in albedo
- Less soil moisture
- High land surface temperatures
- Landscape instability due to wind and water erosion, and
- Soil salinization

**B. Establishing clear information on:**

- I. The biophysical nature of the restoration program area in terms of topography, slope, soils (both physical and chemical), hydrology, present land use, vegetation cover and habitats.
- II. The overall land and water quality of the study area for agriculture and natural resource production, plus water supply (including for livestock).
- III. The socioeconomic situation of the study area: state of production and productivity, plus livelihood condition.
- IV. In general, it also needs to detail the state of agriculture and natural resource management in the locality:
  - Existing extension system and its impact
  - Technology adoption or utilization status: both industrial and biological



- State of transformation and system diversification (irrigation, agroforestry and all other integrated actions)
- V. The different stakeholders and actors working in the area (in order of interest and the roles they play):
- Public sector
  - NGOs
  - The private sector
  - Civic societies
- VI. Presence of land and NRM-related technical and regulatory tools (institutional set-up)
- Policy, strategy and program
  - Laws and regulations
  - Technical manuals
  - Organizational arrangement
- C. **Assess the mode of natural resource management and benefit sharing system (including tenure issues) being practised in the intended restoration area. This could have a private or communal mode. The issues are:**
- Who are the direct users?
  - How is the land use right being secured?
  - Who is responsible for coordinating and organizing implementation actions, and how?
  - Is there any regulatory mechanism (customary or modern) in place to guarantee the users?
- D. **Assessing the perception of communities in the present land resources use system and mode of management.** Discuss and understand how the community assumes the land degradation problem has happened and their suggestion or recommendation (if any) to improve or change the situation. During the assessment, the opinions and perspectives of the youth, women, elders and other community members should be captured and examined so as to set a common and holistic vision of the target restoration areas.

### 3.1.2. Step Two: Defining land use and tenure system practised in the restoration area and its challenges and future opportunities

Land is an essential natural resource both for the survival and prosperity of humanity and is used for multiple purposes. This is well articulated in the UNEP and FAO (1999) document, “The Future of our Land: Facing the Challenge” and includes:

- a. A store of wealth for individuals, groups or a community
- b. Production of food, fibre, fuel or other biotic materials for human use (production function)
- c. Provision of biological habitats for plants, wildlife and micro-organisms (biotic environment function)
- d. Co-determinant in the global energy balance – reflection, absorption and transformation of radiative energy of the sun – and the global hydrological cycle, which provides a sink for greenhouse gases (climate regulation function)
- e. Regulation of storage and flow of surface water and groundwater (storage function)
- f. Storehouse of minerals and raw materials for human use
- g. A buffer, filter or modifier for chemical pollutants (waste and pollution control function)
- h. Provision of physical space for settlements, industry and recreation (living space function)
- i. Storage and protection of evidence from the historical or pre-historical record (fossils, evidence of past climates, archaeological remains) – heritage function.
- j. Enabling or hampering movement of animals, plants and people between one area and another (connectivity function).

However, not every piece of land can provide all the services listed above. It is a given fact that different forms of land have different **suitability and carrying capacities** and can only be sustainable if used accordingly. Lack of evidence-driven and/or context/site-specific technologies and practices is very common in most developing countries, including Ethiopia. For instance, at times when land is abused: i.e., **prime agricultural land** is used for warehouse construction, and thus agriculture is forced to move to other land use systems (forest lands, wetlands, grazing areas and parks); then all sorts of environmental damage, as well as socioeconomic conflicts will occur.

The land use system in Ethiopia has remained indigenous for a long time. In this system, anyone can collect forest products (for fuelwood and other purposes) from any area

(including the so-called natural forest protection or forest ecology areas), allow their animals to graze in any land use system (including farmlands: after crops are harvested), establish his or her housing (settlement) in almost all forms of land, and practise agriculture in any of the land use systems (including wetlands). Furthermore, with the increase in both human and animal populations, there is an increasing demand for both agricultural and natural resource products.

Therefore, the demand for land for farming, settlements and grazing is steadily increasing. According to a study conducted by the Ministry of Agriculture (Gete et al. 2013), **land use competition** and the **overlapping use** for rural settlements, urban expansion, infrastructure, agriculture, grazing, parks and forest development has increased at an alarming rate. Fertile or **prime agricultural land** near urban areas are being converted for housing and infrastructure development. On the other hand, there is no or little appropriate technology to optimize production (crop yields and overall biomass production) in the remaining farmlands. In addition, the encroachment of agriculture and grazing to other land use systems (parks, forests, and even wetlands) has become common. Hence, most forest lands (both in the steep lands and lowlands) and potential wetlands, such as *Chefa* in Amhara Region; *Aiba* in Tigray; Lake *Abijata*, Lake *Zuway* and Lake *Hawassa* grasslands, have all either been converted into agricultural or grazing land and are quickly diminishing (Gete et al. 2013).

Land is a **scarce and fragile resource**. It can be abused in several ways:

- a. Land could be used for an unintended purpose. For example, warehouses could be constructed on prime agricultural land. Thus, in such circumstances, the land resource use decision can be said to be contrary to its suitability class and is thus considered wasted land.
- b. On the other hand, a decision could be made to establish chemical industries within or near settlement areas (including schools). Consequently, the neighbouring community might be exposed to different types of pollutions, such as air, water and even soil pollution problems, which in turn could cause serious health problems, both for human and livestock. This is often followed by unnecessary social conflict.
- c. Similarly, rampant land use competition (in the form of urban sprawling or infrastructure development) also contributes to all forms of land degradation: soil



erosion, soil moisture deficit and deforestation. This results in deterioration of crop, livestock and natural resource production and productivity in the affected areas.

- d. In general, land exploitation results in severe environmental degradation. What follows is extinction of biological resources and deterioration of water resources. All this seriously compromises the sustainability of all development efforts made by the people and government.

Indeed, land resources are finite while human demands are not. The complex nature of land resources, its indispensability on one hand and fragility on the other, has forced people to rely on scientific data and information when making any land-use decisions. Indeed, the world has noted that rampant land use practices (particularly in Africa and Asia) destroyed land quality and the environment, thereby making the populations vulnerable to all kinds of natural and manmade problems and risks. Cognizant of this fact, the international community, during the Rio Earth Summit (UNEP 1992), ***advised all countries to adopt integrated land use planning as a tool to ensure sustainability of development efforts.***

Land use planning should be participatory. Decisions made on the interventions required, level of intensity, sharing of roles and responsibilities must involve stakeholders and user groups at all levels. Furthermore, to ensure sustainability of such endeavours, the purpose of the project, benefit-sharing mechanisms, plus monitoring and evaluation modalities must be clear to all stakeholders and user groups/communities.

