Identifying Options and Scenarios of Voluntary Commitments for Biodiversity in the Agriculture, Livestock and Forestry Sectors in the Bale Eco-Region and the Southwest Natural Forest of Ethiopia

Proposing associated strategies to mobilize economic actors

FINAL TECHNICAL REPORT

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Acronyms

BMNP	Bale Mountains National Park
BER	Bale Ecoregion
CSOs	Civil Society Organizations
CAHWs	Community Animal Health Workers and Experts
CDV	Canine Distemper Virus
CBD	Convention on Biological Diversity
CBNRM	Community Based Natural Resource Management
CBCA	Community Based Conservation Areas
CBA	Cost Benefit Analysis
CRGE	Climate Resilient Green Economy
CWS	Certification of World Standard
DSW	Deutsche Stiftung Weltbevoelkerung
DPSIR	Driver, Pressure, State, Impact and Response
ECX	Ethiopian Commodity Exchange
EFCCC	Environment, Forest and Climate Change Commission
EGTE	Ethiopian Grain Trade Enterprise
EIA	Environmental Impact Assessment
EBI	Ethiopian Biodiversity Institute
ESARO	Eastern and Southern Africa Regional Office
ESE	Ethiopian Seed Enterprise

EPACC	Ethiopian Programme of Adaptation to Climate Change
ECTA	Ethiopian Coffee and Tea Authority
EWCA	Ethiopian Wildlife Conservation Authority
FAO	Food and Agriculture Organisation
FSTU	Forest Sector Transformation Unit
FCPF's R-PP	Forest Carbon Partnership Facility's Readiness Preparation Plan
FGD	Focus Group Discussion
FZS	Frankfurt Zoological Society
FDRE	Federal Democratic Republic of Ethiopia
GTP	Growth and Transformation
GOE	Government of Ethiopia
GDP	Gross Domestic Products
GHG	Green House Gas
GIZ	German Development Cooperation
IPBES	Intergovernmental Science and Policy Platform on Biodiversity and Ecosystem Services
ILO	International Labour Organisation
IUCN	International Union for Conservation of Nature
IWMI	International Water Management Institute
KII	Key Informant Interview
KBAs	Key Biodiversity Areas
NABU	Nature and Biodiversity Conservation Union
NDP	National Development Plan
NBSAP	National Biodiversity Strategy Action Plan

NTFPs	Non-Timber Forest Products
NAPA	National Adaptation Program of Action
OBANRM	Oromia Bureau of Agriculture and Natural Resource Management
OFWE	Oromia Forest and Wildlife Enterprise
OEFCCA	Oromia Environment, Forest and Climate Change Authority
PRM	Participatory Rangeland Management
PEST	Political, Economic, Social, and Technological
PFM	Participatory Forest management
PGRFA	Plant Genetic Resources for Food and Agriculture
PPP	Public Private Partnership
PHEEC	Population, Health, and Environment Ethiopia Consortium
REDD+	Reducing Emissions from Deforestation and Forest Degradation
SWF	Southwest Forest
SWOT	Strength, Weakness, Opportunities and Threats
SDGs	Sustainable Development Goals
UN	United Nations
UNESCO	United Nations Education, Scientific and Cultural Organisation
WRI	World Resources Institute
WWF	World Wildlife Fund
UNEP	United Nations Environmental Program

EXECUTIVE SUMMARY

1. Background

The IPBES, 2019 reported that the health of the ecosystems which humans and all other species depend on is degrading today at an unprecedented rate. With the aim to reverse the curve and promote more sustainable and resilient economies, IUCN collaborates with Expertise France and WWF-France to catalyze the BIODEV2030 Initiative that tries to mainstream biodiversity into key economic sectors in 16 pilot countries, including Ethiopia. The BIODEV2030 initiative is following a "3D" approach (Diagnostic, Dialogue and Disseminate) to achieve its ambitions. Based on results of national biodiversity state and threat assessment (Diagnostic phase, or Study 1) has identified five subsectors with greatest biodiversity impacts in two (2) eco-regions in Ethiopia; namely, Bale eco-region: (1) cereal crops (including wheat, barley, maize, sorghum), (2) livestock rearing, (3) small-scale logging and wood harvesting; and Southwest natural forest: (4) Coffee and (5) small-scale logging & wood harvesting. The purpose of the present study (Study 2) is therefore to identify options and scenarios of voluntary commitments for biodiversity in the five subsectors in the two landscapes and proposing associated strategies to mobilize economic actors.

2. Methodology

This study was carried out following the "DPSIR" conceptual framework. Four principal methods providing complementary and supplementary data were used to collect collate and synthesize required datasets: a) literature review; b) interviews; c) focus group discussions; and d) Stakeholder consultations. Strategic analysis tools, including Value Chain Analysis, PEST analysis, Stakeholders analysis, SWOT analysis and Scenario Analysis were used for data analysis.

3. Key findings

In this document, we report preliminary findings for each subsector on key characteristics of value chains (value chain stages, activities at each stage, and actors involved at each stage), existing laws, policies and strategies, best experiences and commitments, biodiversity impact, SWOT analysis, stakeholder mapping, and proposed strategies for addressing the biodiversity impacts of each subsector via voluntary commitments. These are briefly described as follows.

3.1 Cereal crop subsector in the Bale Ecoregion Landscape

Key characteristics: Cereal cultivation system in the Bale Ecoregion (BER) is characterized by agropastoralism that involves oxen ploughing, hand weeding, manual harvesting and threshing, limited use of chemical fertilizer and improved seed varieties. Households produce cereals on small land holdings, ranging from 0.5–2 ha. However, some households reported their use of inorganic fertilizers and improved varieties of seeds to enhance their agricultural production and productivities. Despite this, productivity is low due, largely, to limited access and use of improved inputs, mainly due to limited financial resources to cover the cost and poor agronomic practices. The value chain is characterized by Production, Processing, Trading and Consumption.

Impacts on biodiversity: In the BER, cover of cropland currently is estimated to be about 8326 km^2, accounting nearly 21% of the total area of BER and increasing from 2675 km^2 (7%) in 1973 and 3667 km^2 (9%) in 1986. Extensive conversion of forests, grasslands, shrublands and woodlands into cropland in the four decades (between 1973 and 2015) has been documented. The net change of cropland has been an increase in 992 km^2 (37%) between 1973 and 1986, 2657 km^2 (73%) between 1986 and 2010), and 2002 km^2 (32%) between 2010 and 2015. Given the ever-increasing demand for arable land by small-scale farmers, due to high population growth rate, the combined mid- and long-term negative impacts of habitat loss and degradation include increased soil erosion and consequently reduced soil fertility and associated agricultural productivity; drying out of perennial rivers; climate change leading to increased temperature and erratic rainfall, drought; siltation of dams and reduced hydroelectric power supply.

Biodiversity best practices and current commitments: Biodiversity-friendly agricultural best practices and commitments at local level include introducing agro-forestry, terracing, soil and watershed management, restoration of degraded areas via reforestation and enclosure, providing training on modern farming practices on agroforestry horizontal Ploughing, mixed cropping, to reduce erosion, Soil and water conservation practices via bund 'soil and stone bund' methods, Terracing. At national level, the new 10 year development plan (2021–230), it is projected to reduce the contribution of crop sector to GDP from 21.4% in 2020 to 16.3% in 2030, by reducing area covered by crop but increasing total production and productivity through agricultural intensification. In addition, Ethiopia has prepared its readiness to implementing the REDD+ program since 2019 to help reduce deforestation and forest degradation due to agricultural activities, while improving the lives of rural populations. BER is one of the targeted regions for implementation of the national REDD+ program, which is an example of an opportunity to voluntary

commitment by the stakeholders, which not only enhance forestry resources, but also other sectors such as agriculture.

Voluntary Commitments and Scenarios

Problem to be addressed: Heavy Deforestation for cereal cultivation land, and Inefficient and biodiversity unfriendly cereal cultivation practices causing biodiversity decline, land degradation and food insecurity.

Voluntary commitments proposed from actors:

VC 1: Avoid any further cultivation land expansion in the strictly protected areas (i.e., Bale Mountains National Park) through effective law enforcement
VC 2: Awareness raising for farmers and government officials on biodiversity laws and policies, impacts of biodiversity degradation on ecosystems and human wellbeing
VC 3: Adopt biodiversity friendly intensive cereal cultivation practices, such as using improved seeds, compost, mulching and manure; mixed cropping; agroforestry; pest/herb control
VC 4: Promote both biodiversity conservation and household livelihood and food security of local communities through alternative income generation options and ESP schemes (e.g., REDD+)
VC 5: Restoration of previously degraded and abandoned cereal cultivation areas through reforestation, Area enclosure, soil and water conservation practices (e.g., 'soil and stone bund' methods, Terracing)

3.2 Coffee Subsector in the southwest forest landscape

The Southwest Forest Landscape encompasses four of the five Biosphere reserves currently designated in Ethiopia: Kaffa Coffee Forest, Yayu Coffee Forest, Sheka Coffee Forest and Majang Forest Biosphere Reserves (Table 1). The landscape (the reserves) covers a total area of 1,171,892 ha, of which 168,185 ha has been demarcated as Core area(s), 333,252 ha Buffer zone(s) 670,933 ha Transitions zone(s).

***Key Characteristics Coffee subsector Value Chain*:** Coffee is a major agricultural export crop, which in the past provided about 60–70% of annual export values but now provides about 22–30% of annual commodity export earnings. Local consumption of the coffee is high, at about 50–53% of production. There are four types of coffee production systems in Ethiopia: 1) forest; 2) semi-forest; 3) garden; and 4) plantations. The first three involve smallholders and account for, respectively, an estimated 10%, 35%

and 50% of total coffee production. Coffee cultivation accounts for an average 0.91 ha of smallholders' total 1.76 ha of land. Smallholders' yearly earnings from coffee account for about 50% their total agricultural income. Large monoculture plantations, on the other hand, account for 5–10% of coffee production, though there are only about 200 of them. These plantations may be owned by non-farmer individuals, such as exporters or processors. Around 10–15% of smallholder producers belong to coffee cooperatives which often to offer better prices to producers, as well as technical support to improve their productivity and farming practices.

Coffee Value Chain in the study landscape comprises of four major functions. Farmers, cooperatives, local traders (supplier), ECX, and exporters are the key actors along coffee value chains. Farmers supply produced coffee to local traders either in the form of red cherry or sundried coffee in primary market. For primary cooperatives, the executive committee meets to set the coffee purchasing prices in the primary market based on the information from ECX, while the local trader set the price on spot at the primary markets in reference to price set by cooperatives in addition to price information, they received from ECX. ***Major constraints*** of coffee production include: poor marketing strategy and access; lack of access to financial loan for coffee producers and deterioration in soil fertility due to vegetation degradation resulting to soil erosion resulting to low quality and quantity production; lack of processing and storage facilities nearby farmers; and lack of coordination among actors.

Direct and indirect impacts of Coffee subsector on biodiversity*:** The direct impacts of Coffee subsector development on biodiversity in the Southwest forests landscape are mainly associated with management practices undertaken during production stage: ***Initial canopy opening / clearing undergrowth, Weeding operations, Shade trees management, and Enrichment planting. Forest loss and degradation hindered regeneration of conservation concern indigenous tree species, reduced tree cover and abundance, decreased plant and animal species richness, increased soil erosion. Overall, a 105 km^2 loss of forest cover in the Yayu Coffee Forest Biosphere Reserve between1986 to 247 km^2, with area of managed coffee forest in the reserve increasing from 8.3 km^2 to 356.5 km^2 during the period. Similarly, forest coverage in the present boundary of Kaffa Coffee Forest reserve in 1986 was about 50% but declined to 31% of the total reserve area in 2019; and a 77.8% decrease in forest cover in the Majang reserve between 1987 and 2017. ***Best practices and current commitments*:** The Nature and Biodiversity Conservation Union (NABU), in cooperation with the Ethiopian Government and other partners, have been implementing the three projects in Kafa Biosphere Reserve from 2009 to 2017. The central aim of these projects was the conservation of

forests in order to protect the biodiversity and maintain ecosystem services for the local people as well as to combat climate change, as forests are crucial carbon sinks. The projects are based on three main pillars: Restoration and management of ecosystems; Regional development and sustainable use of natural resources; and Communication and environmental education

The projects have achieved: The restoration of around 750 ha of natural forest with indigenous species; Established 300 ha of agroforestry areas as well as 1,700 ha of community plantations with fast-growing tree species, which help to satisfy people's wood demand and release pressure from natural forests; and Setup a Participatory Forest Management (PFM) system on an area of 11,600 ha, involving almost 7,800 local people; Introduced as many as 11,200 wood-saving stoves to almost 900 villages in Kafa and 54 locals were trained to produce these stoves as a new source of income, with an ultimate goal of reducing pressure of biomass energy on biodiversity.

The projects mentioned above were preceded by a Public-Private Partnership (PPP) Project, dedicated to a sustainable development in the Kafa biosphere region that ran for more than a decade and is now completed (1999-2009). This project is run by NABU, Deutsche Stiftung Weltbevoelkerung (DSW), German Development Cooperation (GIZ), Original Food as well as Kraft Foods Germany. The concept of the PPP Project: Long-term conservation of the Kafa forests can only be ensured if the livelihoods of local people are benefit from such alternative incomes. When the project was initiated, the prime forest product of Kafa – wild Arabica coffee – had no access to the international market.

Through the project, 27 cooperatives joined the Kafa Coffee Farmers Union and organized a professional processing and quality control of the coffee beans. Since 2005, wild beans have been exported to Europe at a price that benefits the farmers. This development was possible because Original Food imported the sun-dried beans and established an access to the specialty coffee market. From the 2006/7 harvest onwards, "wild collection" and "fair for life" certification enhanced the marketing success, which fulfil mutual benefits of people and biodiversity.

Problem to be addressed: Uncontrolled coffee farm expansion and biodiversity unfriendly production practices.

Voluntary Commitments and Scenarios:

- Avoid or reduce rate of deforestation for new coffee cultivation land
- Strengthen protection and implementation of threat abatement and law enforcement measures
- Reduce the impacts of forest fragmentation on biodiversity through restoration

- Adopt biodiversity friendly modern technology coffee production inputs and production practices, so as to mutually improve both coffee productivity, and status of biodiversity
- Improve coffee quality and income by adopting improved of coffee harvest, post-harvest, and processing, and marketing.

3.3 Livestock Subsector in the Bale Mountains Eco-Region Landscape

***Key Characteristics*:** In the BER, livestock production has been an integral part of the landscape for centuries and the subsector has been the predominant component of the socio-cultural and economic wellbeing of the community in the ecoregion. Like most rural communities in Ethiopia, for communities in the BER livestock is a tractor for crop farming, source of cash income, insurance for uncertainties, fertilizer for crops, expression of status for families and store of asset. Communities in the BER are known to practice the traditional livestock movement system, locally called *Godantu* – a system that allows free mobility of small human and livestock populations within the Ecoregion in order to exploit areas away from their permanent settlement sites. However, this system has been modified since 1970s due to political and socioeconomic changes taken place then after.

***Direct and indirect biodiversity impacts of livestock subsector*:** The direct and indirect impacts of livestock on biodiversity of livestock subsector in the BER include: reduced vegetation cover and a shift from shrubs and perennial grasses to annual grasses and forbs; reduced tree regeneration in different vegetation types; changes in species composition of woody plants, by fostering the expansion of invasive (weedy) species, such as the shrub *Solanum marginatum* and herbaceous species such as *Urtica simensis* in the northern woodlands. Through direct trophic interactions with wildlife, livestock competition for food have been found to impact the distribution, abundance and movement patterns of many conservation concern ungulates such as the endangered endemic Mountain Nyala (*Tragelaphus buxtoni*). The increasing number of domestic dogs in the BMNP has caused various threats to wild mammals of the park through competition for food with wild carnivores, including the Ethiopian wolves and by acting as reservoirs for rabies and canine distemper virus (CDV) and transmitting to the wolves. For example, rabies outbreak in 2015 killed more than 50 adult wolves and the 2016 CDV outbreak swept out over 45% of the total population of adult wolf population of BMNP. Livestock grazing has also caused decline in species richness, diversity and abundances of bird species groups that require tall grass habitat and many globally threatened, locally endemic amphibian and reptilian species. At ecosystem level, livestock has caused soil

compaction, bioturbation via dung accumulation, siltation of rivers and dams, reduced soil infiltrations and increased surface water runoff.

***Existing best practices to reduce pressures/impacts on biodiversity*:** The following are three good practices to learn lessons from for the voluntary commitment. (1) In the current National development Plan (2021–2030), the Ethiopian government has planned to increase the average contribution of the livestock subsector from 2.5% base year (2020) to 3.7% in between 2021 and 2030, by increasing production and productivity but reducing number of livestock by replacing with improved breeds, rangeland management, fodder provision and adequate vet services. (2) The SHARE BER project, a consortium of four NGOs working government sectors, have undertaken good practices to reduce the impacts of livestock subsector on biodiversity. This includes established Water management platform for improved water management: Training Community Animal Health Workers and Experts (CAHWs), Established Participatory Rangeland Management (PRM) Cooperatives: and Initiated National Park Shared Management Practices. (3) The Bale Mountains National Park has planned to implement Grazing Reduction Strategy to regulate livestock grazing in the park in collaboration with local communities, government and NGOs working in the area.

Voluntary commitments for livestock subsector:

Problem to be addressed: Overgrazing in the core zones of the Bale Mountains Ecoregion, and poor livestock husbandry.

Voluntary commitments:

VC1: Reduce the impacts of livestock overgrazing on biodiversity in KBAs, including the BMNP, through formal and informal regulatory mechanisms

VC 2: Improve rangeland and water sources management and water harvesting systems in semi-arid areas to cope-up with livestock feed and water shortage

VC 3: Reduce number of livestock while improving production and productivity through application of modern husbandry practices such as genetically improved breeds, fodder production and modern vet services.

3.4 Small-scale Logging and wood harvesting Subsector in the Bale Ecoregion Landscape

Key characteristics: According to the 2018 National Forest Law, are four types of forest ownerships, all of which are found in the Bale Ecoregion (BER): 1) Private Forest; 2) "Community Forest 3) "Association Forest"; and 4) State forest. State Forest is further categorized into three types in terms of management purposes: a) Preserved Forest – managed by designated State entity; b) Protected Forest – managed either by State entity or through Participatory Forest management; and c) Production forest – managed by government entity. All forest types are exploited, legally or illegally, by local communities for use for: energy source (wood fuel) for households and by small businesses, either directly as firewood or after conversion first into charcoal; construction materials (lumber, pole, bamboo); and furniture manufacturing. Nearly, 75%-90% households in the BER use fuelwood (firewood and charcoal) for cooking, heating and lighting, and the remaining use cow dung and crop residue, as well as electricity in towns. Communities in villages located relatively far from forests tend to own plantations or homestead garden trees to meet their fuelwood demand compared to those villages closer to forests. The average annual per capita fuelwood consumption is estimated to be 4361.75 kg/person/year. The wood supply chain in the BER consists of five stages: ***Production: Processing: Transport and trade: Distribution and retail: and Consumption***.

***The impacts on biodiversity of the wood supply*:** In wood harvesting stage, negative impacts on biodiversity come from the fallen branches and leaves that damages understory vegetation; indiscriminate harvesting, including rare and threatened indigenous tree species with poor regeneration status; and micro-environment modification. These all can lead to forest degradation and changes in vegetation diversity and composition. It is estimated that the use of firewood is emits 8,733 tons of carbon, which corresponds to removal/deforestation of about 92 ha of forest per year. In the wood processing stage, negative impacts on biodiversity are generated from sawdust, wood chips which cause environmental pollutions, affecting the living environment of plants and animals nearby the processing areas. In the consumption stage, the main impacts from fuelwood consumption are environmental pollution due to CO2 and organic particles released to the atmosphere via smoke.

Best experiences and existing commitments*:** The following are currently existing commitments and best practices. (1) ***At woreda level - Agroforestry practice via multipurpose tree plantation; Awareness raising and training by government together with PFM groups; Biogas production as alternative energy source;

Introducing and promoting the use of solar energy panel; Distributing energy efficient stove; Forest demarcation and development; Implementing carbon credit; Planting tree seedlings (2) ***Provisioning of solar energy panels*** - FZS has been providing 25 W solar panels, with full accessories, for a total of 120 households in the kebeles (villages) of Dinsho and Goba Woredas that surround the BMNP, with the aim to reduce forest degradation and the carbon emissions. (3) ***Ethiopia's National Development Plan*** - While protecting the existing 17.35 million ha of forest, Ethiopia also intends to undertake large-scale afforestation and reforestation to increase total forest cover from 15.5% at present to 30% by 2030. The progress is encouraging with involvement of high-ranking government officials including the Prime Minister and other ministers. (4) ***National Tree-Based Landscape Restoration Potential and Priority Maps:*** In 2018, the then Ethiopian Ministry of Environment, Forest and Climate Change, now Forest Development Institute, produced the National Tree-Based Landscape Restoration Potential and Priority Maps in collaboration with the World Resources Institute (WRI), which are available on EFCCC's website. The maps aim to guide decision-makers about where more trees could benefit Ethiopian landscapes, which tree-based landscape restoration options could be implemented in these landscapes, and where to prioritize cross-sectoral implementation (MEFCC 2018a). Based on national and regional experts' input, 73% of Ethiopia's land area was identified as having potential for at least one of the eight tree-based landscape restoration options identified as crucial for Ethiopia's economic, social and environmental goals: Restoration of secondary forests; Restocking of degraded natural forests; Agri-silviculture and agro-silvo-pastoralism; Silvo-pastoralism; Woodlots and home gardens; Commercial plantations for products other than industrial roundwood (mapping specific to industrial planation forest is covered in ''Ethiopia Commercial Planation Forest Industry Investment Plan" report); Buffer plantations around protected areas and national forest priority areas; Tree-based buffer zones along rivers, lakes, and reservoirs. (5) ***Revising National Forest Law:*** The government has proclaimed "The 2018 National Forest Law" – a revised version of the 2007 forest law – which now clearly recognizes the rights of communities and acknowledges their role in managing natural forests and establishing plantations, without unduly compromising ecological services or biodiversity.

Voluntary commitments for logging subsector in the Bale Ecoregion

Problem to be addressed: Excessive logging and wood harvesting for fuelwood, furniture and construction.

Voluntary commitments:

VC 1: Reduce the dependence on natural forests of urban and rural households and service providers (hotels/restaurants, bakeries, etc) on wood products for energy, construction and/or furniture production

VC 2: Strengthen sustainable forest protection, development and utilization by developing management plan, PFM, and ownership certification of private, association and cooperative forests.

3.5 Forestry Subsector in the Southwest Forests Landscape

The key characteristics, impacts, and strategies for voluntary commitments described above for the subsector in the Bale Ecoregion Landscape also applies in the Southwest Forest landscape

4. Conclusions and the way forward

4. Overall Conclusions and Recommendation on the way forward

Results of the study show that all the subsectors analysed have significant biodiversity impacts and also there are opportunities to reduce these impacts while improving productivity of each subsector. In order to effectively implement the voluntary commitments agreed by actors of the subsectors, we recommend the following three key actions, in additions those recommended under mobilization strategy:

- Appointment of a facilitator at each landscape is required to mobilize actors and follow-up implementation of their commitments
- Mobilization for subsectors at each landscape should be lumped together, as almost the actors are the same and the interventions are inter-related
- Implementation monitoring database, including baseline data from literature review and new field surveys, should be setup at the beginning of implementation of the commitments.

1. Introduction and Background

1.1 Introduction

This report presents the preliminary findings of the study “Identifying options and scenarios of voluntary commitments for biodiversity in the Agriculture, Livestock and Forestry sectors in Bale eco-region and the Southwest natural forest of Ethiopia” as part of BIODEV 2030 project implemented in Ethiopia. This report complements the terms of references and clarifies the whole approach to the development of the situation analysis strategy for the identification of options and developing scenarios of voluntary commitments. In addition, this report has included a logical demonstration, based on published data and expert knowledge, to support the choice of key sub-sectors with greatest impact on biodiversity in Bale Ecoregion and Southwest Forest of Ethiopia.

