

Enhancing the Role of the Forestry Sector in Building Climate Resilient Green Economy in Ethiopia:

**Strategy for scaling up effective forest management practices
in Amhara National Regional State with particular emphasis on
smallholder plantations**



Center for International Forestry Research
Ethiopia Office
Addis Ababa



THE FEDERAL DEMOCRATIC
REPUBLIC OF ETHIOPIA
MINISTRY OF ENVIROMENT,
FOREST AND CLIMATE CHANGE

Enhancing the Role of Forestry in Building Climate Resilient Green Economy in Ethiopia

**Strategy for scaling up effective forest management practices in
Amhara National Regional State with particular emphasis on
smallholder plantations**

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FOREWORD

This regional strategy document for scaling up effective forest management practices in Amhara National Regional State, with particular emphasis on smallholder plantations, was produced as one of the outputs of a project entitled “Enhancing the Role of Forestry in Ethiopia’s Climate Resilient Green Economy”, and implemented between September 2013 and August 2015. CIFOR and our ministry actively collaborated in the planning and implementation of the project, which involved over 25 senior experts drawn from Federal ministries, regional bureaus, Federal and regional research institutes, and from Wondo Genet College of Forestry and Natural Resources and other universities. The senior experts were organised into five teams, which set out to identify effective forest management practices, and enabling conditions for scaling them up, with the aim of significantly enhancing the role of forests in building a climate resilient green economy in Ethiopia. The five forest management practices studied were: the establishment and management of area exclosures; the management of plantation forests; Participatory Forest Management (PFM); agroforestry (AF); and the management of dry forests and woodlands. Each team focused on only one of the five forest management practices, and concentrated its study in one regional state.

The team that studied smallholder plantation forest management practices focused on Amhara National Regional State. The other teams examined practices in exclosure; PFM; agroforestry; and the management of dry forests and woodlands, and worked respectively in Tigray; in Oromia; in Southern Nations, Nationalities and Peoples; and in Benishangul Gumuz National Regional States. The findings of all teams were used in the write-up of this strategy, though this report focuses primarily on smallholder plantations. The engagement of senior experts and researchers from regional institutions made the document more relevant to the region, and created opportunities for building the capacity of all staff involved in the process. The draft document was presented and discussed at various workshops at national and regional levels, and was assessed and endorsed by the respective regional authorities.

The Ministry of Environment, Forest and Climate Change (MEFCC) will continue to be actively involved in similar processes. I take this opportunity to encourage relevant offices in the region to make best use of the document, and plan to further improve its content and scope by building on experiences to be gained during the implementation of the strategy. It is important that we systematically document the process and outcomes of the scaling up process and draw lessons. Implementing this strategy will further build the capacity of the region to plan and implement the scaling up of good practices in forest management. The selection and scaling up of effective practices supports regional and national efforts to develop the forestry sector, and significantly enhances its contribution to building a climate resilient green economy in Ethiopia, as envisaged by the government.

On behalf of the MEFCC, I would like to thank all team members and their respective institutions for their contributions. I am particularly grateful to the Center for International Forestry Research (CIFOR) for initiating and implementing this joint project, which played an important role, not only in filling gaps in knowledge and skill, but also in

building capacity at various levels. I also thank the Strategic Climate Institutions Program (SCIP) for funding the project. As SCIP is financed by the Governments of the UK, Norway and Denmark, I would like to extend my appreciation to the peoples and governments of these three countries for their support.

Ato Kebede Yimam
State Minister
Ministry of Environment, Forest and Climate Change
Federal Democratic Republic of Ethiopia
Addis Ababa
15 October 2015

FOREWORD

The Amhara National Regional State is endowed with a range of natural resources, including dry forests and woody vegetation, which represent the most widespread form of vegetation. Forests, both natural and planted, are critical to the wellbeing of the environment, the national economy, and society at large. They contribute significantly to household economies and food security, and thereby, to poverty reduction, economic growth, and social transformation. The regional government, in collaboration with communities, relevant stakeholders and development partners, has worked hard to conserve natural forests and woodlands, and to increase tree and forest cover through a range of mechanisms including: afforestation, reforestation, enclosure, watershed development, and annual tree planting campaigns. The number of private commercial farmers producing seedlings has increased significantly. These farmers produce large quantities of seedlings annually. Increasing attention is being directed towards the production of multipurpose tree species. The regional government is also supporting efforts to ensure that each Kebele in the region has a 50–100 ha plantation forest. These major activities are already yielding some encouraging results. These initiatives are improving the vegetation cover of the region, restoring degraded lands and forests, and offering significant benefits to local communities and the society at large as flows of forest products and services will be enhanced.

However, the current state of forest development, management, and utilization is not satisfactory, and improvements are needed. Deforestation and degradation rates remain high around remnant high natural forests, particularly in the region's dry forests and woodlands. The regulatory wings of the forest administration and respective law enforcement agencies must do more to reduce deforestation and degradation and the illegal movement of forest and tree products. Seedling production, nursery management and plantation establishment and management must be significantly improved, through the adoption of better technologies and practices. There are also large areas of bare hills and mountain slopes, suffering from high rates of soil erosion and land degradation that require large-scale rehabilitation and afforestation efforts. The overall situation calls for concerted efforts to identify and address the causes of land and forest degradation, and explore opportunities for forest sector development. In doing so, it is important that we identify effective forest management practices and scale them up, to enable the region and the country at large to achieve the targets set in the nation's Climate Resilient Green Economy (CRGE) strategy document. Thus, a regional strategy is required to identify and scale up effective forest management practices.

To meet this need, the Center for International Forestry Research (CIFOR), in collaboration with relevant federal and regional institutions, initiated and implemented a project to identify effective forest management practices, and enabling conditions for scaling them up. The study in Amhara focused on smallholder plantation forest management. The findings of the study were used as inputs in the write-up of this strategy document. Our regional bureau has been actively engaged in the writing and review of this document. Thus, we will do our level best to implement the proposed strategy and to use it in developing plans, programs and projects that will foster the development of the forest sector in general,

and the wider use of selected forest management practices in particular. Finally, I would like to thank the authors of this strategy for producing such an important document, and CIFOR and the Ministry of Environment and Climate Change for initiating and implementing the project, by involving experts from our bureau and other institutions in the region.

Ato Shumeye Alemu,
Deputy Head, Bureau of Agriculture, Amhara National Regional State
Bahir Dar
October 15th 2015

PREFACE

In addition to their direct contributions to household economies through wood and non-wood forest products, forests contribute significantly through their services to the environment and to various sectors of the national economy, i.e. agriculture, energy, water, health, tourism, etc. Nationally, the forestry sector contributes to employment generation and income diversification, earning of foreign currency through export, and savings through import substitutions. The sector's ecosystem services for agriculture are well documented, although it is difficult to determine their economic value. Unless growing demands for wood and other forest products and services are met, the rate of deforestation and degradation will continue to rise. Horizontal expansion of agriculture will result in the conversion of forests, woodlands, and bush lands to agricultural fields, if techniques to promote sustainable intensification are not implemented. Therefore, deforestation and degradation are major environmental challenges for Ethiopia. Thus, effective management of its forests is critical.

Identifying and scaling up effective forest management practices is key to significantly enhance the forest sector's contributions to local livelihoods, the national economy and the environment. Wider adoption of good forest management practices enhances the contributions of the forestry sector by building a climate resilient green economy. CIFOR, in collaboration with federal ministries and federal and regional research and higher education institutions, implemented a project that focused on identifying effective forest management practices for scaling up. The study focused on the following forest management practices: exclosure management (based in the Tigray region), smallholder plantations (based in the Amhara region), agroforestry (based in the Southern Nations, Nationalities and People's Regional State), participatory forest management (based in the Oromia region), and the management of dry forests and woodlands (based in the Benishangul Gumuz region). Our team worked in the Amhara region, and critically assessed experiences in smallholder plantation forest management in view of identifying good practices and enabling conditions for scaling them up. The study also examined the limitations and weaknesses of this type of forest management, and identified a number of improvement measures. The team also considered other forest management practices, based on the findings of the teams working in the other four regional sites. Specific suggestions were also made regarding those management practices. In selecting and proposing effective forest management practices for scaling up, the teams benefitted from a series of discussions with communities and senior experts from the region, and from national progress reviews and planning meetings. This strategy document was informed by the findings of our field and desk-based research, the results of graduate students' thesis research, and the comments and suggestions from participants at all levels.

The authors of the document would like to thank several individuals and institutions that contributed to the preparation of this strategy. In particular, our thanks goes to the CIFOR Ethiopia office, for initiating this project and engaging us in its implementation. We thank our respective institutions for allowing us to be involved in the project and work on the write-up of this document. We are grateful to the staff of the Amhara Regional State Bureau of Agriculture, the GIZ-Sustainable Land Management Amhara Region Office,

Bahir Dar University and other institutions who shared their experiences and provided significant contributions during consultative meetings. Their contributions have improved the content and relevance of the strategy to the region. It is our hope that this strategy will be implemented, and will serve as a basis to plan and implement further work to develop the forestry sector in the Amhara region.

The authors

ACKNOWLEDGEMENTS

This publication is an outcome of a project entitled Enhancing the Role of Forestry in Ethiopia's Climate Resilient Green Economy: A Knowledge, Action Research and Innovation Project, which was implemented between September 2013 and August 2015. The project was designed and implemented by CIFOR in collaboration with its national partners, including the Ministry of Environment, Forest and Climate Change, the Ministry of Agriculture and Natural Resources, the Ethiopian Environment and Forestry Research Institute, Wondo Genet College of Forestry and Natural Resources and other higher education institutions and federal and regional research institutes. Over 25 senior experts from 16 organizations were engaged in the project. The intended outcome of the project was to identify effective forest management practices for scaling up, focusing on: area enclosure in Tigray; PFM in Oromia; smallholder plantations in Amhara; agroforestry in SNNPRS; and the management of dry forests and woodlands in Benishangul Gumuz. The major project outputs are strategies for scaling up selected practices for each of the five regions as well as a national road map for the MEFCC to support national efforts to enhance the role of forestry sector in building a climate resilient green economy.

This document was prepared for Amhara National Regional State (ANRS), and was produced with the support of senior experts from the Bureau of Agriculture of ANRS, the Ethiopian Environment and Forest Research Institute, the Amhara Region Agricultural Research Institute and Bahir Dar University. We gratefully acknowledge the contributions of all individuals and institutions to the collection of data and writing-up of this strategy. The draft of this strategy document was improved by feedback from experts and senior officials from the region. I would like to particularly acknowledge the comments and suggestions received from Ato Shumye Alemu, Deputy Bureau Head, and Ato Getachew Engidayehu, the Natural Resources Process Owner, Bureau of Agriculture, ANRS.

The CIFOR Ethiopia office is grateful to members of the National Project Advisory Committee, which oversaw the project, to ensure its relevance and timely completion. I am particularly thankful to His Excellency Ato Kebede Yimam, State Minister of Forest, Ministry of Environment, Forest and Climate Change, for chairing the Project Advisory Committee for over two years. He attended all planned meetings and provided guidance to the project. He also took note of project findings, and encouraged researchers to generate policy and practice relevant findings, and better inform the activities of the Ministry and relevant regional bureaus. Members of the Project Advisory Committee included: the Dean of Wondo Genet College of Forestry and Natural Resources, the Director General of Oromia Forest and Wildlife Enterprise, Head of Amhara Forest Enterprise, Natural Resources Management Process Owners in the regional Bureaus of Agriculture of the five regions, and heads of the Natural Resources Research wings of regional agricultural research institutes operating in the five regions. Our sincere thanks also go to the authors and their respective institutions for taking lead role in the write-up of the strategy, as well as to the respective regional bureaus for actively taking part in the tasks and for reviewing and approving the strategy document.

Our thanks also go to the SCIP Fund for financing the project. The SCIP Fund is financed by the UK, Norway and Denmark. To meet the emerging needs of our national partners, we revised the project activities twice in two years. I would like to recognize the SCIP Fund Management Team for their support with this. With their help, the team managed to plan and implement additional activities without increasing the project budget.

We hope that this document will assist national efforts to develop the forestry sector, specifically related to the selection and wider adoption of effective forest management practices. It was also our intention that the process would help to build human and institutional capacity of national partners, which the project funders were particularly keen to achieve.

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LIST OF ABBREVIATIONS USED

AF	Agroforestry
AFE	Amhara Forest Enterprise
BoA	Bureau of Agriculture
BDU	Bahir Dar University
CIFOR	Center for International Forestry Research
CRGE	Climate Resilient and Green Economy
CSA	Central Statistical Authority, Ethiopia
DFM	Dry Forest Management
EEFRI	Ethiopian Environment and Forest Research Institute
EARO	Ethiopian Agricultural Research Organization
FAO	Food and Agriculture Organization of United Nations
FDRE	Federal Democratic Republic of Ethiopia
GDP	Gross Domestic Product
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GTP	Growth and Transformation Plan
GTP II	Growth and Transformation Plan II
IFAD	International Fund for Agricultural Development
MoA	Ministry of Agriculture
MEF	Ministry of Environment and Forests
MoFED	Ministry of Finance and Economic Development
M&E	Monitoring and Evaluation
NGO	Non-Governmental Organization
NRM	Natural Resources Management
NTFPs	Non Timber Forest Products
ORDA	Organization for Rehabilitation and Development in Amhara
PFM	Participatory Forest Management
PLC	Private Limited Company
REDD	Reducing Emissions from Deforestation and forest Degradation
REDD+	Reducing Emissions from Deforestation and forest Degradation, including the role of conservation, sustainable forest management and forest carbon stock enhancement
SCIP	Strategic Climate Change Institutions Program
SNNPR	Southern Nations, Nationalities, and Peoples' Region
SLM	Sustainable Land Management
SWC	Soil and Water Conservation
UNCCD	United Nations Convention to Combat Desertification
WBISPP	Woody Biomass Inventory and Strategic Planning Project

SUMMARY

In Ethiopia, forests play a considerable role in maintaining environmental stability, and providing good (e.g. fuelwood, saw logs, building materials, gums and spices, livestock feed, bee forage, shelter for pollinators, etc.) for household consumption and for markets. Trees, shrubs and grasses contribute directly to maintaining and restoring soil fertility through the build-up of organic matter and the prevention of soil erosion. In southern Ethiopia, many farming activities take place under the forest canopy. Many farmers prefer this kind of farming, particularly if their crops are shade loving (e.g. coffee). In addition to their environmental value, many forests have cultural and religious value, particularly those that are located near places of worship. For example, in the northern highlands many remnant forests are church protected over centuries as they considered to be sacred. The Government of Ethiopia has launched a number of forest conservation, development, and management initiatives across the nation, such as natural forest conservation and protection, exclosure, reforestation, and afforestation programs. However, current management, and rate of development of plantation forests, is unsatisfactory. There is an urgent need to investigate the causes of these problems, and craft effective forest policies and strategies. A strategy is needed to define principles, mechanisms, procedures, methods, and options for better management of forest resources.