The overriding aim for restoration of degraded hillsides and enclosure areas comprises ecological management, nature conservation and maintenance of landscapes. This is because as clearly articulated by President Park Chung-Hee, “*the degraded landscapes not only portray a bad picture, but also deprive the country of all kinds of benefits*”. Therefore, based on the experiences of many successful countries (Korea, China, Philippines, Japan, Germany), Ethiopia’s plan for rehabilitation and management of such lands needs to:

- a. **Optimize** resources based on the potential of the landscape
- b. Be socially **inclusive**
- c. Be technically **integrated**: consider all forms of benefits to users and the community.

Definition of potential **land suitability classes** (FAO Soils Bulletin 32; 1976 and 81)<sup>11</sup> for future use and priority of interventions based on *slope, soil moisture and fertility status, plus climate change and health risks* are key in the design and implementation of any natural resource and environment-based development program. Different categories of land should be specified and the detailing of appropriate management tools and technologies (both biological and engineering or physical) fit for each category of the landscapes should be designed (FAO 1999). Finally, given all these facts and considerations, detailed investigation of the land's resource potential and resource optimization should be accompanied by a comprehensive program of implementation. In principle, this is all about ensuring **proper land use**. This **land use planning**<sup>12</sup> exercise should be **integrated** and **participatory** as well. Given that the land resource under consideration is generally degraded, then potential land use scenarios could cover more **protection than the production zone**. In both cases, it still can and must be considered to benefit the

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Class S1 Highly Suitable	Land having no significant limitations to sustained application of a given use, or only minor limitations that will not significantly reduce productivity or benefits and will not raise inputs above an acceptable level.
Class S2 Moderately Suitable	Land having limitations which in aggregate are moderately severe for sustained application of a given use; the limitations will reduce productivity or benefits and increase required inputs to the extent that the overall advantage to be gained from the use, although still attractive, will be appreciably inferior to that expected on Class S1 land.
Class S3 Marginally Suitable	Land having limitations which in aggregate are severe for sustained application of a given use and will so reduce productivity or benefits, or increase required inputs, that this expenditure will be only marginally justified.
Class N1 Currently Not Suitable	Land having limitations which may be surmountable in time, but which cannot be corrected with existing knowledge at currently acceptable cost; the limitations are so severe as to preclude successful sustained use of the land in the given manner.
Class N2 Permanently Not Suitable	Land having limitations which appear so severe as to preclude any possibilities of successful sustained use of the land in the given manner.

<sup>12</sup> According to FAO, **land use planning** is a decision-making process that *“facilitates the allocation of land to the uses that provide the greatest sustainable benefits”* (Agenda '21, para. 10.5; FAO-UNEP, 1999). It is a **technical and political process** concerned with the use of land, protection and use of the environment, public welfare, and the design of the rural/urban environment, including air, water, and the infrastructure passing into and out of rural/urban areas such as transportation, communications, and distribution networks in synergy. It assesses (in a systematic and iterative way) the physical, socio-economic, institutional and legal potentials and constraints with respect to an optimal and sustainable use of land resource and **empower people** to make decisions about how to allocate those resources. Therefore, land use planning is **“planning with nature, economy and society”**.

community. The protection zones can also be considered a source of livelihood for the rural community in the form of ecotourism and ecosystem payments<sup>13</sup>.

What matters here is how planners can best optimize the available resources in any given area. At least from the technical point of view, the factors that need to be considered during selection and prioritization of restoration areas include:

- a) That the landscape is **severely degraded**, i.e., natural vegetation cover is diminished, there is serious soil erosion, plus loss of soil fertility and soil moisture. Therefore, the land is believed to have lost almost all its genetic potential (both fauna and flora). Possible causes include extensive farming, deforestation and overgrazing.
- b) That the agriculture and natural resource production and productivity have continued to deteriorate and is unable to support the communities. In other words, the land resource is unable to produce adequate food, fuel, construction materials and medicinal plants and fulfil its ecological purposes (such as clean air and all other environmental services).
- c) When efforts for change and development are unproductive or are too expensive: that introduced new technologies (biological and the use of engineering works) are assumed to make no significant change or are considered too expensive, hence, not feasible (at least in the short- and medium-term).
- d) In general, landforms that have a predominantly rugged topography, steep slopes and shallow soil, rangelands that are severely overgrazed, forest lands that are seriously deforested with badly eroded soils, river systems and wetlands that are drying early and putting communities at risk, water bodies that are exposed to heavy sediment load from upper catchments and therefore risk drying up, are areas that need to be given immediate attention and put under enclosure or closure areas.
- e) However, the degraded landscapes under consideration cannot simply be assumed to have a uniform feature: they often vary in degree of slope, hydrology and vegetation cover. Therefore, any plan to rehabilitate and manage such landscapes is not expected to follow a uniform approach. Care must be taken to thoroughly investigate the potentiality of the study area. The plan for rehabilitation and management of such degraded landscapes could have the following components:

- ✓ Protection areas (ecological management zone)

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<sup>13</sup> Under this principle, the communities and/or any business group living at the downstream areas are generally believed to be beneficiaries of the environmental and ecologic management made on the upstream side. Hence, it is appropriate to consider a mechanism to make these people pay for the service.



- ✓ Production zone (both for field crops, tree crops, agroforestry, horticultural practices and other production systems)
- ✓ Riparian management area (mainly ecological and partly economic management).

### 3.1.3. Step Three: Define the major land users and mode of land and natural resource utilization: Present and Future

**Initially**, a series of discussions should be held with all stakeholders, and using a variety of channels for communication (organized forums, mass media). The team must ensure that the interests of all social groups, especially the youth, women and the landless are taken into consideration. Adequate care and attention must be given to ensure that everyone is heard, appreciated and accommodated.

**Second**, after this, together with the community and other stakeholders, they should investigate and analyse:

- a. Existing relationships between the people and the land (refer to each user category)
- b. The presence of any established mechanisms and tools for sustaining the existing land use and user rights
- c. The perception of the community regarding the potential impact of the existing land use system (if any)
- d. Measures that the community would like to consider in improving the system in the future:
  - i. Future land use: what, why and where?
  - ii. User group mechanisms (on individual or group/cooperatives)
  - iii. Assumed future role of the user group and the community (in ensuring sustainability).

**Third**, with the consent of the community and local administration, potential user groups or beneficiaries are identified and organized. Communities need to be involved in the decision-making process, hence, they must participate in the planning, implementation and evaluation of restoration programs. The beneficiary definition, as per the rule of the region (proclamation no. 236/2006 EC, and code 85/2006 EC) gives priority to youth, women and the landless. However, when the demand for land (under the category) is low or there is excess land, allocation can include all forms of social groups, including investors. The motto here is to ensure that all degraded landscapes and hillsides do not remain bare and unproductive. Recently, the Ethiopian Ministry of Agriculture (MoA) issued a national

development, management and utilization of community watershed proclamation (FDRE, proclamation No. 1223/2020).