1.2 BIODEV2030 Initiative

With the aim to reverse the declining trend of biodiversity and promote more sustainable and resilient economies, the International Union for Conservation of Nature (IUCN) is collaborating with Expertise France and WWF-France to implement the BIODEV2030 pilot project. Funded by the French Development Agency (AFD), the project strives to mainstream biodiversity into key economic sectors in 16 pilot countries (8 operated by IUCN, 8 operated by WWF). At country level, the project aims to foster ambitious and science-based commitments with clear accountability mechanisms. The two-year project shall create the conditions for a national dialogue involving stakeholders around strategic economic sectors, relevant to the country’s economy and biodiversity. This dialogue will aim to catalyse concrete national and sectoral voluntary commitments to reduce pressures on biodiversity over the next decade so as to halt the decline in biodiversity by 2030 and restore biodiversity by 2050.

1.3 BIODEV2030 approach to mobilize biodiversity mainstreaming

The project's strategy to halt the decline of biodiversity by 2030 and support its restoration by 2050 intends to address the root causes of biodiversity decline following a “3D” approach: Identify and rank the major anthropogenic causes and the sectors responsible for the decline of national biodiversity during a "scientific **Diagnostic**" phase. This diagnostic phase should allow national

stakeholders to identify, on a scientific basis, two priority sectors for the rest of the project, as well as possible levers of action to be considered.

Create the conditions for a "multi-stakeholder **Dialogue**" with the aim to obtain voluntary commitments of actors in the key selected sub-sectors to reduce their pressures on biodiversity over the next ten years with measurable objectives. Stakeholders (with a particular focus on economic actors) will be encouraged to commit to biodiversity preservation, on a voluntary basis and with science-based objectives.

"**Disseminate**" and spread the approach within and outside the country to encourage all stakeholders to make voluntary national and sectoral commitments to halt the loss of biodiversity by 2030 and demonstrate the effectiveness of these contributions for biodiversity.

In each country, the project will support a constructive dialogue based on a scientific assessment and a diagnostic of national and sectoral threats to biodiversity based on the various data available. The project will also establish a community of practice at the level of each country in order to operate the science-decision-making interface effectively with a view to building a coherent and cross-sectoral national agenda to achieve the objective by 2030. To this end, national and regional workshops, the IUCN World Conservation Congress in 2021 in Marseille, France (from 3 to 11 of September 2021) and the fifteenth meeting of the Conference of the Parties (COP 15) to the Convention on Biological Diversity (CBD) (first part on 11 to 15 of October 2021 in China and second part in late 2022 in Montreal, Canada) offer opportunities for sharing experiences, disseminating good practices and showcasing initiatives from “champion” countries, with the aim to inspire an even broader mobilization.

In Ethiopia, the BIODEV2030 project is implemented by the IUCN in close collaboration with Ethiopian Biodiversity Institute (EBI), which is also a focal institution for the UN CBD, and the Ethiopian Wildlife Conservation Authority, one of IUCN’s members in the country. Moreover, the project has gained political support from line ministries such as the Ministry of National Plan and Development and the Ministry of Agriculture.

In the first step of the project, an assessment report based on scientific data identified the main threats to national biodiversity and the related economic sectors with greatest impacts in Ethiopia (Study 1). It also identified economic activities responsible for biodiversity decline in a few selected eco-regions rich in biodiversity.

The results of the assessment were reviewed and discussed by national stakeholders during the multi-stakeholder workshop on “Selection of sub-sectors under Agriculture and Forestry for the mainstreaming of biodiversity", held on 28th January 2022.
The participants agreed on the following priority for the “dialogue” phase of the project:

- Agriculture (cereal subsector): focus should be put on cereal and coffee crops,
- Agriculture (livestock subsector)”: livestock rearing and ranching,
- Forestry: focus should be put on small-scale logging and wood harvesting.

The multi-stakeholder workshop has also pinpointed two (2) eco-regions for an in-depth assessment of the five (5) selected sub-sectors and for the mobilization of voluntary commitments:

- Bale eco-region: (1) cereal crops (including wheat, barley, maize, etc), (2) livestock rearing, (3) small-scale logging and wood harvesting. The impacts of habitat conversion for cereal production and open grazing practiced by small holder herders on biodiversity are worsened by small-scale wood exploitation.
- Southwest natural forest: (4) coffee and (5) small-scale logging & wood harvesting are responsible for deforestation and biodiversity loss.

With the current population of ca. 120 million people and growth rate of 2.6% per annum[1], Ethiopia ranks the second most populous country in the continent (World Bank, 2021). The country is categorized as a low-income country by the World Bank (World Bank, 2021). Nearly 79% of the population lives in rural areas, and 31% lives below US$1.90 purchasing power parity per day (World Bank, 2021). The Ethiopian economy is heavily dependent on the agricultural sector, which has suffered from the recurrent droughts that are reflected in extreme fluctuations of outputs, making it the most vulnerable in sub-Saharan Africa. Agriculture plays an important role in livelihood as their primary source of income, employment opportunity for 36% of labor force and export value (Planning and Development Commission, 2020). In 2020, the exported value of agriculture sector reached 48.7 billion US Dollar (2021), of which coffee accounted for 32.6%, cereal 50% and livestock 18%. Ethiopia is also one of the world’s most biologically diverse and unique countries and centre of crop origin. Ethiopia has 314 mammal species, including 57 (18.5%

[1] https://www.worldometers.info/world-population/ethiopia-population/

of the total mammal species) endemic species. Out of the 314 mammal species, populations of 74 (23.5%) species are experiencing declining trend and 39 (12.4%) are currently globally threatened, including 16 threatened and 4 near threatened endemic species. Similarly, about a quarter (214 species) of the total bird species occurring in Ethiopia are experiencing decreasing population trend and 36 species are globally threatened. Of the 253 reptile species known from Ethiopia, 26 (10%) are endemic to the country. Of the 78 amphibian species occurring in Ethiopia, half (39) of the species are endemic and 18 of them are globally threatened (Tessema et al. 2021). The high population size that has been growing at rapid rate and the dependence of livelihoods on rainfed agricultural production practices using traditional farming practices, large number of livestock (the highest in Africa) with low productivity and human dependence on forest resources for energy and construction have strongly been impacted biodiversity of the country.

In the last two decades, Ethiopia has been invested heavily in infrastructure, agriculture, education, health, disaster risk management and safety nets. These investments have led to significant progress in economic and social development including increased life expectancy, reductions in income poverty and malnutrition, increased school enrolments and expanded access to health services, fresh water, improved sanitation and biodiversity conservation (Planning and Development Commission, 2020; World Bank 2021). Despite these gains, however, major challenges remain; 87% of the population is "multidimensionally poor", suffering from some combination of food insecurity, insufficient access to adequate education and health services, energy. As such, the Government of Ethiopia has now developed a 10-year "National Development Plan (2021–2030)" to promote sustainable development, improving quality, added value and competitiveness, protecting the environment, biodiversity and ecosystem. The government recognizes that achievement of green development requires shifting the development strategy from agricultural production to industrial economic development, from high-yield agriculture to high-tech, ecological, responsible, sustainable agriculture, climate resilient, initiating digital transformation, moving from single-sector development to multi-sector integration. One of the challenges for Ethiopia to achieve its development ambitions while still protecting environment and preserving natural resources and biodiversity will be how to work in an interdisciplinary manner and bring together the sometimes-contradictory interests of different sectors and actors/stakeholders through integrative initiatives and policy measures to promote sustainable

agriculture, forestry and biodiversity conservation practices to reduce pressures on ecosystems and on biodiversity. This study is intended to address this issue.

1.4 Scope and Objectives of the Assessment

1.4.1 Scope

In the second step of the project, a situation analysis of the five (5) selected economic sub-sectors in the two (2) selected landscapes was carried out (Study 2) to "identify options and scenarios for voluntary commitments for biodiversity", for which IUCN's ESARO is currently recruiting a team of consultants and for which we have applied and have been selected. The study shall identify options, in each region, for the sectoral objectives and trajectories for actions and resources needed to reverse the erosion of biodiversity, in order to support the achievement of Ethiopia's NBSAPs and of the post-2020 global biodiversity framework. Outputs of the study will be used to launch the multi-stakeholder dialogue phase of the 'BIODEV2030 project in Ethiopia.

1.4.2. Objectives

The overall objective of Study 2 is to conduct an in-depth analysis of the selected subsectors and their actors at the selected landscape level (3 sub-sectors in Bale region: cereal, livestock rearing and ranching, small-scale wood logging & harvesting; 2 subsectors in Southwest forests: coffee, small-scale logging & wood harvesting) and to identify opportunities, constraints, existing good practices and possible scenarios of voluntary commitment of actors in order to reduce biodiversity loss in Ethiopia.

The specific objectives of the Study 2 are:

[1]. To execute an in-depth analysis of the 5 priority sub-sectors in their selected landscapes (mapping actors and their position in the value chain, their power, their interests, their willingness to commit so as to identify potential allies and possible opponents);
[2]. To characterize precisely how each sub-sector is impacting biodiversity, by describing the specific production practices that do contribute to biodiversity erosion,
[3]. To identify existing or not existing (but existing in other countries) good practices and possible scenarios of actions for each sub-sector, including any sub-sector commitment; and
[4]. To propose a strategy to mobilize stakeholders across the 5 priority sub-sectors.

The expected outputs of the assignment were:

[1]. Present the results in the form of possible scenarios of commitments, highlighting their underlying logic in a synthetic way (i.e., problem addressed, extent of expected change, solutions / practices to be implemented for achieving such a change, contributions by each type of actor, and possible milestones on a 10-year trajectory, and possible enabling conditions (accompanying measures by the public sector)).

[2]. Propose a strategy for mobilizing stakeholders in the 3 target sectors for the dialogue phase, based on the mapping of actors, their identified power, interests, motivations and appetites, and suggest possible accountability mechanisms.

2. Methodological Approaches

2.1 Study Landscapes - Overview

2.1.1 Bale Mountains Ecoregion Landscape

The Bale Mountains Ecoregion (BER) lies between 50º22'–80º08'N and 38º41'–40º44'E in the Oromia Regional State in south-eastern Ethiopia (Figure 1). It covers an area of 2,217,600 ha and elevation ranges from 1400 to 4377m asl (BMNP, 2017). BER, comprising BMNP at its heart, is the largest Afroalpine area left in Africa and characterized by forest areas, afro-alpine plateau, mountains and valleys, grasslands (BMNP, 2017). The region presents very unique ecological features. The central area of the eco-region is a high plateau much of which is above 3000m asl. Several peaks rise from this plateau including Tullu Dimtu (4377m), the second highest peak in Ethiopia. South of the plateau the land falls steeply into the moist tropical Harenna Forest, that distinctly shows several altitudinal vegetation stratifications within short distances starting with mountain grasslands at approximately 3700m, followed by Erica forest, and extending to moist tropical forests of variable species composition such as highland bamboo (*Arundinaria alpina*), *Coffea arabica* and others at the middle altitude, and dryland woodlands in the lowlands below 1500m asl. On the northern aspect the eco-region is characterized by high ridges and broad valleys covered mainly with dry Afromontane vegetation of mainly Juniper (*Juniperus procera*) and Hagenia (*Hagenia abyssinica*) species interspaced with other ecosystems such as grasslands and wetlands (BMNP 2017).

The eco-region encompasses the largest area of Afro-alpine habitat on the African continent. The forests together with the Afro-alpine plateau are host to a globally unique and diverse fauna and flora, including a significant number of rare and endemic species such as Mountain Nyala (*Tragelaphus buxtoni*), the Ethiopian Wolves (*Canis simensis*) and many others. It harbours about 67% of mammals known from the Afromontane region in Ethiopia (Asefa 2011; see Box 1).

The BER belongs to the Afromontane biodiversity hotspot, one of the 34 global biodiversity hotspots, and has critical biodiversity and ecological significances (see Box 1). In addition to the BMNP, it encompasses six national priority forest areas (PFAs): Aloshe Batu, Goro Bale, Harana Kokosa, Menna Angetu, Kubayu, and Adaba Dodola, which in total are 566,258 ha including the 85,348 ha forest in the Bale Mountains National Park.

The eco-region is inhabited by about 1.6 million population (urban and rural combined). Moreover around 12 million population both in the eco-region and beyond within Ethiopia, Somalia and Kenya are estimated to directly and indirectly depend on several ecosystem services of the forests of the Bale eco-region. Particularly, those rural people in the eco-region are directly dependent on the forest and other natural resources of the area. Major livelihoods strategy of the population is cultivation, livestock production and forest-based income. The local community depends on the natural resources of the eco-region for their livelihoods. Annual direct consumptive use value of forest products is valued at US$ 407 per household from the forests, 228US$ per household from livestock, and part of the later value also attributable to the forest system as forest grazing is the dominant form of livestock production in the area. Moreover, crop cultivation that provides the highest annual income directly comes from ecosystem services from the forest ecosystem services within eco-region.

However, the eco-region is facing pressure that is growing over time. This pressure it is experiencing currently will challenge the long-term sustainable conservation of this globally unique ecosystem and its biodiversity resources. Between 2000 and 2011, the BER experienced annual deforestation rate in the range of 1.1% to 6.6%, depending on the forest type and agricultural frontier expansion, with an average rate of 3.7% for the entire eco-region. This rate is almost four times the 1% country-wide deforestation rate (FAO, 2010).

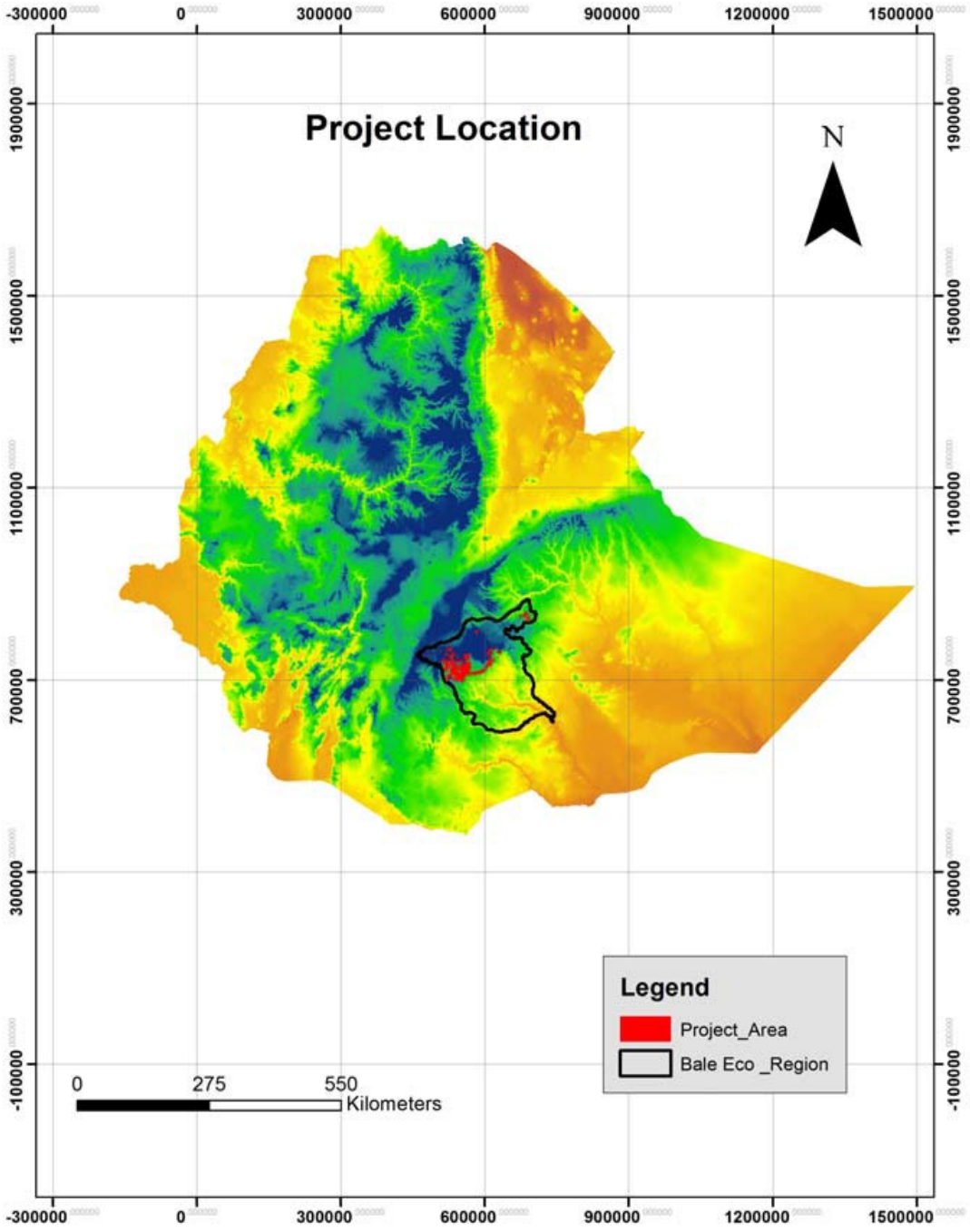

Figure 1. Map showing the location of BER in Ethiopia.

Box 1. Why conservation of the Bale Mountains Ecoregion matters? Some facts:

***Biodiversity conservation**:*

- Is one of the 34 global hotspot biodiversity areas
- The BMNP is one of the three Zero Extinction Alliance areas identified in Ethiopia so far
- Biodiversity Contains the largest (1000 km^2 or 60% of the total) Afroalpine habitat in the continent
- The Harenna forest, in the southern slope, is the second largest moist montane forest and the only cloud forest remaining in the country
- Harbours over1600 vascular plant species, including160 species endemic to the country and 34 locally endemic to the Ecoregion, and 80 mammal species, 30 (52%) of which are endemic to the country and 13 species found only in the BER, including the critically endangered Harenna Shrew (*Crocidura harenna*)
- Harbours the highest number of globally/nationally threatened vertebrate species in the country
- Home to flag species: over half the global population of Ethiopian wolves (*Canis simensis*), the rarest canid in the world, and listed as Endangered by the World Conservation Union (IUCN), and over two-thirds of the global population of the endemic and similarly endangered Mountain Nyala (*Tragelaphus buxtoni*), estimated to be approximately.
- The Harenna forest harbours unique forest populations of Lions and African wild dog, both typically savannah species and globally threatened

  .

Ecosystem services:

- Alpine lakes and mountain streams are a key feature of BMNP and, as well as providing vital habitat and ecosystem services, are an attractive scenic feature in their own right, and for birdwatchers.
- Source of 40 springs that form four big rivers which are:
  - The only source of perennial water for 1.6 million people in the ecoregion and 12 million people far-away, including northern Somalia and Kenya depends;
  - Hydroelectric power, irrigation; and
  - Horas (mineral springs) serving as salt supplements to livestock, improving their nutrition, health and productivity.
- Genetic stocks of wild plants: the forests and grasslands of the Bale Mountains have important stocks of valuable wild genetic material, including wild coffee (*Coffea arabica*) and medicinal plants.
- Carbon sequestration – sinks 1.6 billion tonnes of C2O per year.
- Scenic Values: Mountain peaks, vast plateau and lava flows over 4,000 m asl, showing evidence of glaciation, as recently as 2000 years ago. This unique landscape, wildlife and rich culture make the BER one of the top potential ecotourism destination areas globally – for example, currently identified as the 4^{th} top birding destination areas in Africa.
- Cultural Values: Traditional transhumance system (*Godaantuu*), which is a key feature of traditional human use of the Bale Mountains. Cultural sites: a number of cultural sites are situated within the Ecoregion, some of which are still used by local communities for religious reasons.

2.1.2 The Southwest Forests Landscape

The southwest forests landscape encompasses several forest blocks that span between three National Regional States of Ethiopia (Oromia, Gambela and South-West Regional States) (Figure 2). This forest landscape constitutes over a half of the country's forest cover (Woldemariam and Fetene, 2007; Senbeta, 2014). They occur within altitudinal range from 900 to 2700 m asl and harbours a large number of endemic and economically important plants species, including *Coffea arabica, Aframomum corrorima* and *Piper capense*These forest blocks are biodiversity hotspot of global interest (Schmitt, 2006), with *C. arabica* is a flagship species in the Kafa biosphere reserve (Tadese et al. 2021). Within this landscape, four forest blocks with high biological, ecological and socioeconomical importance have been designated as biosphere reserves since 2010: Kafa, Sheka, Majang and Yayo (Tadese et al. 2021; see Figure 2). Kafa and Sheka forests are found in the Kafa and Sheko administration zones, respectively, of the South-Western National Regional State of Ethiopia. Kafa forest covers about 540,713 ha, while Sheka 238,925 ha. Located between the Illubabor and Buno Bedelle zones of the Oromia regional state, Yayo Forest covers 167,021 ha. Majang forest, in the Majang zone of Gamebella region, covers 224,925 ha. Yayu Forest biosphere is situated in the Oromia regional State, Majang in Gambella region, and Kaffa and Sheka Forest biosphere reserves in the newly formed regional state (South-Western Regional State) (Figure 2).

Table 1. Description of the four Biosphere reserves studied in the Southwest Landscape.

Name	Designation year	Location	Area (ha)			
			Total	Core zone(s)	Buffer zone(s)	Transition zone(s)
Kafa Biosphere Reserve	2010	Kafa zone, South-Western National Regional State	540,631	41,319	161,427	337,885
Majang Biosphere Reserve	2017	Majang zone, Gambella National Regional State	225,490	43,878	73,400	108,212
Sheka Biosphere Reserve	2012	Shek zone, South-Western National Regional State	238,750	55,255	76,395	107,100
Yayo Biosphere Reserve	2010	Illubabor and Buno Bedele zones, Oromia National Regional State	167,021	27,733	21,552	117,736

The dominant means of livelihood of those communities is agriculture, which is dominated by cash crop production particularly coffee and honey. However, coupled to increasing human population, expansion of subsistence and commercial coffee cultivation into the intact, core zones of natural forests currently and likely in the future is the top pressure threatening biodiversity of the Forests (Tadese et al., 2021). In addition, logging and wood harvesting for firewood, charcoal, timber and other purposes, and environmental-unfriendly investment activities and practices, like commercial tea and coffee plantations, have been posing significant threat to biodiversity (Woldemariam and Fetene, 2007; Siraj, 2016; Tadese et al., 2021). These Southwest forests are currently registered by UNESCO as Biosphere Reserves. For detail on the zonation schemes and management objectives of each zone, see Table 2.

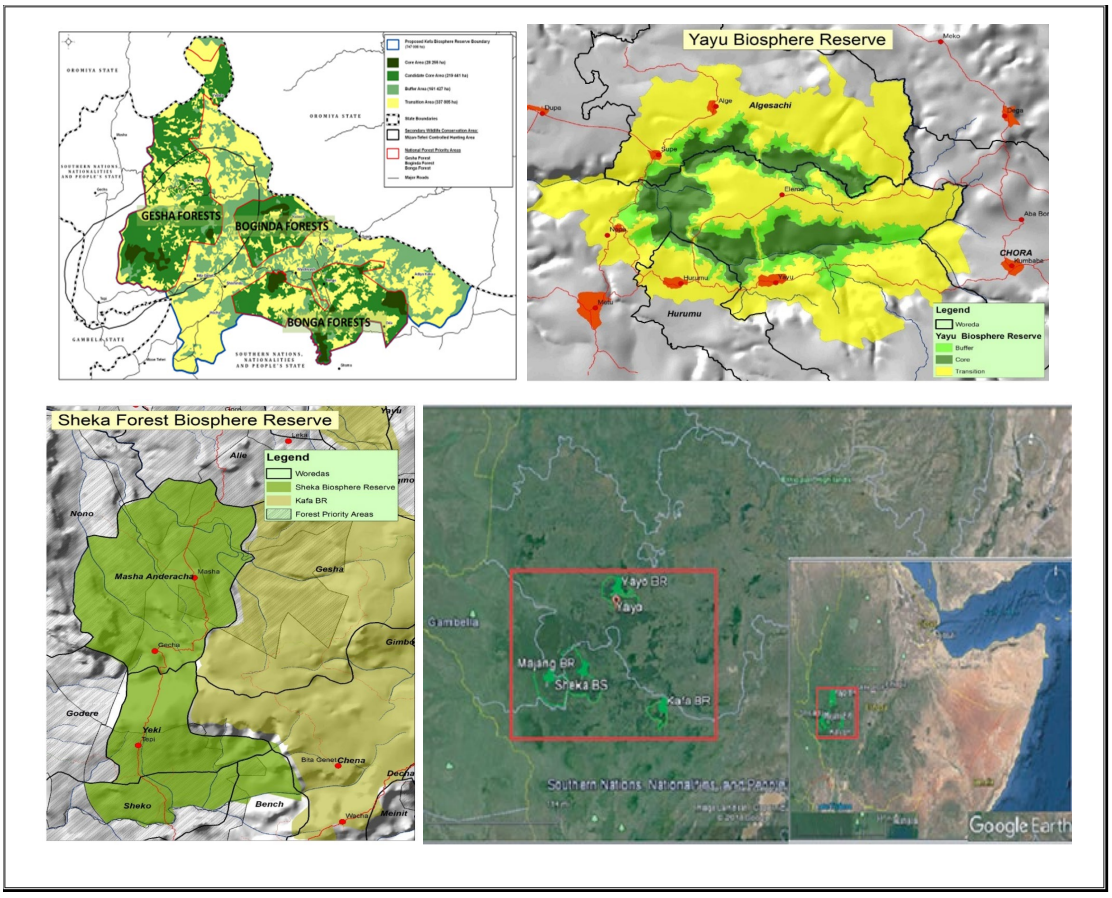

Figure 2: Maps the four Biosphere reserves in South-Western Forest landscape (Kafa Coffee Biosphere Reserve (top left); Yayu Coffee Forest Biosphere Reserve (top right); Sheka Coffee Forest Biosphere Reserve (bottom left); and Majang Biosphere Reserve (bottom right). (Source: Tadesse et al., 2021).