This document provides a strategy for the Amhara region for the scaling up of best practices in forest management. The strategy mainly focuses on management interventions appropriate for plantation forests, as this is the dominant type of forest in the region. Major constraints of plantation forests have been identified, and appropriate, alternative measures have been proposed. This strategy will serve as the foundation to prepare regional and national strategy to support and govern the development of plantation forests. The document also highlights effective management interventions for scaling up best practices of other forest management approaches, such as agroforestry, exclosure, Participatory Forest Management (PFM), and dry forests and woodlands management across the region. Scaling up involves disseminating innovations to wider areas and to more people and this involves engagement of various institutions from grassroots organizations up to policymakers. Development institutions and the private sector have a part to play in the promotion and adoption of the useful technologies and best practices. This study outlines some of the guiding principles, key elements and pathways of scaling up.

To ensure the successful implementation of the strategy, it is essential that relevant institutions and their highest decision making bodies (i.e. federal, regional, Zone, district, and PA level) take ownership of the prepared strategy, and then integrate it with their development plans and programs. Similarly, it is important to identify the different actors that play a role in implementing the strategy, and define the duties and responsibilities of each actor. The state, communities, individual farmers, organized members of communities and private firms all have a role to play in implementing this strategy. Thus, it is important to clearly distinguish and plan how these actors will be involved, and to build partnership modalities and monitoring and evaluation system to maximize learning from the process of applying this strategy.

1. BACKGROUND

1.1 Introduction

Ethiopia is widely known for its agro-ecological, faunal, and floral diversity, and for its economic dependence on agriculture. The majority of Ethiopians (approximately 85%) live in rural areas; and agriculture is the main economic activity, accounting for 41% of the national GDP. Smallholder farming is predominant and accounts for more than 90% of agricultural production (MoFED 2011). The livelihoods of the rural population are heavily dependent on natural resources, particularly renewable natural resources and forest resources.

High natural forests, woodlands, plantation forests, and bamboo forests are some of the major components of Ethiopia's forest resources. FAO (2001) estimates that natural high forests, woodlands, plantations and bamboo forests cover 35.13 million ha of the land mass of the country. If shrub lands are included in this estimate (in accordance with the Intergovernmental Panel on Climate Change's definition of 'forest'), forests cover 50% of Ethiopia's land mass (61.62 million ha). WBISPP (2004) estimates Ethiopia's forest cover to be 59.7 million ha, of which 6.8 % is high forest, 49% woodland, 0.2% plantation forest, and 44% shrub land.

These forest resources offer a range of benefits, many of which cannot be provided by other kinds of land use. Forests are sources of food, feed, fuel, construction and industrial wood, gums, resins, and medicine, and sustain the livelihoods of millions of people. Trees sequester carbon and therefore support adaptation to, and mitigation of the effects of climate change. They are vital in soil and water conservation, watershed management and ensuring a healthy hydrological cycle. Trees have the potential to maintain soil fertility and can combat the loss of soil nutrients and thus significantly boost agricultural productivity. Tree planting can also prevent land degradation and desertification as well as the rehabilitation of degraded lands. Trees can also minimize the silting up of hydroelectric dams. The use of forest resources as source of energy is high as an estimated 108.5 million M3 of fuelwood was gathered from Ethiopia's forests in 2005 (FAO, 2005).

Although the forestry sector's contribution to the national economy has not been well documented, Ethiopia's Central Statistical Authority (CSA) (2014) estimates its contribution to be 4% to the total GDP, and FAO (2014) estimates its contribution to be 10.9%. Forests also provide Non-Timber Forest Products (NTFPs), which refers to a wide range of products. Moreover, rural development experts and policymakers are increasingly acknowledging the role of forestry in food security.

Despite the socioeconomic and environmental benefits that can be derived from the forest resources; they are being diminished as a result of unsustainable handling and utilization. The most frequently cited cause of deforestation is rapid population growth, which can lead to an increase in demand for crop and grazing land, and wood for fuel and construction. A lack of proper land-use planning can also exacerbate the rate of deforestation. Ever-expanding new settlements and commercial farming activities in forests

and woodlands, and the resulting conversion of forest land into agricultural land, also puts significant pressure on forests. Moreover, due to a loss of vegetation, millions of cubic meters of topsoil are lost on annual basis, resulting in significant land and environmental degradation, which poses a serious threat to sustainable development. Deforestation in Ethiopia has led to severe shortages of forest products such as fuelwood, industrial and construction wood and other wood and non-wood products. As a result, the country imports a number of wood products. In 2013, the country imported ETB 147 million worth of wood products (ERCA 2014).

In light of these problems, the government of Ethiopia has launched a number of forest conservation, development, and management initiatives across the nation, including natural forest conservation and protection, area enclosure, reforestation, and afforestation. Despite the efforts of current and previous governments, a number of chronic forestry problems remain unresolved. There are still gaps, constraints, and deficits with regard to ensuring sustainable forest management and enabling the sector to effectively contribute to the national economy. Concerted efforts are required to investigate the causes of these problems, and develop forest policies and strategies accordingly. There is an urgent need to formulate a strategy that outlines principles, mechanisms, procedures, methods, and options for better management of forest resources.

This document attempts to provide a forest management strategy for the Amhara region for scaling up best practices of forest management. The strategy mainly focuses on management interventions appropriate for smallholder plantation forest, as this is the dominant type of forest in the region. The document also highlights effective management interventions for scaling up best practices of other forest management practices, such as agroforestry (AF), enclosure, PFM, and dry forests and woodlands management across the region.

1.2. Ethiopia: socioeconomic profile and development strategy

Ethiopia is located in the horn of Africa between 3-15° N latitude and 33-48° E longitude, bordering Sudan, Eritrea, Kenya, Somalia, and Djibouti. The nation stretches over more than 1.1 million km², and altitudes range from 125 meters below sea level at Afar depression, to 4620 metres above sea level at Ras Dejen Mountain, which results in a wide variety of climate zones and soil conditions. With more than 80 million inhabitants, Ethiopia is the most populous nation in Eastern Africa, and the second-most populous in Africa after Nigeria. With annual population growth of more than 2%, Ethiopia will have more than 120 million inhabitants by 2030 (CRGE 2011).

The country's major natural resources are mainly land, water and natural vegetation, which provide habitats for a wide range of biodiversity. The national economy is primarily based on agricultural production, which is predominantly subsistent in nature. Smallholder farmers with an average land-holding of less than one hectare account for over 90% of the agricultural area under crop production, and 95% of agricultural outputs (Legesse 2003). The agricultural production system is mainly rain-fed and traditional, and is characterized by minimal use of fertilizers and pesticides. As Ethiopia's economy relies on the

agricultural sector, natural resources should be managed sustainably. It is only through the sustainable management of its agricultural resource base that Ethiopia will be able to achieve its rural and economic development goals. The Climate Resilient Green Economy (CRGE) is one of the country's most important forestry policy frameworks, and contains initiatives to reduce greenhouse gas emissions, outline a development path for green growth, and provide the analytics required to secure carbon funding (CRGE 2011). The Growth and Transformation Plan (GTP) is another important national development program relevant to forestry. This five-year program focuses on ensuring sustainable economic development, transforming the economy, and meeting the Millennium Development Goals.

1.3 Overview of the forestry sector in Ethiopia

1.3.1 Forest resource base and management

Estimates of Ethiopia's forest coverage over various periods of time differ significantly. The reason for the wide disparity is linked to inconsistent definitions of the term "forest". Institutions have defined "forest" in various ways and contexts, and these different definitions have been used as the basis of a range of national and sub-national inventory projects. A range of evidence suggests that large parts of Ethiopia were once extensively covered by diverse forest resources. However, this forest coverage has undergone substantial changes over time due to a number of factors. Forest coverage has been significantly reduced by the clearing of land for agricultural use and the felling of trees for fuel. The current rate of deforestation is estimated to be 0.8% per year, while the current expansion of planted forests is approximately 0.18% per year, which does not compensate for the loss of natural forests (FAO 2001; Teketay et al. 2010). Forest resources in Ethiopia are subjected to remarkably high rates of deforestation and forest degradation (Reusing 1998; WBISPP 2004). For example, FAO (2007) and Reusing (1998), estimate a deforestation rate of 163,600ha/year and 141,000 ha/year, respectively. Major causes of deforestation include: the growing need for fuelwood and agricultural land; overgrazing; and improper forest and land tenure policies (Lemenih et al. 2007). Extensive forest fires have also resulted in further losses.

1.3.2 Significance to the national economy and local livelihoods

For Ethiopia's rural households, forests are integral to everyday existence, as they represent sources of: fuelwood, construction wood, fencing poles, furniture, utensils, medicines, shelter, livestock feed, bee forages, soil fertilizers, shelters for domestic animals and wild life. Although the contributions of the forestry sector to national and regional economies have not been well documented, recent data from CSA (2014) estimates its contribution to be 4% of the total GDP and FAO (2014) estimates its contribution to be 10.9%. Forest resources are vital sources of energy, as 70 to 80% of total energy consumed comes from biomass (CRGE 2011). Ethiopia's forests provide non-timber forest products (NTFPs), which include a wide range of products naturally produced by forest species, in genera such as *Boswellia*, *Acacia*, *Olea*, *Hagenia*, *Eucalyptus*, *Commiphora*, and *Pinus*, as well as bamboos, palms, reeds, grasses, and residue products from the liquidation of lumber, etc. NTFPs include gum, wax, incense, animal feed, medicine, honey, fruits, fibers, and mushrooms. As a result, rural development experts and policymakers are increasingly acknowledging the role of forestry in

food security.

1.3.3 Sectoral policies and strategies

Over the past few decades, the Ethiopian government has put several sectoral and cross-sectoral policies, strategies and programs in place, with the aim of enhancing the socioeconomic and environmental contributions of the sector. These include the Rural Development Policy and Strategies, the Forest Conservation and Utilization Policy and Strategy, the Federal Forest Law, the Environmental Policy of Ethiopia, the three successive five-year development plans, the CRGE Strategy, and Ethiopia's REDD+ readiness program. These policy provisions and key programs are summarized briefly in the following sub-sections.

Environmental policy (1997). This is one of many policies that directly relate to forest development and conservation. Ethiopia's environmental policy was approved in 1997, and aims to improve quality of life through sustainable development and utilization of natural resources. It also aspires to conserve traditional resource management practices. The policy includes provisions for: soil management and sustainable agriculture; forests and tree resource management; and genetic, species and ecosystem diversity conservation and management. These provisions play important roles in guiding efforts to promote afforestation and re-afforestation.

The Rural Development Policy and Strategy (2001). The rural development policy and strategy document was issued in November 2001. This document underlines the need to rehabilitate and restore the country's degraded natural resources. It calls for having well thought objectives and in planning tree planting initiatives. Specifically, it emphasizes the integration of tree planting in agricultural landscapes. This policy led to a number of encouraging achievements related to exclosures, sustainable land management initiatives, and watershed management programs. However, achievements related to afforestation and re-afforestation remain limited. Lack of implementation instruments, such as regulations, directives, and relevant, well-resourced institutions, are key factors that undermine success. For example, Lemenih and Tadesse (2010) report that over the last decade, the forestry sector has received less than 10% of the overall budget allocated to the Ministry of Agriculture, both at federal and regional levels.

Environmental Impact Assessment Proclamation (2002). This law is one of the federal laws intended to protect the environment from the potential negative impacts of development investments. The law has a regulation and a guideline developed in 2004 to assist its implementation. The general aims of the EIA law are: to predict and manage the environmental effects of proposed developmental activities; to harmonize environmental, economic, cultural and social considerations into a decision making process; to implement environmental rights and objectives enshrined in the Constitution; and to bring about administrative transparency and accountability. The EIA law, regulations and the guideline are reasonably comprehensive to have put considered obligations on private investment and state development projects to present EIA reports from certified consultants before securing a license to invest. Guided by the federal EIA law many regional governments produced

environmentally responsive investment directives particularly focusing on the protection of forests.

Forest Conservation and Utilization Policy and Strategy (2007). The formulation and enactment of this policy reflected the government's commitment to enhancing the nation's forest resource base. The main objective of this policy is to increase the economic contributions of the forest sector, and satisfy the nation's demand for forest products, by promoting sustainable forest management and utilization practices. The policy also encourages the engagement of the private sector and local communities in managing production and protection forests. The policy introduces an incentive mechanism in the form of reduced land taxes, to promote the establishment and development of private and community-owned forests. The policy recognizes the need to certify forest use rights, which is important to enhancing afforestation and re-afforestation programs. It also encourages improved management of dry forests and woodlands to promote sustainable utilization, while also responsibly conserving native trees and shrubs through encouraging natural regeneration. However, key provisions in the Forest Conservation and Utilization Policy and Strategy have not been clearly translated into binding legal articles, nor are there concrete implementation directives. This policy could promote the sustainable use and conservation of dry forests and woodlands, as well as their effective management, to promote natural regeneration of native trees and shrubs.

Forest Development, Conservation and Utilization Proclamation (2007). The Forest Development Conservation and Utilization Proclamation number 542/ 2007 is the most recent national forest law. It provides legal grounds to the Forest Conservation and Utilization Policy and Strategy of 2007. The proclamation recognizes two types of forest ownership, i.e. state, and private (which pertains to both communal and individual ownership). The 2007 forest legislation was criticized for placing greater emphasis on punishment for wrong doing than on incentives to reward good behaviour, and for failing to fully recognize communal ownership rights. Furthermore, a lack of regulation to ensure the effective implementation of the proclamation has been described as a significant bottleneck.

The 2011-2015 Growth and Transformation Plan and the 2011 CRGE Strategy. The Ethiopian Government launched the 2011-2015 GTP with the intention of making Ethiopia a middle income country by 2025. The GTP envisages that the country's GDP per capita will grow from 378 USD in 2010 to 1271 USD in 2025. The GTP stresses the need to strengthen natural resources conservation and management. In line with this, the major forestry sector activities proposed by the first GTP include: the rehabilitation and restoration of degraded lands through exclosures; multipurpose tree planting; and the development of management plans for priority forests and tree seed collection and distribution. The CRGE is Ethiopia's recent green growth development strategy. The plan has identified four pillars, one of which is forestry, and emphasizes the protection and re-establishment of forests, in recognition of their economic and ecosystem services, including as carbon stocks. The CRGE has set a target to sequester more than 40 million tons of CO₂e, through the afforestation and reforestation of 3 million ha of land, and the

sustainable management of 4 million ha of forests and woodlands by 2030. Moreover, at the New York Climate Summit, Ethiopia made a pledge to restore 15 million ha of degraded forests and land by 2030, which is evidence of the government's determination to restore degraded lands. All of these commitments represent opportunities to scale up successful exclosures, tree planting and forest management practices. Promoting sustainable management of dry forests and woodlands contributes to meeting these national targets and international pledges.