**Fourth**, intensive effort must be made to:

- a. Define the mode of land use<sup>14</sup> and tenure system: the type of land use possibilities it can have based on the planning criteria. If the land is large enough, it can be divided into blocks (one block = 100 ha<sup>15</sup>). Then, depending on the overall demand and distribution norms in the region (code no. 85/2006: article 27 and 28), the number of beneficiaries can be decided and allotted.
- b. Organize the user group into an association or cooperative.
- c. Facilitate appropriate finance and technology access: fill resource gaps of user groups.
- d. Support user groups to establish and develop clear working guidelines (or by-laws).
- e. Train and build the knowledge base and awareness of user groups and the community with regard to the state of land resources and the overall environment in the study area, the risk of environmental degradation, climate change and the possibility of sustainable economic use of these resources. In addition, arrangements must be made to build the technical capacity of user groups, thus training materials must be developed.
- f. Finally, define the system of monitoring and follow-up to ensure the sustainability. This can help user groups and the community to confidently decide on the measures to be taken.

Generally speaking, user groups and communities that have an established knowledge and understanding of the overall environment they are living in, and are clear about how to manage and benefit from their resources, increase the probability of programs' successes and ensure long term sustainability. Moreover, such communities are also believed to be highly empowered in their decision-making.

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<sup>14</sup> With this, it is meant: 1) based on land suitability the use system is first defined. If found productive enough for any of the use systems, then the mode of use (on individual or group bases to be determined. 2) the mode of use for this case is also assumed to be determined based on the size of the land resource or enclosure area. If the land is large enough, it is still recommended the users are organized in one form of organization (MSE or cooperatives) – to ensure there is an appropriate coordination of actions in this case it is also very easy for the executor to organize any kind of extension support: training, technology provision, market linkage, etc.

<sup>15</sup> This sizing was particularly set for the lowlands forest and area closure management (the incense and gum and jatropa growing areas). The point here is it could allow a good management in case of fire protection and the production system. However, in the case of the highland enclosure areas, the size could differ. As the minimum size for association (MSE) is about ten people in a group, then the blocking exercise could consider this make the arrangements. The point is this development area has to be safe and sustainable in all aspect.

**Finally**, ensure that there is a high level of **understanding** and **acceptance of rule of law** (the agreed terms) among all user groups and stakeholders.

#### **3.1.4. Step Four: Define the major stakeholders working in the area (at all levels) and their roles: Present and Future**

The work of hillside and exclosure area management is demanding and calls for integrated interventions and coordinated management. This is because hillside or exclosure management is about land resource management and utilization. Regardless of the level of involvement or size of land that each stakeholder owns, every site is expected to have several interested groups. Therefore, the first thing is to define the stakeholders: those who can affect or be affected by the issue. Focus on the key actors; those who have the most significant impact or influence.

Effective planning and implementation of any restoration program requires clear definition and understanding of the key<sup>16</sup> players and their planned roles. In this regard, the key players or stakeholders in the case of hillsides and area closure or exclosure management include, among others:

- a. Political or administration officials: at national, regional, zonal and local level (*Woreda and Tabia*).
- b. The public sector: sector offices at the national, regional and local levels.
- c. Community leaders: including elders and religious leaders
- d. Civil society (international and national): NGOs, CBOs, CSOs, associations of farmers and water-users, religious organizations, academia.
- e. User groups: youth, women and the landless, plus the community.
- f. Financial organizations: multilateral, bilateral, government, private sector, banks, insurance companies, microfinance organizations, cooperatives, unions.

Effective and successful implementation of natural resource programs often requires active participation<sup>17</sup> of all stakeholders. The work is demanding, but today the issue of

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<sup>16</sup> **Real or Key player** is any party who will work on the restoration program/project, be it directly or indirectly affected by it, or have legal jurisdiction or influence over some or any part of it (Ritchlin 2001).

<sup>17</sup> Why Participation? The introduction of participatory planning in any program design is assumed to facilitate:

- **Better decisions.**
- **Tap into sources of local knowledge:** and



participation, cooperation and collaboration has become more fashionable; the efforts made in project implementation are not commensurate with the achievements seen on the ground. All stakeholders, and especially the major ones, are indeed expected to engage right from the beginning. Therefore, effort must be made to define the role or form of engagement that each of these stakeholders are expected to play.

To do this, **open forums** are organized for all stakeholders: local administration, respective sectors, NGOs working in the area (if any), the communities or user groups, and experts. In this forum the program objective and all other related issues are discussed in detail and all participants are expected to reach an understanding (Gebrekirstos et al. 2020). Moreover, the stakeholders are expected to **own the program** and **define sector-level activities (plan)** consistent with the general plan and objective. They also need to agree on a **system of monitoring and follow-up**. Thus, stakeholders will regularly gather to evaluate their performance, chaired by the coordinator or focal institution – often delegated to coordinate the program. Finally, the local community, as they are the premier beneficiaries of the restoration program, are expected to play a key role in the planning and implementation of program objectives. To ensure effective participation of user groups and community, there is need to adequately equip them with the necessary knowledge, skills and awareness. Another important reason for educating the community is that it creates a good volunteering opportunity, lends hands to the efforts, and assists in stewardship and monitoring in the years to come.

### **3.1.5. Step Five: Set integrated and participatory degraded landscapes/exclosure areas restoration and management goals**

The quality of land in most parts of the country is declining at an alarming rate, leading to a significant reduction in its productive capacity and environmental services (Gete et al. 2013). Among others, the main causes of land degradation comprise different land use malpractices: free grazing, free fuelwood collection, agricultural encroachment as a result of poor production systems (low tillage agricultural practice, poor fertility management),

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- **Avoid an antagonistic plan-making process**, which jeopardizes the whole exercise. Participatory planning encourages people to support and defend the plan.

urban sprawling, and rampant infrastructure development. In addition, it is obvious, that climate change is also exacerbating the problem.

Experiences at the international level (the Republic of Korea, China, Philippines) and even some of the best case studies in the region (Abreha-we-Atsbeha Gergera watershed, Gendebta and Mai Shigurti villages) prove that degraded landscapes can be rehabilitated and the community can enjoy all benefits, if properly managed. The requirements for setting strategic restoration, rehabilitation and management goals for degraded hillside landscapes is complex, because:

- a. **First**, the landscapes are not uniform and are often **mosaics**. Their catchment is characterized by *uplands, lowland, and riparian areas*. Each of these landforms have different potential and opportunities for development.
- b. **Second**, the sectoral and community interest for any of these landscapes, watersheds or catchments is varied.
  - i. Eco-zone (exception for touristic benefits)
  - ii. Production zone (including zones for forestry, agroforestry, crop, livestock, beekeeping, irrigation, medicinal plants, and other contextually best-fit interventions)
  - iii. Water reservoirs or harvesting zone
  - iv. Settlement zone
  - v. Research and demonstration zone
- c. **Third**, the investment capacity of the people and even the region has remained low over time. The required investment resources include the following:
  - i. Finance
  - ii. Technology (both industrial and biological)
  - iii. Information (both biophysical and socio-economic)
  - iv. Human capital.
- d. Therefore, in order to set up strategic restoration and rehabilitation goals of these degraded hillside landscapes or enclosure areas:
  - i. There is need to conduct a comprehensive assessment of all these different issues and interests: political, technical or biophysical resources by potential and socioeconomic situation.
  - ii. Furthermore, serious efforts must be put into building ownership, the knowledge base and raising awareness of the community to help them make informed decisions.