Table 2. Criteria and management objectives of zones of the Biosphere Reserves in the Southwest Forests landscape.

Zone	Description	Criteria	Management objective
Core zone	• Natural forest-including wild coffee forest • Maintains the ecological integrity and ecosystem services of the protected areas • Preservation of the water catchment function • Ecological research and education	• Nature reserves • Biodiversity hot spots • Wetlands and water sources • Wild coffee gen pool	• Strict conservation of flora and fauna with only non-destructive use for beekeeping, wild coffee collection and research in ecologically non-sensitive areas
Buffer zone	• Conservation-including buffer zone activities • Restoration of degraded forest areas and coffee • Preservation of the water catchment function • Development of ecotourism & Nature based enterprise • Controlled utilization of wood and NTFP • PFM/CBNRM	• Natural forest, coffee, NTFPs and glades not zoned as protected area • Patches of indigenous trees and medicinal plants	• Strict conservation of rare or endangered flora and fauna species and their habitats with possible non-destructive use of NTFPs and no expansion of current commercial agricultural and forestry activities, esp. coffee and tree plantations
Transition zone	• Commercial production and extraction of wood • PFM/CBNRM • Commercial Forest and coffee management • Promote on-farm tree growing • Promote income generating activities • Support community institutions in forestry program • Protection of riparian belt and hilltop afforestation • Infrastructure development	• All areas that will be designated or has been already designated for commercial forest and coffee production by land use and land administration unit of the Illu Abba Bor and Buno-Bedele Zones.	• Diversification and intensification of agriculture and forest land use, emphasizing watershed protection and sustainable land use practices, esp. organic and conservation farming

2.2 Conceptual framework

This study 2 was aimed to conducting an in-depth analysis of the selected 5 subsectors and their actors at the selected landscape level (3 sub-sectors in Bale region: cereal, livestock, small-scale

wood logging & harvesting; 2 subsectors in Southwest forests: coffee, small-scale logging & wood harvesting); identify the opportunities, constraints; and identify 2 (two) scenarios of "voluntary commitments" of actors per economic (sub)sector to reduce pressures on biodiversity in the landscapes. The 2 (two) scenarios were contrasted by their level of ambition: one scenario with a medium level of ambition and one with high level of ambition.

For the purpose of this specific study, we adopted the following definition of a "voluntary commitment": "a strategic, actions based on consensus, shared vision, and scientifically robust evidence that led to positive and measurable change. This definition which we adopted from BIODEV2030 initiative further define 'voluntary commitments as "a set of forward-looking, strategic, shared and science-based actions that lead to positive and measurable change in biodiversity."

Accordingly, we used the DPSIR (Driver, Pressure, State, Impact, and Response) causal framework throughout the situation analysis to enhance understanding of structure and causal relationships within each economic subsector; and to support the formulation of voluntary commitments by economic sector actors contributing for reducing pressure to biodiversity. A hypothetical example of the use of the DPSIR conceptual framework for "logging subsector" is shown on Figure 3. Application of the DPSIR model as a "Theory of Change Model" in this study was through our understanding that the Drivers (cereal cultivation, grazing and logging in Bale Ecoregion landscape; coffee production and logging in the SW forests landscape) and associated activities exert pressures such as habitat degradation and loss that induce changes on the state of biodiversity that leads to the impacts that voluntary commitments can respond with mitigation, adaptive or curative actions, that will influence the sectors, reduce the biodiversity pressure, eventually improving the state of biodiversity, reducing the impact.

To achieve this, range of strategic analysis tools were used, including PEST analysis, Value Chain Analysis, Stakeholders analysis, SWOT analysis and Scenario/Projectary Analysis.

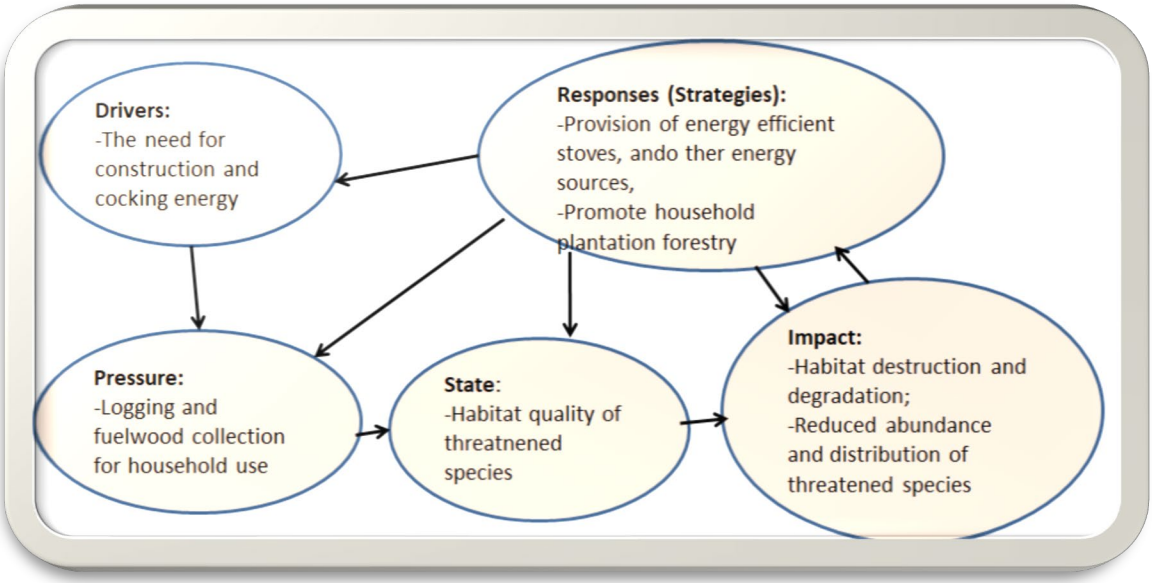

Figure 3. DPSIR conceptual framework showing the linkages across the components for logging subsector.

2.3 Analytical framework

The general framework for this task is shown in Figure 4, consisting of five main steps: (i) Literature review; (ii) Data collection and field survey; (iii) Data analysis/consolidation and preliminary findings report writing; (iv) Stakeholders consultations and feedback on preliminary findings, commitments of each stakeholder identified and secured, and Scenarios/trajectory development; and (v) Final report developed, reviewed and refined and submitted.

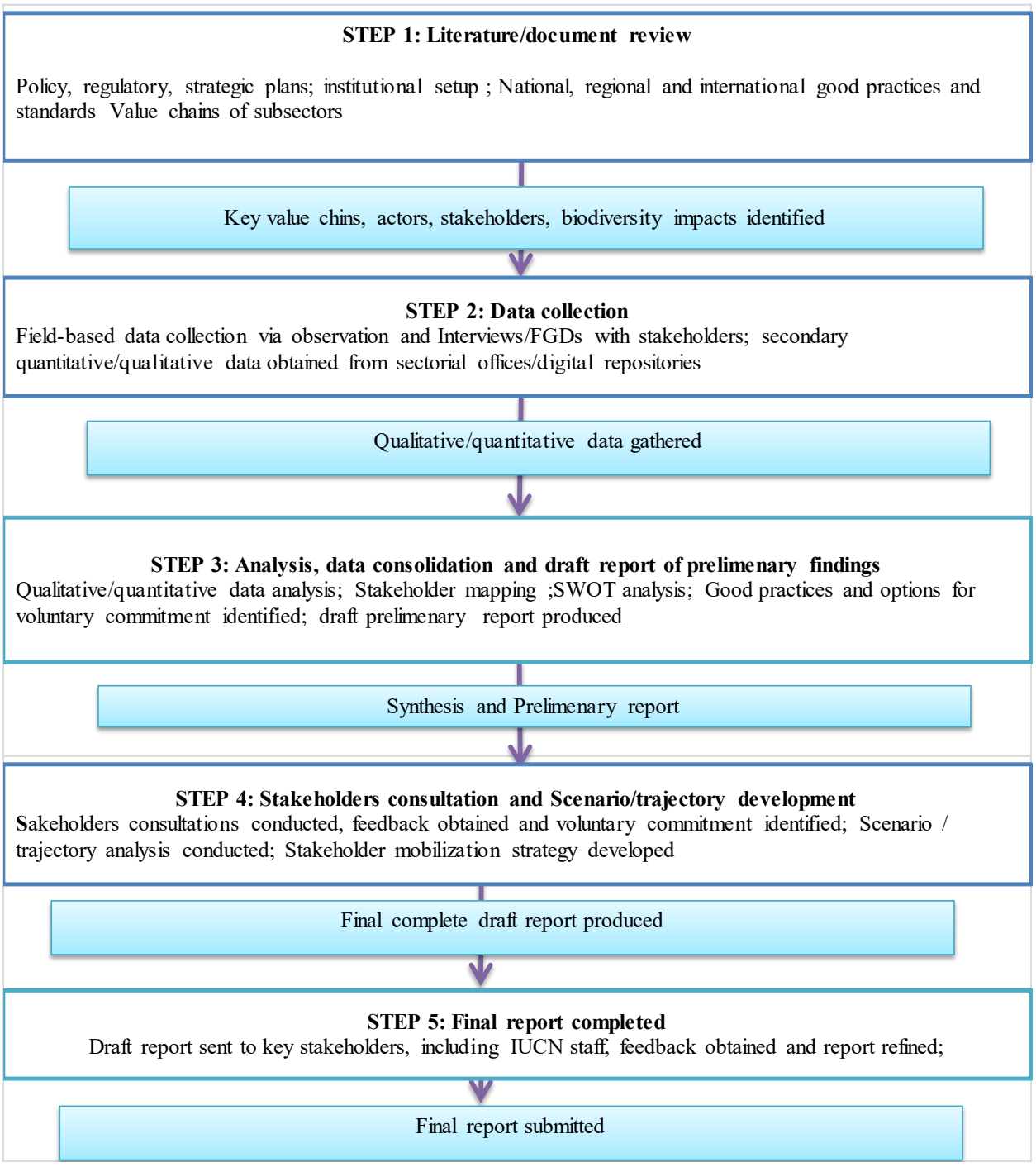

Figure 4. Analytical framework for situation economic analysis of crop, livestock, coffee and logging subsectors in the BER and SWF landscapes.

2.3.1 Methods of data collection

Four principal methods providing complementary and supplementary data were used to collect collate and synthesize required datasets: a) literature review; b) interviews; c) focus group

discussions and Stakeholder consultations. The key questions and the methods and tools used to collect data/evidence to address each specific objective are presented in Annex 1a-d. The consultant team has made field trips to the two landscape areas to conduct individual interviews, focus group discussions and facilitate SWOT analysis for the 5 subsectors. Each method of data collection and tools used are described below (a preliminary list of potential sectors consulted for information/data generation is provided on Annex 2):

Literature/Document/ Review: We performed a detailed analysis of all identified relevant published and unpublished documents and reports, and scientific articles. All documents of a political or strategic nature analysed include National Development Plan, Sectorial Policies and Strategic plans related to agriculture, forestry and biodiversity, or International Agreements that frame the BIODEV2030 initiative. In addition, unpublished information/data has been accessed from international (e.g., IUCN), and online repositories were visited for relevant policies, strategic plans, reports/ databases/ of public institutions, civic societies, business companies, and scientific articles was obtained. This method is important for answering and framing the results of the situational analysis questions related to the following objectives: conduct detailed analysis for major subsectors and characterize them so that the commitments should aim to reduce the pressures arising from the subsectors; and map the actors, their institutional context and their interactions. List of most relevant documents analysed are provided in Annex xx.

Interviews: This method was used for collecting primary data on all questions and objectives of the situational analysis, with major focus on "production practices" of the economic actors producing and impacting the ecosystems and their biodiversity, associated with strategic value chains of the 5 target economic subsectors (type, geographical area) that the commitments should aim to reduce.

Semi-structured interview questions (see Annex 1a-d) are developed and administrated to various key informants. The entire interview questions are divided into sections each of which are intended to be addressed to specific categories of the stakeholders. Description of which sections are addressed to public institutions and other stakeholders, and guideline for conducting interview/FGDs is also provided in Annex 1. It also included a brief introduction to the BIODEV2030 project and to the consultancy on Situational Analysis, followed by main questions

and a number of sub-questions for the interviewees. The key informants (interviewed) are members of Public Institutions (3-5? people for each of the 2 landscapes), Research and Academic Institutions (3-5?), Trade Associations (2), Civil Society Organizations (CSOs; 2), conservation and rural development NGOs (3-5?), and other Stakeholders (4?) that include producers and processors considered strategic for the successful implementation of the volunteer commitment for reduction of biodiversity degradation. Thus, a total of 23 semi-structured interviews were being conducted. Interviews were conducted in person and via phone call (see Annex xx).

Focus Groups Discussion (FGD): FGDs were used to capture the perceptions and experiences, on production practices by the 5 economic subsectors and involved participants of key informants from Public Institutions, Research and Academic Institutions strategic partners, Trade Associations, donors/funders, Civil Society Organizations (CSOs), local leaders and other key Stakeholders. The team focused on understanding, and describing 2 contrasted (low, high level of ambitions) scenarios of voluntary commitments in each sub-sector. The identification of key informants was performed during the inception phase and based on the consultant team's previous experiences; this will be validated revised at consultation with the IUCN staff and BIODEV2030 advisory committee. Wider discussions were conducted with experts using major discussion points at the national workshop guides similar to the one used in the interview method.

National, regional state and landscape levels consultations and workshops: In the prospect of developing biodiversity voluntary commitments at the landscape level, an analysis of the subsectors at the national/regional state level were carried out. Firstly, we visited relevant Federal, Regional State, Zone and District government organizations and conducted discussions with directors and senior experts on the BIODEV 2030 and the objectives of the sector assessment (Annex XX). Then, a national level workshop was held from October 5–7th 2022 at Bishoftu town and attended by xx participants of the five subsectors with key national/regional stakeholders. And, thirdly, two landscape level workshops were conducted: one between 29 October–2 November 2022, at Jimma town for the Southwest Landscape stakeholders, and one at Bale Robe Town from 13–15 November 2022 for Bale landscape. The aim of this workshop was to: i) present findings of literature review and field investigations, ii) get feedback and enrich, and iii) to collect voluntary commitments.

During each workshop, the first day was devoted to presentation of findings of literature review and field investigations and getting feedback. The presentations were mainly focusing on key characteristics of each subsector's Value Chain, actors involved at each stage of the value chains and their Institutional structure; Impacts of each subsector on biodiversity; Biodiversity best practices and current commitments and preliminary Stakeholder mapping. Then, the second and third days were devoted to collection of voluntary biodiversity commitments. Accordingly, at the national workshop, four working groups (cereal subsector in the BER, livestock in the BER, coffee in the SW forests, and logging at both landscapes) were formed based on their expertise and experiences and knowledge of the two landscapes. For the SW forest landscape, participants were grouped into two (Yayu Forest working group, and Kafa and Sheka forests working groups) and asked to work both on coffee and small-scale logging subsectors. We thought that this grouping strategy was plausible because of the difference in their key stakeholders: Yayu is managed by Oromia regional state, while the latter two biosphere reserves by South-West regional state. Additionally, we also found small-scale logging to be driven by coffee production. Thus, commitments dedicated to coffee subsector are believed to address issues pertaining to logging. Similarly, two working groups formed for voluntary biodiversity commitments in the BER (logging being lamped with cultivation): cereal and livestock subsectors.

During the working group sessions, each group was given introductory briefings by facilitators (consultants and Abdeta [IUCN staff]) and formats used for listing and characterizing the voluntary commitments. In short, information collected from each working group was: Problem to be addressed, Biodiversity commitments, Quantification of the commitments, Implementation time, Monitoring measures and reporting, Responsible Stakeholders, and Financial resources. The full descriptions of the terms of references, workshop procedures and participants for each workshops/landscape are provided in Annex xx.

2.3.2 Data Analysis and Synthesis

A range of Strategic Analysis methods were applied to the data/information gathered to conduct the situation analysis so as to develop scenario-based voluntary commitment strategies and to propose actors mobilization strategies. Data analysis and integration were conducted simultaneously during and after data collection. All quantitative data were summarized and illustrated using graphical or tabular tools, while qualitative data and information obtained through

document reviews, interviews and focus group discussions were transcribed and organized in thematic manner. Then, qualitative thematic content analysis was performed to summarize and organize data into thematic categories relevant to the study. Data organized in this way were analysed applying the following Strategic Analysis tools: Value Chain analysis, Stakeholder analysis, PEST analysis (Political, Economic, Sociocultural and Technological), and SWOT (Strengths, Weaknesses, Opportunities and Threats) Analysis.

Value Chain analysis [Boxes and Arrows]

Value chain, in this study, was defined as the connected network of individuals, organizations, resources, activities and technologies relevant to the production, distribution and sale of a commercial product. The value chain involves processes that bring a product from conception through various phases of production, delivery to final consumers and final disposal after consumption. This strategic analysis tool, based on the information and data collected, was applied to map out key value chains of the selected five (5) sub-sectors to determine stages (support activities that facilitate the primary activities, products and production practices, marketing, delivering product, and consumption); and to identify key factors affecting biodiversity targets, including direct and indirect threats posed on biodiversity at each stage of the chain, opportunities, and enabling conditions of biodiversity-friendly production practices (see also SWOT analysis below).

Stakeholder analysis

Based on the information gathered from the questionnaires during the field and the national level consultations, a stakeholder analysis was carried out using the "stakeholders' analysis matrix tool" for analysing the power/influence and interest of the stakeholders in developing voluntary biodiversity commitments. Stakeholder interest was defined as the extent to which the interests of a stakeholder engaged in agriculture and energy impact on biodiversity. Stakeholder interest was assessed using the criteria shown in Table 2. While, Stakeholder influence refers to the power that a stakeholder has over biodiversity conservation outcomes. Influence can be direct or indirect. Formal influence may derive from their ability to directly affect decision making through, for example, the issue of government approval and permitting decisions. Indirect influence derives, for example, from a stakeholder's ability to influence others or their access to important information. Assessment was qualitative based on the criteria presented in the table below.

Table 3. Definitions of the Stakeholders' Interest and Influence.

(a) Interest	**Definition**
High	Cereal crop cultivation, livestock and forestry subsectors, in the Bale Ecoregion, and coffee and forestry subsectors, in the SW forests landscape, stakeholders have already developed voluntary biodiversity commitments, or they have already a plan to develop them, or they let them know that now on voluntary Biodiversity commitments is a priority of their organization and they want to develop them as part of this assignment.
Low	The above stated subsectors have not developed any voluntary commitments. Their priorities are related to other issues, and they do not show any interests in developing commitments nor in taking part in biodiversity voluntary commitments.
(a) Influence	
High	The stakeholder or stakeholder group is considered highly influential if it has the capacity to stop the biodiversity erosion and the capacity to take voluntary commitments, having significant impact on biodiversity loss and on the other stakeholders. For example, powerful civil society organizations or private companies that can affect the operation of the agriculture and logging subsector.
Low	The stakeholder or stakeholder group is isolated and has limited capacity to exert influence over the biodiversity conservation. For example, stakeholders who lack institutional and social legitimacy, lack awareness on biodiversity or have weak capacity. Isolated communities that are geographically distant.

As shown on figure 5 below, crossing 2 criteria (influence: low / high; interest: low / high), we mapped the actors in each sub-sector to identify the likely allies and the likely opponents to any change in harmful productive practices and level/type of engagements in the implementation of proposed biodiversity voluntary commitments strategies.

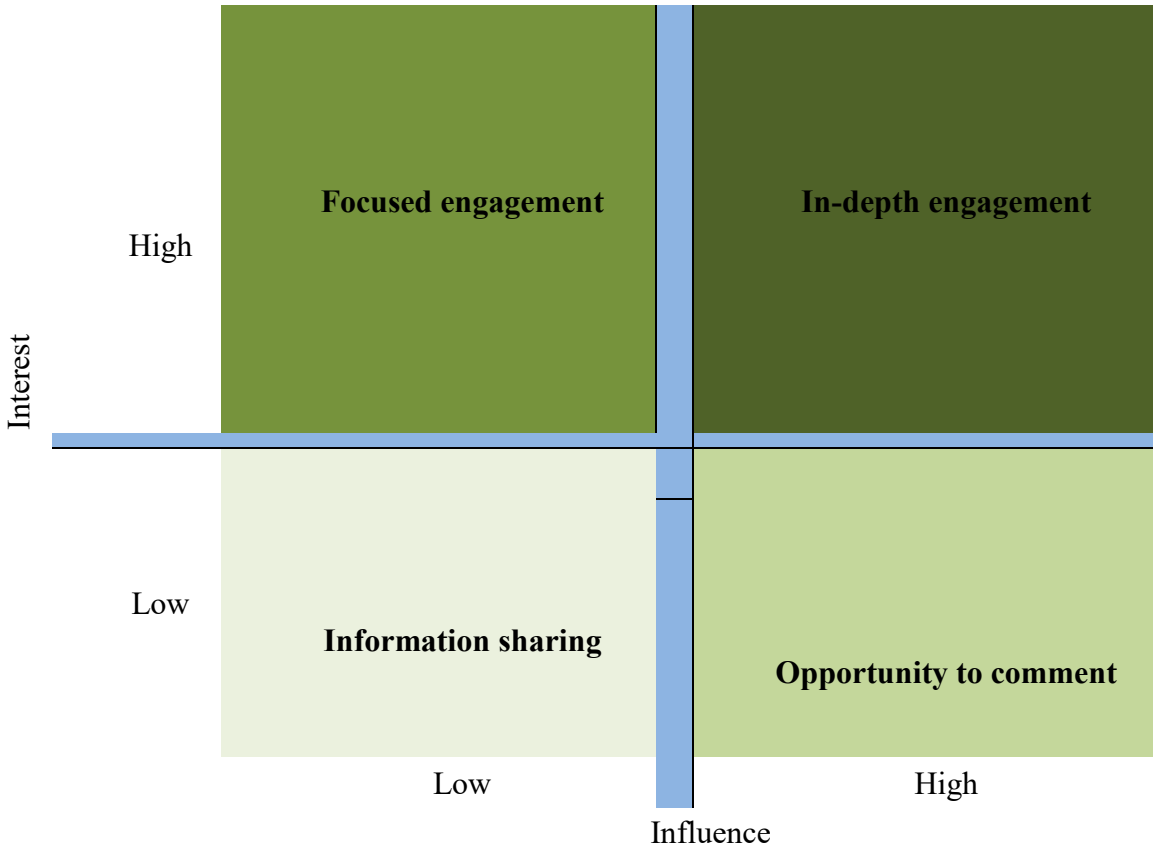

Figure 5: Conceptual framework of stakeholders' analysis matrix.