The National REDD+ Program. REDD+ provides incentives for developing countries engaged in forest conservation and carbon sequestration. This global carbon offsetting mechanism provides a financial flow to forest dwelling communities. REDD+ will be embedded in the national CRGE implementation strategy. Ethiopia aspires to reduce deforestation and forest degradation by addressing their underlying drivers and immediate causes. Strategic interventions include the sustainable management of existing forests and the creation of new forests. Ethiopia considers REDD+ to be a promising opportunity, and a viable source of sustainable finance for investment in forest management, conservation, and restoration. This represents a way of enhancing the multiple benefits of forests, including carbon sequestration and biodiversity conservation, watershed management, increased resilience to climate change, improved livelihoods and reduced poverty. Therefore, REDD+ is expected to create opportunities for the forest sector to further contribute to the overall, national goal of sustainable development.

1.3.4 Links between the forestry sector and other sectors

Several sectoral policies and functions may directly or indirectly link with the forest sector. Sectors with interacting functions must be managed well to ensure sustainable development. Successful integration ensures the complementarity of the various sectors' activities, and facilitates the achievement of the nation's development goals. Sectors that are closely linked with the forest sector are briefly discussed in the following section.

Agriculture: Agriculture is closely linked to the forest sector. Successful afforestation and re-afforestation programs positively affect the productivity of agricultural landscapes, by preventing soil erosion and downstream flooding. Forests maintain a healthy hydrological cycle, ensuring recharge and replenishment of ground water. Moreover, if firewood is widely available, crop residue can be used to fertilize farmlands rather than for cooking and heating. On the other hand, a desire to increase grain production may trigger the expansion of agricultural lands, and the conversion of forests and forest lands to crop fields. The livestock sector is also closely linked to the forest sector. Free grazing is a practice that hinders the natural regeneration and survival of seedlings. In countries with high livestock populations, such as Ethiopia, free grazing creates a considerable problem for the forest sector. This is problematic, as forests are a significant source of fodder for livestock, especially during the dry season. This is particularly true in arid and semi-arid areas, where trees also serve as shade for livestock.

Water and Energy: Both the quality and quantity of a catchment's water supply is largely dependent on vegetation cover. Afforestation and re-afforestation of upper catchments, using appropriate tree species, guarantees a regular flow of clean water. However, tree species with high transpiration rates may deplete the water resources of a catchment. Thus, the tree species that cover catchment areas must be managed in order to maintain a positive water budget. The energy sector is also closely linked with forestry. Trees planted in the upper catchments are vital to safeguarding hydroelectric power projects. The forest cover in the upper catchment ensures downward infiltration of water, and minimizes downstream runoff and silt. Moreover, a continuous flow of tributary rivers within the catchment area of hydroelectric mega projects, ensures a sustainable water supply and uninterrupted power generation.

Tourism: Forests have positive impacts on tourism, as they serve as habitats for wild-life and create attractive green landscapes. Opportunities to use income from tourism to fund the management and development of forests require greater exploration. However, tourism can also negatively affect forests. Felling trees for the development and construction of hotels and restaurants reduces forest cover. Moreover, camping tourists may cause forest fires.

Roads: Road expansion often requires the felling of trees, and may trigger further degradation and deforestation as loggers will have easier access to the forest. Easier access can also facilitate investment by the private sector to establish plantations and the marketing of forest products by forest managers as well. Remedial measures need to be designed to mitigate such negative impacts. On the other hand, roads also facilitate access for those responsible for managing, monitoring and protecting forests. Roads may stimulate the engagement of private investors, which could contribute to the overall development of the forest sector.

1.3.5 The forestry sector's role in Ethiopia's CRGE and international conventions and pledges

Climate change and forests are intrinsically linked. Climate change represents a threat to forests, and protecting forests from conversion and degradation helps to mitigate the impacts of climate change. Forests mitigate the negative impacts of climate change because of their capacity to remove and store carbon from the atmosphere. Forests act as sinks, as they can absorb emissions and store large quantities of carbon for extended periods of time. Forests also play an important role in supporting adaptation to the evolving, and sometimes dramatic, changes to the natural resource bases that sustain livelihoods worldwide. Sustainable forest management is thus a critical component of any policy or program that seeks to address growing global concerns about the impacts of climate change. There is a great need to halt deforestation and forest degradation, conserve remaining natural forests, and re-establish forests with the aim of adapting to and mitigating the adverse impacts of climate change. Deforestation and forest degradation must be reversed, to enable the continued provision of economic and ecosystem services, and economic growth. Fuelwood currently accounts for more than 80% of Ethiopian households' primary energy supply, particularly in rural areas. Furthermore, forests contribute an estimated 4%

to the national GDP, through the production of honey, forest coffee, and timber. They also provide a number of valuable ecosystem services by: protecting soil and water resources by controlling the discharge of water to streams and rivers, preserving biodiversity, functioning as a carbon sink, cleaning the air (which has important health benefits), and boosting land fertility. Despite their economic and environmental value, Ethiopian forests are under threat.

1.3.6 Emerging opportunities for the development of the forestry sector

The establishment of the Ministry of Environment and Forest and the Ethiopian Environment and Forest Research Institute are significant achievements for the Ethiopian forestry sector. The emergence of these institutions represents a renaissance of the forestry sector. Current circumstances provide fertile ground for translating ideas into action, and for bringing transparency and accountability to the realization of forestry goals and objectives. There has also been increasing recognition of the role of forests in promoting poverty reduction, food security, and environmental resilience. The environmental services and supportive functions provided by the forestry sector to other development sectors (e.g. hydro and irrigation dams, eco-tourism, etc.), are receiving greater attention. There is also growing awareness among policymakers of the threats of climate change to socio-political and economic development. As the economy grows, the ever-growing demand for wood and wood products (both domestically and abroad), could also represent a springboard for development, albeit one with a number of associated challenges. There is also growing international interest in supporting national forestry development, especially related to the conservation of biological diversity, national parks, and ecological hot spot areas, etc. The following are commonly cited opportunities for forestry development:

The establishment of the Ministry of Environment and Forest (MEF) and the Ethiopian Environment and Forest Research Institute (EEFRI). The establishment of the MEF and the EEFRI are significant achievements for the Ethiopian forestry sector. The absence of such organizations has been the subject of much debate between professionals and policymakers for many years. Organizational competence can be enhanced through capacity building programs. A monitoring and evaluation system is required at all levels to improve accountability and responsiveness, and to ensure that objectives are effectively met.

The existence of regional land use and administration policy. The development of the federal rural land administration and regional land use and administration policy represent significant steps towards effective land use planning. The land certification procedure mandated by this policy also represents a breakthrough in assuring use-rights and tenure security. However, a lack of implementation has negatively impacted the effectiveness of the land use policy.

The establishment of the regional forest enterprise. The establishment of the regional forest enterprise is a significant measure undertaken by the regional government. State owned forests in the region were mismanaged and largely underutilized for long. They now fall under the administration of the forest enterprise and are being utilized for the benefit of society.

The presence of research and higher education institutions. Education and research play critical roles in ensuring economic growth, poverty reduction, and sustainable human development. Current hubs for knowledge and information on forestry development and management include: the regional forestry research directorate (under the regional agricultural research institute); seven government universities in the region; and other governmental and private colleges. These institutions are centers of excellence for developing new technologies, and generate information that has the potential to enhance forest development and management in the region.

National and international market opportunities. As the economy grows, the wood and construction industries are blooming, which has led to a significant demand for wood and wood products. This opens up a considerable market for those who would like to engage in forest development. There is also growing demand from the global market, particularly from neighboring countries requiring eucalyptus poles. Given the favorable climatic and soil conditions, and hence fast rate of tree growth, it is possible for Ethiopia to produce not only for domestic consumption, but also for export.

Mass mobilization to promote natural resources management (NRM) and communities' interest in planting trees. Mass mobilization, to promote water and conservation activities in watersheds, has created a favorable environment for tree planting as a biological soil and water conservation measure. A wide-scale tree planting campaign, which has been launched annually since the Ethiopian millennium in 2007, has also triggered reforestation initiatives across the nation.

The expansion of hydropower and irrigation dams and the possibility of maintaining catchments by planting trees. Tree planting can prevent the siltation and sedimentation of catchments caused by the expansion of hydropower and irrigation dams across the nation and the region.

Availability of land for tree planting. Ethiopia is a mountainous country and vast areas of hillsides and mountains that are degraded due to overgrazing and years of cultivation can be used for reforestation and afforestation activities.

1.3.7 Challenges affecting the development of the forestry sector

The major challenges affecting the development of the forestry sector are the following (Tesema 2008).

Absence of proper institutional arrangement at lower levels. Ethiopia's forest administration must be organized effectively in order to perform its functions properly and achieve its stated goals. The government has made some progress towards this by establishing the MEF and the EEFRI. However, as the federal structure has not been matched with equivalent structures at the regional level, this structure is limited in its capacity.

Competing land use/economic interests. An absence of rural land-use planning, classification, and demarcation, continues to exert significant pressure on forest lands. This has exerted considerable pressure on forest areas at risk of major land-use changes. The clearing of forests for crop production, both by small-scale farmers and large-scale investors, represents the primary cause of deforestation. Tenure security and use rights alone cannot bring about significant change, unless complemented with improved land-use practices. Integrated land-use planning at the national level, and the participation of communities at the local level, are therefore very important.

Weak inter-sectoral links. Policies related to agriculture, industrial development, energy, transport and other related sectors, may have a direct or indirect influence on the way forest resources are managed, and in some cases, may promote deforestation and forest degradation. On the other hand, forest policies also have an impact on many related areas, including rural development, management of the natural environment, and the livelihoods of rural and urban people. These relationships must be balanced through a policy of integration and coordination, to ensure synergy within and across sectors.

Lack of enforcement of forest laws and regulations by the responsible bodies. Regardless of whether a forest is owned by an individual, state or community, appropriate regulations should always be in place in order to promote sustainable forest management. If there are clear forest rules and regulations, and the respective enforcement mechanisms are in place, sustainable forest management is more likely to occur. Local administrative and judiciary structures (e.g. police, prosecutor, court, etc.) should be aware of their roles and responsibilities with regard to enforcing forest laws and regulations, and should work closely with forest offices and forest managing communities in order to combat illegal forest activities.

Poor regulation of movement of forest products. The over-utilization and exploitation of forest resources has been exacerbated by the removal of check points to enforce limitations and prohibitions. The absence of proper surveillance, and a lack of control over the movement of forest products, can lead to illegal harvesting/logging, deforestation, and the loss of substantial government revenue in the form of taxes and royalty fees.

Lack of appropriate forest management plan. Many forests (both state managed and privately owned), lack appropriate forest management plans, which makes them less productive, unsustainable, and economically unprofitable.

Lack of databases and knowledge management. With the frequent restructuring and fragmentation of the forestry sector, there is a loss of institutional memory, organized data, documents, and accumulated knowledge systems. This making learning from experiences and developing informed plans and this prevents the sector from establishing strong foundations for future activities.

Lack of adequate forest technologies, equipment and facilities. The education, research, and extension wings of the forestry sector lack adequate technologies, equipment, and facilities to properly execute their plans and projects.

Biotic and abiotic stresses. Climate change and its impacts (e.g. drought, disease, etc.) have negatively affected forest resources. In recent years, widespread infestations of pests have been recorded affecting large tracts of forest across the country, particularly the following species: *Eucalyptus globulus*, *Eucalyptus camaldulnesis*, *Cupressus lusitanica*, and *Pinus patula*. Diseases and infestations have become major concerns for nurseries and plantations. There are no clear guidelines that stipulate how forests could be protected from pests, diseases, animals, etc., and well defined steps and clearly articulated procedures are required.

2. FORESTRY IN AMHARA REGION

2.1 Amhara Region

Amhara region is located in the northwestern part of Ethiopia, and is situated between 8o 45`-13o 45` N latitude and 35o 15`- 40o 20` E longitude. The region borders four national regional states: Oromia in the south, Afar and Benishangul Gumuz in the east, and Tigray in the north. It also shares a common boundary with Sudan to the west. According to CSA (2015), the population of the region in July 2015 was estimated to be approximately 20.02 million. Approximately 83.8% of the population lives in rural areas. Agriculture, livestock, and forest production are the main economic activities of the region. Amhara is endowed with a range of natural resources, including forest resources. However, due to pressures from livestock, expansion of agriculture, and unsustainable use, forest resources have undergone severe degradation and depletion, which has resulted in high rates of soil erosion, loss of soil fertility, and degradation of water resources. However, the regional government and non-governmental organizations are making significant efforts to conserve and manage the remnant forest, through reforestation, afforestation and related activities.

2.2 Forest resources base of the region

Most of Ethiopia's forest resources are found along the lowland belt of the West Gojam, Awi and North Gondar zones, bordering Sudan and the Tigray and Benishangul Gumuz regions (see Table 1). The region's plantation forest cover is expected to be much higher than is stated in Table 1, as smallholder plantations (in the form of private woodlots and communal plantations), have not been included in the table, and are rapidly expanding in the high and midland districts of Awi, East Gojam, West Gojam, South Gondar and North Wollo Administrative Zones of Amhara National Regional State (ANRS).

Table 1. Forest types and area coverage in the Amhara National Regional State (ha).

Type of forest	Area (ha)	Forest cover in percent (%)
Woodlands	415,379.64	2.64
Open Woodland	325,428.10	2.07
Dense Bush land	482,643.44	3.07
Open Bush land	407,268.47	2.59
Natural dense forest	463,949.64	2.95
Plantation (excluding smallholder plantations)	62,973.31	0.40
Riverine forest	20,652.61	0.13
Sum	2,178,295.21	13.85

Source: GIS Based Forest Resource Assessment, Quantification and Mapping in Amhara Region (BoA 2012a).

2.2.1 State forests

Amhara's state forests include priority state forests and regular state forests. Seventeen forest areas in the region have been identified nationally as priority forest areas that must be conserved for their biodiversity and ecological benefits. These are: Wof Washa in N. Shoa; Erkie in Oromia; Yegof in Desie Zuria; Denkoro Chaka in S.Wollo; Woinye in N. Wollo; Guna, Alemsaga and Tara Gedam in S. Gondar; Matebia, Angereb and Gundo Gordim in N. Gondar; Kinbaba and Sekela Mariam in W. Gojam; Yeraba and Abafelase in E. Gojam; and Kahtasa and Elala Guangua in Awi Zone. There are approximately 124 regular state forests in various districts of the region. In addition to this, the region also contains a number of plantation forests established through state run projects. These include the Gondar fuelwood plantation in N. Gondar, Desie fuelwood plantation in S.Wollo, and Debre Birhan fuelwood plantation in N. Shoa Administrative Zones. Regional and national parks (e.g. Alatish and Semen parks in N. Gondar) and Denkoro Chaka priority state forest in S. Wollo are known to host diverse wildlife.