- e. Finally, considering all the challenges and problems listed above and the development needs of the people (sectoral interests included) a prioritization exercise must be conducted. It should be participatory, inclusive and context-driven. In fact, this process is effective only when it is done with the full involvement of key stakeholders and the community.

Management of degraded landscapes is not only the responsibility of one sector or the community. Everyone has a stake. This is how successful countries such as the Republic of Korea<sup>18</sup> succeeded. The hillside landscapes are often mosaic in nature, each giving a special service to some specific sector or even a social group:

- a. **The uplands** – mostly comprising steep slopes and rugged topography. The soil is mostly thin and low in fertility and moisture status. Thus, it is often foresters, ecologists, culture and tourism personnel who show prime interest in these areas.
- b. **Lower plains<sup>19</sup> and farmlands (Fig. 16)** – somewhat deep and fertile soil and relatively good soil moisture. Thus, it is mainly the ministry of agriculture (including the forestry and agroforestry sectors) who are interested and play a considerable role in the development and management of these areas.
- c. **Riparian lands<sup>20</sup>** – excellent water zone. However, it is also ecologically fragile. Indeed, the stakeholders and interested groups are many. Therefore, care must be taken to address all the different interests (including downstream communities), without compromising its sustainability.

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<sup>18</sup> The Republic of Korea, ROK, has a noble experience in this regard, specially in the implementation of its reforestation program. Here, the program was headed directly by the president himself. Sectors which are believed to have a role are identified and made part of the team. Hence, each sector and all other bodies are made to determine their role and come with a plan of action. For example:

- the forestry sector is considered to be responsible to establish technical standards, develop implementation models, facilitate proper seedlings, and lead the plantation works;
- the forestry research institute is considered as responsible for technology development and follow up for the impact of plantation;
- the ministry of agriculture is also responsible for the provision of fertilizer and the extension activities;
- the cooperatives sector/section is responsible for organizing user groups;
- the finance institutions are also responsible for facilitating the fund systems;
- etc.

<sup>19</sup> This landscape includes both the plain farmlands and gentle slope farmlands too.

<sup>20</sup> This is a landscape laying along river sides and often having a good potential for production and the ecologic management.





**Figure 16.** Typical pictures of plain landscapes, Tigray. (Photo by Belete Tafere)

Finally, **goal setting** for hillsides and degraded landscapes management is important to ensure the following:

- a. **Sustainable land and natural resource management:** *The deal now is about degraded landscape management. That means, a good part of the land resource in Tigray and even the country is degraded: severe soil erosion, deforestation, and deterioration of water resources. This, in turn, has resulted in the decline of production (both agriculture and natural resources), and loss of biodiversity, hence making the people vulnerable to all forms of calamities (floods, drought and famine). Therefore, the design and definition of goals and objectives in the rehabilitation and management of these degraded landscapes should consider covering all the different issues and concerns discussed above.*
- b. **Resource use optimization:** *The region is experiencing a serious unemployment problem. Several youth and women, and even landless people in most rural areas are still having difficulties engaging in any form of livelihood activity. Therefore, when setting objectives and goals for degraded landscapes management, one should explore and define all potential opportunities (social and economic use) that these hillsides and degraded landscapes could bring to the people.*

- c. **Capacity building:** *The management of degraded landscapes is complex: technically, socially, economically and politically. It is indeed multifunctional and therefore has a multi-sectoral interest. All these demands for **comprehensive information and knowledge management**. Therefore, the design and definition of the objective and goal of degraded landscape management must consider inclusion of all these different interests and the level of knowledge and technology required.*
- d. **Monitoring, Reporting and Verification (MRV):** *It is important that all FLR and restoring degraded landscapes interventions have manageable MRV systems in place to assess progress towards specific goals, support adaptive management and ensure transparency in the process of restoration activities.*

### 3.1.6. Step Six: Determine detailed restoration and rehabilitation and utilization plan for degraded landscapes under consideration

**Planning**<sup>21</sup> for landscapes is generally of a multi-use nature: involving various trade-offs that favour one use at the expense of others; this can lead to inappropriate use or management of land resources. As a result, many potential negative impacts, such as degradation of soil, water and biological resources, loss of productive land or prime agricultural areas, loss of ecosystem functions and associated services mainly due to agricultural encroachment and urban sprawling could occur. Thus, **planning** for degraded hillside management is about the effective use of all available land resources.

In Ethiopia, and particularly in Tigray, the absence of **land use policy** and **planning** is believed to have encouraged the free use of natural resources (forest and forest products, rangelands, wetlands). It is also common to find different land users (including sector offices) unnecessarily competing over a piece of land. As a result, prime agricultural areas are converted for settlement, social infrastructure (schools, markets) or even worse, warehouse construction. Thus, agriculture is pushed to other areas (forest areas, wetlands), causing further land degradation and deforestation. Moreover, conversion of wetlands to agricultural and even settlement areas is destroying the biodiversity and water potential of the region, hence making the area susceptible to different types of calamities: drought,

<sup>21</sup> **Planning** is essentially a process of deciding in advance what is to be done, when and where it is to be done, and how it is to be done, and by whom. To plan is to look ahead and chalk out the future course of operations of an enterprise. The benefit of planning (UNDP, 2009) includes among others:

- Enables us to know what should be done when
- Helps to mitigate and manage crises and ensure smoother implementation
- Improves the focus on priorities and leads to more efficient use of time, money, and other resource
- Helps to determine what success will look like.

famine, pollution. This often happens where there is a potentially suitable unused land located within an acceptable distance that could be better utilized as a settlement or for putting up infrastructure.

The question is: how can one convert this phenomenon (degradation of landscapes, the deforestation problem) into an opportunity? In effect, we need not go far. The experiences in the region, such as *Midimare (Adwa)*, *Tabia Abreha-we-Atsbeha (Kilte Awlalelo)*, the Gergera watershed in Atsbi and even the *Mugulat* mountain are good examples of natural regeneration of Juniper and Olea trees. Thanks to the selfless move by the community to rehabilitate and manage the severely degraded landscapes in their areas, encouraging biophysical (vegetation cover, hydrology) change was observed in a very short time, hence helping the community enjoy more livelihood opportunities, e.g., through irrigation, apicultural practices, fattening and sale of dairy products. These experiences, especially that of *Tabia Abreha-we-Atsbeha*, *Gergera watershed* and the *Midimar* catchment were and are also used as a learning ground in an effort to manage other similar degraded landscapes in the region and beyond.