The definitions of the type of engagement planned with the stakeholders were based on their interest and influence and are categorized into four aspects namely:

a. ***In depth engagement***: They are expected to be developed with stakeholders that will need to be closely involved in planning and/or implementing activities related to biodiversity commitments.
b. ***Focused engagement***: They are expected to be developed with stakeholders that will need to be involved during the implementation of the activities related to the biodiversity conservation commitments.
c. ***Opportunity to comment***: This is expected to be implemented with stakeholders that need to be informed about the plans and progress during the implementation of the activities related to the biodiversity commitments. The influence of these stakeholders can be improved by empowering them and grouping them to raise their voice.

d. ***Information disclosure***: This is expected to be implemented with stakeholders that needs to be monitored so that engagements start when their power or interest change.

The PEST strategic analysis

The PEST (Political, Economic, Social, and Technological dimensions) approach was used as a major systematic literature review tool to collate information that characterize the subsectors. Political dimensions include the (sub)sectoral policies, institutions, tax policy (e.g., incentives), programs that are positively or negatively impacting biodiversity. Political dimension also includes legal factors such as international agreements/conventions, national laws and regulations, and the level of implementation of the environmental and biodiversity laws and regulations. Economic dimensions included contributions of subsectors to Growth Domestic Product, import and export indicators, etc. Social dimensions include the main stakeholders (from the public and private sectors, as well as from the civil society, NGOs), employees, social classes and minorities, attitudes toward the sub-sectors, income level, etc. Technological factors include innovation and disruptive technologies that may affect the subsectors and their impacts on biodiversity.

In addition, the following dimensions of each subsector were compiled from literature review:

Environmental dimensions include the geographical location of the subsectors, impacts on biodiversity (e.g.: habitat loss, species loss, pollution emissions, etc.), best practices and biodiversity commitments (if already taken).

- Key cereal crop, coffee, livestock and forest product supply chains (defined in sector' strategies and development agenda) and in terms of having significant impacts (both positive and negative aspects) on biodiversity and potential for policy interventions for prevention of biodiversity decline or reducing pressures on biodiversity (key processes, actors, stakeholders, etc.);
- Best practices and standards (at the landscapes, in the country and internationally) of the key identified supply chains/value chains of each subsector that are potential to be up-scaled towards protecting/reducing pressures on biodiversity;
- Lessons learnt in resource mobilization and promotion of stakeholder's engagement (especially from private sector) in reducing pressures on biodiversity in the 5 (five) subsectors.

SWOT analysis

The Consultant Team used SWOT analysis to identify Strengths, Weakness, Opportunities and Threats (UNEP, 2011). ***Strengths and Weakness*** (internal factors) of each subsector has been assessed based on whether national biodiversity policies, strategic plans (e.g., NBSAP) are present or not; effectiveness of sectors' implementation of the policies and NBSAP, where mainstreaming of biodiversity conservation across have been practises and effectives thereof.

Opportunities and Threats of the SWOT did largely come from the PEST analysis. From legal framework, **opportunities** for reduction of pressure on biodiversity include Ethiopia's commitment to implementing international biodiversity and socioeconomic development conventions/treaties and national development strategic plans. This included: CBD and Biodiversity Strategic Plan, etc., and presence and implementation of its current NBSAP. The national targets defined in the NBSAP (NBSAP, 2020) have been reviewed and compiled using as an opportunity for guiding stakeholders' voluntary commitments for reducing pressures on biodiversity.

In addition, the existing legal framework on biodiversity conservation, analysis of opportunities for commitment favouring biodiversity has been considered existing national and local actions such as national development plan, climate-resilient green economy strategy, Participatory Forest Management (PFM), Community-based Conservation Areas (CBCA), Reduced Emissions through Avoided Degradation and Deforestation (REDD+) project, integrated watershed management actions by Non-governmental Organizations (NGOs), presence of skilled/trained manpower, such as agricultural extension agents trained on environmental conservation, and technologies/techniques for sustainable intensification of agriculture through the use of improved technological packages, namely improved seeds, use of inorganic fertilizers and other agro chemicals, and use of mechanical power including tractors.

Major constraints for commitment favouring biodiversity assessed include level of financial resources for conducting good quality research for scientific-based evidences in the sectors; capacity or unwillingness of farmers to adopt new technologies and facilities to improve agricultural/forestry products and productivity; gaps in laws/policies implementation and enforcement; collaboration and coordination across sectors; and existence and level of incentives including financial incentives, product processing and marketing, etc. Furthermore, the SWOT analysis was used to analyze identified best practices, in comparison with current practices. The

results of SWOT analysis suggest interventions for scaling up towards reducing pressures on biodiversity along different selected/assessed supply chains.

The proposed intervention strategies

The proposed intervention strategies mainly revolve around:

- **SO** Strategy: Pursuing opportunities appropriate to strengths
- **WO** strategy: Overcoming weaknesses to pursue opportunities
- **WT** Strategy: Develop a protection plan to avoid being sensitive to the effects of the challenge.

2.3.3 Scenarios analysis

Scenario analysis was conducted following the DPSIR framework, based on available background information and proposed voluntary commitments.

2.3.4 Strategies for mobilizing stakeholders

Strategies for mobilizing stakeholders in the 5 target subsectors for the dialogue phase were developed based on the results of the above analyses, particularly stakeholders' analysis and scenarios defined above. Relational Charts tool (using box-and-arrow) was applied to map actors of each subsector. Based on this, for each actor, assessment and evaluations were made on the following variables: i) their interests, motivations and appetites, ii) their interactions, structures and line of command and information sharing, and iii) focusing on private and public related to policy, economic, investment, infrastructure, capacity, and governance, potential incentives, obstacles/disincentives, and measures to address disincentives. As actors and proposed voluntary commitment actions for subsectors at landscape level were interdependent and almost the same, we provided detailed description of proposed mobilization strategy only for Cereal crop subsector in the Bale Ecoregion and Coffee subsector in the Southwest Forest landscape.

2.3.6 Limitations and Overcome Strategy

This study faced two major challenges that have resulted to incompliance with the project implementation plan: lack of secondary data and civil unrest in Ethiopia. Specially, civil war in

Ethiopia mean it was difficult to travel to landscape areas for field observations and consultation of local stakeholders, and government officials at all levels have been busy with the security issues. Consequently, the stakeholders workshop, which are the vital steps in the study processes, was only held between 13–15 November 2022.

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3. RESULTS AND DISCUSSION

3.1 Cereal crop subsector in the Bale Ecoregion Landscape

3.1.1 Key characteristics - national level overview

The agricultural sector, in general, and the cereal subsector, in particular, is a critical pillar of Ethiopia's economy. In the last three decades, the sector has contributed an average of 24% to national GDP and provided employment for 80% of the total workforce (total work force estimated to 81 million; ILO, 2022) of rural households. Cereal production is one of the most important sub-sectors in the country's agriculture-based economy, contributing 18% (or 75% of the total agricultural share in the GDP) (FDRE, 2020). However, crop yields are relatively low due to the country's rugged topography, poor land management, small-scale landholdings, erratic rainfall, drought, limited mechanization, and insufficient supplies of fertilizer and improved seed. The government and the international community are working together to address many of these challenges. The Ministry of Agriculture, at Federal level, and Bureaux of Agriculture at Regional State, are the central and subcentral organ, respectively, which direct, plan and ensure the execution of legislation and policies of the agricultural sector.

As shown on Figure 6 below, trends in cereal crop cultivation in Ethiopia in the last three decades (1993 to 2018) has been increasing in total area harvested (ha), total production (tonnes) and Yield (hg/ha), although the Yearly I$ per person showed declining in the last two years which likely is due to the political instability.

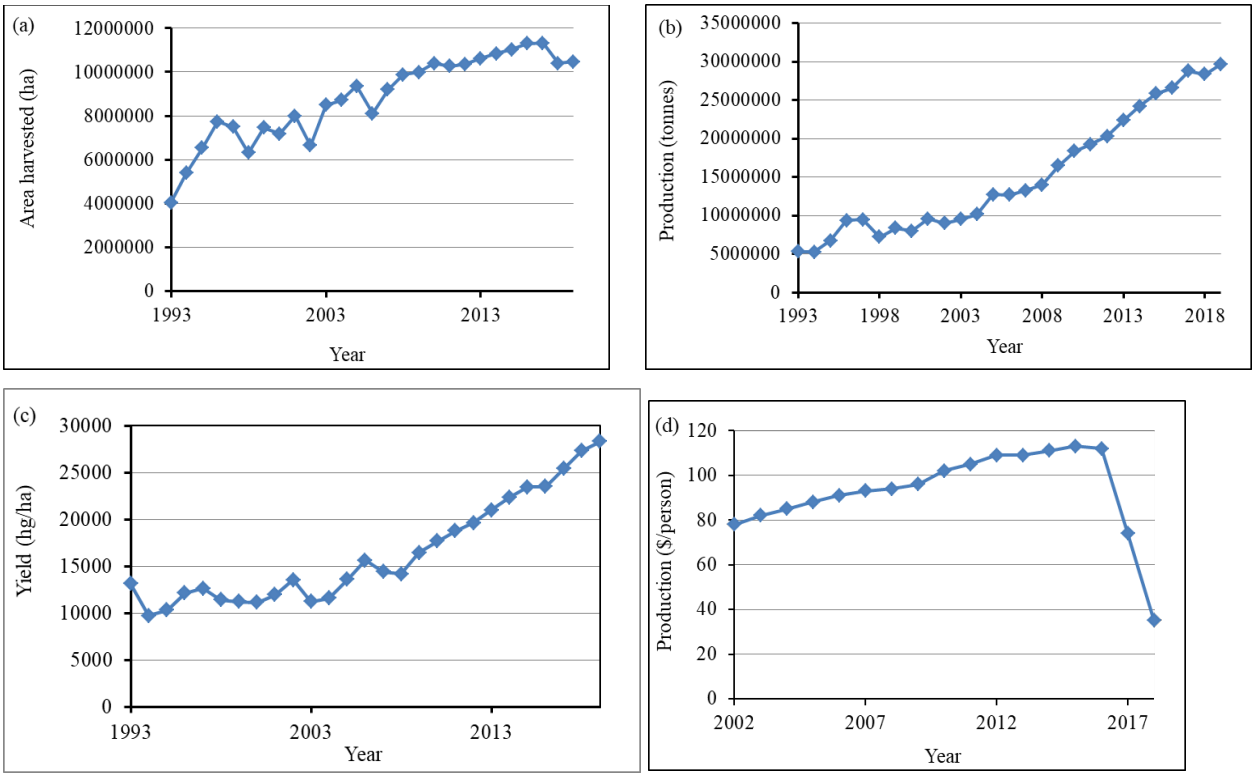


Figure 6. Trends in cereal crop cultivation in Ethiopia in the last three decades (1993 to 2018), showing (a) total area harvested (ha), (b) total production (tonnes), (c) Yield (hg/ha), and (d) Yearly I$ per person.

3.1.2 Key characteristics cereal crop subsector in the Bale Ecoregion

In the BER, cereal cultivation systems is similar to those known in many highlands parts of Ethiopia; majority of farmers in the BER also practice mixed cultivation, with only few residents in the southern part of the region practicing pure pastoralism. Cereal crop farming system in the ecoregion is characterized by traditional Ethiopian highland practices that involve oxen ploughing, hand weeding and manual harvesting and threshing (Mezgebu and Workineh, 2017). The farming system is characterized by low input and low output system, with limited use of chemical fertilizer, mainly due to untimely supply and economic constraints, and market access (SHARE Bale Eco-Region, 2017). In general, three major crop farming systems are identified in the BER: agro-pastoralist (mixed agro-pastoralist), silvo-cultural and commercial farming (see SHARE Bale Eco-Region, 2017). The mixed agro-pastoralist system is the most widespread cultivation practice, found almost throughout the ecoregion, and is practised by smallholder subsistent farmers (Table 4; Figure 7). In the highlands, the mixed agro-pastoralist farming system may comprise at least three sub-types depending on major crop types that are influenced by altitude: i) barley subsystem;

ii) wheat/pulse mixed system; iii) maize/teff subsystem. The barley sub-system is typical of the cool and humid high altitude areas above 3000m asl. Wheat can also be grown mixed with barley in this farming system, while in recent year potato is also emerging as important crop in this part. The wheat/pulse subsystem occupies intermediate altitude range (2,000-3,000m asl) below the above sub-system, while the maize/teff sub-system is typical of the warm and humid lower altitude area near transition to the hot arid and semiarid lowlands in the altitude range between 2,000-1,500m asl (see also BMNP, 2017; SHARE Bale Eco-Region, 2015, 2017).

The Silvo-cultural cultivation system occurs in the south and south-western parts of the eco-region, i.e., in the Harenna forest. Here, coffee production is one of the major important crop types both in terms of production (land cover) and contributions to household livelihoods. Coffee is produced in the form of small-scale garden production system as well as production from natural stands – wild coffee. In this part of the eco-region Enset (*Mussa ventricossa*) or false banana cultivation is also common. Overall, forestry provides up to a third of annual household income for residents in this part of the ecoregion (Table 4; SHARE Bale Eco-Region, 2015, 2017). Finally, though it is small in area, two large scale state-owned farming firms are present in the north (Serofta) and north-eastern (Sinana Agricultural farm) part of the BER.

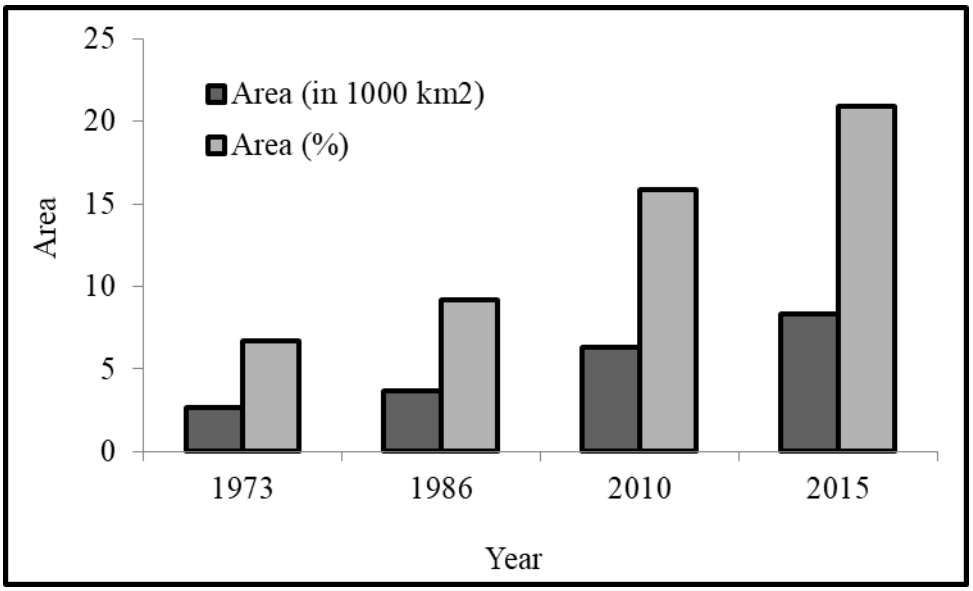


Figure 7. Area (in 1000 km^2 and % of total area of the ecoregion) of land under cultivation in the Bale Ecoregion between year 1973 to 2015.

Small-scale farmers in the BER reported that they produce cereal on small land holdings, ranging from 0.5–2 ha. They also reported that some households use inorganic fertilizers and improved varieties of seeds to enhance their agricultural production and productivities (Table 4). Specifically, they reported the use of fertilizers like PSNB and UREA, which they access from various suppliers: Farmers Unions and Cooperatives, local farmers associations, and Private retailers. Price of a quintal (100kg) of fertilizers on the average is 5100Birr (range: 3800–5000 birr), or roughly $USD 75–100. Improved varieties of seeds used include Barley varieties such as Grace, Ebony, HB 1963, Hb1964, and Wheat varieties such as Hidaase, Huluqa, Ogolcha and Oborra. Farmers access these seed varieties from Farmers Unions and Cooperatives, local farmers associations, Private retailer, and NGOs. Improved Seed is defined as crop variety which gives significantly higher yield, better quality and/or better benefit compared to traditional varieties of seeds and usually produced by the Ethiopian Seed Enterprise (ESE) in Ethiopia. However, crop productivity is very low due, largely, to limited access and use of improved inputs, mainly due to limited financial resources to cover the cost and poor agronomic practices. Hence, increased access to extension, research, finance, and adoption of improved production technologies to improve productivity are keys for reducing poverty and improving the wellbeing of the population.

Table 4. Amount of fertilizer used for different crop types.

Crop	Fertilizer type	Amount (kg)/ha
Haricot beans (Boloqqee)	PSNB	100
Mashoo	PSNB	150
Zea maize/Sorghum	PSNB + UREA	100 + 100
Zea maize/Sorghum (red soil)	PSNB + UREA	100 + 200
Teff	PSNB	150
Wheat/Barely	PSNB + UREA	100 + 200

Source: consultants interview with key informants.

3.1.3 Cereal subsector Value Chain in the Bale Ecoregion Landscape

3.1.3.1 Characteristics of Value chain and actors involved

Small-scale Cereal crop subsector Value Chain in Ethiopia, in general, and in the Bale Landscape, in particular, consists of production, processing, Transport, Distribution and Trade and Consumption (Figure 8). The input supply (fertilizer, seed, herbicides, etc) activities are greatly

expedited by farmers' cooperative unions though it is also practiced by individual traders. Activities at the production stage are largely accomplished by smallholder farmers and include preparation of land, sowing seed, weeding, harvesting, and thrashing. Then, local farmers sale to retailers or consumers. When sold to retailers, they sale directly to customers or to processor companies (flour producing companies) who in turn sale the processed products (flour, bread etc) to consumers. There are institutions that help support the actors in the value chain (the diagram on the right-hand side). The general contexts of the different components of this value chain are described in detail in the following subsections from political, economic, social, technological and environmental dimensions.

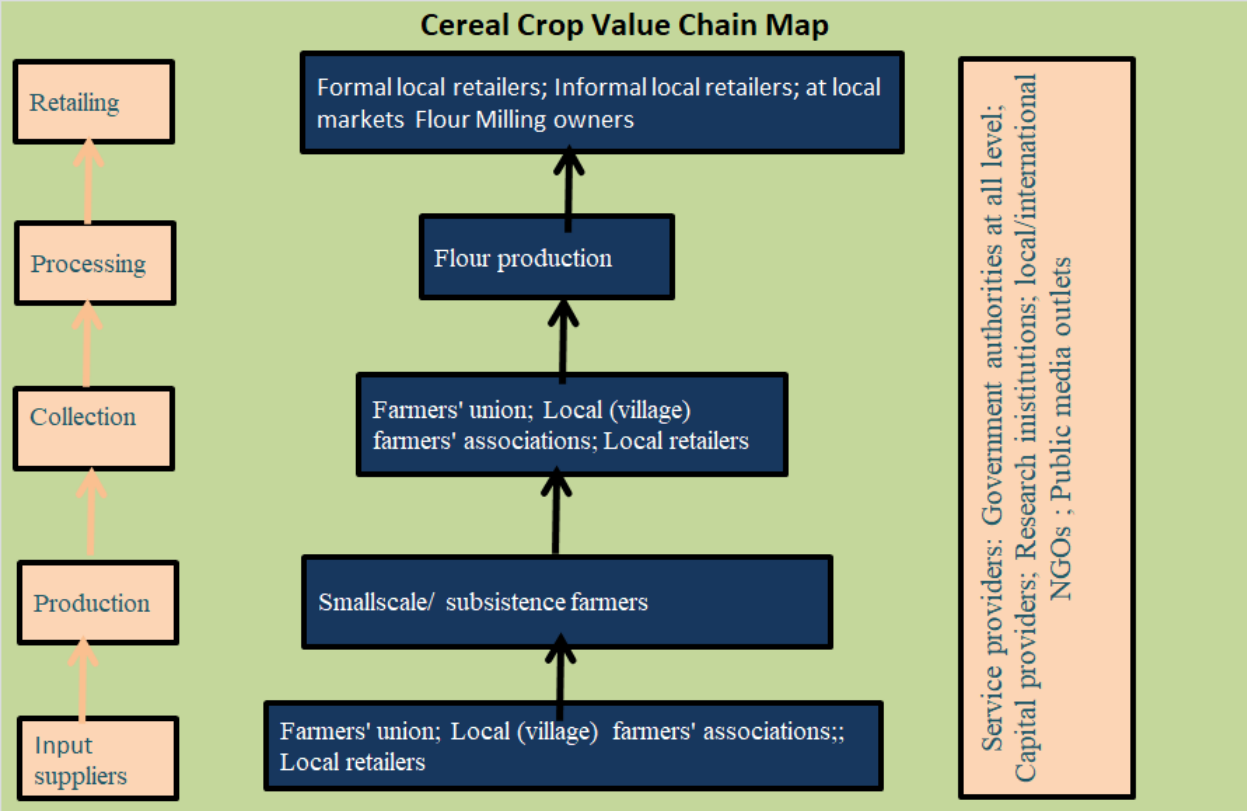


Figure 8. Overview of Cereal crop subsector Value Chain analysis, showing the different stages (functions) of the cereal value chain in Ethiopia. The first is input supply, then production, then collection, then processing and then retailing, the actors in the chain that are involved at each stage (shown in dark blue fill), and institutions that help support the actors in the value chain (the diagram on the right-hand side).

3.1.3.2 Actors' Institutional structure

Instructional structure of cereal crop in Ethiopia is shown on Figure 9. The Ministry of Agriculture, at federal level, and Agriculture Bureaux of regional states are the key responsible institutions for

policy formulation and strategic sector development plans for cereal crop subsector at the federal and regional state levels, respectively. Zone (subregional level accountable to the regional state agricultural bureau) and district ('Woreda' – accountable to zone agricultural office) agricultural offices are responsible to implementation of national and regional state policies and strategic plans, and management, providing extension services and capacity building for farmer producers. Within each hierarchically setup institutions are 'Crop sectors' whose key responsibilities are regulating, managing and improving crop production and productivity. At local or village level are development agents who provide extension services to farmers and farmers associations. At some areas, there are small-scale farmer groups, cooperatives or unions with major goal to link farmers to markets and for rural transformation.

3.1.3.3 Legal regulatory and Policy Frameworks

There are a number of legal, policies and strategic development plans relevant to environmental-friendly cereal crop production practices in the country. Summary of these laws, policies and plans are described as follow, and details are provided in Annex xxx.

Constitution of the Federal Democratic Republic of Ethiopia, (enacted in 1995): is the supreme law of all laws in Ethiopia and provides a framework within which all national (federal and regional states) and international policies shall be enacted and made effective.

Rural Land Administration and Use (Proclamation No. 456/2005): This law defines the state ownership of rural land and the tenure rights of the land occupant including rights to 'property produced on his land', rights of inter-generational tenure transfer, and rights to exchange land and limited leasing rights. Provisions are made for the registration and certification of tenure rights. The rural land administration and land use laws are being implemented by the regional states.

National Economic Development Strategy (1993): The guiding strategy under the National Economic Development is known as the 'Agricultural Development Led-Industrialization' (ADLI). This strategy further developed into sectoral strategies that include Agriculture, Industry, Mining, Population growth, technological progress, Economic and Social infrastructure, etc (MoFED, 1993).

Proclamation on Biosafety (No. 655/2009): The objective of this Proclamation is to protect human and animal health, biological diversity and in general, the environment, local communities

and the country at large by preventing or at least managing down to levels of insignificance the adverse effects of modified organisms.

Nagoya Protocol on Access to Genetic Resources: Ethiopia has acceded to the Nagoya Protocol, and this will eventually enhance implementation of the National ABS Law by creating conducive conditions for cooperation between parties, providing for user country obligations to support compliance, establish proper follow up mechanisms and harmonization of existing ABS legislation. At present, EBI has formulated Code of Conduct to accessing genetic resources and community knowledge and benefit sharing, a further move to effective use of the Protocol. To widen the operation, it is being translated into different local languages, namely: Amharic, Afan Oromo and Tigrigna.