Amhara also contains significant areas of dry forest and woodlands, which contain bamboo and a number of gum producing species. Gum and incense are found in the North Gondar Zone (particularly in Metema, Quara, West Armachiho, Tegede, Tach Armachiho and Aderkay districts), Awi Zone (mainly in Jawi and Zigem districts), in East Gojam Zone (in Shebel Berenta, Baso Liben and Debre Elyas districts), South Wollo Zone (in Wogide district), North Shewa Zone (in Merabete district), and West Gojam Zone (in Bure Zuria and Womberima districts). These resources are also found in other zones, although to a lesser extent. In Metema district alone, *B. papyrifera* accounts, on average, for 51% of woody plant density (Eshete 2002), although variations occur from site to site as a function of local edaphic, climatic and anthropogenic factors. Ecologically, the species is important, as it can grow in areas where other trees fail to grow. Bamboo is another species important for people in the region as it is becoming an important source of cash income to smallholders. There are two types of bamboo species in ANRS: highland bamboo (known in Amharic as kerkeha) and lowland bamboo (known as shimel). Different environmental and ecological conditions determine where these species will grow. Lowland bamboo is mainly found in North Gondar, Awi and West Gojam, and to a lesser extent in East Gojam Zones. Highland bamboo is most widespread in Awi, West Gojam and East Gojam Zones, but is also found in the South Gondar Zones. However, there is a lack of awareness among smallholders particularly in the lowland areas of bamboo's economic value, and in many cases, it is being burned and cleared for farming. Current levels of lowland bamboo are expected to decrease significantly due to such actions, which are likely to be exacerbated by the resettlement of farmers from less productive and crowded highland areas to these areas and because rapid expansion of commercial farming

2.2.2 Community and private forests

Private forests include forests that are developed by: individuals (smallholders or commercial farmers); members of a peasant association or any association organized by individuals, or governmental or non-governmental organizations. In ANRS, community forests are developed and conserved by kebeles on communal lands, to promote the development of the kebele and the rehabilitation and conservation of degraded

areas. Many forests, which in the past were developed and conserved by the government, have now been transferred to kebeles, to be managed and used as community forests. Community and privately owned forests are significant sources of forest resources in ANRS. Communal lands in rural areas could be used for tree plantations to diversify the forest cover. Forest development programs are required in the region to address severe shortages of wood for fuel, construction and industry, and create sources of income for the rural poor.

2.2.3 Major drivers of deforestation and forest degradation

Much of the literature on forestry defines deforestation as a non-temporary change of land-use from forest to other forms of land-use, or the depletion of forest crown cover to less than 10%. Although there is no consensus among professionals and policymakers with regard to the underlying and proximate causes of deforestation, the most frequently cited cause of deforestation is rapid population growth, which is widely believed to lead to an increase in demand for crop and grazing land, and wood for fuel and construction. A lack of proper land-use policies and corresponding laws also contribute to increasing deforestation rates. Deforestation is also aggravated by ever-expanding new settlements and commercial farming activities in forests, and the associated conversion of forest and woodland into agricultural land. Scholars continue to debate regarding the most significant cause of deforestation, and which types of stressors have the greatest impact (e.g. economic, social, political, cultural, ecological). Indeed, there remain significant gaps in knowledge regarding the effects of, and relationships between, these factors. However, many scholars argue that tropical forest destruction has been the result of innumerable, individual decisions that are rational on a small scale, but have irrational consequences on a large scale.

2.2.4 Governance of the Forestry Sector

Only if effective forest governance is in place can forestry, as an economic sector, contribute to the socio-economic development of the nation. Poor governance, particularly related to forests, has significantly contributed to the failure of relentless efforts to ensure sustainable forest management. Weak governance has caused numerous, interrelated and interwoven obstacles to sustainable forest management. Governance constraints, such as a lack of: transparency, responsiveness, rule of law, accountability, and regional institutional coordination represent significant barriers to progress in the forest sector. Participation is a centerpiece of good governance. Additional efforts are required to ensure the active involvement of local communities, non-state actors, and civil societies, in economic, social, and political matters in general and in managing forest resources of the country in particular. Local communities, civic societies, NGOs and members of the private sector should be actively engaged in these processes, from policy formulation and planning, to grassroots level implementation. Participating organizations must also ensure that their structures and procedures are well designed, and that organizational competence is promoted through capacity building programs. A suitable monitoring and evaluation system must also be implemented at all levels, in order to help improve accountability and responsiveness, and to ensure effectiveness in achieving objectives. A comprehensive policy statement is required to provide orientation and direction for the choice and execution of government activities that affect both the state and the private sector. The policy statement should provide a framework for decisions that need to be taken within the forest sector. It should set clear standards for decisions in order to avoid ad hoc acts.

3. EFFECTIVE FOREST MANAGEMENT PRACTICES FOR SCALING UP

3.1 Plantation forest management

3.1.1 Global trends and relevant experiences

At present forests cover 30.6% of the world's total land area (FRA, 2015), which represents just under 4 billion ha, and corresponds to an average of 0.6 ha per capita. The five most forest-rich countries (i.e. the Russian Federation, Brazil, Canada, the United States of America and China) account for 54% of the total forest area (FRA, 2015). Large-scale afforestation and natural expansion of forests in some countries has reduced the net loss of forest area significantly. The net change in forest area between 2000 and 2010 is estimated to be -5.2 million ha per year, down from -8.3 million ha per year between 1990 and 2000 (FAO 2010). In 2000, forest plantations covered 187 million ha, of which, Asia accounted for 62%. Plantation areas have increased significantly since 1995, when they were estimated to cover approximately 124 million ha. The countries with the largest areas of plantation forest are: China, with 24% of global plantations; India, 17%; Russia, 9%; USA, 9%; Japan, 6%; Indonesia, 5%; Brazil, 3%; Thailand, 3%; Ukraine, 2%; and Iran, 1%. The global new planting rate is estimated at 4.5 million ha/year. Plantations in Asia account for 79% of this number, and South America accounts for 11%. Other continents account for only 10%. In terms of genera composition, Pinus and Eucalyptus remain the two most important genera worldwide (FAO 2001)

Following high rates of deforestation in Ethiopia, attempts have been made to establish plantation forests to satisfy the growing wood demands of the population, and to rehabilitate degraded lands. These plantations are predominantly made up of exotic tree species, including Eucalyptus spp., Cupressus lusitanica, Acacia decurrens and Pinus spp. These species have been chosen due to their fast growth, and attractive economic returns. Individual smallholders, in particular, prefer to plant fast-growing, exotic tree species. This is also true in most communal and state owned plantations. A culture of tree planting is growing rapidly in ANRS. Contrary to the growing interest in tree planting, the application of appropriate silvicultural practice before, during and after planting is limited. Therefore, in order to improve the growth performance, stand quality, and yield of plantation forests, it is essential to identify effective practices that can be scaled up. With this in mind, a study was conducted to identify effective plantation practices that can be scaled up by adopting some recommended improvement measures.

The study was carried out in ANRS, where there are a number of small-scale plantations. The purpose of the study was to: 1) identify and select the best plantation practices; 2) assess the biophysical and socioeconomic impacts of plantations; 3) identify innovative, alternative management approaches for the purpose of scaling up the best plantation management practices; 4) provide baseline information for preparing a regional forest management strategy, and contribute to the preparation of a national forest management road map.

3.1.2 Effective practices on smallholder plantations for scaling up

The best examples of smallholder plantation identified were: an *Acacia decurrens* plantation in Fagita Lekoma Woreda, Awi Zone; an *E. globulus* plantation in Lay Gayent Woreda, South Gondar Zone; and an *E. camaldulensis* plantation in Mecha Woreda, West Gojam Zone. The following factors were considered in the selection of these sites: adaptability, growth rate, compatibility with the other land uses, suitability to the objective of tree planting, and market potential of the product. The silvicultural management of the plantation, especially related to spacing, planting techniques and tending operations were considered in the identification of best plantation practices. We observed that the smallholder farmers having plantations were well aware of the advantages of using appropriate silvicultural management techniques to enhance the productivity of plantations.

The spacing between rows and trees of *Eucalyptus* plantations was 1m x 1m (for the current market of fuelwood and poles). In the case of *A. decurrens* plantation, the owners adopted a technique of planting trees together with crops such as wheat, teff, maize and green pepper during the first growing season. After harvesting the crops, the farmers left the trees to grow. Planted trees had a high rate of survival. According to farmers, plantations are ready for harvesting five or six years after planting. Farmers uproot the tree at the time of harvest, so that cereal crops can be grown for one or two years before the area is replanted with *A. decurrens*.

The major purpose of the *A. decurrens* plantation is to generate income by selling the stand to charcoal producers or wholesalers. Some owners have recently started producing charcoal independently. The farmers are well aware of the multiple socioeconomic advantages of *A. decurrens*, compared to *E. globulus*, another tree species commonly planted in the Awi Zone of ANRS. The economic benefits of growing trees are reportedly higher than cultivating annual crops. Farmers were encouraged to plant *A. decurrens* due to: its fast growth; its use as fuel and construction wood; its potential to be used for charcoal or animal fodder; its role in soil fertility maintenance; and the marketability of this species. Smallholder tree planting has provided occasional employment opportunities for jobless youths and women.

Best practices in communal forest plantations. There are relatively few communal plantations in Amhara. Most of the existing communal plantations were established under the previous Marxist regime that was in power between 1974 and 1991, with diverse objectives including fuelwood production, and soil and water conservation. In some areas, communal plantations have since been used to promote soil and water conservation, and to provide a means of income generation for communities. Local communities were not actively involved in planning and implementation during the establishment of these communal plantations. As a result, in some cases, the trees are over-matured, and in other cases, the trees have been harvested several times, and there are no coppice management and protection procedures in place. Therefore, it is very difficult to identify examples of best practice in communal plantation sites. However, 11 communal plantation sites were assessed and evaluated as part of this study. Among these, three newly planted and communally managed sites were evaluated. A communal plantation located in Shabra village, Abchikli Keble, South Achefer Woreda in West Gojam Zone was found to demonstrate some of the best management practices compared to others. With

regard to silvicultural management, this plantation was better in terms of: site preparation, protection, species diversity, and soil and water harvesting structure. The major tree species in this plantation were: *Grevillea robusta*, *Acacia saligna*, *Cordia africana*, *Jacaranda mimosifolia*, *Acacia abyssinica*, *Croton macrostachyus*, *Eucalyptus camaldulnesis*, and *Sesbania sesban*.

Best practices on commercial forest plantations. Commercial forests in Amhara region include forests administered by the Amhara Forest Enterprise (AFE), and plantations owned by individual investors and groups of individuals licensed to invest in plantation forests. AFE manages 61,450.5 ha of natural and plantation forests (personal communication from Ato Feleke Tessema). Most of the forests the enterprise owns were established in the 1970s and 1980s. Private investment in commercial plantation forests is not widely practiced in the region. As such, it is very difficult to identify recently planted, well managed, commercial plantations, and examples of best practice. However, this study identified ten commercial plantation forests and evaluated two of the best managed. One of these plantation forests belong to the AFE and the others are owned by group of individuals licensed to invest in plantation forests. A plantation in Debre Tabor, Eyesus Kebele, Farta Woreda, South Gondar Zone, owned by a group of licensed individuals, was identified as an example of best practice. This plantation was established in a cluster form (i.e. four blocks) by a group of individuals. The owners of three of the blocks are inhabitants of Debre Tabor, and the fourth block is owned by a group of police officers. The plantation owners chose to plant their 10.5 ha cluster with *E. globulus*. Silvicultural factors, such as site preparation, protection, and species-site-objective matching are well managed. Each of the plantation blocks has its own business plan, and each group has its own tree nursery.

Major plantation constraints and proposed improvement measures Major constraints of plantation forests have been identified and appropriate measures are proposed to effectively scale up the selected plantation practices. These should guide efforts to prepare a plantation strategy for ANRS

Table 2. Summary of major gaps and the proposed improvement measures

Gaps/constraints	Proposed measures
1. Silvicultural	
Poor seed and seedling quality	Use selected seed sources and improved seedling production techniques
Delays in making seeds available	Improve the tree seed collection, quality control and distribution system
Inadequate site preparation	Conduct timely and adequate site preparation
Poor planting technique and spacing	Use standard planting procedures (time of planting, pit size, removing polythene bags during planting) and appropriate spacing suitable to the plantation's objective
Poor post planting management	Conduct weeding, hoeing, and protect seedlings from grazing, fire, etc.
High dependence on single tree species	Introduce alternate and high value indigenous timber spp. and multipurpose tree species

	Adopt an appropriate harvesting technique and coppice management
2. Economic	
Inadequate value addition	Improve small scale wood processing and product diversification
Poor marketing system	Provide market information and strengthen market linkages
Limited expansion of forest industries	Promote expansion of different forest product based industries
3. Environmental	
Discourage undergrowth	Use of wider spacing, appropriate thinning, pruning, etc. to allow undergrowth.
Competition and shading on crop land	Buffer planting and introduce minimum distance from crop field
Adverse effect on natural resources	Avoid collection of leaves and bark from plantations and use wider spacing
Lack of knowledge on mixed plantation	Introduce alternative species that also meet producers' objectives
4. Institutional	
Insufficient extension and land administration service	Install better extension service system and implement proper land-use plan at local level and explore options to certify plantation forests to improve tenure security
Inadequate institutional and policy support	Set clear objectives and management plans for plantations and through appropriate institutions enforce and support proper use and responsible management
Lack of skills and knowledge of experts at various level	Provide consecutive training to enhance capacity in planning, monitoring and evaluating

3.1.3 Strategies to promote sustainable plantations in the region

Programs and projects that aim to promote smallholder plantations should address the following strategic issues. These relate to silvicultural, economic and institutional factors.

(i) Silvicultural issues

The following are important silvicultural issues that should be addressed.

Use of selected seed sources and improved seedling production techniques: A seed source is the stand of trees where seed is collected. A seed source can be single trees, a natural stand, a plantation or a seed production area or seed orchard. A seed source should yield sufficient quantity of seed of high physiological and genetic quality, which matches the plantation site and purpose. In regions where large-scale afforestation programs are undertaken, there is considerable demand for seeds. A lack of seeds often represents a bottleneck in plantation planning. The source (provenance) of the seed is important to the future of the plantation. This source will influence not only the volume to be obtained, but also its adaptation to the plantation site, plant health, type and rate of growth, wood quality, etc. In selecting the seed source, its uniformity and volume must be kept in mind, and the trees must have well-shaped trunks, good growth habits, and be in good health. For dioecious species, the availability of both male and female trees must be ascertained and

when thinning; care must be taken to leave a balanced sample of male and female trees.

The following are some suggestions for successful seed source establishment and quality seed production:

- select, map and manage seed sources from existing forests
- in establishing a seed orchard:
 - select phenotypically superior trees (plus trees) from natural forest or plantations
 - collect open pollinated seeds (cuttings) from the selected trees
 - raise seedlings or produce grafts or cuttings
 - establish and evaluate progeny test or establish clonal bank
 - establish seedling (clonal) seed orchard
 - saw recalcitrant seeds as soon as possible to avoid the problem of viability.
- put in place seed supply system (i.e. seed storage, testing, labeling, and certification).
 - All tree seed should be documented to provide information regarding its origin, collection, handling and quality
 - establish seed quality control quarantine authority
 - build the capacity of the AFE's seed center
 - establish seed supplier cooperatives and build their capacity
 - develop a regional strategy for seed supply
 - establish forest seed research, production and distribution networks.