Indeed, as repeatedly stated in this document, the issue of degraded landscapes is complex and related to their topography, hydrology and overall ecology. Thus, the planning process demands a detailed investigation of its biophysical resource and socioeconomic status. This is what is commonly defined as a situational analysis. The planning approach needs to involve modern techniques and approaches – such as remote sensing, precision farming<sup>22</sup>, modelling, the use of apps, and the Option by Context Approach (Sola et al. 2017; Sinclair et al. 2019).

After investigation of the biophysical and socioeconomic information<sup>23</sup>: prior to implementing restoration activities, it is important to define the objective of the landscape

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<sup>22</sup> It is the practice of farming which is more accurate and controlled application of fertilizer and water resources when it comes to the growing of crops and raising livestock. The approach is it uses a wide array of items such as GPS guidance, control systems, sensors, robotics, drones, autonomous vehicles, variable rate technology, GPS-based soil sampling, automated hardware, telematics, and software and produce all the necessary information for its effective farm management.

<sup>23</sup> Here, a detail checklist is to be produced by all specialists, including foresters, soil scientists, agronomists (as the case may be), ecologists, economists, etc. The mode of survey is also designed: so as to be transparent and inclusive in all ways. Moreover, the survey works include a



restoration based on the potential of the land to be restored and communities' preference. For instance, if the potential and common practice in the area is apiculture, restoration should include honey production activities. If the potential use by the community is livestock production, the landscape should be managed to meet fodder demand. If the major problem in the area is fuel wood shortage, the landscape should be managed to solve the fuelwood problem in the area.

- a. The **first** thing that needs to be done is to define the part of the landscape that is seriously degraded and can only be left for **natural regeneration** or **eco-exclosure** areas. These include areas with either very steep or gentle slopes, but generally have very shallow soil depth and are stony. Where possible, consideration for moisture conservation and plantation activities can be looked into.
- b. The **second** point is defining the areas that can be rehabilitated and managed using any form of intervention: physical and biological conservation. This is obviously dealing with lands with moderate soil depth and include gentle slopes:
  - i. Regarding **physical measures**, focus should be given to the most effective water harvesting (both in- and ex-situ) structures. These include techniques such as deep trenches; bench terraces; eyebrow basin and half-moon structures (in plantation areas).
  - ii. Concerning **biological measures**, focus is to be given to adaptive and productive multi-purpose trees (fruit, fodder, timber, firewood, fertilizer) and other high value and biomass grasses and legume shrubs. Indeed, serious effort is needed to identify these technologies and define *where to get* and *how to grow and care* issues.
- c. The **third point** is to define the area that can be used as a **production zone**:
  - i. **Plain and gentle slope areas** with modest to good soil depth and fertility are generally considered potential farmlands – rainfed, irrigated and for agroforestry practices. Here, owing to age-old agricultural mal-practices, many of these lands are commonly seen to be bare and denuded of their vegetation cover. Therefore, most of them are also likely to have some degradation problems, including poor soil fertility and moisture status. In addition, there is lack of wood products. It is still recommended to introduce an intensive mechanism for communities to practise farmland tree management. This could be possible, either through recommending that any of the remaining vegetation potentials be left to self-regenerate (in the form of traditional agroforestry) or by just planting adaptive and multi-purpose seedlings (modern agroforestry). To do this, an incentive

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detail biophysical analysis: i.e. ground observation supported by laboratory analysis. Following this, a detailed exercise is to be conducted to define and categorize the future use system.

- arrangement could be important. Incentives could include: 1) providing free seedlings and technical/expert support, 2) arranging any form of award for those who manage to have a total survival rate and hence achieve good vegetation cover, and 3) linking farmers to carbon finance-related programs and initiatives.
- ii. **Uplands (if any)** – can be suitable for tree crops (private and communal) in the form of woodlots and agroforestry systems. When the soil depth is good enough for bench terrace construction and access to water for irrigation is available, such lands can also be used to grow horticultural crops: mainly fruit trees and vegetables. However, owing to the sensitivity of these landscapes, necessary attention and care must be paid to the design of the irrigation system to ensure that the risk of soil erosion is minimal or within an acceptable range. Otherwise, the crises, both to the ecology and the economy, could be severe and destructive.
  - iii. **Riparian** – conservation plus economy (planting fruit and fodder trees, plus grasses). Management of river courses and sides is believed to ensure enhanced and sustained moisture in the area, which can also result in multiple use opportunities for communities. These include:
    1. increased and clean or clear water resources
    2. increased biomass production (for animal feeds and other purposes)
    3. improved access to fruit supply (indeciduous and exotic)
    4. natural beauty and ecotourism
  - iv. At this level, activities are expected to ensure that there is harmonization among the different interests: economic, social, political and ecological (environmental).
- d. The **fourth point** is to detail the type of **production activity** - crop management, horticultural management, woodlot management (for fuelwood, industrial and construction) and pasture management.
- i. Define the detailed planting activity and modes of plantation, such as
    1. where to plant
    2. what to plant
    3. how much to plant
    4. when to plant
    5. how to plant. At this point, the plantation area has to have a clearly defined map including all the categories of use: fuelwood and agroforestry zones.
  - ii. Under this activity there is need to set the standards for:
    1. Seed collection and nursery management
    2. Agroforestry management
    3. Private woodlot plantations
    4. Forest ecology management
    5. Reforestation and/afforestation practices
    6. Ecological protection

7. Upland soil and water management
  8. Riparian management
  9. Lower plan and farmland management.
- e. **Fifth**, user groups are identified (in line with the different user systems as defined in **step 3**), organized and trained<sup>24</sup>. Respective institutions responsible for carrying out the different activities (step 4) are also detailed here.
- f. **Sixth**, all forms of arrangements are also detailed as regards financial and material support mechanisms<sup>25</sup> and facilitated in time.

**Finally, the system of extension or consultative service and monitoring<sup>26</sup> and evaluation<sup>27</sup> for project implementation has to be established with the participation of all stakeholders and user groups.**

Moreover, the sequence of actions and share of responsibilities should be produced in the form of a **roadmap** to ensure effective or smooth implementation of the program objectives. The roadmap should also be presented to all stakeholders either through a workshop or other forms of communication. This helps the stakeholders and user groups establish a clear understanding of the objectives of the program and share of responsibility to enhance commitment. Finally, the success of project implementation is generally based on the level of **cooperation, collaboration and ownership**. Furthermore, establishment of a **focal institution** with the role of facilitation and coordination of actions is important and needs to be delegated.