Access to Genetic Resources and Community Knowledge, and Community Rights Proclamation (No. 482/2006) and Regulation (169/2009): After ratifying the Convention on Biological Diversity (CBD) and International Treaty on Plant Genetic Resources for Food and Agriculture, as well as adopting international model laws and guidelines, Ethiopia has issued Access to Genetic Resources and Community Knowledge, and Community Rights Proclamation (No. 482/2006) and Regulation (169/2009). Recently, the country has ratified the Nagoya Protocol, which will enhance the implementation of the national ABS laws.

Plant Breeders Right (Proclamation No. 481/2006): Plant Breeders Right was one of the significant developments for the conservation and sustainable utilization of the country's plant genetic resources that was issued by the People's House of Representatives of the Federal Democratic Republic of Ethiopia in 2006. The proclamation deals*, inter alia*, with the protection of their community knowledge that is relevant to the plant genetic resources, obtaining an equitable share of benefits from the use of plant genetic resources, exchanging and selling farm-saved seed or propagating material of the farmers' varieties; as well as the new plant varieties protecting under breeders' rights, and to collectively save, use, multiply and process farm-saved seed of protected varieties.

Development Conservation and Utilization of Wildlife (Proclamation No. 541/2007/Regulation): The major objectives of the Proclamation and the Regulation are to conserve, manage, develop and properly utilize the wildlife resources of Ethiopia; to create conditions necessary for discharging government obligations assumed under treaties regarding the conservation, development, and utilization of wildlife, and to promote wildlife-based tourism and

to encourage private investment. Accompanying this proclamation is Development Conservation and Utilization of Wildlife Regulation articulating provisions pertaining to implementation of the proclamation

Environmental Policy (1997) and Proclamation on Environmental Impact Assessment (No. 299/2002): The Environmental Policy of Ethiopia has an overall goal to improve the health and quality of the life of all Ethiopians and promote sustainable social and economic development by adopting environmental management principles. The **Proclamation on Environmental Impact Assessment (No. 299/2002) was also enacted** which highlights that EIA shall be mandatory for specified categories of development/investment activities undertaken either by the public or private sectors.

International agreements: CBD: Ethiopia is 54th signatory to the CBD and ratified the convention in 1994 (Negarit Gazetta, 98/1994). The following are major legal frameworks that govern the conservation, sustainable use and access and sharing of benefits arising from the use of the country's biodiversity and associated community knowledge.

Sectoral and Cross-Sectoral Strategic Plans

Four key strategies relevant to harmonize crop subsector and biodiversity conservation and supporting voluntary commitments of key actors are: Ethiopia's National Development Plan (Ethiopia 2030), Growth and Transformation (GTP II), Climate Resilient Green Economy (CRGE) Strategy, and Revised National Biodiversity Strategy and Action Plan (2020–2025). ***"Growth and Transformation Plan (GTP; 2010):*** Ethiopia's long-term national development plan is the "Growth and Transformation Plan (GTP), a 30-years (2010-2030) plan launched in 2010. As set forth in the GTP, Ethiopia's vision is "becoming a climate resilient middle-income economy by 2025, with a zero net increase in carbon emissions by 2025." Achieving this vision requires increasing agricultural productivity, strengthening the industrial base, and fostering export growth. Economically, it means growing fast enough to increase the current gross domestic product (GDP), decreasing the share of GDP contributed by agriculture from more than 40% to less than 30%, and migrating from farming and herding to jobs in the services and industry sectors.

Climate Resilient Green Economy strategy (CRGE; 2011): CRGE is envisioned to ensure Ethiopia's green growth path and foster development and sustainability. Launched in 2011 and

fully integrated into the GTP, the CRGE strategy was mainly aimed to address both climate change adaptation and mitigation objectives. This was followed by sectoral CRGE strategies.

National Development Plan (NDP; 2021–2030): At present, the country has developed and launched in 2021 a 10-year (2021-2030) National Development Plan (NDP), with a theme: "Ethiopia 2030: The Pathway to Prosperity". The plan stresses the importance of inclusive growth to alleviate poverty; reduce inequalities and promote progress in gender equality and youth rights; the importance of promoting private sector investment and trade; and the enhanced provision of social services and public goods to sustain economic growth supported. This NDP is aligned with and outlines strategies to achieve Ethiopia's global commitments, including the 2030 Agenda for Sustainable Development and the Paris Agreement on climate change. The integrated nature of development and the need for multi-sectorial solutions are recognised and addressed, and critical cross-cutting issues such as climate change, green growth, the environment, gender and children equality, disability and governance are mainstreamed in the plan. In this plan, it projected to reduce the contribution of crop sector to GDP from 21.4% in 2020 to 16.3% in 2030, by reducing area covered by crop but maintaining total production through agricultural intensification.

Agricultural Extension Strategy of Ethiopia (formulated by the MoA in 2017): its objective is "To transform Ethiopia's agriculture through the implementation of pluralistic extension system by providing demand-driven and market-oriented extension services to male, female and youth farmers, pastoralists and agro pastoralists." This vital strategy has identified 9 pillars: Strengthen FTCs through active participation of community and capacity building; Enhance agricultural knowledge and information services; Enhance client oriented and multi actor's advisory extension services; Facilitate market linkage and enhance value chains development; Gender, youth, and nutrition mainstreaming; Enhance environmentally sustainable agricultural practices; Enhance institutional arrangements, coordination, and linkages among key agricultural development partners; Human resource development and utilization for effective extension service deliver; and Establish strong and dynamic result-based monitoring, evaluation, and learning for continuous improvement of extension services delivery.

Revised Ethiopia's National Biodiversity Strategy and Action Plan (NBSAP; 2020): the vision of this plan is conserving, restoring and value biodiversity and ecosystems of the country, maintaining rich biodiversity and ecosystems that deliver essential benefits to all the people of Ethiopia.

Agricultural development perspective

The Government of Ethiopia (GOE) has embarked on implementation of a where agriculture is on the top of priority sectors. According to new Ethiopia's ten-year economic development plan (2021-2030), the agriculture sector is projected to grow at 6.2% per annum over the next ten years. In addition, the ten-year development plan aims at boosting agricultural export revenues and substituting imports by reducing production costs. To achieve this, the GOE seeks to leverage on developing huge unutilized arable land, modernizing production systems, and improving uptake of technology. Furthermore, the ten-year plan envisages building a climate resilient green economy (CRGE). In this regard, Ethiopia is looking to expand development efforts to fight land degradation and to reduce pollution; reduce Green House Gas (GHG) emissions; increase forest protection and development; increase production of electricity from renewable sources for domestic use and for export; and focus on modern and energy saving technologies. Summary of agricultural plan is presented in the Table 5 below.

Table 5. Summary of agricultural focus areas and objectives laid out in Ethiopia's ten-year national economic development plan (2021-2030).

Agriculture Focus Areas	Objectives
1. Free agriculture from rain dependence 2. Agricultural mechanization services 3. Contract farming, cluster approach and land consolidation 4. Livestock, animal feed and animal health 5. Horticulture (irrigation and urban farming) 6. Private sector participation 7. Institutional implementation capacity	• Improve income and livelihood options for farming and pastoral communities through increased productivity and competitiveness • Raise export of agricultural output and substitute imports • Make agriculture a viable and profitable enterprise through value addition • Create rural employment opportunities • Enhance livestock health access and quality • Preserve animal genetic resources and increase pastoral research • Improve the development of animal feed and access to markets

Agriculture Focus Areas	Objectives
8. Climate resilient sustainable agricultural development	• Develop livestock specific extension package for each livestock type

The BMERP will work to improve government and community partnerships on one hand and facilitate the development of community based local institution on the other to result in an improve forest ecosystem and landscape management in the Bale eco-region (BER). About 62 local PFM cooperatives will be established and their capacities strengthened (the establishment process already started) to jointly with OFWE manage forests in the eco-region. The BMERP also identified and planed a number of interventions. Through the new form of institutional arrangement and management regime, and project related activities the BMERP aims to avoid unplanned deforestation of considerable area of unique Afromontane forests to reduce the emission of a large quantity of GHG as described below, contribute to the improved conservation of rich and globally significant biodiversity and enhance local livelihoods through the sustainable use and development of local resources including products and services from the forests. Three management entities: EWCA/BMNP, OFWE, OEFCCA, private-community/CHAs

3.1.4 Impacts of cereal cultivation practices on biodiversity

The major drivers of the natural resources problems in the co-region are population growth, poverty, lack of cross-sectoral integrated actions and policies, and capacity gaps at human and institutional levels for responsible natural resources management. The main environmental challenge for the agricultural sector is reducing deforestation, practiced for converting land to agriculture, as deforestation concerns are growing among all stakeholders. Natural resources base of the BER is declining due to human actions (e.g., deforestation, expansion of agricultural land and overgrazing and forest fire) and natural factors (e.g., drought). For example, the conversion of grazing lands to agricultural lands in the highlands of BER is increasing livestock pressure on the remaining grazing lands and affecting the traditional transhumance practice. Degradation of grassland and forest resources as well as land conversion has resulted in soil erosion, flooding,

drought, and depletion of ground water. This in turn has led to chronic food insecurity and vulnerability to increased land degradation and recurring drought. The impacts of inappropriate land use and management practices on the livelihood of communities in the BER have been further aggravated by climate change/variability.

Based on study on land use/cover changes in the last 40 years and derived trends in amount of land converted to cultivation (Figure 9). In the BER, cover of cropland currently is estimated to be about 8326 km^2, accounting nearly 21% of the total area of BER and increasing from 2675 km^2 (7%) in 1973 and 3667 km^2 (9%) in 1986 (SHARE Bale Ecoregion, 2017; Figure 9). Extensive conversion of forests, grasslands, shrublands and woodlands into cropland in the four decades (between 1973 and 2015) has been documented. The net change of cropland has been an increase in 992 km^2 (37%) between 1973 and 1986, 2657 km^2 (73%) between 1986 and 2010), and 2002 km^2 (32%) between 2010 and 2015 (see Figure 9; see also SHARE Bale Ecoregion, 2015, 2017).

In sum, our findings affirm the previous thought that cereal crops (barely/wheat in the northern and upper Harenna forest) and maize/sorghum (in the southern and south-western) part of the BER are extensively cultivated crops in terms of agricultural area. According to this figure 9, there is a huge and progressive conversion of grasslands into crop lands in the extreme west of the landscape. These conversions of grasslands have had impacts on biodiversity. As such, we recommend that practices associated with cereal cropping subsector a major driver of biodiversity loss in the ecoregion which should be addressed via the voluntary commitment measures.

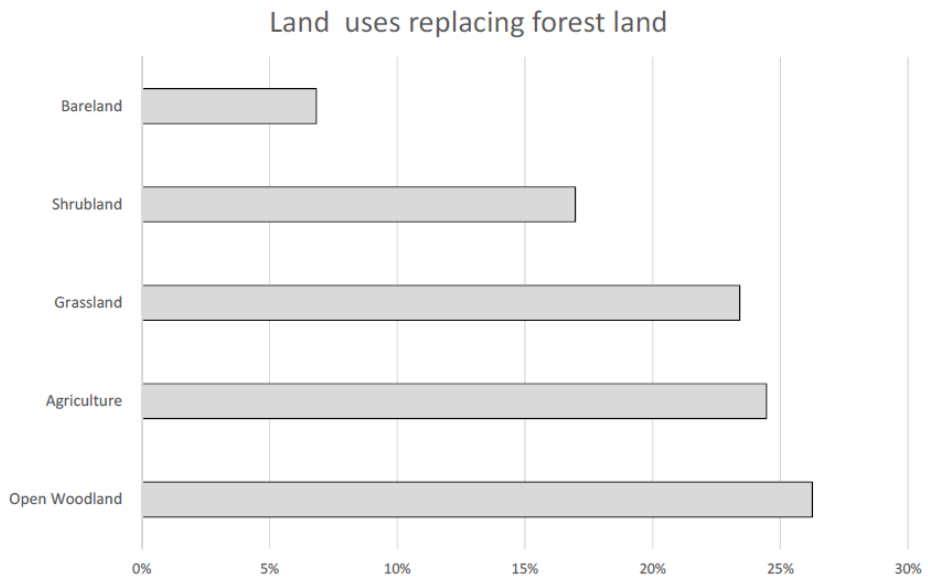


Figure 9. Land uses replacing forest over the period 2000 –2013 (as % of the total forest loss over the period).

Given the ever-increasing demand for arable land by small-scale farmers, due to high population growth rate, the combined mid- and long-term negative impacts of habitat loss and degradation include:

- Increased soil erosion and consequently reduced soil fertility and associated agricultural productivity,
- Drying out of perennial rivers
- Climate change leading to increased temperature and erratic rainfall, including short in duration but heavy rain, and sometimes drought Climate change and its adverse ecological, economic and social impacts, such as:
    - Reduction in the length of growing seasons that has resulted in the loss of many long duration varieties as well as force large areas of marginal agriculture out of production.
    - Altering the underlying agro-ecosystems through elevated temperatures and CO2 levels, leading to changes in crops pests and disease activity and population levels.
    - Climate change also causes shortage of livestock feeds, disease outbreak, change in disease distribution and shrinkage of rangelands.
    - Desertification, forest fire, high evapo-transpiration, and drought.
    - Changes in air temperature and precipitation.

- Pollution of rivers due to agrochemicals (herbicide, fertilizers) carried by erosion
- Cultivation of steep slopes (slope above 45 degree) without any erosion mitigation measures in place
- Degradation and shrinkage of natural ecosystems, mainly forests, and eventual loss of ecosystem services,
- Siltation of dams and reduced hydroelectric power supply.

3.1.5 Biodiversity best practices and current commitments

Best practices from and commitments from local level:

Respondents in the administrative zones and District in the landscape as well as farmers contacted during the field assessment stated the following biodiversity-friendly agricultural best practices which they are practicing currently:

- Local advocacy currently supporting biodiversity conservation through community sensitisation and forest restoration
- Application of modern scientific based practices are under way to increase production with low input
- Stakeholders consistently raising community awareness on how to adapt to climate change
- Increasing awareness and practice of pest control through trainings and massive community education
- Nationally led and locally implemented massive natural resources management and development becomes part of local development endevour
- Awareness raising on best farming, nature friendly, practices
- Creating alternative income sources such as micro-trade, beekeeping, etc opportunities
- Extension services related to the above
- Biodiversity friendly practices such as compost preparation are well under adoption
- Providing training on modern farming practices
- Stakeholders such as NGOs are supporting promotion of agroforestry and use of non-timber forest products.

- Afforestation/plantation and reforestation, agroforestry, Area closure, Horizontal Ploughing, Mixed cropping, to reduce erosion, Soil and water conservation practices via bund 'soil and stone bund' methods, Terracing.

Existing Best practices at national level:

It is important to note that, forests have been severely degraded over the years, hence Ethiopia has prepared its readiness to implementing the REDD+ program since 2019 to help reduce deforestation and forest degradation, while improving the lives of rural populations. BER is one of the targeted regions for implementation of the program. This Ethiopia's Bale Ecoregion REDD+ program is an example of an opportunity to voluntary commitment by the stakeholders, which not only enhance forestry resources, but also other sectors such as agriculture. A benefit sharing plan is being prepared with local actors and communities that have contributed to the results, to ensure that they receive the majority of the benefits. This will allow the stakeholders to continue promoting community management of natural resources and restoration of degraded areas, while stimulating conservation-friendly, nutrition-sensitive, and climate-smart farming models.

3.1.6 SWOT Analysis for the cereal crop cultivation in the Bale ecoregion

Preliminary results of SWOT analysis are presented on Table 6. Strengths to implement voluntary commitment in the cereal subsector include: adoption of policies, laws and institutions; high government commitment to international sustainable development goals (e.g., UN SDGs, CBD); adoption and ownership of nature sensitive national development plan and NBSAP goals with clear targets; high motivation at all levels of government authorities for socioeconomic and environmental development; organized community for ease mobilization for voluntary commitment for watershed development and rehabilitation of degraded land; and present nation-wide movement for afforestation, reforestation, soil and water conservation. Despite these strengths, there are some weaknesses, including low level of agricultural input supply; short sighted sectorial policies with often conflicting priorities and overlapping and unclear responsibilities among some inter-related sectors; and lack of coordination among different sectors and with development and conservation organizations, NGOs, Civic societies and local communities. Yet, there are opportunities to maintain the strengths and turn the weakness into

strengths. This includes existence of increasing interest of national and international donor and development agencies to support sustainable development (Table 6).

Table 6. SWOT Analysis for the cereal crop cultivation in the Bale ecoregion.

Strengths	**Weakness**
• High commitment at all levels of government authorities for socioeconomic and environmental development • Organized community, making ease for mobilization • Nation-wide movement for afforestation, reforestation, soil and water conservation • Consistent community organization and mobilization for voluntary commitment (42 days per year free labour by communities for communal land rehabilitation) • Inclusion of biodiversity conservation and climate change in national policies as cross-sectorial issue	• Sectorial policies often conflicting • Overlapping and unclear responsibilities among some related sectors • Lack of coordination among different sectors and with development and conservation organizations, NGOs, Civic societies and local communities • Poor law enforcement among judiciaries • Low level of agricultural input supply to intensify farming • Low level of adoption of modern farming practices
Opportunities	**Threats**
• Increasing interest of national and international donor and development agencies in sustainable development of both socioeconomic and biodiversity • Existence of fertile land and large potential of conservation and agricultural land • Biodiversity is becoming priority agenda at all levels • Fast and extensive awareness raising endeavours are emerging in formal and informal education	• Drought • Erratic rainfall • Political instability and peace insecurity • High inflation rate • Poverty • Increasing number of jobless youth

3.1.7 Synthesis: Recommendations and scenarios of commitments for cereal subsector

Based on the analysis of the subsector, synthesis of the links and cause effect and responses is following the DPSIR conceptual model is shown on Figure 10.

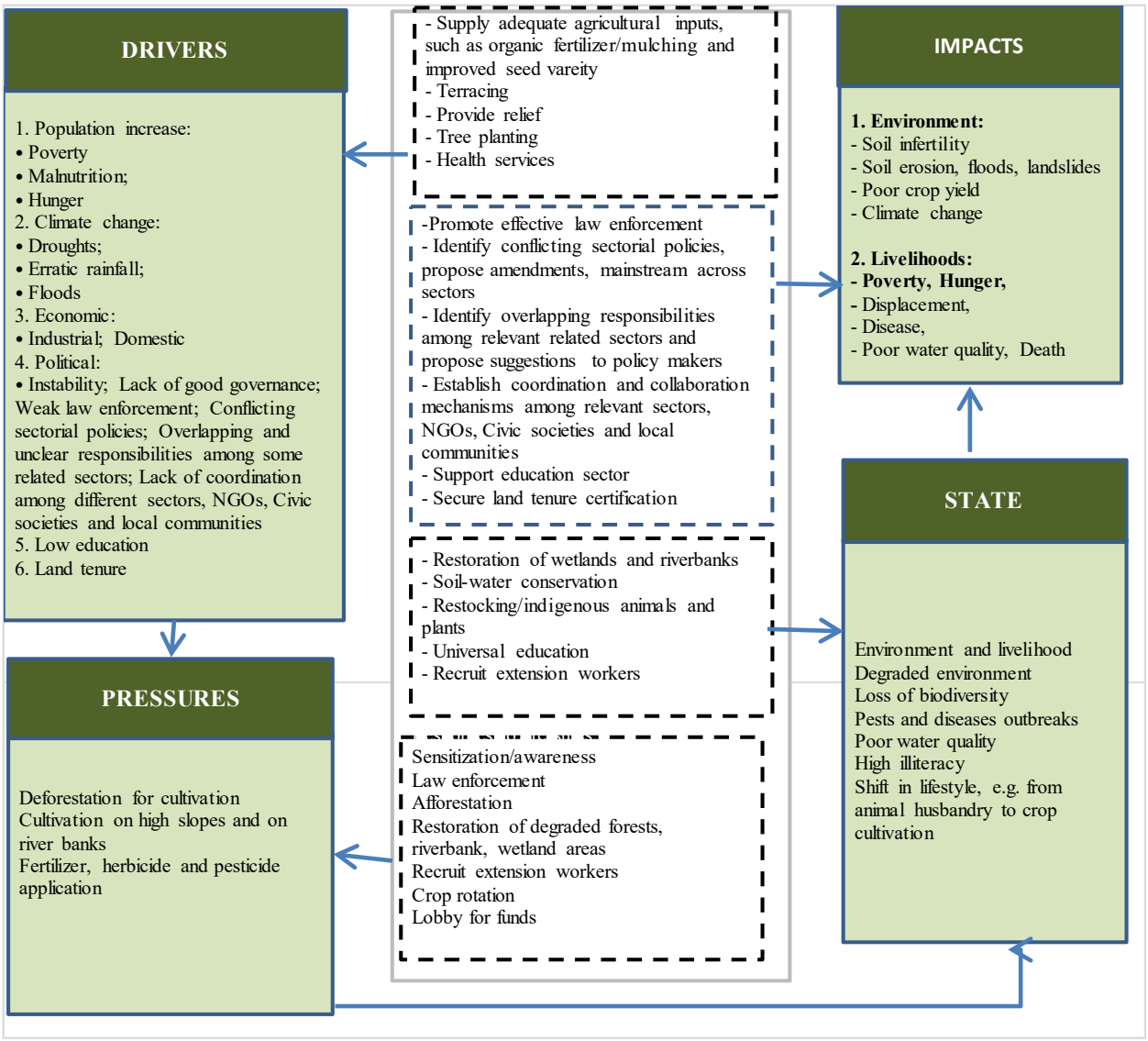


Figure 10. The DPSIR framework for assessing cereal crop production in the Bale Ecoregion.

Description of Voluntary Commitment Scenarios

As shown on Tables 7 and 8, for cereal subsector in the Bale Ecoregion, two major biodiversity pressures associated with coffee subsector are identified: **Heavy Deforestation for cereal cultivation land, and Inefficient and biodiversity unfriendly cereal cultivation practices causing biodiversity decline, land degradation and food insecurity**. Proposed voluntary commitment measures and Scenarios of ambitions are described as follows:

- Avoid any further cultivation land expansion in the strictly protected areas (i.e, Bale Mountains National Park) through effective law enforcement
- Awareness raising for farmers and government officials on biodiversity laws and policies, impacts of biodiversity degradation on ecosystems and human wellbeing
- Adopt biodiversity friendly intensive cereal cultivation practices, such as using improved seeds, compost, mulching and manure; mixed cropping; Agroforestry; pest/herb control
- Promote both biodiversity conservation and household livelihood and food security of local communities through alternative income generation options and ESP schemes (e.g., REDD+)
- Restoration of previously degraded and abandoned cereal cultivation areas through reforestation, Area enclosure, soil and water conservation practices (e.g., 'soil and stone bund' methods, Terracing)

Implementation of these recommendations is divided into two ambition levels: Low level Scenarios and High level Scenarios. These are briefly presented as follows:

Heavy deforestation for cereal cultivation land

Conversion of natural habitats to small scale cereal crop farming has been remained the major threats to biodiversity in the Bale Mountains Ecoregion. Since the last four decades, this has resulted to significant forest cover loss and degradation, and declining status of biodiversity. The ultimate impacts have been loss of vital ecosystems services on which local communities and people residing far away; increased local extinction risks of rare and/or threatened species - resulting to decline in species diversity. The following strategic measures are recommended for voluntary commitments (VC):

VC 1: Avoid any further cultivation land expansion in the strictly protected areas (i.e., Bale Mountains National Park) through effective law enforcement

Through effective and collaborative law enforcement measures, it is supposed that the BMNP, Zone/Woreda Rural land offices and Smallholder farmers to ensure 100% avoidance (High ambition Scenario) of any further expansion of new cultivation fields within KBAs by 2030 which is maintained then after. NGOs working in the landscape are expected to provide financial and

logistic supports for law enforcement and woreda judiciaries will be engaged in the law enforcement processes.