These details should be elaborated and presented in the form of a training manual.

Accessibility: Normally, easily accessible stands should be selected, to reduce the cost of management, inspection, and seed collection. When genetically adequate species are found off the beaten track, it is preferable to collect their seed and sow it in places that are easier to reach.

Stand management: The following preparations are normally undertaken in a stand that is going to become a seed stand:

- removal of minus trees to improve the genetic quality of the seed
- thinning to allow adequate space for flowering, fruiting and seed collection
- clearance of the undergrowth to facilitate seed inspection and collection
- demarcation of the stand, particularly when there are contamination problems
- treatments to increase production, such as pruning or application of fertilizers, and other treatments as found appropriate to protect fruiting, such as application of fungicides and insecticides.

A record of all activities and treatments applied, phenological information, and information on seed harvesting should be kept.

Quality seedling production: A nursery is a place where seedlings are propagated, managed and grown to a plantable size. To ensure strong planting material, good nursery stock is essential.

Seedling production: Seedling quality is often overlooked in tree cultivation for a number of reasons, including the farmers' lack of knowledge of the characteristics of a high quality seedling. Measures to improve seedling quality include:

- upgrading and standardizing the management of existing central nurseries

(project and state owned)

- establishment of standard forest nurseries on strategic sites
- determining the type of species to be produced based on site conditions and objective
- diversifying seedlings to be produced (choice of species)
- preparing a nursery establishment and management package for use by nursery workers and extension agents to train farmers.

Improve site selection and preparation: Identifying a suitable site for planting is one of the determining factors in the success of a plantation. Commonly, site selection is carried out by different actors, including policymakers, foresters, and the community. Species site matching should be carried out based on the objective of the plantation. Owners must also make sure that the site for a commercial plantation is not severely degraded. Trees must be selected carefully to suit the climate, soil, topography, and the objective of the plantation. Site preparation activities (e.g. clearing, leveling, soil conservation, and water harvesting structure construction), should be carried out well in advance, prior to commencing tree planting. It is essential to carefully consider the layout and the density of initial planting.

Improve tree planting and post planting operations: It is important to critically consider when to start tree planting. Usually, planting starts as soon as a specified quantity of rain has fallen. Planting can commence when the soil is wet to a specified depth (approximately 20cm). Appropriate seedling handling, planting and tending operations (i.e. weeding and cultivation, beating up, thinning, pruning and coppice management) are also essential. Depending on the site condition, it may be necessary to protect the plantation from damage caused by fire, insects, disease, and animals.

Introduce alternate and high value tree/shrub species: Many reforestation programs have focused on the promotion of a few, well-known, exotic species. In Ethiopia, *Eucalyptus* spp., *Cupressus lusitanica*, *Pinus patula*, *Grevillea robusta* are among the widely used exotic tree species. Most of these species have fast growth rates and enable rapid economic return on reforestation, but they have some limitations. It is important to minimize dependency on a single species, so as to reduce the risks posed by biotic and abiotic agents. Therefore, it is important to introduce and promote alternative, fast-growing species in smallholder, communal and commercial plantations (Annex 2). Mixed plantations using alternate species should be promoted.

Adopt appropriate harvesting and coppice management techniques: In forest plantations that are established for wood production, trees and shrubs are harvested once they reach the 'optimum size' that suits the end product. From a biological standpoint, trees and shrubs should not be cut until they have at least grown to the minimum size required for production. Beyond attaining the minimum size, the question of when to harvest must still be addressed. Product diversification and assortment, appropriate harvesting time and techniques; and improved coppice management should be taken into consideration.

Promote planting trees with annual and leguminous crops (Taungya system): With the appropriate management practices in place (e.g. spacing, harvesting and tending operations), some tree species could be planted with annual and leguminous crops until the tree canopy closes in areas where land scarcity is limiting tree growing by framers. A manual on the Taungya management system should be prepared. Other relevant measures include:

- introduce and adapt plantation forest management practices (from inside the country and from abroad)
- promote urban forestry
- encourage involvement of the private sector, and support investment in plantation forests and forest industries in the country (e.g. though guidelines, incentive mechanisms, technical support, market information, etc.)
- protect plantations and natural forests (e.g. from pests, diseases, fire, invasive species, parasitic plants, etc.).

(ii) Economic considerations

Value addition and product diversification: In order to increase the economic returns of forests and its products, it is important to consider various value addition options. Some of the opportunities include: planting diversified species for product diversification; exploring value addition options; devising mechanisms to strengthen forest industries; and improving the technical skill of existing wood processing and manufacturing institutions. Income from forests could be maximized by increasing forest product assortment, and introducing technologies that facilitate product diversification (e.g. technology to harvest/produce bark for tannin, essential oils, timber, charcoal, etc.). These activities could be linked with research institutes and universities. In addition to this, it is important to provide technical and business skill training to tree growers to help them add value to the wood products they produce. Facilitating access to finance (credit provision) could also help to strengthen and promote value addition practices. Some options include:

- developing a system for the capture and re-use of royalty fees
- increasing the number of actors in forest product marketing
- supporting community based institutions (e.g. forest users, cooperatives, private limited companies, etc.)
- promoting out-grower arrangements
- promoting sustainable finance sources (e.g. REDD+, CDM, etc.).

Promote the expansion of different forest product based industries: Promote different forest product based industries in areas where resources are available (e.g. furniture, chip wood, particle board, plywood, etc.).

Provide market information and strengthen market linkages: Tree growers commonly sell products individually or through middlemen, and prices are set by bargaining. In many cases, businessmen benefit more from this system than tree growers. To improve this situation, growers could be organized into producer co-ops. Assistance with identifying market chains, and establishing links between tree growers and processors, could also be provided. This could help to improve bargaining power and access to financial assistance (e.g. obtaining a loan from a revolving fund). Adequate financial resources allow producers to

expand their market range as they can collectively transport their products to wider markets.

Enhance environmental sustainability: Expansion of pure eucalypts often creates conflict between neighboring tree planters and non-planters, because of the significant amount of shade they produce. Therefore, land owners adjacent to eucalypt plantations are often forced to plant eucalyptus as well. Therefore, the following strategies should be implemented to enhance environmental sustainability, and reduce the reported negative effects of eucalyptus expansion:

- promote cluster plantation
- encourage buffer planting and introduce minimum distance of trees from crop fields
- promote mixed plantations
- encourage the use of wider spacing
- implement proper land-use plans
- integrate with soil and water conservation structures.

(iii) Institutional aspects

A successful forest management system requires strong forestry intuitions, with clearly defined responsibilities, at regional, zonal, woreda and kebele levels. These institutions must strengthen the extension system, and implement appropriate policies and strategies. The following actions represent ways to strengthen the institutional framework:

- implement a strong organizational setup with clearly defined responsibilities
- put in place responsive extension service system and establish land-use plan at the local level.
- strengthen and set up community based forest institutions.
- strengthen law enforcement (i.e. local bylaws, national proclamations, policies and strategies)
- increase collaboration and coordination of partner institutions
- formulate and endorse regional forest policy, proclamations and directives
- build robust and efficient monitoring and evaluation systems
- strengthen research on forestry (e.g. choice of species)
- encourage private sector involvement in commercial forestry (e.g. incentives, demarcation of land for forestry investment, etc.).

3.2 Other forest management practices for scaling up

3.2.1 Managing dryland forests and woodlands

3.2.1.1 Global trends and relevant experiences

Dryland ecosystems cover a variety of terrestrial biomes (i.e., arid steppe, grasslands, tropical and subtropical savannahs, dry forest ecosystems and coastal areas), which are extremely heterogeneous. Dryland forest resources are of great socioeconomic and ecological importance in Sub-Saharan African countries, as they play significant roles in: diversifying the livelihoods of both rural and urban households; wood and food security; providing animal feed; human health care; and environmental conservation. Despite their great importance, these resources have been subjected to severe degradation, owing to a number of natural, anthropogenic as well as socioeconomic and

policy-related factors, leading to their complete disappearance in some places. In Ethiopia, drylands are host to numerous forest resources and have multiple benefits. Dry forest are dominated by ecologically and socioeconomically important species of the genera *Acacia*, *Boswellia*, *Commiphora* and *Sterculia*, which are principal sources of tradable oleo-gum resins that can be traded locally and internationally (Worku 2006). According to Lemenih and Teketay (2004), although there is still a lack of reliable data, it is estimated that there is potential to harvest over 300,000 t of oleo-gum resins from dryland forests in Ethiopia, which represents a significant opportunity for economic development. Gums and gum-resins play significant economic roles both at the local and national scales in Ethiopia (Eshete et al. 2005).

3.2.1.2 Dry forests and woodland management practices

Dryland forests or woodlands are the major sources of the forest resources in Amhara's lowlands (they represent the largest share of total forest cover). According to WBISPP (2002), woodlands cover approximately 1,040,064 ha (6.6%) of Amhara. However, according to a GIS Based Forest Resource Assessment carried out by the Bureau of Agriculture (BoA 2012) the region's woodlands are estimated to cover approximately 740,807.74 hectares (4.71 % of the region). Amhara's woodlands are mainly dominated by *B. papyrifera*, which is the most important gum producing, multipurpose, perennial tree species. This species has been recorded in nine zones, including 39 woredas and over 150 kebeles. It is abundant in Metema, Quara and Armachiho Woredas of North Gondar Zone. Gum and resin based dry forest management (DFM) in Kurmuk and bamboo based DFM in Homosha (Benishangul Gumuz Region) were selected as examples of good practice to be scaled up in Amhara's dry forests.

The Kurmuk gum and resin based dry forest management program has a detailed management plan, which was prepared using a participatory approach. The activities prescribed in the management plan are being executed according to the plan. Growing stock is monitored and most respondents believe that there has been an improvement in the composition and diversity of plant species in areas under PFM schemes. There are clear guidelines on permitted levels of exploitation of forest products (frankincense, medicinal plants, grasses, etc.), and the protection of forests against fire and other illegal acts. In terms of socioeconomic benefits, the process was participatory, community members participating in PFM receive more income, and vulnerable groups were included in the process. Furthermore, resources are well demarcated, community bylaws are respected and enforced, and there are clear guidelines on benefit sharing. Weaknesses of the two programs include: a lack of mainstreaming of the carbon market, pest management, and integration with other sectors (i.e. a landscape approach). Discussions with farmers revealed that diversification of product types requires further exploration. The farmers explained that certain fruit trees, such as *Adansonia digitata* (baobab, "Agangulish"), and *Tamarindus indica* ("Mela"), can enhance incomes.

Dry forest management in Homosha has significantly contributed to the regeneration of bamboo. Seedlings are protected against fire, grazing and termites (through the use of ash and digging trenches). Some of the economic benefits identified by farmers and

experts include: increased income, improved market opportunities, and more employment opportunities. Other positive aspects of this project include: a clear benefit sharing mechanism; clear demarcation of resources; strong enforcement of bylaws; the existence of a monitoring system; the engagement of state and non-state agencies (e.g. Kebele administration, Bureau of Agriculture, private companies such as Bamboo star, NGOs such as SoS-Sahel and Farm Africa); community participation in all phases; and gender sensitivity (e.g. women's associations are involved in the process). Weaknesses identified include: a lack of enrichment planting using other valuable species; a lack of silvicultural practice to better manage bamboo; reliance on only one product type (lack of product diversification – e.g. there is potential for apiculture); little or no value addition; and uncertainty regarding the future of the cooperative when all dead bamboo has been collected.

3.2.1.3 Identifying and scaling up effective dry forest and woodland management practices

The following regional good practices in dry forest management were identified:

- regional guidelines for regulating gum and resin production in dry forests and woodlands
- gum and resin producing dry forest concessions for gum and resin companies
- the establishment of local gum and resin producers' cooperatives
- Participatory Forest Management conducted by the Organization for Rehabilitation and Development in Amhara (ORDA) and AFE
- research outputs on Acacia, Boswellia and Commiphora species.

The following measures are proposed to improve dry forest and woodland management and use in ANRS:

- create awareness about the need for responsible use of dry forests and woodlands amongst relevant regional institutions (investment office, bureau of agriculture, land use administration, law enforcement agencies, trade bureau, etc..) about the existing legal framework
- ensure the long lasting involvement and commitment of governmental institutions to take over projects from NGOs and the later need to devise well thought and agreed up on exit strategies to ensure continuity of project impacts after the completion of NGO projects
- facilitate institutional integration (based on clear mandates and institutional roles)
- integrate concept of carbon trade into dry forest and woodlands management practices
- determine the time frame for how many years a stand can be tapped continuously and introduce longer resting periods
- promote appropriate tapping procedures and set resting periods
promote PFM
- define forest ownership in the context of rural land law
- assess the resource base and current utilization patterns
- delineate and demarcate land, and establish clear ownership rights and

introduce harvesting rotation

- introduce a mechanism to regulate trans boundary cattle movement and define trans boundary movement of cattle
- control smuggling of gum resin products
- revise land allocation for investment based on potential
- promote the planting of *Acacia senegal* and support gum production

3.2.2. Promoting agroforestry systems

3.2.2.1 Global trends and relevant experiences

AF can be tool to promote sustainable development, improve the quality of life of rural communities, and reverse environmental and land degradation. Available evidence clearly indicates that AF systems sustain food and wood security, enhance livelihood diversification, and offer a number of ecosystem services, including biophysical sustainability (Sanchez 1996). As a climate change adaptation tool, AF has been shown to increase on-farm production resilience to climate variability, by buffering crops from the effects of temperature and precipitation variation, as well as strong winds associated with storms. The increased plant and animal diversity within AF systems represents greater diversity in food, fuel, fodder, medicinal plant and income for the smallholder farmers (Méndez et al. 2010). Managing agroforestry practices

A number of traditional AF practices are carried out in Amhara, including: parkland AF, use of live fences, homestead AF, boundary/border-line planting, road/path-side plantations, and planting trees in and around public institutions. Improved AF practices continue to be introduced, including: alley cropping, tree planting on soil and water conservation (SWC) structures, and multi-story plantations on reclaimed gullies. The tree/shrub species used in these AF practices include: *Chamasytus palmensis* in the highlands; and *Sesbania sesban*, *Lucinea leucocephala*, *Tephrosia*, *Calliandra*, and *Cajanus cajan* at mid-altitudes and in the lowlands. Some specific examples of traditional AF practices/systems carried out in Amhara include: *Acacia*-based parkland AF in Minijar-Shenkora; *Croton macrostachyus* -based parkland AF in Debre Elias and Mecha; home garden AF in Tarmaber, Shoa Robit, Finoteselam, Mankusa; coffee-based AF in Zegie; *acacia*-based parkland AF in East Amhara; bamboo-based AF in Awi zone; gorge live fences in East Amhara and Abay; a *Faidherbia albida*-based system in Gondar Zuria; *Acacia abyssinica*-based AF near Merto Lemariam; *Acacia polyacantha*-based AF near Shoa Robit, and a *Rhamnus prinoides* based system near Mota.