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<sup>24</sup> Pertinent standardized technical manuals are to be produced in good time and the training facilitated using convenient mechanisms: face to face, media utility, etc.

<sup>25</sup> Here a detail work has to be made specifying:

- ✓ The Photo by of finance and material,
- ✓ Mode of communication,
- ✓ Who facilitates the process, and
- ✓ The mode of report.

<sup>26</sup> **Monitoring** can be defined as the ongoing process by which stakeholders obtain regular feedback on the progress being made towards achieving their goals and objectives (UNDP definition).

<sup>27</sup> **Evaluation** is a rigorous and independent assessment of either completed or ongoing activities to determine the extent to which they are achieving stated objectives and contributing to decision-making (UNDP definition).





Figure 16: Partial view of Gergera watershed (Tigray) depicting the uplands, plains and gentle landscape features  
(Photo by Niguse Hagazi/ICRAF)





Photo by ICRAF-Ethiopia



## CHAPTER FOUR

### 4.1. Implementation, policy and institutions

#### 4.1.1. Implementation of program activities in degraded landscapes

The success of any program implementation begins with the availability of an appropriate plan, clearly defined objectives and activities. This plan should be integrated, participatory and inclusive. Once the plan is ready, then concerted effort is needed to ensure that adequate preparations are made before commencement of activities in terms of:

- a. Availing a clear and site-specific plan of action
- b. Adequate budgetary support
- c. Supply of adequate logistics (as needed)
- d. Presence of experts (professionals): recruited or delegated
- e. Provision of required technologies, both biological and industrial
- f. Development of common rules and standards (technical and regulatory)
- g. Adequate forums for awareness-raising for stakeholders and the community
- h. Clearly defined and empowered user groups: well oriented, trained and organized (in the form of micro and small enterprises, CBOs and cooperatives)
- i. Established support mechanism for user groups (financial, technical and material)
- j. Clear communication mechanisms among the different actors or stakeholders
- k. Institutional arrangement<sup>i</sup> needed (for now and the future) and ensure the presence of political will. In effect, this work requires solid political and administrative support to be given by the government. The institution to be established has to have full mandate and authority to carry out the mission.

Landscape management is multifunctional and multi-sectoral in nature; thus, a clear system of cooperation and collaboration should be established. All interested groups and stakeholders have to establish clear objectives and develop their own action plans within their jurisdiction, and commit to its effective implementation. Finally, the progress in implementation of sector-based objectives and synergic value created should be discussed and evaluated (what is locally referred to as “*Gemgam*”) on a regular basis by establishing common forums headed by a government body with the capacity to make decisions.

#### 4.1.2. Policy, strategy and program

Regardless of the possible reasons one may give, it is a fact that Ethiopia is one of the countries in the world that has suffered most from severe environmental and land

degradation problems. Thus, most of the landscapes, as well as a good part of the country, particularly the northern and eastern parts, are commonly exposed and denuded of vegetation cover. Therefore, the government of the Federal Democratic Republic of Ethiopia, decided to take some serious measures to correct the situation. The issue is no different in the case of Tigray. Hence, efforts were and are being made by the regional government to adapt and adopt the different policies, strategies and programs developed by the country and implement them consistently. These policies and strategies need to be checked to ensure they are contextually appropriate and are indeed being modified (if required) without compromising the basic principles.

Some of the strategic measures taken in the field of natural resource and environmental management at federal level, especially related to the development of pertinent policies, strategies and legislation:

- a. **Conservation Strategy of Ethiopia (1995):** with an overall goal “to improve and enhance the health and quality of life of the Ethiopian people and promote sustainable social and economic development through sound management and use of natural, human-made and cultural resource and the environment as a whole to meet the needs of the present population without compromising the ability of future generations to meet their own needs”.
- b. **Environmental Policy (1997):** has the overall goal of “improving and enhancing the health and quality of life of all Ethiopians and to promote sustainable social and economic development through the sound management and use of natural, human-made and cultural resources and the environment as a whole is meeting the needs of the present generation without compromising the ability of future generations to meet their own needs.” This policy has indeed incorporated several sector-specific and cross-sectoral environmental policy provisions including husbandry and sustainable agriculture; forest, woodland and tree resources, genetic species and ecosystem diversity, water resources, energy resources, mineral resources, human settlements, urban environment and environmental health, control of hazardous materials and pollution from industrial waste, atmospheric pollution and climate change; cultural and natural heritage, population and the environment, community participation and the environment; community participation and the environment, tenure and access rights to land and natural resources, land use plan, social and gender issues, environmental economics, environmental information systems, environmental research, environmental impact assessment, environmental education and awareness.



- c. **Water Resource Management Policy & Strategy and Legislation (1999)**: has the overall goal of enhancing and promoting “all national efforts towards the efficient, equitable and optimum utilization of the available water resources of Ethiopia for significant socioeconomic development on a sustainable basis”.
- d. **Forest Development, Conservation and Utilization Policy, Strategy and Legislation** aims “to meet public demand in forest products and foster the contribution of forests in enhancing the economy of the country through appropriately conserving and developing forest resources”.
- e. **Development, Management and Utilization of Community Watersheds. Proclamation No. 1223/2020, Pages 12, 733 (2020)** aims to prevent environmental degradation and natural resource depletion, biodiversity conservation and to develop water resources and reduce greenhouse gas emissions with a view to increasing production and productivity of farmers, pastoralists and agro-pastoralists to ensure food security and create a conducive environment to create job opportunities.
- f. **Climate Resilience Green Economy, CRGE (2011)** aims to “reach middle-income threshold by 2025 and keep growth carbon neutral”.

All these policies and strategies are supported by necessary institutional arrangements and pertinent technical and regulatory guidelines (NILUP Policy Framework 2017).

The environmental protection and climate change management (CRGE) policies and strategies of Ethiopia are indeed detailed and comprehensive. That is why the country has been considered as one of the forefront actors in environment and climate change management globally. However, the area of concern is that despite the efforts made in the development of such noble policies and strategies, the implementation aspect is often said to be poor and not commensurate to the needs of the people and country. Several reasons are often given by the government and various organizations. These include:

- a. Limited knowledge and skill of implementing groups: in fact, efforts to correct this gap in most cases are either partial or inappropriate.
- b. The levels of understanding and commitment – local administration, experts, community – is also limited. In most cases, understanding of the content and context of the different laws and other regulatory tools is limited.
- c. There is a serious shortage or limitation in the provision of and access to appropriate technologies (both hardware and software).
- d. Ethiopia’s low financial and material capacity also constrains project implementation.