VC 2: Awareness raising for farmers and government officials on biodiversity laws and policies, impacts of biodiversity degradation on ecosystems and human wellbeing

One of the major challenges in addressing biodiversity conservation issues is lack of awareness and knowledge of farmers and government officials on biodiversity laws and policies, the links between biodiversity, ecosystem services and human wellbeing. In response to this, BMNP, Zone/Woreda Rural land and OFWE will undertake awareness raising and training events. This is supposed to cover 50% of target local communities and government officials by 2025 (Low level ambition Scenario) and 90% by 2030. Other actors like NGOs will provide logistic supports.

Inefficient and biodiversity unfriendly cereal cultivation practices causing biodiversity decline, land degradation and food insecurity Heavy soil erosion

Inefficient and biodiversity unfriendly cereal cultivation practices causing biodiversity decline, land degradation and food insecurity

Inefficient and biodiversity unfriendly cereal cultivation practices are causing biodiversity decline, land degradation and food insecurity. For example, it has resulted to heavy soil erosion and reduced soil fertility, drying out of perennial rivers and siltation of dams. This in turn has resulted to reduced agricultural productivity, shortage of drinking water both for humans and livestock, animal and human health problems and insufficient hydroelectric power supply. To address this problem, the following VCs are identified.

VC 3: Adopt biodiversity friendly intensive cereal cultivation practices, such as using improved seeds, compost, mulching and manure; mixed cropping; agroforestry; pest/herb control

Woreda Agricultural offices and Kebele Extension Agents are supposed to ensure 30% increase in number of households adopted modern techniques of cereal cultivation by 2025 (Low Scenario) and 75% by 2030 (High Scenario), with annual achievement of 15% between 2024-2030. Other actors will provide supports needed, such as research on and provisioning of improved seeds by Mada Walabu University (MU); and Sinana Agri Research Center.

VC 4: Promote both biodiversity conservation and household livelihood and food security of local communities through alternative income generation options and ESP schemes (e.g., REDD+)

The Bale Ecoregion is currently covered under the national REDD+ programme. Thus, at least 50% of communities living in and around forest lands are expected to be beneficiaries of this initiative by 2030. Develop modalities for community benefits from ESP through the REDD+ Programme and identifying other income generating options, such as NTFPs, will be undertaken by NGOs and Universities.

VC 5: Restoration of previously degraded and abandoned cereal cultivation areas through reforestation, Area enclosure, soil and water conservation practices (e.g., 'soil and stone bund' methods, Terracing)

Improving the status of biodiversity and ecosystem functions in the Bale Ecoregion requires, among others, restoration of previously degraded habitats. Thus, restoration of 75% **(High ambition Scenario**) of previously degraded habitats by 2030 is proposed by BMNP, smallholder farmers and Woreda forestry and agricultural offices. To facilitate implementation of this measure, Mada Walabu University will provide scientific and technical inputs needed for the restoration, including:

- identifying threatened and/or endemic species most impacted from fragmentation and coffee management practices;
- identifying potential areas for restoration; and
- identifying feasible restoration approaches (enclosure, enrichment plantation, etc); and conduct monitoring the performance (success/failure history) of the measure and share lessons learnt.

Table 7. Potential voluntary commitments of Cereal subsector under low scenario of ambition (2023-2030).

Problem to be addressed [Pressure]	**Sate**	**Impacts**	**Response: VC**	**Actors**	**Expected change**	**Actions by other actors [+ Actors]**	**Responsible Actors**	**Monitoring measures and reporting**	**Broad Indicators**
Deforestation for cultivation land to increase cereal production	Increased soil erosion and consequently reduced soil fertility and associated agricultural productivity, § Pollution and drying out of perennial rivers, siltation of dams; Climate change Siltation of dams and reduced hydroelectric power supply. "	Loss of ecosystems services such as wild sources of food, water, firewood and building materials, recycling of nutrients, and CO2 sequestration; deterioration of human wellbeing	Avoid any further cultivation land expansion in the strictly protected areas (i.e, Bale Mountains National Park) through effective law enforcement	BMNP; Zone/Woreda Rural land admin.; Smallholder farmers	100% avoided by 2030, which will be maintained then after	Financial and logistic supports for law enforcement	NGOs	Review of LE reports; Ecological monitoring data; LULCC change analysis	Number of dialogues, meetings and consultations held with stakeholders
						Collaboration in persecution of transgressors	Woreda Judiciaries		
			Awareness raising for farmers and government officials on biodiversity laws and policies, impacts of biodiversity degradation on ecosystems and human wellbeing	BMNP; Zone/Woreda Rural land admin.; OFWE	50% of local communities and government officials trained by 2025	Financial and logistic supports for law enforcement	NGOs		Number of farmers educated
Inefficient and biodiversity unfriendly cereal cultivation practices causing biodiversity	Heavy soil erosion; reduced soil fertility; drying out of perennial rivers; siltation of dams;	Reduced agricultural productivity; Shortage of drinking water both for humans and livestock;	Adopt biodiversity friendly intensive cereal cultivation practices, such as using improved seeds, compost, mulching and	Small scale farmers; Zone/Woreda Agricultural offices; Kebele Extension Agents	30% increase in number of households adopted modern	Research on improved seeds	Mada Walabu University (MU); Sinana Agri Research Centre (SARC)	Office records (Desk review); Farmers consultation; Scientific reports	Scientific publications; number of training events

decline, land degradation and food insecurity	Siltation of dams	Insufficient hydroelectric power supply	manure; mixed cropping; Agroforestry; pest/herb control		technologies by 2025	Provision of improved seeds	Farmers Cooperatives/Associations		
						Extension services and training on production of compost and bio-friendly pest control and weeding practices	Woreda Agri. office and Kebele Extension Agents		
			Promote both biodiversity conservation and household livelihood and food security of local communities through alternative income generation options and ESP schemes (e.g., REDD+)	BNP; OFWE; Small scale farmers; Zone/Woreda Agricultural offices; Kebele Extension Agents	At least 100% of communities living in and around forest lands benefited by 2025	Develop modalities for community benefits from ESP through the Bale Ecoregion REDD+ Programme	OFWE; EWCA; NGOs	Review of documents; Implementation reports	Agreement documents; Implementation reports
						Promote the contribution of NTFPs to household economy	OFWE; EWCA; NGOs		
			Restoration of previously degraded and abandoned cereal cultivation areas through reforestation, Area enclosure, soil and water conservation practices (e.g.,	BMNP; Zone/Woreda Rural land admin.; Smallholder farmer	1 study on restoration potential assessed and sites identified by 2025	Identify threatened and/or endemic species that are potentially most impacted from harmful cereal crop	Mada Walabu University (MU); Sinana Agri Research Centre (SARC)	GIS analysis based on Ground truthing and Remote sensing	Area restored

			'soil and stone bund' methods, Terracing)			management practices			
						Identify potential species and sites of high conservation importance for restoration	Mada Walabu University (MU); Sinana Agri Research Centre (SARC)		
						Assess and determine suitable restoration approaches (enclosure, enrichment plantation, etc)	Mada Walabu University (MU); Sinana Agri Research Centre (SARC)		
						Facilitate implementation of the chosen restoration measure, and conduct monitoring the performance (success/failure history) of the measure and share lessons learnt	Universities/Research institutions; Woreda/Kebele Extension Agents and EFCC; NGOs		

						Establish baseline data, and undertake monitoring and evaluation and share scientific-based information on the effectiveness of voluntary commitment measures taken in favour of biodiversity conservation, using key biodiversity components (e.g., threatened, rare, endemic species; forest cover status) as indicators of effectiveness	Mada Walabu University (MU); Sinana Agri Research Centre (SARC)		

Table 8. Potential voluntary commitments of Coffee subsector and high scenario of ambition for biodiversity (2023-2030)

Problem to be addressed [Pressure]	**Sate**	**Impacts**	**Response: VC**	**Actors**	**Expected change**	**Actions by other actors [+ Actors]**	**Responsible Actors**	**Monitoring measures and reporting**	**Broad Indicators**
Deforestation for cultivation land to increase cereal production	Increased soil erosion and consequently reduced soil fertility and associated agricultural productivity, § Pollution and drying out of perennial rivers, siltation of dams; Climate change Siltation of dams and reduced hydroelectric power supply. "	Loss of ecosystems services such as wild sources of food, water, firewood and building materials, recycling of nutrients, and CO2 sequestration; deterioration of human wellbeing	Avoid any further cultivation land expansion in the strictly protected areas (i.e, Bale Mountains National Park) through effective law enforcement	BMNP; Zone/Woreda Rural land admin.; Smallholder farmers	100% avoided by 2030 and maintained then after	Financial and logistic supports for law enforcement	NGOs	Review of LE reports; Ecological monitoring data; LULCC change analysis	Number of dialogues, meetings and consultations held with stakeholders
						Collaboration in persecution of transgressors	Woreda Judiciaries		
			Awareness raising for farmers and government officials on biodiversity laws and policies, impacts of biodiversity degradation on ecosystems and human wellbeing	BMNP; Zone/Woreda Rural land admin.; OFWE	90% of local communities and government officials trained by 2030	Financial and logistic supports for law enforcement	NGOs		Number of farmers educated
Inefficient and biodiversity unfriendly cereal cultivation practices causing biodiversity	Heavy soil erosion; reduced soil fertility; drying out of perennial rivers; siltation of dams;	Reduced agricultural productivity; Shortage of drinking water both for humans and livestock;	Adopt biodiversity friendly intensive cereal cultivation practices, such as using improved seeds, compost, mulching and manure; mixed cropping;	Small scale farmers; Zone/Woreda Agricultural offices; Kebele Extension Agents	80% increase in number of households adopted modern	Research on improved seeds	Mada Walabu University (MU); Sinana Agri Research Centre (SARC)	Office records (Desk review); Farmers consultation; Scientific reports	Scientific publications; number of training events

decline, land degradation and food insecurity	Siltation of dams	Insufficient hydroelectric power supply	Agroforestry; pest/herb control		technologies by 2030	Provision of improved seeds	Farmers Cooperatives/Associations		
						Extension services and training on production of compost and biofriendly pest control and weeding practices	Woreda Agri. office and Kebele Extension Agents		
			Promote both biodiversity conservation and household livelihood and food security of local communities through alternative income generation options and ESP schemes (e.g., REDD+)	BNP; OFWE; Small scale farmers; Zone/Woreda Agricultural offices; Kebele Extension Agents	At least 50% of communities living in and around forest lands benefited by 2030	Develop modalities for community benefits from ESP through the Bale Ecoregion REDD+ Programme	OFWE; EWCA; NGOs	Review of documents; Implementation reports	Agreement documents; Implementation reports
						Promote the contribution of NTFPs to household economy	OFWE; EWCA; NGOs		
			Restoration of previously degraded and abandoned cereal cultivation areas through reforestation, Area enclosure, soil and water conservation practices (e.g., 'soil and stone bund' methods, Terracing)	BMNP; Zone/Woreda Rural land admin.; Smallholder farmer	By 2030, 75% (15% per year from 2026 to 2030) of previously degraded habitats restored	Identify threatened and/or endemic species that are potentially most impacted from harmful cereal management practices	Mada Walabu University (MU); Sinana Agri Research Centre (SARC)	GIS analysis based on Ground truthing and Remote sensing	Area restored

						Identify potential species and sites of high conservation importance for restoration	Mada Walabu University (MU); Sinana Agri Research Centre (SARC)		
						Assess and determine suitable restoration approaches (exclosure, enrichment plantation, etc)	Mada Walabu University (MU); Sinana Agri Research Centre (SARC)		
						Facilitate implementation of the chosen restoration measure, and conduct monitoring the performance (success/failure history) of the measure and share lessons learnt	Universities/Research institutions; Woreda/Kebele Extension Agents and EFCC; NGOs		

						Establish baseline data, and undertake monitoring and evaluation and share scientific-based information on the effectiveness of voluntary commitment measures taken in favour of biodiversity conservation, using key biodiversity components (e.g., threatened, rare, endemic species; forest cover status) as indicators of effectiveness	Mada Walabu University (MU); Sinana Agri Research Centre (SARC)		

3.1.8 Stakeholder mapping and Mobilization Strategy

Stakeholders mapping is important for developing mobilization strategy to effectively implement voluntary biodiversity commitment actions. Result of analysis of stakeholder mapping for cereal crop subsector, showing their direction of interactions [influence, collaboration (alliance) and information exchange] are shown on Figure 11, and the level of engagement in the implementation of the voluntary commitments is provided on Figure 12.

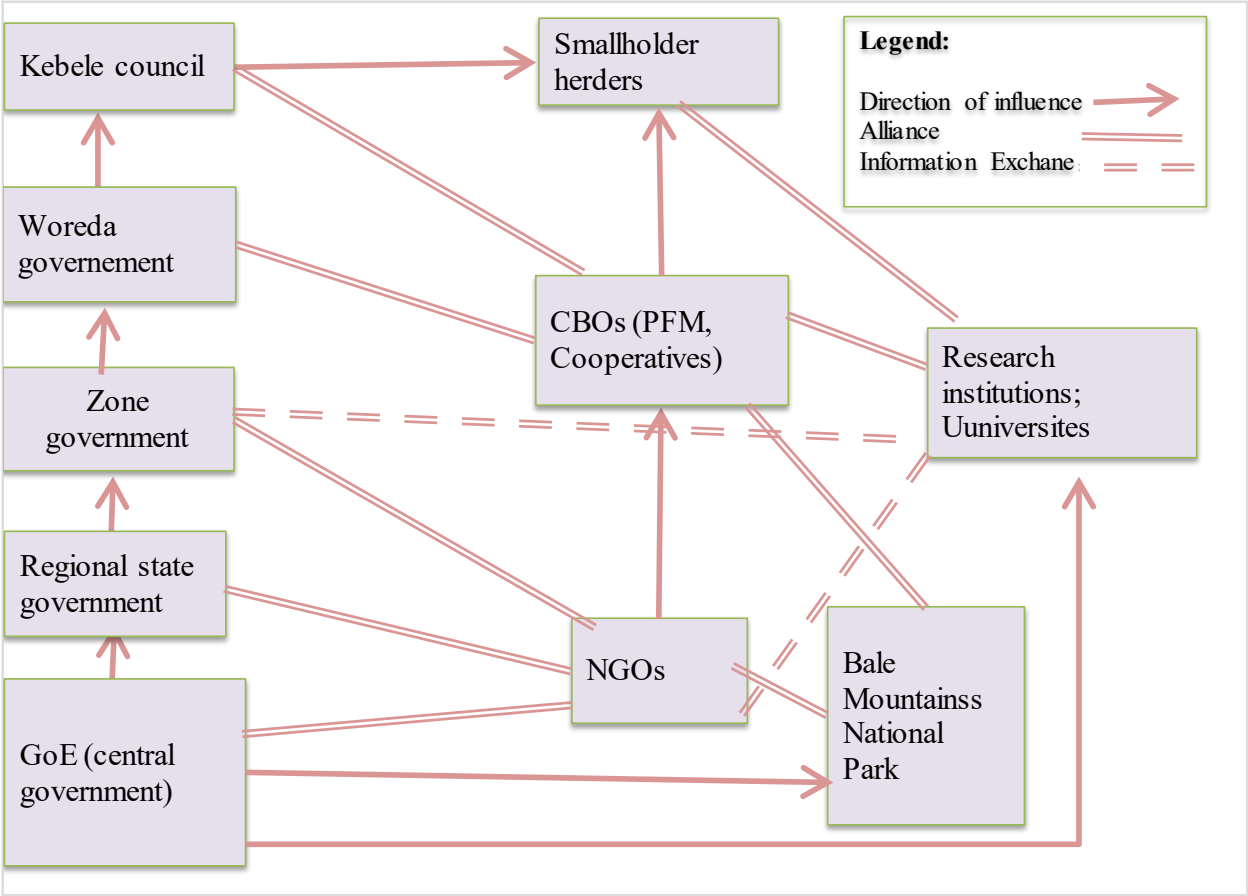


Figure 11. Stakeholder mapping for cereal subsector in the Bale Ecoregion.

Stakeholder Mobilization strategy

As defined in the framework of BIODEV2030, a voluntary commitment (VC) is defined as "a set of forward-looking, strategic, shared and science-based actions that lead to positive and measurable change in biodiversity." Thus, the proposed VC in this Study 2 for the Bale Ecoregion were obtained by consensus following an inclusive process of discussion and negotiation involving the actors and their stakeholders.

This voluntary commitment is part of the implementation of Ethiopia's National Biodiversity Strategy and Action Plan (NBSAP). EBI, as a NBSAP coordinator and CBD focal point, takes the responsibilities to facilitate the processes of implementation and mobilization of actors for the voluntary commitment. Engagement types of each actor for the subsectors in the Bale Ecoregion are shown in Figure 12 below.

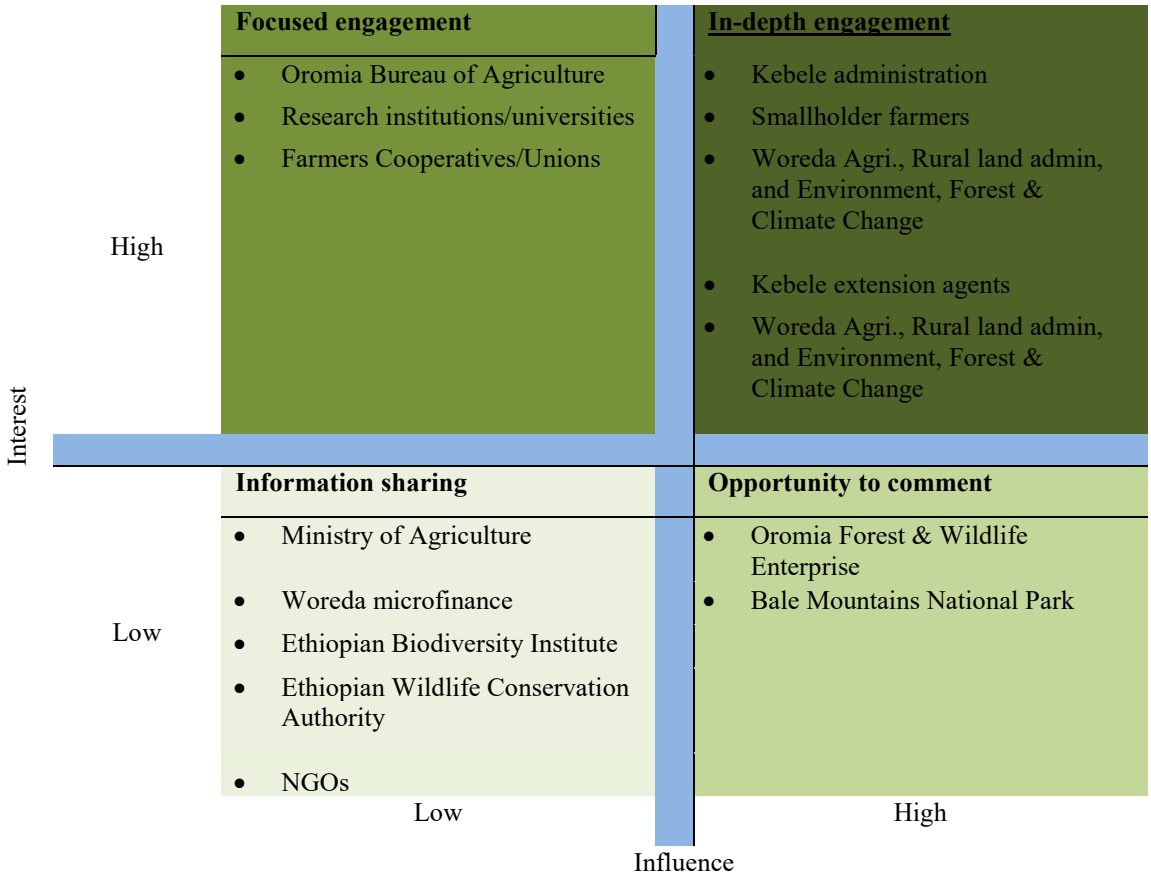


Figure 12. Stakeholder engagement level for cereal subsector in the Bale Ecoregion.

Overall, we suggest the steps for mobilization of actors for the proposed VCs in the Bale Ecoregion:

1. Introduce the concept of VC and framework of BIODEV2030 to all legitimate actors

Inclusiveness (and recognition of the plurality of interests and values) of the process of building a VC is as important as its content. The effective involvement and participation of all relevant stakeholders will enhance the chances of good ownership of the VC, which will increase its chances of implementation, monitoring and evaluation. As such, the VCs should be further discussed as much as necessary by all legitimate stakeholders in the subsectors in the landscape, relying on actors with a capacity to influence other actors ("opinion leaders"). The concept/definition of CV and the need for (findings of Study 1), and the stakes, objectives, means and consequences of the VCs (finings of Study 2) should be understood and appropriate by each stakeholder.

2. Agree on the formulated VC:

a) Refine role of each of the actors in the implementation.
b) Develop Concrete action plan for each of them, including:

- "Counterparts / Enabling conditions": Means to be implemented by other actors (State, NGOs, financial actors...) to enable or accelerate this change

- Other means/actions to be implemented by other stakeholders to promote ambitious change and the adoption of good practice:

- Technical means (change/adaptation of regulation or law, incentives...)

- Financial means (investments, grants...)

- Human resources (training, etc.)

3. Establish Woreda and Kebele VC committee

Establishing a committee composing of relevant individuals representing different social groups (community leaders, religious leaders, youth and women, etc) needed to mobilize and bring together all actors. The composition, roles, responsibilities, mandates, communication strategies should be clearly defined.

4. Develop standard formats of commitments for different types of actors

Standard formats of commitments may differ depending on the type of stakeholders to be mobilised, such as multi-stakeholder agreement, Sectoral commitment, etc. Thus, for each type of actor, the content of their commitments should be prepared, typically describing: a list of "possible" actions to improve practices and reduce pressures on biodiversity for each target sector, based on available knowledge from Study 2.

5. Secure financial sources for mobilization

Here, the VC lists the activities and means that will be implemented to achieve the objectives, in order to be concrete and not to remain at the mere statement of the objective. The means in question may be technical, financial, human, etc. They can be broken down by type of actor (economic sectors and other actors) and must take into account their respective capacities to contribute, as expressed during the dialogue phase (bilateral and multi-stakeholder). An action plan must accompany the VC and detail these means.

6. Establish Monitoring and Evaluation systems

In consultation with universities and research institutions:

- Develop monitoring strategies of the implementation of the voluntary commitment with specific indicators describing the resources to be mobilised

- collect, publish data regularly, and communicate to the public vai workshops, annual conferences, websites, scientific journals, etc

- revise the goal(s) and objectives according to the results;

- ensure that financial means and resources are available for the effective implementation of monitoring and evaluation systems.

3.2 Coffee Subsector in the southwest forest landscape

3.2.1 Key Characteristics of Coffee Subsector in the Southwest Forests Landscape

3.2.1.1 Coffee Subsector overview

Production and contribution to the socio-economy

The Ethiopian economy is currently highly dependent on agriculture, which contributes about 40% to GDP and 80% of export revenue. Coffee is a major agricultural export crop, which in the past provided about 60–70% of annual export values but now provides about 22–30% of annual commodity export earnings (Kufa 2015). The 2016/17 export earnings reached US$897 million with the export of about 232,000 tons of coffee. In GTP II, the GoE set a goal of more than doubling coffee production by 2020 to achieve a one million tonne annual target. This target was not achieved. A new target set by the ECTA of tripling production by 2024 will require a significant response by the private sector. In 2021/2022 fiscal year, Ethiopia earned a record-hit 1.4billion USD by exporting 300,000tons of coffee to the international market, which signifies that this sub-sector has huge potential to grow as aspired by GoE's development plans.

Production Systems and Producers

There are four types of coffee production systems in Ethiopia: 1) forest; 2) semi-forest; 3) garden; and 4) plantations. The first three involve smallholders and account for, respectively, an estimated 10%, 35% and 50% of total coffee production (Minten et al., 2017). Under such systems, farmers integrate coffee into a mix of food, fodder and cash crops, with the coffee produced for their own consumption and to earn cash by selling red or dried cherries (BASIC, 2018). Thus, there are very few monoculture coffee smallholders. Coffee cultivation accounts for an average 0.91 ha of smallholders' total 1.76 ha of land owned. Smallholders' yearly earnings from coffee account for about 50% their total agricultural income (Minten et al., 2017). Large monoculture plantations, on the other hand, account for 5–10% of coffee production, though there are only about 200 of them (Hutz-Adams, 2020; Schäfer, 2019). These plantations may be owned by non-farmer individuals, such as exporters or processors.