The SNNPR is known for its successful traditional AF systems, which have been practiced for thousands of years in different parts of the region. Most AF in southern Ethiopia is characterized by high species diversity and a variety of vertical and horizontal arrangements.

3.2.2.3 Identifying and scaling up effective agroforestry practices

In SNNPR, the following were identified as effective AF practices:

Fruit, coffee and enset-based AF in the mid-highland zone

Fruit, coffee and enset-based AF plays a significant role in promoting plant

diversity through the integration of woody species into the agricultural landscape. Some of the dominant components of the surveyed AF systems include: multipurpose trees/shrubs, coffee, enset, fruit trees, annual crops, vegetables, medicinal plants, and animal species.

Moringa-based AF in Gocha's lowlands in Konso

Moringa-based AF has been practiced for more than 125 years and covers approximately 85% of the area of Gocha PA. Moringa AF accommodates diverse crop species. Major crop components (more than 13 species) include: *Sorghum bicolor*, *Zea mays*, *Coffea arabica*, *Musa paradisiaca* (banana), *Brassica oleracea* (Ethiopian kale), *Ipomoea batatas* (sweet potato), *Manihot esculenta* (cassava), *Eleusine coracana* (millet), *Chata edulis*, *Cajanus cajan* (pigeon pea), *Eragrostis abyssinica* (teff), *Cucurbita* sp. (pumpkin), *Capsicum* sp. (pepper), and Lablab.

Apple and bamboo-based AF in the highlands:

The plant diversity of the surveyed AF systems is a clear indication of the range of functions these systems provide for households. At these study sites, AF is widely practiced as a means of income generation. Recommended improvement measures include: the introduction of improved germplasm for various species, the adoption of appropriate management and harvesting methods for Moringa and other species; and the improvement of market linkages through value chain development for Moringa and honey.

These AF systems were identified as examples of best practice with the potential to be scaled up in similar agro-ecological zones in ANRS.

3.2.2.4 Selecting and scaling up effective agroforestry practices in Amhara Region

The following strategies are proposed to improve AF practices in Amhara region:

- control free grazing by:
 - ◇ enforcing proclamations, directives and bylaws
 - ◇ enhancing fodder production and utilization
 - ◇ improving livestock breeds
 - ◇ introducing cash crops on farmlands
- improve the knowledge and skill of experts and farmers in the application of AF through:
 - ◇ training
 - ◇ experience sharing to demonstrate the tangible benefits of AF practices
 - ◇ the establishment of model AF sites
 - ◇ the documentation of best practices
- enhance research-extension links by establishing and strengthening farmer-extension-research groups
- improve the supply of quality seeds and seedlings
- increase the availability of AF trees in the highlands by introducing and adapting multipurpose species
- increase seedling survival through:
 - ◇ proper species-site matching
 - ◇ proper nursery management and use of quality seeds
 - ◇ effective water harvesting structures

- ◇ protection against animals, fire, pests and disease
- improve integration of multidisciplinary professionals (e.g. foresters, horticulturalists, agronomists, and livestock experts) in the planning, implementation and management of AF practices by:
 - ◇ organizing forums for joint planning, implementation and monitoring and evaluation (M&E)
 - ◇ providing training on participatory planning and evaluation methods
- establish value addition and market information systems for AF products by:
 - ◇ assessing and mapping value chains for various products
 - ◇ providing market linkages and information systems
- improve the management of existing AF practices through:
 - ◇ the maintenance of parkland trees
 - ◇ training on managing emerging seedlings and saplings
 - ◇ tending operations (e.g. lopping, pruning and pollarding).
- plant fruit trees on bunds
- plant multipurpose trees in gullies
- promote multi-story AF systems, especially on irrigated lands.

3.2.3 Participatory Forest Management

3.2.3.1 Global trends and relevant experiences

PFM in the case of Ethiopia is an approach whereby multiple parties (generally local populations and the state) negotiate a management plan as part of a broader agreement, including complementary initiatives, bylaws, incentives and compensations (Borrini-Feyerabend et al. 2004). Broader goals include joint authority in decision-making, shared resource management, conservation of biodiversity, and community livelihood support. Associated benefits include reduced forest management costs, increased utilization efficiency, and enhanced equality and community rights (Borrini-Feyerabend et al. (2004). In brief, PFM has the potential to promote good forest resource governance and sustainable forest management.

Although numerous attempts have been made to promote sustainable forest management in Ethiopia (particularly in 1980s), the top-down approach taken not only failed to involve communities, but denied them their long-standing traditional use rights. As a result of their alienation, villagers were hostile towards state-owned forests for many years (Bekele 2003). Current attempts to involve communities in resource management and the sharing of forest benefits represent a promising policy shift.

3.2.3.2 Management of PFM practices in Ethiopia and Amhara

Within an Ethiopian context, PFM is defined as a working partnership between the relevant government institutions and local communities in the management of forests. This partnership is based on negotiated and defined roles and responsibilities, and agreed upon benefit sharing arrangements, and aims to enhance forest conditions and improve the livelihoods of rural communities (unpublished training material on PFM approaches by the Ministry of Agriculture in 2012. This arrangement requires community groups to manage, develop and utilize forest products and services in a sustainable way.

PFM in ANRS has begun recently and on-going practices in the region include:

- SOS- Sahel-led PFM in the natural forests of Katasa (Awi zone) and Tara Gedam (North Gondar)
- Organization for Relief and Development in Amahra (ORDA)-led PFM in Alafa, Metema Quara, and Jawi
- Amhara Forest Enterprise (AFE)-led PFM in Jawi, Quara, and Metema
- IFAD-led Community based integrated natural resource management in Lake Tana Watershed in Mecha, North Achefer, Lay Armacho)

3.2.3.3 Selecting and scaling up effective PFM practices in Amhara

New PFM guidelines comprise three major phases (based on PFM experiences in Oromia region):

- (i) **Mobilization**, which includes stakeholder analysis to clearly define and map roles and responsibilities, create awareness of PFM approaches, and establish community-based forest management institutions
- (ii) **PFM planning**, includes forest demarcation, participatory forest resource assessment (PFRA), mapping, preparation of forest management plans, approval, formulation and signing of the forest management agreement (FMA) to be negotiated and signed by both parties) and the development of bylaws
- (iii) **Implementation** includes capacity building, skills development and M&E. It is important to note that these steps may not strictly follow a sequential order. Some steps, such as participatory monitoring, PFM planning, and the organization of community groups could be done simultaneously.

The following strategies are proposed to improve PFM in Amhara:

- improve and diversify the opportunities for income/livelihood improvement provided by forests by:
 - ◇ introducing additional NTFPs
 - ◇ diversifying forest development/AF
 - ◇ utilizing timber on a sustainable basis and adding value to products
 - ◇ strengthening marketing
 - ◇ promoting alternative, non-forest-based income generation activities (e.g. handicrafts, petty trade, etc.)
- create awareness of the importance and benefits of PFM among stakeholders through:
 - ◇ forums
 - ◇ training and experience sharing
 - ◇ the organization of specific day in a year to popularize PFM and
 - ◇ the establishment of PFM working groups
- identify gaps and devise clear benefit sharing mechanisms that are agreed upon by members and non-members
- ensure the sustainability of PFM interventions by
 - ◇ preparing exit strategies
 - ◇ building the capacity of local communities and government partners
 - ◇ mainstreaming PFM plans into broader government plans

- ◇ maximizing productivity and income generation activities
- ◇ having an effective institutional setup (if possible team of experts or at least an expert) within government offices that will be in charge of PFM

3.2.4 Managing enclosures

3.2.4.1 Global trends and relevant experiences

In this strategy we define enclosure as a method of rehabilitating land by protecting an area from the interference of animals and human encroachment for limited period of time, depending on site capacity and vegetation re-establishment. Enclosures are areas selected for natural regeneration. In steep and degraded areas with shallow soil, restoring the natural vegetation is the preferred means of land reclamation. Thus, the main objective of enclosure is site rehabilitation/reclamation.

In Ethiopia, the practice of enclosure has been traditionally exercised for centuries, as agricultural land has periodically been allowed to rest, with minimal interference, to promote increased productivity (Birhane 2002). Enclosure minimizes interference and allows the land to rest for increased productivity. The modern ways of managing area enclosure were first implemented in the 1980s, as part of a development package to promote soil and water conservation works. . Using these techniques, degraded lands are allowed to rest for a number of years, which promotes the regeneration of natural vegetation (Bendz 1986).

3.2.4.2 Management of enclosures

Enclosure is a practice of excluding human and animal interventions from communal, degraded landscapes or hillsides (formerly used for free grazing), consolidating them with SWC structures and enriching them with tree plantings, with the aim of promoting restoration, rehabilitation, and re-vegetation. Area closures (enclosures) are mainly found in the eastern section of the Amhara region (i.e. Waghamera zone, North Wollo zone, South Wollo zone, Oromia zone). There are some successful enclosures, where sustainable, commercial honey production is practiced (Lasta, Lalibela, Bugna and Sekota).

The norms of community participation in the practice of area enclosure are not uniform across all enclosures. Some enclosures are allocated for landless youths and women to manage and use rehabilitated sites based on a cut and carry system. In some areas, enclosures are run by community members. Community members may formulate their own bylaws on the utilization of products harvested from enclosures. The benefits for communities provided by enclosures include: grass biomass for fattening, beekeeping, job creation for landless youths and women, and SWC. Enclosures continue to expand in areas where community members receive such benefits, but in areas where benefits are not diversified and land availability is lacking, communities have little interest in expanding enclosures. Current developments, practices, and examples of enclosures in Amhara region include:

- ◇ research outputs in the field of enclosure management
- ◇ the integration of area closure and apiculture, and the implementation of a cut and carry system for fattening, through the allocation of portions of the enclosure to landless and unemployed youths and women in Waghimra and

North Wollo

- ◇ the integration of exclosures with apiculture and fattening in Banja, Este, Machakel, Gozamin, Achefer
- ◇ the application of direct sowing of economically and environmentally important multi-purpose trees (MPTs) in exclosures (*Casuarina equisetifolia*, *Acacia saligna*, *Dodonia viscosa* etc.)

3.2.4.3 Identifying and scaling up effective practices relevant to the region

Accelerating and sustaining ecological restoration through exclosure requires appropriate interventions. Recommended interventions should be objectively evaluated by farmers, with the aim of identifying the most suitable interventions. In some of the exclosures, slow rehabilitation represents the most significant challenge. Slow rehabilitation of exclosures could be caused by a variety of factors. Thus, it is necessary to assess these underlying factors and identify appropriate solutions. Based on the review of experiences in Tigray, the following are suggested to improve performance of exclosures in Tigray Region in particular and in the country in general

- enrichment planting, soil scarification, broadcasting with native flora, and broadcasting with native flora with seed treatment
- in-situ water harvesting structures, water collection structures, and irrigating sites
- species-site matching with existing size, species-site matching with big size (saplings), post planting, care/tending
- conservation focused management, production focused management, and protection focused management
- time series data every three years, five years, and seven years
- defined ownership: individual, individual nested in cooperatives, cooperatives
- balance between conservation and utilization: protection based bylaws, production based bylaws, and conservation based bylaws
- fair benefit sharing: equitable, contribution based, and greater shares for vulnerable individuals
- use of emerging opportunities: carbon trading scheme, ecotourism
- establishment of value chains at local, regional, national, and international level.

The following strategies could help improve the performance of exclosures in Amhara region:

- establish functional local institutions
- improve the production and productivity of biomass in exclosures through:
 - ◇ direct sowing
 - ◇ enrichment plantation
 - ◇ physical soil and water conservation structures/water harvesting structures
 - ◇ the preparation and implementation of a management plan
 - ◇ the control and management of free grazing
 - ◇ the diversification of the economic benefits of exclosures
 - ◇ research to maximize productivity of exclosures
 - ◇ the preparation of productivity enhancement packages
- devise a conflict resolution mechanism by means of:
 - ◇ participatory bylaw formulation and implantation

- ◇ clear benefit sharing mechanisms
- ◇ continuous awareness creation forums
- ◇ the enforcement of proclamations and directives on the management and utilization of rehabilitated watersheds.
- strengthen forest protection to control and manage: invasive species (e.g. Lantana cammara), free grazing by domestic animals, fire, diseases, pests, etc.

3.3 Districts where selected practices could be scaled up

Area enclosure can be adopted anywhere in the region where there is a need to rehabilitate degraded lands and forests. Similarly, good practices in AF and smallholder plantations should be adapted to local contexts and scaled up in areas where farmers plant trees. PFM is a useful tool to encourage community participation in the responsible management and sustainable use of forests and woodlands. The table below lists districts/woredas where the proposed selected forest management practices might have the greatest chance of being adopted.

Table 3. Woredas where the selected practices could be scaled up.