Photo by ICRAF-Ethiopia

#### **4.1.3. Rules, Regulations and By-laws**

The government has worked to produce practical policies, strategies and programs. However, if that is not complemented with the necessary regulatory tools and institutions, the plans will come to nought. Second, the fundamental factor of success in the implementation of environmental protection, natural resource and land management-related programs is the issue of ownership and appreciation of purpose by the community and user groups (at all levels), local level administration and experts. As far as this is realized, the commitment to achieve the purpose shall then be governed by the state of know-how and skill of the implementing group, more specifically the experts responsible for the techniques. Nonetheless, in addition to this, there is need for integrated, participatory and inclusive technical guidelines, and pertinent regulatory tools (including by-laws). Technical guidelines must be produced in line with the international standards and references made of potential success stories from other countries. Finally, after producing all these potential documents (technical and regulatory), workshops and other forums should be organized to discuss implementation.

#### **4.1.3. Tigray global policy award on curbing land degradation**

This review work confirmed that comprehensive design of policy and strategies and putting it in effect through community engagement would result in successful rehabilitation of degraded landscapes as well as the creation of a resilient community. In this regard, the success of the Tigray region restoration program has received global recognition.

*“More people, less erosion – Ethiopia’s Tigray region demonstrates that this can be a reality: They will take home the Gold Future Policy Award 2017, beating 26 other nominated policies to the prize. Also known as the “Oscar for Best Policies”, the Future Policy Award highlights the world’s best policies that combat desertification and land degradation. <https://mailchi.mp/6e7510222e0c/worlds-best-policies-on-land-restoration-shortlisted-for-global-award-press-release-658281?e=a041e52ace>”*





Photo by ICRAF-Ethiopia



## CHAPTER FIVE

### 5.1. Organizational arrangements, capacity building and resource mobilization

#### 5.1.1 Organizational arrangements

The land management issue is complex – covers technical, social and political aspects. There are several stakeholders (institutions, researchers, policymakers and public) all with varying interests. In effect, land management is one of the areas where good governance is lacking. Therefore, any decisions for land use change should consider:

- Establishing common platforms for all stakeholders to discuss issues under consideration and play their part; and
- Defining and organizing a focal institution that has the role of coordination of actions and resources.

Community-level responsibilities should be managed by the community themselves. Therefore, they should establish the required organizations, plus rules needed to attain their goal, as per their customs and traditions. Ethiopia's rural communities are believed to have many important traditional and indigenous institutions, such as water user associations (for irrigation and the water system), participatory forest management user associations, and watershed committees that need to be strengthened and transformed to assume various development roles. These community-based institutions and organizations are assumed to play a major role not only in participation in the planning and design of projects and programs, but also in empowerment of the local population, key stakeholders in the management and utilization of their natural resources in a sustainable manner. The key principle here is that the natural resource and environment management initiatives are all of the community and for the community. Therefore, community-based and grassroots institutions are expected to represent and protect the local interests.

#### 5.1.2. Capacity building

Implementation of such programs to restore and rehabilitate degraded hillsides or enclosure area management requires a comprehensive capacity building program at all levels of government and social systems. Intensive efforts are needed to sensitize the community on the risk of environmental and landscape degradation using all communication mechanisms. Moreover, pertinent pieces of training and awareness building need to be designed and implemented in time.



**Figure 17.** Community capacity building and practising FMNR techniques (*Photo by ICRAF-Ethiopia*).





Photo by ICRAF-Ethiopia



### 5.1.3. Resource mobilization and management

Degraded land is among the global concerns contributing to climate change. This is because:

- a. *Vegetation cover in the landscape is removed, hence contributes to the global increase in greenhouse gas (GHG) emissions, thus increasing global warming trends and the occurrence of heatwaves.*
- b. *A bare landscape means there is increased risk of all kinds of soil erosion (wind, water), hence poor soil moisture availability. Therefore, the overall agriculture and natural resource production potential and productivity also decrease, making the population more vulnerable to different types of naturally- and anthropogenically-induced calamities, including droughts, famine, floods, forest fires and water-borne diseases. This is then a real concern of the international community too – in terms of global market security and the migration/refugee problem.*

Considering the risk and seriousness of the problem of climate change and environmental degradation in general, the international community has been supporting various countries to establish common policies, strategies and programs, and has also availed resources to combat the challenges. Some examples include the Green Climate Fund (GCF) and the Bonn Challenge. African initiatives comprise the Great Green Wall (GGW) initiative, the initiative on Sustainability, Stability and Security or 3S initiative, and the African Forest Landscape Restoration Initiative (AFR100).

Resources for implementation of degraded landscape programs come from a number of sources:

- a. The international community who support restoration and rehabilitation programs and projects. However, one needs to have a clear understanding of the interests and agendas of these institutes, and ensure they do not conflict with the national agenda.
- b. Free labour provided by user groups and the community. Indeed, the Tigray region's long experience of social mobilization is a good example.
- c. The government. This can be in the form of:
  - i. Human resource support (expertise)
  - ii. Material (technical and construction)
  - iii. Logistics (transport facilities)

- iv. Seed money
- d. Self-financing. Some of the possibilities include:
  - i. Setting up a financial basket to collect funds from the community, and decide how much each member should contribute<sup>28</sup>
  - ii. Participate in a payment for ecosystem services (PES) scheme.

Previous failures in forest restoration were mainly due to the top-down approach with very limited local consultation (Gebrekirstos et al. 2020). Thus, it is only through such kind of organized effort or endeavour that one can dare to say that the restoration and any form of degraded lands rehabilitation program designed is sustainable and ensures the entire designed objective.

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<sup>28</sup> In this case it is advisable that such project or program establishes a financial basket that can be used to sustain the program in the future. The money from the basket can be used in case of need for any infrastructural maintenance and expansion activities.