Around 10–15% of smallholder producers belong to coffee cooperatives (Hutz-Adams, 2020). Cooperatives tend to offer better prices to producers, as well as technical support to improve their productivity and farming practices (Minten et al., 2017). However, the least well-off coffee smallholders often live in remote sites and produce small volumes of low-quality coffee, which they then need to sell fluidly throughout the year. They thus sell to mobile coffee traders that have

more flexible financial arrangements and less of a focus on quality and volume than cooperatives (Hutz-Adams, 2020). As such, cooperatives tend to under-represent the poorest smallholders (El Ouaamari, 2013). There is also evidence that women's participation in cooperatives is limited, with finding that, in a sample of 73 coffee cooperatives, women accounted for only 20% of members and 18% of leadership positions. Many studies (e.g., Dereje et al., 2016; Gashaw et al., 2017) found that men and women participate in all coffee production activities, but women do most of the work in raising coffee seedlings (48.5%) and coffee picking (50.7%). This bias is even more apparent in processing activities such as the cleaning and sorting of coffee cherries (72.5%), and coffee cherry drying and de-hulling (70%). Men, conversely, are particularly involved in land preparation and cultivation (65%), loading/unloading of coffee (78.5%), and marketing activities (64%).

Trends in production, consumption, and exports show that local consumption of the coffee crop is high, at about 50–53% of production. This demand is met by household-level roasting and an ever-increasing number of formal roasting businesses, which have reportedly grown to around 200, with 150 in Addis Ababa alone. Exports are undertaken by those registered with the ECTA—reportedly 323 registered exporters.

In the Southwest forests landscape, coffee is produced both by smallholder farmers and commercial companies and accounts for about 70% of household yearly income. Smallholder farmers practice garden coffee in the backyards, semi-forest coffee in the buffer zone of forests and forest coffee in core areas of the dense forests. On the other hand, commercial producers practice plantation and semi-forest coffee production systems. Commercial /large scale coffee production system largely practice plantation coffee management mainly carried out in degraded secondary forest lands and woodland habitats, and to lesser extent semi-forest coffee production. In Southwest Forests, it is estimated that about 50% of the coffee supply is garden coffee, while about 35% comes from semi-forests, 10% is from forests, and 5% is from plantations coffee. Recent reports show increasing both in the area of coffee cultivated and production volume in Southwest Forest landscape. For example, in Sheka zone, area under coffee production has increased by about 82% between 2011/12 and 2015/16, while coffee produced doubled (UNIQUE-NABU Consortium, 2017). Consequently, natural forest areas where wild coffee gene pools occur

are currently under constant threats. This is largely due to anthropogenic factor, mainly coffee management intensification.

Most of the garden and plantation coffee are located in the transition zone of the biosphere reserve. While the semi-forest coffee falls in the buffer zone of the reserve, and wild (forest) coffee is in the core zone of the biosphere reserve. To increase coffee productivity farmers are commonly engaged in shade thinning and under growth slashing in the buffer zone. This tends to prompt degradation of the ecosystem and loss of biodiversity. Another important distinction between producers is the quality of the coffee they supply to the market. High-quality green coffee beans can be sold at the average prices most of the time. The quality attributes of the green bean partly stem from the soil and plant themselves as well as cherry growing and picking stage. They however by and large come from the processing stage. There are four measures for coffee quality in Ethiopia: 1) certification (e.g., FairTrade); 2) grade; 3) geographical origin; and 4) post-harvest treatment. In short, higher-quality coffees are certified coffees, washed coffees, coffees graded Q1 or Q2 by the ECX or the Coffee Liquoring Unit (on a scale of 1 to 5). Across all coffee production systems the use mechanization, irrigation, fertilizers, pesticides and herbicides is minimal.

3.2.1.2 Coffee subsector Value Chain

Coffee Subsector Value Chain in the study landscape comprises of four major functions. Farmers, cooperatives, local traders (supplier), ECX, and exporters are the key actors along coffee value chains. Farmers supply produced coffee to local traders either in the form of red cherry or sundried coffee in primary market. Price at the primary market is set based on coffee price information received from ECX via text message on cell phone or through communication with representative at ECX. For primary cooperatives, the executive committee meets to set the coffee purchasing prices in the primary market based on the information from ECX, while the local trader set the price on spot at the primary markets in reference to price set by cooperatives in addition to price information, they received from ECX. Key informants stated that usually local traders offer better coffee price than cooperatives. Key activities and actors involved in each Value Chain function are briefly described as follows:

A. ***Input supply***: Key activities in this element of the Value Chain include those carried out by research institutions, for example: production of better coffee varieties, and development and

dissemination of environmental-friendly agricultural practices among smallholders while large commercial coffee growers could disseminate best practices to neighbouring smallholders.

Other inputs for coffee production which can be undertaken by the public sector, cooperatives, Federal/Regional government bodies and NGOs, include:

- Coffee budwood and seed production, carried out by the public sector.
- Extension support - this is considered public, Cooperatives, Federal/Regional government bodies and NGOs.
- Supplying equipment for Farming, Harvesting, product packaging, Pulping, Hulling, Cleaning and grading, Roasting (by the private sector).
- Extension and financial supports (government, private sectors and NGOs).

B. Production: Production of red and dried cherries is the sole responsibilities of the smallholder farmers and private/large-scale commercial farmers. Collectors and Brokers are also involved in the production by transporting to hulling or washing stations.

***C. Processing*:** Key activities and actors include:

- Hulling, and wet processing: by private sector, Cooperatives, Unions, Private processors
- Transport to warehouse: by public sector
- Storage: Warehousing, weighbridge: by private sector
- Roasting and grinding: by private sector
- Certification of roasters: by federal state-owned sector
- Certification of World Standard (CWS): This is a regional state function through the extension services.
- Grading: Grading of coffee beans is undertaken by the Ethiopian Commodity Exchange (ECX).

***D. Marketing and Distribution*:** ECX sale platform: ECX can be considered a special type of Public-Private Partnership (PPP). For exporters, this has changed but not for local roasters who

are still unable to purchase directly from producers.

- Certification of exporters, collectors, traders, and brokers
- Sale of green bean via traders and brokers
- ECX Sale platform
- Cleaning, grading, and bagging
- CLU export quality certification – by government
- Freight forwarding
- Transportation
- Sale of roasted Coffee at Coffee shops and Supermarkets

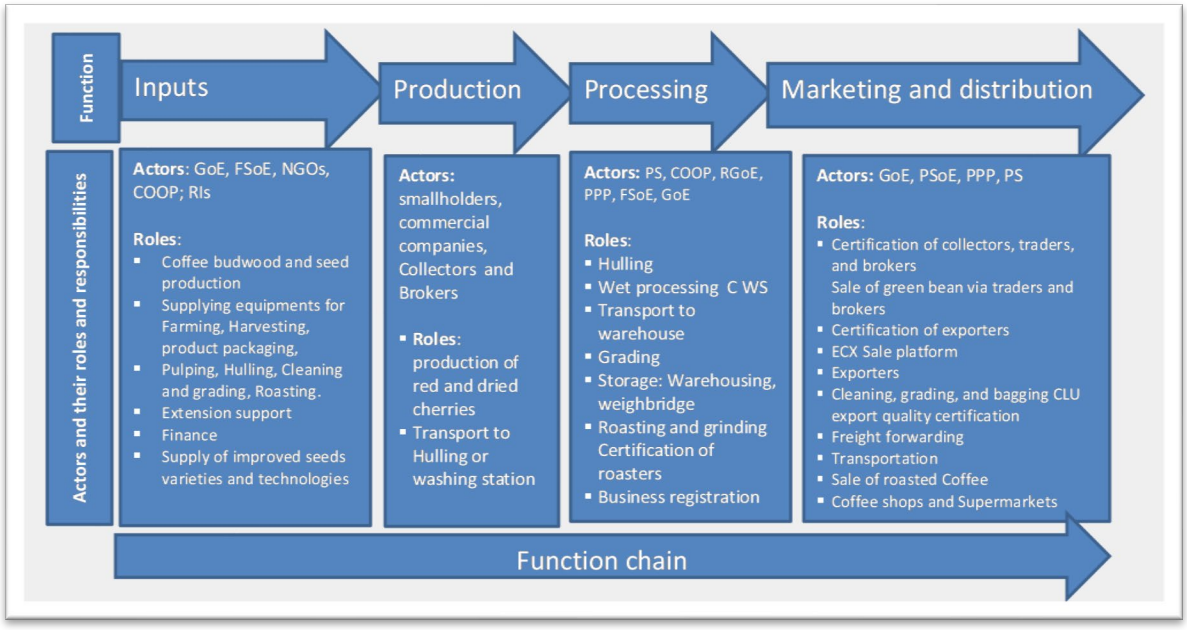


Figure 13. Coffee subsector value chain showing the major functions, key actors and their roles and responsibilities in each element of the chain (Abbreviations: GoE = the Government of Ethiopia; FSoE = Federal State-owned Entity, COOP = Farmers Cooperatives; RIs = Research institutions; PS = Private sector; RGoE = Regional Government of Ethiopia; PPP = Public-Private Partnership; PSoE = Public State-owned Entities).

3.2.1.3 Coffee Subsector Institutional Actors

Structure and linkages of key institutions in Coffee production and marketing value chain in Ethiopia is shown on Figure 14. The key ones are described as follow:

The Ethiopian Coffee and Tea Development and Marketing Authority

The Ethiopian Coffee and Tea Development and Marketing Authority, re-established in 2015, has a mission of identifying and addressing challenges in the development and marketing of coffee. Its mandate is to control and regulate the market, from issuing and revoking trading licenses to carrying out quality inspection in accordance with the coffee market control and regulation proclamation. It also has the mandate to provide an extension support program at the regional level and promote coffee and tea within the country and in the international market.

Ethiopian Commodity Exchange (ECX)

ECX was established in 2008, by proclamation No. 550/2007, as a partnership between the GoE and private investors. In August of the same year, by proclamation, all coffee trading had to be through ECX. This was initially met with huge resistance from exporters and international importers who wanted to continue with the existing system that systematically disadvantaged the smallholder (Gabre-Madhin 2009). It has now grown to an organization employing 800 people. ECX is regulated by the Ethiopian Commodity Exchange Authority (ECEA), under proclamation No. 551/2007.

ECX receives green bean into storage and grades the coffee when it is received. Warehouse receipts are issued, which facilitates a level of access to credit. ECX has a sophisticated multi-modal MIS using electronic ticker, mobile phone SMS, website, bulletins, radio, TV, and an information center. The immediate trading information is accessible only to members and traders. Other market actors experience a delay in accessing this information and large international importers have expressed a need for a more readily accessible, real-time market information system, which includes better estimates of production and quality reports.

Ethiopian Grain Trade Enterprise

The EGTE was initially established to stabilize the price of grains but was unsuccessful in achieving this objective. It was reorganized in 1999 for the purpose of purchasing grain, oilseeds, and pulses both for local wholesale and export. Since 2009, the EGTE has diversified its business to include coffee export. This is through 10 branch offices and 91 trade centres throughout the country.

The EGTE has an in-house logistics component with warehouses having capacity of 820,000 metric tons of grain and coffee. In addition, it has its own fleet of heavy and light trucks to facilitate its export and domestic operation. Specifically, for coffee, the EGTE has modern coffee cleaning machines that can polish, sort, clean, and bag 90 metric tons of coffee per day.

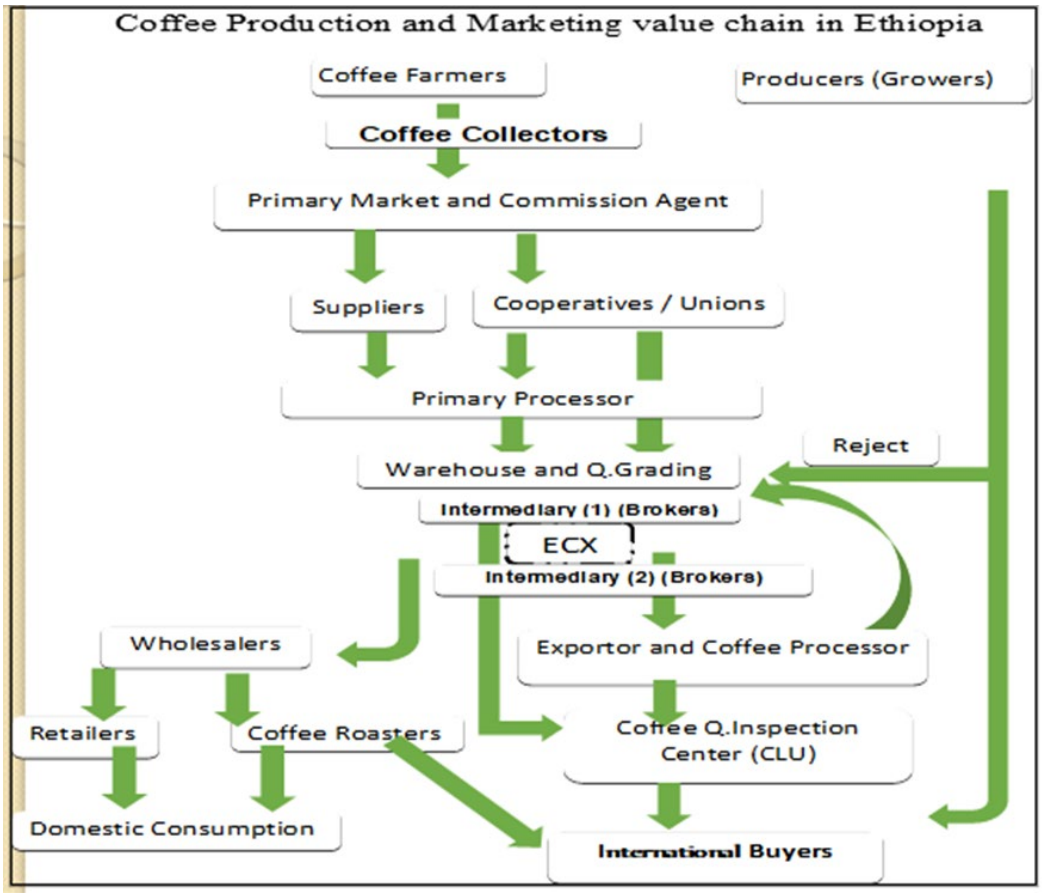


Figure 14. Structure and linkages of actors in Coffee production and marketing value chain in Ethiopia (Source: Ethiopian Coffee and Tea Authority, 2017).

3.2.1.4 Policy frameworks and strategies

There are a number of legal, policies and strategic development plans relevant to environmental-friendly cereal crop production practices in the country. The following laws, policies and plans are relevant to the coffee subsector: Rural Land Administration and Use (Proclamation No. 456/2005); National Economic Development Strategy (1993); Proclamation on Biosafety (No. 655/2009); Nagoya Protocol on Access to Genetic Resources; Access to Genetic Resources and Community Knowledge, and Community Rights Proclamation (No. 482/2006) and Regulation (169/2009);

Plant Breeders Right (Proclamation No. 481/2006); Development Conservation and Utilization of Wildlife (Proclamation No. 541/2007/Regulation); Environmental Policy (1997), Environmental Impact Assessment Proclamation (No. 299/2002), and International agreements: CBD:
Sectoral and Cross-Sectoral Strategic Plans: Four key strategies relevant to harmonize crop subsector and biodiversity conservation and supporting voluntary commitments of key actors are: Ethiopia's National Development Plan (Ethiopia 2030); "Growth and Transformation Plan (GTP; 2010); Climate Resilient Green Economy (CRGE; 2011) Strategy; and Revised National Biodiversity Strategy and Action Plan (2020–2025).

3.2.2 Major challenges and constraints of coffee subsector in the southwest forest

The major challenges and constraints of coffee subsector in the southwest forest landscape are largely related to policy, environmental and practices related to production, handling/storage, processing and marketing. This specifically includes:

- Poor marketing strategy due to disconnected communications among coffee institutions at federal to local levels; for example, there is no ECTA structure at zone and woreda levels – levels where most decisions are made that affect coffee production and productivity and its impact management.
- Lack of access to financial loan for coffee producers
- Low quality coffee production due to lack of processing and storage facilities nearby farmers
- Deterioration in soil fertility due to vegetation degradation resulting to soil erosion
- Key responsible government (e.g. Ministry of Agriculture) and public (Ethiopian Coffee and Tea Authority (ECTA)) usually give more attention to how much coffee produced and/or sold, but not to how it is produced and in what quality.
- Loose link between research and extension system (the research output is not well accessed by producer)
- Poor encouragement of the producer (support policy, access for loan, theft during harvest/ low support from legal body at grass root level
- Lack of infrastructure such as warehouses and offices, in adequate access to services, market information, low value addition and in adequate processing stations
- Lack of coordination among coffee actors

- Poor EIA of commercial (large-scale) producers

3.2.3 Direct and indirect impacts of Coffee subsector development on biodiversity in the Southwest forests landscape

The direct and indirect impacts of Coffee subsector development on biodiversity in the Southwest forests landscape are mainly associated with management practices undertaken during production stage. Common coffee production practices and their changes over time period are provided on Table 9, and the major mechanisms (management practices) through which coffee management practices across the four coffee production systems impact biodiversity in South West Ethiopia are summarized in box 2. The most notable impacts reported by the Coffee subsector stakeholders include:

- Forest loss and degradation
- Defaunation and their associated ecological values
- Hindered regeneration of conservation concern indigenous tree species
- Soil erosion
- Heightened extinction risks of wild coffee species varieties through feedback effect processes – coffee cultivation expansion into wild areas replace gene pools, which also is exacerbated by land use change and deforestation for crop farming and settlement and by climate change.
- Deterioration of ecosystem services provided by the forests, such as CO2 sequestration
- Climate change manifested via increased temperature and erratic rainfall

Table 9. Changes in Coffee production practices in the Southwest Forests Landscape, Ethiopia.

	Period			
Variables	2004[a]	2014[a]	2025[b]	2030[b]
Improved management practices				
Stumped tree (%)	1.3	2.6	3.9	5.2
Mulching (%yes)	21.8	45.4	69	92.6
Pruning (%yes)	15.7	36.7	47.7	68.7
Compost (%yes)	1.8	9.2	16.4	23.8
Tilling (%yes)	71.1	76.7	82.3	87.9
Number of weeding	1.9	2.1	2.3	2.5

Modern input use				
Improved seedlings (%yes)	24.7	31.8	38.9	46
Chemical fertilizer use (%yes)	1.4	2.5	3.6	4.7
Herbicide use (%yes)	1.1	1.5	1.9	2.3
Pesticide/Fungicide use (%yes)	1.6	0.4	0	0
Yields (in whole dried cherries)				
Average (kg/ha)	961	756	595	468
Median (kg/ha)	800	600	450	337.5

Source: [a:] Minten et al. (2014); [b:] Authors' estimation based on extrapolation.

Box 2. Major Coffee production practices impacting biodiversity in the Southwest forests

Initial canopy opening / clearing undergrowth: Coffee yield is highly correlated with the number and size of the branches of coffee trees. This in turn is related to the amount of solar radiation reaching the lower vegetation strata and the presence or absence of small trees and shrubs competing with coffee. Under undisturbed natural forests, coffee plants tend to grow taller in height, with few branches and produce only very few cherries due to high canopy cover and competition with small trees and shrubs in the understory. Hence, farmers practicing semi-forest coffee and plantation coffee management systems usually open up the canopy by thinning shade trees, and clear the understory vegetation to increase coffee yield. During opening up phase, vegetation is completely cleared indiscriminately, regardless of a species is endemic or threatened. The amount of vegetation removed through these practices critically important threat to biodiversity.

Studies conducted in Yayu and Sheko forests, for example, have shown a 50% decline in the number of plant species in managed coffee forest compared to the undisturbed forest. Similarly, canopy cover of trees in forest where intensive coffee management system (so-called forest-garden coffee) is found to be about 45-60% compared with. 60 and 80% cover in forest where semi-forest coffee production systems is practiced.

Weeding operations: Weeding is one of the regular annual management operations carried out by all farmers. Weeding operations can be 2-4 times per year, but the two major weeding seasons are beginning of the rainy season and beginning of the harvesting season. Through this practice, most herbaceous vegetation, emergent and potentially competing with coffee are cleared. During harvesting, weeding is done to create access to pick coffee cherries from the trees, and also to allow picking of early maturing coffee cherries dropped to the ground. Along with herbaceous vegetation, small seedlings of trees, climbers and shrubs are all cleared during weeding time. This practice thus has great impact on biodiversity, as it prevents any sapling to grow and develop into big trees or shrubs.

Shade trees management: This management system involves removing (via debarking or cutting trees) some canopy trees within cultivation plots every year whenever the canopy cover increases. Gole's (2003) study in the Yayu forest report 50, 41 and 36 stems of canopy trees in undisturbed forest, new semi-forest coffee (< 5 years), old semi-forest coffee (> 10 years), respectively.

Enrichment planting: The distribution pattern of wild coffee is not regular, and uniform throughout the forest. It is dense in some areas, and very sparse in other areas. In areas where the coffee trees are sparsely distributed, farmers

often plant coffee seedlings to fill the gap. This gap filling practice involves clearing any regeneration of small trees/shrub which could have an important impact on species diversity and biodiversity of the area.

3.2.4 Best practices and current commitments

An example of best practices in environmentally friendly coffee production came for Projects in the Kafa help to support a wide range of sustainable development and conservation goals[2]. The Nature and Biodiversity Conservation Union (NABU), in cooperation with the Ethiopian Government and other partners, has been implementing the following projects in Kafa Biosphere Reserve: "Biodiversity under Climate Change: Community-based Conservation, Management and Development Concepts for the Wild Coffee Forests" (2014-2017) and "Climate Protection and Preservation of Primary Forests - A Management Model using the Wild Coffee Forests in Ethiopia as an Example" (2009-2013). The central aim of these projects was the conservation of forests in order to protect the biodiversity and maintain ecosystem services for the local people as well as to combat climate change, as forests are crucial carbon sinks.

The projects are based on three main pillars:

- Restoration and management of ecosystems
- Regional development and sustainable use of natural resources
- Communication and environmental education

The projects have achieved:

- The restoration of around 750 ha of natural forest with indigenous species.
- About 300 ha of agroforestry areas have been established as well as 1,700 ha of community plantations with fast-growing tree species, which help to satisfy people's wood demand and release pressure from natural forests.
- On an area of 11,600 ha, a Participatory Forest Management (PFM) system has been set-up, which involves almost 7,800 local people.
- As many as 11,200 wood-saving stoves have been introduced to almost 900 villages in Kafa and 54 locals were trained to produce these stoves as a new source of income, with an ultimate goal of reducing pressure of biomass energy on biodiversity.

[2] https://en.nabu.de/topics/biodiversity/kafa-biodiversity/forest-management.html

- Special tourist infrastructures, such as animal and bird watching towers as well as hiking trails have also been built to promote ecotourism in the Kafa Biosphere Reserve, whose aim is to create alternative means of living for the locals.

The projects mentioned above were preceded by a Public-Private Partnership (PPP) Project, dedicated to a sustainable development in the Kafa biosphere region that ran for more than a decade and is now completed (1999-2009). In 1999, Geo Rainforest Conservation launched this model initiative with private and public partners, including The Nature and Biodiversity Conservation Union (NABU), Deutsche Stiftung Weltbevoelkerung (DSW), German Development Cooperation (GIZ), Original Food as well as Kraft Foods Germany. The concept of the PPP Project: Long-term conservation of the Kafa forests can only be ensured if the livelihoods of local people are benefit from such alternative incomes. When the project was initiated, the prime forest product of Kafa – wild Arabica coffee – had no access to the international market.

Through the project, 27 cooperatives joined the Kafa Coffee Farmers Union and organized a professional processing and quality control of the coffee beans. Since 2005, wild beans have been exported to Europe at a price that benefits the farmers. This development was possible because Original Food imported the sun-dried beans and established an access to the specialty coffee market. From the 2006/7 harvest onwards, “wild collection” and “fair for life” certification enhanced the marketing success, which fulfil mutual benefits of people and biodiversity.