Management practices	Zone	Woreda	Remarks
1) Smallholder plantations			
Acacia decurrens	East Gojam	Goncha, Bibugn, Debay Tilangin, Senan, Gozamin, Aneded, Hulet Eju, Machakel	
	Awi	Banja, Ankesha, Guagusa Shikudad, Dangila	
	West Gojam	S/ Achefer, Mecha, Sekela, Bure, Quarit, Dega Damot, Denbecha, Yilimana Densa	
	South Gondar	Este, Andabet, Liy Gayint, Simada, Farta, Dera	
	North Gondar	Gondar zurya, Debark, Dabat, Wegera, Chiliga,	
	North Shewa	Angolela Tera, Asagirt, Ankober, Basonaworana, Merabete,	With research support
	South Wollo	Borena, Dese Zuriya, Kutaber, Sayint, Legambo, Mehal sayint	With research support
	Wollo	Mekete, Delanta, Wadila, Bugna	With research support
	Eucalyptus globules	East Gojam	Goncha, Bibugn, Debay Tilangin, Senan, Gozamin, Aneded, Hulet Eju, Machakel
Awi		Banja, Ankesha, Guagusa Shikudad, Fagita Leko-ma, Dangila	
West Gojam		S/ Achefer, Mecha, Sekela, Bure, Quarit, Dega Damot, Denbecha, Yilimana Densa	
South Gondar		Este, Andabet, Liy Gayint, Simada, Farta, Dera	
North Gondar		Gondar zurya, Debark, Dabat, Wegera, Chiliga,	
North Shewa		Angolela Tera, Asagirt, Ankober, Basonaworana, Merabete,	With research support
South Wollo		Borena, Dese Zuriya, Kutaber, Sayint, Legambo, Mehal sayint	With research support
North Wollo		Mekete, Delanta, Wadila, Bugna	With research support

Management practices	Zone	Woreda	Remarks
Eucalyptus camandulensis	East Gojam	Enebse sarmidir, Shebel Berenta, Baso Liben, Debre Elias, Machakel, Dejen	
	Awi	Banja, Ankesha, Guangua, Fagta Lekoma, Dangla, Zigem	
	West Gojam	abi Tehinan, Bure , N/Achefer, S/ Achefer, Mecha, Wonberma	
	South Gondar	Dera, Andabet, Fogera, Ebenat, Libokemkem	
	North Shewa	Ankober, Antsokia, Efiratana Gidim, Kewet, Minjar Shenkora, Moretna Jiru	
	Oromia	Bati, Artuma Fursi	
	Wag Hemira	SeKota, Gazi Gebla	
2) Management of dry forests and woodlands			
	East Gojam	Dejen, Shebel Berenta, Baso Liben, Debre eliyas,	
	Awi	Jawi, Zigem, Guangua	
	West Gojam	Bure, Womberma, Jabe tehinan,	
	South Gondar	Ebenat	
	North Gondar	Metema, Quara, W. Armachiho, Tach Armachiho, Tegede, Alefa, Aderkay, W. Belesa, E. Belesa,	
	North Shewa	Merabete	
	North Wollo	Bugna, Meket	
	South Wollo	Wogdi	
	Wag Hemira	Abergele, Ziqua, Dahina	
3) Agroforestry			
Fruit, coffee, and enset based AF in the mid-highlands	Fruit, coffee, and enset based AF in the mid-highlands	Enebse sarmidir, Shebel Berenta, Baso Liben, Debre Elias, Machakel, Dejen	
	Awi	Banja, Ankesha, Guangua, Fagta Lekoma, Dangla, Zigem	
	West Gojam	abi Tehinan, Bure , N/Achefer, S/ Achefer, Mecha, Wonberma, Yilmana Densa	
	South Gondar	Dera, Andabet, Fogera, Ebenat, Libokemkem	With research support
	North Shewa	Ankober, Antsokia, Efiratana Gidim, Kewet, Minjar Shenkora, Moretna Jiru	With research support
	Oromia	Bati, Artuma Fursi,	
	South Wollo	Albuko, Wogidi, Worebabo,	
	North Wollo	abiru, Kobo, Gubalafto	
	Wag Hemira	SeKota, Gazi Gebla	

Management practices	Zone	Woreda	Remarks
Morigna based AF in lowland areas	East Gojam	Enebse sarmidir, Shebel Berenta, Baso Liben, Debre Elias, Dejen	
	Awi	Guangua, , Zigem, Jawi	
	West Gojam	Jabi Tehinan, Bure , N/Achefer, Wonberma	
	South Gondar	Ebenat, Libokemkem	
	North Gondar	E/ Belesa, W. Belesa, Adarkay, Metema, Quara, Alefa	
	North Shewa	Antsokia, Efiratana Gidim, Kewet, Minjar Shenkora, Moretna Jiru	
	Oromia	Bati, Artuma Fursi, Jile Timuga	
	South Wollo	Albuko, Wogidi, Worebabo,	
	North Wollo	Habiru, Kobo,	
	Wag Hemira	SeKota, Gazi Gebla, Abergele	
Apple and bamboo based AF in highland areas			
	Awi	Banja, Ankasha, Fagita lekoma, Guagusa Shikudad	
	West Gojam	Sekela, Dega Damot, Quarit,	
	South Gondar	Farta, Este, Layi Gayint, Este,	
	North Gondar	Debark, Janamora	
	North Shewa	Tarmaber, Baso Orana, Menz Lalo, Menz Gera,	
4) Participatory Forest Management	East Gojam	Enarj Enawuga, Awabal, Goncha Seso Enese, Hulet Eju Enese	
	Awi	Banja, Ankasha, Guangua, Zigem, Jawi	
	West Gojam	Dembecha, Sekela, Bahirda Zurya, Jabi tehinan, Quarit	
	South Gondar	Farta, Layi Gayint, Libo kemkem, Fogera,	
	North Gondar	Metema, Kuara, Tach Armachiho, W/ Armachiho, Gondar Zuriya, Chilga, Alefa, Debark, Dabat, Lay armachiho	
	North Shewa	ar maber, Basona Worana, Ankober, Menz Mama, Menz Gera, Minjar Shenkora,	
	Oromiya	Dewa Chefa, Bati,	
	South Wollo	Dese Zuriya, Legambo, Kutaber, Kalu, Ambasel, Tewledere, Delata, Wadila	
	North Wollo	Gubalafto, Habru, Gidan, Kobo, Bugina, Meket	
Wag Hemira	Sekota, Gazgibla		

Management practices	Zone	Woreda	Remarks
5) Area Enclosure	East Gojam	Enebse Sar midir, Shebel Berenta, Dejen,	
	West Gojam	Bure,	
	South Gondar	Aderkay, Telemit, Dabat, W/ Belesa, E/ Belesa, Chiliga, Lay Armachiho, Wogera	
	North Gondar	Farta, Libo kemkem, Lay Gayint, Tach Gayint, Simada, Ebenat,	
	North Shewa	Antsokiya, Efratana Gidim, Kewot, Minjar Shenkora,	
	Oromiya	Dewa chefa, Artuma Fursi, Jile temoja, Dewa Arawa, Bati	
	South Wollo	Kalu, Albuko, Ambasel, Dese Zuriya, Wogide, Argoba, Worebabo	
	North Wollo	Gubalafto, Lasta, Bugna, Kobo, Meket, Habru, Gidan	
	Wag Hemira	Sekota, Abergele, Dahina, Gaz Gebla, Sahila, Zequala	

3.4 Scaling up effective forest management practices

3.4.1 Rationale and objectives of the regional strategy

The Ethiopian landscape contains a wide variety of vegetation resources. This ranges from tropical rainforest and cloud forest in the southwest, to desert scrub in the east and northeast, to parkland AF. There are also limited plantation forests (Teketay et al. 2010). Rapid population growth, the expansion of agricultural land, and increasing demand for forest products exerts huge pressure on natural forests, and this has resulted in the depletion of natural forests. Increasing demand for timber and fuel has necessitated the establishment of plantation forests. In Ethiopia, the establishment of plantation forests commenced with the introduction of exotic tree species in around 1890.

In the years following the Ethiopian millennium, massive reforestation/afforestation programs have been carried out, and billions of seedlings are reported to have been planted all over the country by communities, individuals and state plantation programs. However, the success rate of current of plantation forest development is unsatisfactory, and post-planting management has not been adopted in most of these plantations. No appropriate silvicultural operations have been carried out in existing plantations, and as a result, many plantations are over-matured and not well managed. Both state-owned and community plantation forests need improved management and sufficient protection as most stands are not utilized in a timely manner, and are prone to encroachment.

The overall objective of the strategy is to enhance the role of plantation forests in Ethiopia's CRGE, through the identification and scaling up/out of best forest management practices in Amhara. The specific objectives are:

- to increase production of forest products on a sustainable basis, including: saw timber, fuelwood, poles, fodder and minor forest products

- increase agricultural production through reduced land degradation and increased soil fertility
- conserve forest ecosystem and genetic resources and reduce pressure on natural forests
- improve livelihoods through employment opportunities linked with income generation activities
- improve the management of existing forests
- increase forest cover.
- contribute to mitigation and adaptation to climate change
- improve value addition and marketability of forest products
- contribute towards increased foreign currency earning (global market)
- contribute to the regional and national economy
- improve forest governance in the region.

3.4.2 Strategy development process

Amhara Regional State has made considerable efforts to promote reforestation. However, many new plantation forests have been less successful than expected. As such, it is imperative to ask why the efforts of a wide range of participants have failed to address the problem. To address this question, CIFOR initiated an SCIP-funded project, on the theme of “enhancing the role of forestry in Ethiopia’s CRGE”. The aims of this project were to: identify and select best plantation practices (i.e. smallholder, communal and commercial), evaluate the impacts of plantation forests (e.g. socioeconomic impact of plantation forests, biophysical impacts of plantation forest) and conduct an ex-ante evaluation (e.g. major plantation constraints and alternative improvement measures).

The following practices were considered in the preparation of the regional forest strategy: the management of plantation forests, PFM, AF, establishment and management of area enclosures, and management of dry forests and woodlands management. Detailed study on each of these forest management practices was conducted in Amhara, Oromia, SNNPR, Tigray and Benshangul Gumuz Regional States, respectively. The results of the studies conducted in the other regions were used in the preparation of the regional forest strategies. A major limitation associated with this strategy is that technology that works well in one locality may not necessarily work in another area where it is to be adopted. In order to overcome this drawback, it is essential to be flexible when developing the intervention packages.

3.4.3 Scaling up effective practices

Scope and guiding principles in scaling

Scaling up refers to the introduction, promotion or expansion of viable, important, verified, and better performing technologies and best practices, to different beneficiaries living within similar agro-ecological zones so that these best practices can be used to increase production and income to improve their livelihoods. Best practices are disseminated outside of their original area, to cover larger areas and reach a larger number of beneficiaries. This strategy is also known as scaling out. Scaling up is the highest level of the technology

transition ladder, and involves various institutions from grassroots organizations to policymakers. In addition to this, development institutions and members of the private sector play a role in promoting and adopting useful technologies and best practices. This process requires the collaboration of other, relevant implementing agencies and/or stakeholders, to ensure the adoption of useful and important technologies and best practices by a large number of farmers, to increase their production and productivity. The contributions of stakeholders at various levels are critically important, because these minimize the chances of making mistakes, which could affect the effectiveness of the scaling up process. The key elements and pathways of the scaling up process are presented in the following diagram.

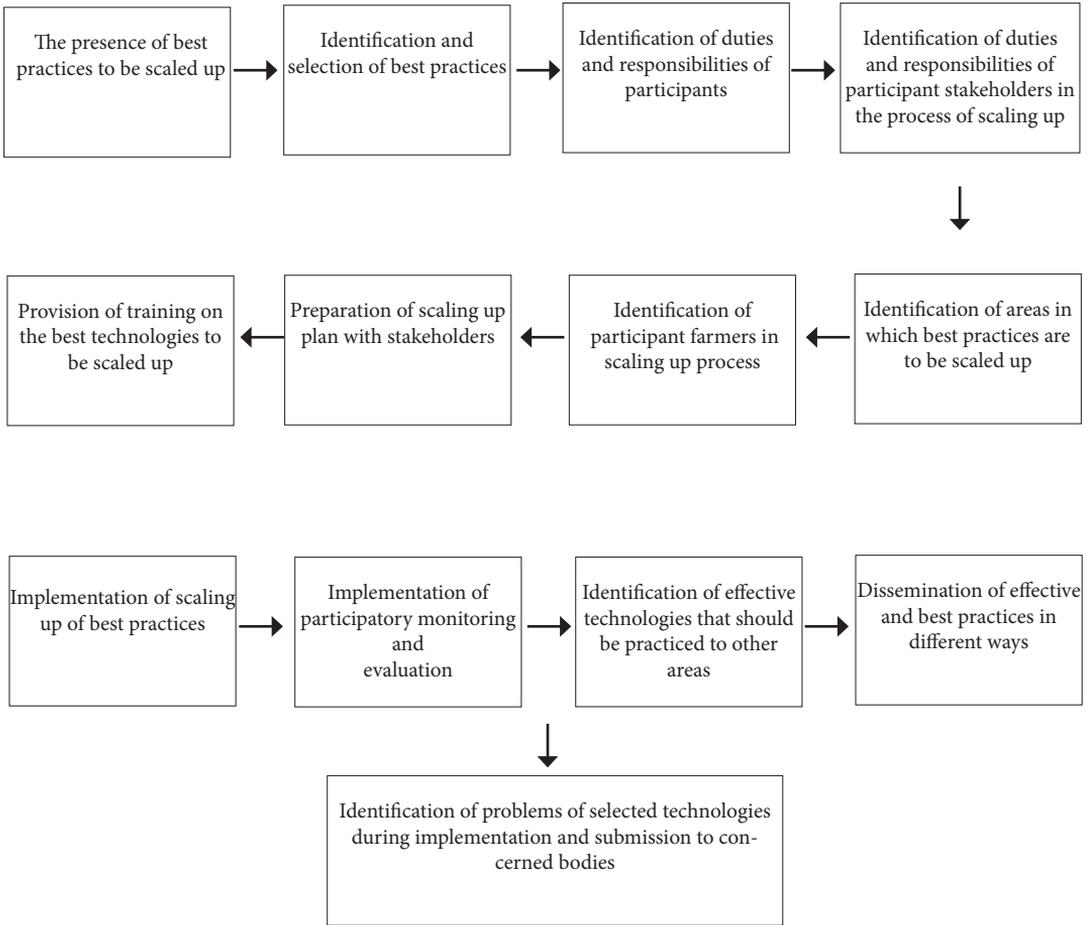


Figure 1. Scaling up procedures (Source: BoA 2015)

3.5 How to scale up?

Ethiopia has recently started scaling up best practices in the forestry sector. Various practices in forestry and AF have been implemented on individual farms as packages, as well as on communal and state-owned plantations and in natural forests. Development facilitators at all levels have tried to deliver technical backstopping. While there have been some success stories, evaluations and witnesses in the field suggest that contributions to the livelihoods of local communities and environmental stability have been limited. Many factors contributed to these less satisfactory results, particularly, technical, institutional and policy gaps.

There are many of forestry and AF practices across the country. It is important to identify how these best practices can be scaled up to ensure sustainable forestry development. In scaling up forest management practices, the best practices and the roles and responsibilities of stakeholders should be identified. Based on the identified examples of best practice, implementation packages, manuals, training materials, leaflets, brochures and guidelines should be prepared. Training should be provided for local communities and staff of implementing partner government organizations (GOs) and NGOs. Additional activities to support the scaling-up process include: experience sharing; workshops; and conferences and field days for local communities and implementing partners of GOs and NGOs. Brochures and leaflets should be prepared and distributed, and mass media should be organized in the various districts and kebeles where the best practices are to be scaled up, to create awareness among local communities. In addition, the best practices should be demonstrated on permanent plots. Technical support and supervision should be provided during the implementation stages of these activities. Participatory monitoring and evaluation should be conducted at various levels. Documentation, recordkeeping and reporting should be conducted periodically to ensure the successful implementation of scaling up of best practices.

What are the boundaries for scaling up?

Intervention measures can be implemented in: small-scale and commercial plantations; areas where PFM is implemented; areas where AF, dry forests and woodlands, enclosure development and management are practiced; or even initiated as new intervention. Therefore, it is important that the specific sites where the intervention will take place are clearly identified. Each specific intervention measure should be applied in areas where it is relevant and best suited.

3.6 Opportunities and challenges for scaling up

Opportunities for scaling up best forestry practices include: the existence of good practices in the forestry sector; the availability of structure at various levels; the government's commitment to scaling up best practices; and the existence of strategies and development plans (e.g. CRGE, GTP).

The challenges for scaling up best forestry practices include: promoting practices in areas where they may not work well, inadequate skill and knowledge; lack of financial and physical resources; insufficient commitment and attention of experts; staff

turnover; inadequate participation of beneficiaries and lack of or inadequate phasing out or exit strategy for externally funded projects; and poor forestry extension service.