# SECTION VI

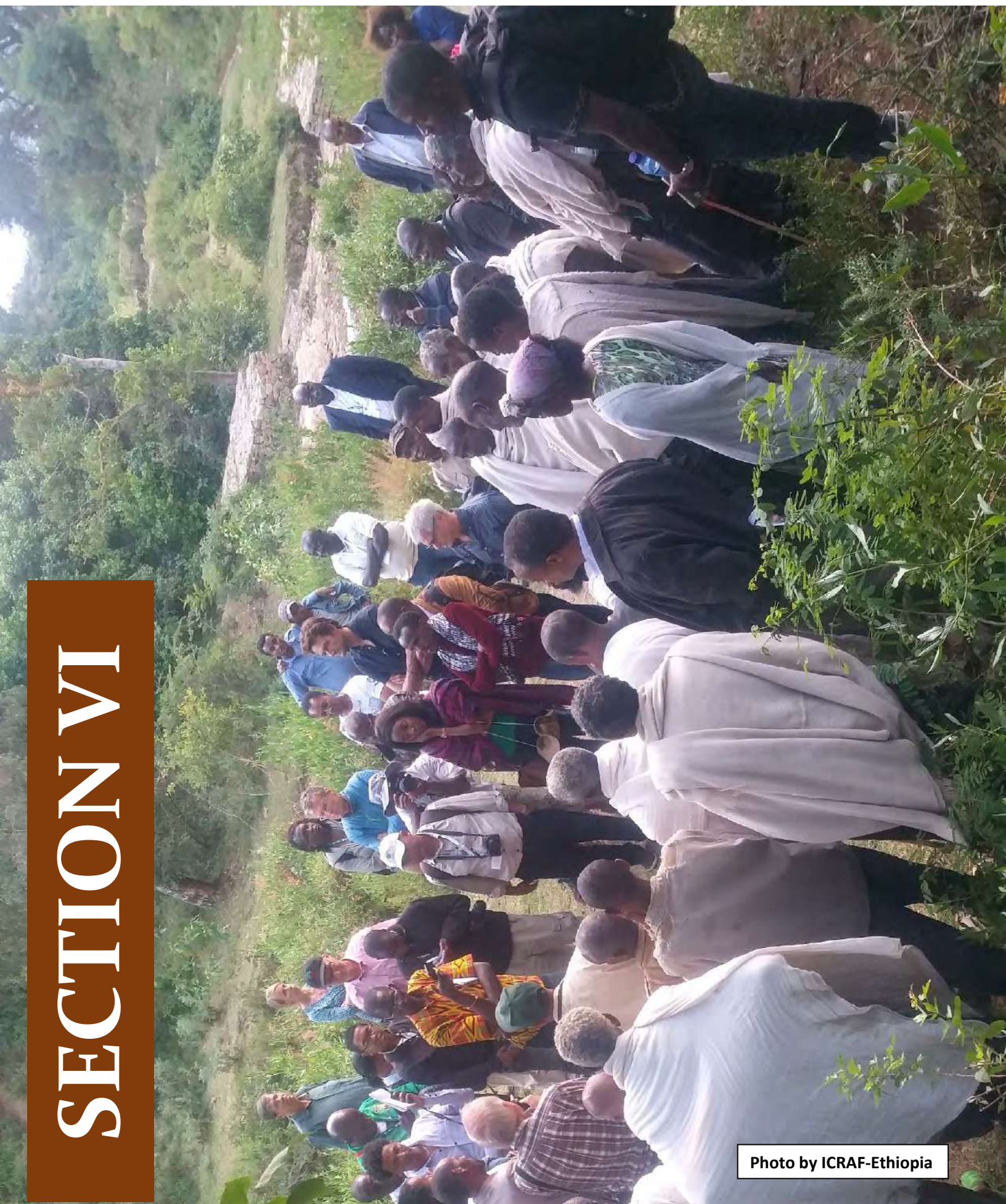


Photo by ICRAF-Ethiopia



## CHAPTER SIX

### 6.1. Monitoring, evaluation and learnings

Effective monitoring – the process of assessing progress towards specific goals that the restoration effort plans to achieve – is in principle an essential element of any development program. It provides timely feedback on the state of implementation of the designed objectives and activities, results and the impact created, demonstrates success to the donor and reveals the potential of scaling up. Monitoring can also be used as a basis to guide decision-making and learning processes.

The monitoring and evaluation process has been a crucial component of the FLR. It ensures transparency and provides evidence of progress, achievements and impact on livelihoods, and was prioritized in the government's Rural Development Strategy. The strategy clearly highlights the problems of land degradation, the goals of the FLR and the barriers. Besides, the monitoring process was used as a guide and support for FLR implementation and adaptive management by providing feedback and learning. It was a platform which shared evidence with donors and investors to enhance trust and attract additional investment for scaling up.

The process has been participatory and involved all stakeholders, The aim is to:

- *Have updated knowledge and information on the state of progress, effectiveness of interventions, achievement, and challenges of the program implementation; and*
- *Identify areas for future follow-up and support needed to ensure effective implementation of objectives.*

The monitoring team focus on the landscape impact and consider the impact of the FLR on regrowth of natural vegetation, biomass harvested for livestock, honey produced the number of youth engaged and the financial benefits obtained. The process is comprehensive that the governance structure including how benefits are shared will be monitored. The conflict resolutions mechanisms are highly decentralized and effective,

Mostly, indigenous knowledge will be employed to collect biophysical data and as support during monitoring.

The planning for effective implementation of natural resource management, environmental protection and land-related programs must adequately consider and integrate a proper system of follow-up, monitoring and evaluation. In effect, the system must ensure that the management group and all stakeholders have access to the latest information, and hence any challenge can be solved in a timely manner. During the whole process learnings must be documented and shared with all relevant stakeholders. They also must take time to go out to the field to verify the information. That is why the Korean president said: “Nothing can be done when you work with EARS and MOUTH. You should work with LEGS and EYES”.

In the future, the monitoring and evaluation process will be strengthened with the introduction and application of open source geomatic tools like Openfris. Especially, in Tigray, the Land Degradation Surveillance Framework (LDSF) will be an ideal M&E tool. The LDSF, which was developed by ICRAF, is designed to provide a biophysical baseline at landscape level, and a monitoring and evaluation framework for assessing processes of land degradation and the effectiveness of rehabilitation measures (recovery) over time.

## **CONCLUSION**

Land degradation is generally expressed as land and vegetation degradation, loss of biodiversity, soil nutrient depletion and moisture stress. It is common in the northern parts of Ethiopia such as in Tigray. In an effort to deal with the problem, collective efforts have been made for decades with the active participation and contribution of local communities and development partners. Thus, we believe that this review work, which is supported by case studies, including success stories from Abreha-We-Atsbeha and the Gergera watershed, give some insights into restoration program design, management, implementation and evaluation.



In Tigray, the decade-long efforts have resulted in significant socioeconomic benefits and ecosystem services. However, the level of effort put into the restoration program was not commensurate with the actual investment. Taking the exclosures as one form of restoration in Tigray, the contribution towards a more resilient community and environment was demonstrated in areas like Abreha-We-Atsbeha and Gergera watershed. Thus, the six steps highlighted in this document are important and should be supported with an inclusive and participatory monitoring and evaluation system. One of the failures observed during the decades of restoration efforts were in relation to lack of clarity on setting of objectives on the proper management of exclosures. This indicates the need for clarity of objectives and roles and responsibilities of various actors in the management of exclosures and degraded landscapes. To this end, restoration plans involving exclosures require clear and shared goal, vision, roles and responsibilities.

Therefore, it is recommended that all restoration program planners, managers and other actors follow the six-step approach suggested in this review work with some adjustments to suit local contexts in various locations of Tigray and beyond. It is also important to ensure that the local communities are central players during the whole process of planning and decision-making for successful and effective restoration of degraded landscapes.

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