3.7 Creating enabling conditions for scaling up

a. Aligning with ongoing plans and initiatives

Forestry is one of the four major pillars of Ethiopia's Climate Resilient Green Economy (CRGE). The adoption of the CRGE suggests that the Government of Ethiopia is committed to promoting afforestation, reforestation, enclosure and better forest management practices, to enhance forest cover and increase carbon sequestration and/or stock of forests and woodlands. The CRGE strategy is also expected to address the sustainable management of remnant forests resources. The CRGE recommends the afforestation of 2 million ha, the reforestation of 1 million ha, and the improved forest management of another 2 million ha of woodlands (CRGE 2011). Ethiopia is undertaking a range of development programs to support the implementation of the CRGE strategy, including the GTP, which also sets targets related to afforestation/reforestation, forest conservation, and forest management plans. The country is also committed to implementing various international conventions and agreements, including the Great Green Wall, the Convention on Biological Diversity, REDD+, the UN Convention to Combat Desertification (UNCCD), the Convention to Combat Climate Change, the UN Framework Convention on Climate Change/UNFCCC, and the New York Pledge. In order to meet the targets set by the government, significantly increase forest cover, and raise the forest sector's contribution to the national economy, Ethiopia requires reforestation/afforestation programs that are well planned, scientifically managed, regularly monitored, and implemented in participatory manner. This scaling up strategy could play a vital role in facilitating the successful implementation of national programs, and international agreements and commitments.

b. Linking with the livelihood strategies of communities

The scaling up strategy should be linked with the livelihood strategies of rural communities and plans to rehabilitating and protecting the natural resource base and the environment. Therefore, the strategy should focus equally on resolving the actual problems faced by communities, and the resource base. It should consider integrated rural development approaches, and use indigenous practices as an entry point.

c. Ensuring active participation of communities and increasing their benefits

To ensure the effective implementation of the scaling up strategy, it is crucial that communities actively participate in the planning process, and the selection and evaluation of best practices from the outset, and take ownership of the interventions. This will enhance the communities' opportunities to secure benefits from scaled up best practices. The diversification of forest product types, and an increase in products and productivity creates enabling conditions for the scaling up of best practices.

d. Building capacity of local government structures

Before the scaling up process is undertaken, efforts should be made to build the capacity of government structures and community based organizations, through

technical, institutional and logistics support. Technical training should be conducted on the identified best practices, including awareness creation, experience sharing and field trips.

e. Enhancing the role of state agencies, the private sector and other non-state actors

The contributions of each stakeholder are critically important to the scaling up process. It is necessary to clearly identify and negotiate the roles and responsibilities of the various stakeholders, and motivate them to efficiently do their part to realize the implementation of the scaling up strategy. In addition to this, it is important to provide close supervision and follow-up, facilitate information exchange and take necessary remedial action on time to rectify errors and weaknesses. Timely and effective extension services should be provided for private and non-state actors.

f. Strengthening cross-regional and regional-federal collaboration in forestry

Due to the global significance of forest development, it is vital to strengthen cross-regional and regional-federal collaboration, by implementing a system that promotes transparency, trust-building and collaboration. The following activities could support the implementation of such a system: financial, technical and logistic support; joint planning and implementation; experience sharing on best practices; conflict resolution; and networking with regional, national and international organizations.

4. IMPLEMENTING THE STRATEGY

4.1 Strategic directions

Scaling up refers to the expansion, replication, adaption, and maintenance of successful practices to reach a greater number of people. Interventions can focus on both horizontal and vertical scaling up. The forest management intervention measures outlined in this document were compiled based on field level practices observed in five regions. Effective practices in plantation management, PFM, AF, exclosure and dry forests and woodlands management, were documented in Amhara, Oromia, SNNPR, Tigray and Benshangul Gumuz Regional States, respectively. It is important to critically consider the physical, ecological, social, and cultural and policy context of each region, as well as their institutional capacity and awareness levels, to ensure the successful implementation of scaling up activities. It is also essential to determine the expected impact of the intervention, and develop indicators for monitoring and evaluating achievements. The knowledge acquired from pilot projects should be recorded, so that it can be used to improve the scaling up model. Once an effective practice is identified, there are many possible pathways for scaling up a successful intervention. To accomplish this, it is essential to ensure adequate institutional, legal and technical capacity to carry out the planning, coordination and implementation of the strategy.

4.2 Preparing an operational plan

The following indicative operational plan is recommended.

Activity	Year 1	Year 2	Year 3	Year 4	Year 5
Institutionalization of an implementing body for the strategy (under the mandated bureau)	X				
Sensitization of policymakers, experts, and communities about the strategy.)	X				
Preparation of extension manual for the five strategies	X	X			
Identification of suitable areas for scaling up	X				
Selection of community members to be involved in the scaling process	X				
Capacity building (e.g. experience sharing, field visits, training, participatory demonstration sites, etc.)	X	X	X	X	X
Facilitation and/or provision of technologies, inputs and technical backstopping	X	X	X	X	X
Value addition and creation of market linkages	X	X	X	X	X
Monitoring and evaluation		X	X	X	X
Impact assessment					X

4.3 Addressing organizational, human resources and financial requirements

Owning the strategic document and aligning it with the existing forest development activity. For the successful implementation of the strategy, it is essential relevant organizations and the respective leaders at all levels (i.e. federal, regional, zone, district and PA) owns the prepared strategy, and streamlines it with the current development program. It is also important to identify the different actors that play important roles in implementing the strategy, and clearly articulate the duties and responsibilities of each actor. The state, the community, individual farmers and organized and private firms have roles to play in the implementation of this strategy. It is therefore a prerequisite to plan where and how to involve these actors.

Critically evaluate if the existing policies, regulations, land use, institutional setup and capacity are conducive to successfully implementing the strategy. The implementation of the strategy must be supported by the development of conducive policies, regulations and directives. It is, therefore, necessary to revisit the existing policies that have a direct or indirect influence on the implementation of the strategy, and make the necessary amendments to support its proper implementation. Another important factor that directly or indirectly influences the implementation of the strategy, or any other development program, is the existence of suitable institutional set up and capacity to manage anticipated responsibilities. Strong, responsible institutional set up, with clear mandates is required. It is also important to consider how to integrate the contributions of other stakeholders, so as to facilitate the smooth implementation of the strategy.

Identify relevant stakeholders and partners who have a stake in implementing the strategy, and bring them on board during both the planning and implementation phases. Different GOs, NGOs and CBOs undoubtedly have different roles to play in implementing the strategy. It is therefore necessary to identify these institutions, identify their roles, and clearly establish how best to involve them in the implementation process. To effectively make use of the contributions of all collaborators and partners, a steering committee could be established, comprising all relevant stakeholders.

Identify, map, demarcate and gazette forests and forest lands where the various interventions are to be applied. It is anticipated that the strategy will incorporate various forest management intervention measures, including plantation, PFM, AF, dry forest and woodland management, and exclosure. It is necessary to identify where each of these intervention measures would be best implemented. Hence, it is essential to properly understand the resource base, and develop priority intervention measures suitable to the specific sites.

Encourage the involvement of private investment in forest development and management. To do so,

- implement incentive mechanisms to enhance private sector involvement in the development and management of forests
- prepare clear guidance packages, implementation manuals and other necessary

supportive manuals for each intervention measure,

- solicit funding required to strengthen implementation capacity
- ensure that all stakeholders, particularly communities, are engaged in planning and implementation
- prepare complete packages for each of the intervention measures.

4.4 Implementation and coordination: engaging key actors and negotiating their roles

4.4.1 The role of state and non-state actors

The roles of key state and non-state actors are crucial to the successful implementation of the strategy. The primary actors and their responsibilities are described in Table 3.

Table 3. Roles of different actors in the implementation of the scaling up strategy for best forest management practices in ANRS

Stakeholders	Responsibility
MEF	Providing direction; coordination; technology package development; capacity building; technical backstopping; monitoring and evaluation; soliciting funds; revising policies, rules regulations and directives; planning and developing criteria and indicators for impact assessment; and strengthening partnerships with other institutions
Regional bureaus	Awareness creation; training; technical backstopping; package development and implementation; providing direction; coordination; capacity building; budget allocation; monitoring and evaluation; revising rules, regulations, directives and institutional set up; aligning activities with existing regional programs
Zonal	Coordinating, monitoring and evaluation
Woreda and Kebele	Training, awareness creation, implementation, follow-up
Research and HLI	Providing technical and advisory support and improving access to technologies; impact assessment; adopting technology from elsewhere; generating information and technologies
Other line ministries (of agriculture, trade, information, water and energy, etc.)	Collaboration; technical support; aligning with current activities, policies and regulations; providing financial and material support
Other line bureaus	Playing their respective roles, and collaboration
Non-governmental actors	
NGOs	Training, capacity building, implementation, project development
Civil societies	Training, capacity building, implementation, project development
Community based organizations	Participation, facilitation, implementation
Private sector	Take part in Implementing the strategy and support it through investment

4.5 Potential risks and mitigation measures

When implementing development programs, there are potential risks that may hinder the successful execution of the strategy. It is, therefore, important to identify the possible risks, and devise appropriate mitigation measures in advance. Some of the risks are summarized below:

- institutional instability and fragmentation of the operation
- failure to pay due attention to the holistic implementation of the full scaling up package
- inadequate use of available and emerging opportunities
- diseases and pest infestations in nurseries and plantations
- risks associated with unclear ownership of the strategy and scaling up program
- limitations of financial and material support mechanisms
- lack of full implementation of relevant policies and documentation of outcomes, in view of generating evidence to propose improvement measures
- lack of effective, timely monitoring and evaluation may lead to poor decisions in scaling up.

4.6 Monitoring, evaluation, reporting and improvement of the strategy

Monitoring and evaluation are key components of a successful scaling up strategy. M&E are important tools for assessing the strengths and weaknesses observed during the implementation phase. Necessary corrective and improvement measures must be taken in a timely manner. It is essential to implement an appropriate monitoring and evaluation system to regularly follow up on the process and ensure the timely execution of corrective measures. There is a need to develop criteria and indicators that can be used during monitoring and evaluation. Monitoring and evaluation should:

- address the main factors that affect the implementation of the anticipated intervention measures
- identify the opportunities and constraints that may affect the process of scaling up
- undertake periodic assessments of the socioeconomic, environmental and technical impacts of the intervention measures (preferably against a control group)
- provide periodic feedback on any unforeseen aspects of the scaling up process that arise during the implementation process, and devise ways to address these issues
- carry out critical analyses to check if set milestones have been reached and expected outputs have been met
- identify improvement measures that need to be taken, and issues that require further research.

5. THE WAY FORWARD

Climate change has become one of the most significant topics on the global agenda in recent years. Countries must develop strategies to adapt to and mitigate the impacts of climate change. Managing existing natural forests and woodlands, and rehabilitating degraded lands through tree planting programs is considered to be one viable approach. Ethiopia and the wider region have been involved in a range of forest development and management initiatives for many years. The lessons learned from those initiatives, as well as from watershed conservation activities, the millennium tree planting project, and mass mobilization experiences, can be used as a springboard for planning the scaling up of selected intervention measures. This strategy is designed to make sure that the targets set in CRGE, GTP II, REDD+ initiatives, and other international agreements and pledges, are successfully implemented. It is also equally important to establish an enabling environment, and identify the actors needed for the successful implementation of the scaling up strategy. It is essential to ensure that scaling up is effectively mainstreamed with existing development and operational plans. In addition to this, it is important to undertake periodic reviews and critically consider whether the existing national strategy, operational policies, processes, and available budget and human resources are supportive of, and in accordance with the planned scaling up activity. Furthermore, proper handling and management of information related to the scaling-up process is essential for the formulation, implementation, and monitoring of similar programs, and for making the necessary adjustments to the scaling-up process. In this regard, the MEF must provide unreserved technical backstopping, capacity building and strong support and encouragement to implementers at all levels; pursue the scaling-up agenda as national agenda; and align and incorporate it into the national plan. The MEF and the responsible regional offices are expected to develop criteria that can be used during the implementation and monitoring process. It is also necessary to clearly determine what the sector wishes to achieve through the scaling up process, and at what scale, and identify the right balance between innovation and scaling-up. Moreover, there is a need to clearly identify the kind of scaling up that is anticipated, the appropriate mechanisms to support the scaling up activities, and the proactive measures required to integrate the scaling up activity with existing programs at federal and regional levels.

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ANNEXES

Annex 1. Criteria for species selection by forest plantation systems.

Large-scale industrial forest plantation	Large-scale nonindustrial forest plantation	Small-scale village/ community forest plantation	Agroforestry systems
Yield over 10-15 m ³ /ha/ year	Intensive root system	Easy propagation	Multiple uses
Easy propagation	Good survival and growth	Coppicing	N ₂ -fixation
Marketing Valuable timber	Suitable for marginal lands	Multiple uses	Deep rooting
Suitable for monocultures	Undemanding Multiple uses	Fast growth	Coppicing
Resistance to pests Fire/ wind resistance Auto-tolerant	Good natural regeneration	Short rotation	Fast growth
Ease of pruning Good wood properties	Easy propagation Coppicing	High acceptance	Light crowns
Availability of proven seeds	Soil improvement	Site-specific	High acceptance
Site-specific	Robust against browsing		Site-specific
	Site-specific		

Adapted from Camirand (2002)

Annex 2. Proposed alternative fast growing and multipurpose tree/shrub species for smallholder, communal and commercial plantations

No	Species	Plantation type
1	<i>Eucalyptus deglupta</i>	All
2	<i>Pinus patula</i>	Commercial
3	<i>Eucalyptus saligna</i>	All
4	<i>Eucalyptus grandis</i>	All
5	<i>Cordia africana</i>	All
6	<i>Hagenia abyssinica</i>	Commercial/communal
7	<i>Podocarpus falcatus</i>	Commercial
8	<i>Juniperus procera</i>	Commercial
9	<i>Olea</i> spp.	Commercial
10	<i>Jacaranda equisetifolia</i>	Smallholder/communal
11	<i>Shinus molle</i>	Smallholder/communal
12	<i>Casuarina equisetifolia</i>	Smallholder/communal
13	<i>Acacia melanoxylon</i>	All
14	<i>Malus pumila</i> (Apple)	Smallholder/communal
15	<i>Persea americana</i>	Smallholder/communal
16	<i>Mangifera indica</i>	Smallholder/communal
17	<i>Prunus persica</i>	Smallholder/communal
18	<i>Psidium guajava</i>	Smallholder/communal
19	<i>Citrus</i> spp.	Smallholder/communal
20	<i>Pinus maximinoi</i>	Commercial
21	<i>P. keyensis</i>	Commercial

No	Species	Plantation type
22	Gmelina arborea	All
23	erminalia ivorensis	All
24	Tectona grandis (Teak)	Commercial
25	Highland bamboo	Smallholder/communal
26	Acacia senegal	All
27	Moringa stenopetala	Smallholder/communal
28	Populus spp.	All
29	Faidherbia albida	Smallholder/communal
30	Grevillea robusta	Smallholder/communal