Ethiopian Government current commitments

Coffee, Ethiopia's largest export crop is the backbone of the Ethiopian economy. However, Ethiopia has not yet fully exploited its position as the producer of some of the best coffees in the world due to several factors. Smallholder coffee farming, which has been an important pillar of the Ethiopian economy for centuries, has been confronted by various problems both internal (e.g. weak markets, insufficient infrastructure, insufficient research and extension, shortage of farmland) and external (e.g. global coffee price decline, increasing food and oil prices), which threaten the further expansion of a dynamic and commercially oriented smallholder coffee sub-sector. Lack of competitiveness, lack of infrastructure, in adequate access to services, low value addition, in adequate technology transfer and research, competition of khat and rainfall variability are among major constraints of coffee production in Ethiopia. Price volatility, Poor accesses to

market, little market promotion and incentive mechanism, and low price were reported to be the major problem of coffee marketing in Ethiopia.

As Ethiopian coffee continues to dominate world markets, the government is now putting in place a new reformed policy in place to create more opportunities for farmers, suppliers and exporters in the industry, so that they can benefit from direct market chain. The new government commitment and policy intends to improve quality control and marketing elements of the value chain system. The bottlenecks to the country's coffee producing potential, is the extended value chain system which does not add any significant value neither to the market nor the product. The farmer receives no more than 50 to 60 percent of the true price. Another reason is the fact that since most coffee trees are old, production quality and quantity per unit of land is lower, compared to other coffee producing countries. Based on current commitments and policy reformed, it will ensure a higher share of benefits for the farmers, "In the previous policy, the farmers were allowed only to sell coffee to the primary buyers. Not to the exporters, not to the suppliers, they [did] not get the chance to directly export. But in this policy, the government designed different options for the farmers". If they have the capacity, the farmers themselves can now be directly involved in exporting the coffee they produced. Or they can opt to sell to exporters, or to local industries that roast and pack coffee. Hence, the new policy offers Ethiopian coffee farmers a number of options. In the previous policy, there used to be sink holes in the middle that would absorb more than 40 percent of the price of the coffee produced, without adding any value. But now, once the reform is implemented, Ethiopia hopes to see the farmers' share of benefits to rise up to 90 or 95%, from a previous rooftop share of up to 60%.

3.2.5 SWOT Analysis of Coffee supply value chain

Preliminary result of SWOT analysis is presented in the Table 10 below. This will be refined during the stakeholders consultation workshop. Main strengths include existence of various coffee varieties, increasing demand of Ethiopian coffee in the global market Growing number of wet coffee processing in the area, growing trend in private and public-private partnership investment, establishment of Ethiopian Coffee and Tea Development and Marketing Authority. Key weakness include overlapping and unclear responsibilities among sectors and lack of coordination among different sectors; inappropriate coffee shade tree management and new plan preparation for planting; lack of technical and financial capacity of farmers to enter the market. The major

opportunities are increasing interest of national and international donor and development agencies in sustainable development of both socioeconomic and biodiversity, and existence of fertile land. However, drought and/or erratic rainfall due to climate change, coffee berry disease, political instability and peace insecurity, high inflation rate and poverty are identified as threats to achievement of biodiversity friendly development of the subsector.

Table 10. SWOT Analysis of Coffee supply value chain.

Strengths	**Weakness**
• Existence of rich coffee varieties increasing demand of Ethiopian coffee in the global market Growing number of wet coffee processing in the area • Existence of conducive environment for private and public-private investment policy • Establishment of Ethiopian Coffee and Tea Development and Marketing Authority • High commitment of government authorities at all levels for socioeconomic and environmental development • Presence of coffee nurseries for seedlings production • Focus has been given to garden coffee expansion • Presence of NGOs projects and donors working on social and environmental development • High awareness of small-scale coffee producers on procedures to supply high quality coffee • Organized community in PFM cooperatives • Government's consideration of biodiversity conservation and climate change as cross-sectorial issue • Large-scale reforestation and afforestation campaign throughout the country	• Sometimes conflicting policies of different sectors • Overlapping and unclear responsibilities among sectors related to forestry/agriculture • Lack of coordination among different sectors • Inappropriate coffee shade tree management and new plan preparation for planting • Limited private public partnership • Coffee Cooperatives are inefficient and lack capacity to enter the market • Poor law enforcement among judiciaries • Low level of agricultural input supply • Low level of adoption of modern farming practices
Opportunities	**Threats**

• Increasing interest of national and international donor and development agencies in sustainable development of both socioeconomic and biodiversity • Existence of fertile land	• Drought and/or erratic rainfall due to climate change • Coffee berry borer/disease • Political instability and peace insecurity • High inflation rate • Poverty

3.2.6 Synthesis: Recommendations and scenarios of voluntary commitments for Coffee subsector

Based on findings of the situation analysis discussed in the previous sections, two major biodiversity pressures associated with coffee subsector are identified (Table 11 and 12): Deforestation and Forest Degradation that affects landscape configuration and ecosystem quality, and Loss of Biodiversity due to unfriendly coffee management practices. To address these problems, it is recommended that actors of the subsector will voluntary take the following strategic measures:

- Avoid or reduce rate of deforestation for new coffee cultivation land
- Strengthen protection and implementation of threat abatement and law enforcement measures
- Reduce the impacts of forest fragmentation on biodiversity through restoration
- Adopt biodiversity friendly modern technology coffee production inputs and production practices, so as to mutually improve both coffee productivity, and status of biodiversity
- Improve coffee quality and income by adopting improved of coffee harvest, post-harvest, and processing, and marketing

Implementation of these recommendations is divided into two ambition levels: Low level Scenarios and High level Scenarios. These are briefly presented as follows:

Deforestation and Forest Degradation

Conversion of natural habitats to investment and small-scale coffee farming has been remained the major threats to biodiversity in the Southwest Forest landscape. Since the last four decades, this has resulted to significant forest cover loss and degradation, forest fragmentation (increased number and isolation of patches, and reduced patch size), and declined biodiversity status. The ultimate impacts have been loss of vital ecosystems services on which local communities and people residing far away; local extinction of rare and/or threatened species - resulting to declined species diversity; and reduced gene flow between coffee subpopulations, leading to more vulnerability of the forest coffee gene pools to extinction risk which obviously is exacerbated by climate change. The following strategic measures are recommended for voluntary commitments (VC):

VC 1: Avoid or reduce rate of deforestation for new coffee cultivation

Actors of the coffee subsector have agreed to ensure avoidance or reduction of rate of deforestation for new coffee cultivation to 50% by 2025 (**under Low Scenario**) and to 75% by 2030 (**under High Scenario**) compared to the rate in the last decade (from 2000–2020). To achieve this, key actions need include: carry out Environmental and Social Impact Assessment of existing and new coffee investment projects; avoidance of leasing out new coffee investment within buffer and core areas of the biosphere reserves; avoid expansion of garden and plantations coffee production into semi-forest (buffer zones of reserves) and forest (core areas) production areas; Enhance cross-sectorial collaboration towards biodiversity conservation; and monitoring, evaluating and sharing scientific-based information on the effectiveness of voluntary commitment measures taken in favour of biodiversity conservation, using key biodiversity components (e.g., threatened, rare, endemic species; forest cover status) as indicators of effectiveness.

VC 2: Strengthen law enforcement/threat abatement/protection

Weak law enforcement by responsible government agencies is one of the major factors driving the pressure from land use change to coffee production. Therefore, in order to strengthen law enforcement for better protection of forests, developing and implementation of Forest land certification mechanisms for specific ownership types (private, communal, cooperative/ association and public/state ownerships) is required in the transition zones of the biosphere

reserves. This certification process is proposed to be done for 20% of forest area currently unprotected (unknown ownership status) by 2025 (**Low Scenario) and 40% by 2030 (High Scenario**). In addition, providing incentives for coffee farming households to offset costs associated with their commitments in favour of biodiversity (e.g., reduced expansion of coffee farmland, participation in biodiversity management and development), through REDD+ scheme.

VC 3: Reduce the impacts of forest fragmentation on biodiversity

Coffee cultivation expansion has caused forest fragmentation, which is characterized by increased number of patches, decreased patch size and increased isolation. Fragmentation has disastrous consequences on species' survival, demography and genetic diversity, especially of those with limited dispersal and that prefer core/interior habitats. Addressing this issue requires increasing patch size and connectivity through restoration of previously degraded habitats within the buffer and transition zones. Here, restoration of 20% (Low Scenario) by 2025 and 30% (High Scenario) of previously degraded habitats proposed to thereby increase patch size/connectivity of by 20% and 30% of forest patches currently existing in the landscape, respectively under Low vs High Scenarios. While restoration is proposed to be done by smallholder coffee producers, enabling and supportive actions are proposed from other actors. For instance, Jimma, Mettu and Teppi universities and Jimma agricultural and forestry research institutions have expressed their commitments to provide scientific and technical inputs needed for restoration, including:

- identifying threatened and/or endemic species most impacted from fragmentation and coffee management practices;
- identifying potential areas for restoration within the buffer and transition zones, especially areas degraded due to long years of intensively managed semi-forest and garden coffee production; and
- identifying feasible restoration approaches (enclosure, enrichment plantation, etc); and conduct monitoring the performance (success/failure history) of the measure and share lessons learnt.

VC 4: Adopt biodiversity friendly modern technology inputs and production practices so as to mutually improve both coffee productivity, and biodiversity status

Indiscriminate vegetation removal during weeding, inappropriate coffee shade tree management and use of chemicals (fertilizers, herbicide, and pesticide) are among the major biodiversity unfriendly coffee management practices in the Southwest Forest landscape. In addition to impacting ecosystems processes and functions (and thus services), these practices result to increased vulnerability of threated species to extinction. To mitigate these impacts, adopt ion of biodiversity friendly modern technology inputs and production practices (use of improved coffee seed/seedling variety, compost and manure, weeding, coffee tree pruning, mulching, and tilling) are required so as to mutually improve both coffee production and productivity, and the status of biodiversity. Supports to smallholder coffee producers from government, NGOs and research institutions include, technical, material and financial supports, such as Coffee seedling production, Coffee nursery development, and capacity building training on adoption of organic fertilizers), and scientifically improved coffee varieties that are disease and drought resistant and resilient to impacts from thereof.

VC 5: Improve coffee quality and income through improved coffee harvesting, post-harvesting and processing, and marketing systems

Another reason for expansion of coffee cultivation in the Southwest Forest landscape is due to low quality of and thus income from coffee sales. Improving coffee quality will improve benefit from the sale which in turn contributes to slowing down of coffee land expansion. In this regards, actors of coffee subsector have agreed to promote coffee quality enhancing practices to 20% in coffee quality and 10% increase in coffee income by 2025 (Low ambition) compared to what has on the average been practised in the last decade. This expected to be increased to 50% quality and 40% income by 2030. The following VC actions and supports are agreed to be provided by government, extension service agents, research institutions and NGOs to achieve these ambitions:

- Provide basic infrastructure facilities such as support (e.g., roads, electricity, water) in the coffee growing areas, around washing and hulling stations, and roasting facilities
- Support adoption of selective harvesting practice and using bed for drying of cherries instead of on the bare ground
- Increase the share of red cherries (compared to dried cherries) in total sales of coffee
- Improve marketing arrangements
- Integrate coffee certification into government plan and allocate budget for it

Table 11. Potential voluntary commitments of Coffee subsector and low level of ambition for biodiversity (2020-2030).

Low level of ambition (2023-2025)									
Problem to be addressed [Pressure]	**Sate**	**Impacts**	**Response: VC**	**Actors**	**Expected change**	**Actions by other actors [+ Actors]**	**Responsible Actors**	**Monitoring measures and reporting**	**Broad Indicators**
Accelerated Deforestation and Forest Degradation due to conversion of natural habitats to small scale and commercial coffee cultivation land	Loss of forest cover; habitat fragmentation (i.e., increased number of patches and patch isolation, and reduced patch size); deterioration of species' habitat quantity and quality; local extinction of rare and/or threatened species - resulting to declined species diversity; loss of genetic diversity due to limited gene flow between fragmented wild coffee	Loss of ecosystems services such as wild sources of food, water, firewood and building materials, recycling of nutrients, and CO2 sequestration; deterioration of human wellbeing	Avoid or reduce rate of natural forest conversion to new commercial coffee investment within the core and buffer zone areas of the biosphere reserves	Region/zone/woreda Bureaux of Investment (BI), Environment, Forest and Climate Change (MEFCC); Ethiopian Biodiversity Institute (EBI)	30% reduction by 2025 in new coffee land compared to the rate that happened between 2010-2020.	Carry out Environmental and Social Impact Assessment prior to endorsing any new coffee investment projects	Zone/Woreda Env'l protection offices and Investment offices; Jimma, Mettu, Banga and Teppi universities (= Universities); Jimma Agriculture and Forestry Research Centers (Research centers)	GIS/Remote sensing analysis; Monitoring data Reports; Office records	Rate of deforestation compared to the rate between 2000-2020; % increase in ESIA.
						Establish and strengthen cross-sectorial collaboration and coordination for biodiversity conservation	EBI; Woreda EFCC		

	subpopulations, leading to more vulnerability of the forest coffee gene pools to extinction risk which is exacerbated by climate change; overall declined state of biodiversity					Identify legal gaps/conflicts across relevant sectors and propose new amendments	Universities; Research Centres		
						Awareness raising and training of biodiversity conservation, investment, environmental, agricultural and land administration sectors on relevant laws and policies associated with biodiversity, economic development and investment	Universities; Research Centres; EBI; Woreda EFCC; Kebele Development Agents		
						Monitor and evaluate effectiveness of the ambitioned VC, and share lessons learnt via suitable media	Universities; Research Centres; EBI		
			Avoid or reduce expansion of garden and existing investment plantations coffee into buffer zones	Forest Cooperatives/PFM groups; Woreda FEPCC, NGOs	Reduction of illegal coffee production to 20% by 2025 (10% per	Strengthen capacity of existing and new established community PFM groups in the buffer and transition zones	Woreda FEPCC/OFWE; NGOs; EBI	Office records; Monitoring data reports	Law enforcement reports; Documents of Incentive mechanisms established

			(semi-forest coffee area) and core zones (wild forest coffee collection zone) of the reserves through implementation of effective conservation and threat abatement measures, including: (a) forest ownership certification for specific ownership type (private, communal, cooperative/association and public/state ownership); (b) incentivising via ESP, and (c) law enforcement)		year in 2024 and 2025) in the buffer/core zones compared to the average rate between 2010 and 2020; Illegal activities reduced by 30% by 2025	Explore enabling conditions (e.g., legal, policy) for the potential for forest ownership certification	Universities/ Research institutions		
						Facilitate and document and share results/lesson/of each step followed during the certification process	Universities/ Research institutions		
						Awareness creation to community members, private sectors, etc	Woreda agri office; Kebele Extension Agents		
						Provide incentives for farming households to offset costs associated with their commitments in favour of biodiversity (e.g. reduced expansion of farmland, participation in biodiversity management and development), through REDD+ scheme and sharing revenue gained from	NGOs;		

						sport hunting in the controlled wildlife hunting areas			
						Enhance cross-sectorial collaboration towards biodiversity conservation	EBI; Woreda EFCC		
						Developing and signing of binding laws	EBI; Woreda EFCC		
						Document all events taken place and share results/lesson/of each step followed during the certification process	Universities/ Research institutions; EBI		
			Reduce the impacts of forest fragmentation on biodiversity, including threatened species and forest coffee	EFD, Zonal, woreda and kebele office of agricultur e, Bo FEPCC, EPA,	20% (10% each in the years 2024 and 2025) of previousl y degraded	Identify threatened and/or endemic species that are potentially most impacted from harmful coffee management practices	Universities/ Research institutions	GIS analysi s based on Groun d truthin g and Remot	Area restored; Increased patch size and connectivity

			gene pool by increasing patch size and connectivity through restoration of previously degraded habitats within the buffer and transition zones, especially areas	NGOs, EFD, BoFEPCC, OFWE, OEPA, BoA, NGOs (NABU, EWNRA, ECFF), community, private sectors	habitats restored within the buffer and transition zones of the biosphere reserves	Identify potential species and sites of high conservation importance for restoration within the buffer and transition zones, especially areas degraded due to long years of intensively managed semi-forest and garden coffee production areas	Universities/ Research institutions	e sensing	
						Assess and determine suitable restoration approaches (enclosure, enrichment plantation, etc)	Universities/ Research institutions		
						Facilitate implementation of the chosen restoration measure, and conduct monitoring the performance (success/failure history) of the measure and share lessons learnt	Universities/ Research institutions; Woreda/Kebele Extension Agents and EFCC; NGOs		

						Establish baseline data, and undertake monitoring and evaluation and share scientific-based information on the effectiveness of voluntary commitment measures taken in favour of biodiversity conservation, using key biodiversity components (e.g., threatened, rare, endemic species; forest cover status) as indicators of effectiveness	Universities/ Research institutions		
Loss of biodiversity due to unfriendly coffee management practices, including indiscriminate vegetation removal during	Vegetation degradation; reduced plant and animal diversity, increased vulnerability of threatened species to extinction	Loss of ecosystems services such as wild sources of food, water for drinking irrigation, firewood and building materials, along with	Adopt biodiversity friendly modern technology inputs and production practices (application of improved variety, compost and manure,	ECTA, MoA/BoA, NGOs, Extension Agents	30% increase in number of smallholders adopting modern. technologies of productio	Awareness raising for smallholder producers on the importance of adopting modern technologies in enhancing both coffee productivity and biodiversity condition	Woreda agri office; Kebele Extension Agents	House hold surveys; Office records	Increased Coffee production and productivity "

weeding and coffee shade tree management		recycling of wastes into nutrients, and CO2, local extinction of plant and animal species; wild coffee extinction	weeding, pruning, mulching, and tilling) so as to mutually improve both coffee production and productivity, and biodiversity		n inputs and management practice by 2025; 10% increased Coffee productivity (kg/ha) band income by 2025	Support smallholders, technically, materially and financially in Coffee seed production, Coffee nursery development, and Production and adoption of use organic fertilizer and other friendly practices	Woreda agri office; Kebele Extension Agents; NGOs; Traders		
						Integrate climate change adaptation and mitigation actions	Woreda EFCC office		
						Develop biodiversity-friendly forest and semi-forest coffee management practices guideline (Code of Practice) and promote its implementation	Universities/ Research institutions; Woreda/Kebele Extension Agents and EFCC		
						Conduct scientific research on appropriate coffee varieties, disease and drought resilience, and	Universities/ Research institutions		

						coffee agronomy.			
						Certification and promotion of coffee products for suppliers	Zone/Wored a Trade offices; ECX		
						Provide extension services, including training and guidance on modern inputs and practices	Woreda agri office; Kebele Extension Agents		
			Improve coffee quality and income by adopting improved of coffee harvest, post-harvest processing, and marketing	Small scale farmers; Woreda; Extension agents; Traders; cooperatives/unions; ECX	Improved quality practices to 20% of current practitioners by 2025, 10% increases in coffee quality, income by 2025	Encourage smallholder coffee farmers practice quality coffee harvesting systems (e.g., selective harvesting) and processing (e.g., using sunbed for drying of cherries instead of on the bare ground), and increasing the share of red cherries (compared to	Woreda agri office; Kebele Extension Agents	Sales reports; House hold survey	Sales reports; Household survey

						dried cherries) in total sales of coffee			
						Provide extension services, including training and guidance on modern technologies applied for improving coffee quality	Woreda agri office; Kebele Extension Agents		
						Support establishment of smallholder coffee producers associations and cooperatives	Zone/Wored a Micro-finance and Enterprize offices; Extension agents; ECX		
						Seek financial supports required for coffee production/proce ssing via donations and micro-credit loans	Woreda Finance & Economic development office, and Micro-finance and Enterprize office; NGOs		

						Provide basic infrastructure facilities such as support (e.g., roads, electricity, water) in the coffee growing areas, around washing and hulling stations, and roasting facilities	Woreda Rod, Water, Energy and Agri offices; NGOs		
						Improve marketing arrangements for smallholder producers	Zone/wored a Trade offices		

Table 12. Potential voluntary commitments of Coffee subsector and high level of ambition for biodiversity (2020-2030).

Low level of ambition (2023-2025)									
Problem to be addressed [Pressure]	**Sate**	**Impacts**	**Response: VC**	**Actors**	**Expected change**	**Actions by other actors [+ Actors]**	**Responsible Actors**	**Monitoring measures and reporting**	**Broad Indicators**

Accelerated Deforestation and Forest Degradation due to conversion of natural habitats to smallscale and commercial coffee cultivation land	Loss of forest cover; habitat fragmentation (i.e., increased number of patches and patch isolation, and reduced patch size); deterioration of species' habitat quantity and quality; local extinction of rare and/or threatened species - resulting to declined species diversity; loss of genetic diversity due to limited gene flow between fragmented wild coffee subpopulations, leading to more vulnerability of the forest coffee gene pools to extinction risk	Loss of ecosystems services such as wild sources of food, water, firewood and building materials, recycling of nutrients, and CO2 sequestration; deterioration of human wellbeing	Avoid or reduce rate of natural forest conversion to new commercial coffee investment within the core and buffer zone areas of the biosphere reserves	Region/zone/woreda Bureaux of Investment (BI), Environment, Forest and Climate Change (MEFCC); Ethiopian Biodiversity Institute (EBI)	Reduction to 75% in new coffee land cultivation by 2030 (15% per year between 2026 and 2030) compared to the rate between 2010-2020.	Carry out Environmental and Social Impact Assessment prior to endorsing any new coffee investment projects	Zone/Woreda Env'l protection offices and Investment offices; Jimma, Mettu, Banga and Teppi universities (= Universities); Jimma Agriculture and Forestry Research Centers (Research centers)	GIS/Remote sensing analysis; Monitoring data Reports; Office records	Rate of deforestation compared to the rate between 2010 - 2020; % increase in ESIA.
						Establish and strengthen cross-sectorial collaboration and coordination for biodiversity conservation	EBI; Woreda EFCC		
						Identify legal gaps/conflicts across relevant sectors and propose new amendments	Universities; Research Centres		

	which is exacerbated by climate change; overall declined state of biodiversity					Awareness raising and training of biodiversity conservation, investment, environmental, agricultural and land administration sectors on relevant laws and policies associated with biodiversity, economic development and investment	Universities; Research Centres; EBI; Woreda EFCC; Kebele Development Agents		
						Monitor and evaluate effectiveness of the ambitioned VC, and share lessons learnt via suitable media	Universities; Research Centres; EBI		
			Avoid or reduce expansion of garden and existing investment plantations coffee into buffer zones (semi-forest coffee area) and core zones (wild forest coffee collection zone) of the	Forest Cooperatives/PFM groups; Woreda FEPCC, NGOs	Reduction of illegal coffee production to 70% by 2030 (10% per year from 2024 to 2030) in the buffer/core zones compared to the average rate between 2010 and 2020; Tenure security given to 50% of	Strengthen capacity of existing and new established community PFM groups in the buffer and transition zones	Woreda FEPCC/OFWE; NGOs; EBI	Office records; Monitoring data reports	Copies of Ownership Tenure certificates; Law enforcement
						Explore enabling conditions (e.g., legal, policy) for the potential for	Universities/ Research institutions		

			reserves through implementation of effective conservation and threat abatement measures, including: (a) forest ownership certification for specific ownership type (private, communal, cooperative/association and public/state ownership); (b) incentivising via ESP, and (c) law enforcement)		natural forests in the transition zones by 2030, respectively with annual rate of 15%; 50% of forest dweller communities enefited form carbon financing; Illegal activities reduced by 75% by 2030	forest ownership certification			repo rts; Doc ume nts of Ince ntive mec hani sms estab lishe d
						Facilitate and document and share results/lesson/of each step followed during the certification process	Universities/ Research institutions		
						Awareness creation to community members, private sectors, etc	Woreda agri office; Kebele Extension Agents		
						Provide incentives for farming households to offset costs associated with their commitments in favour of biodiversity (e.g. reduced expansion of farmland, participation in biodiversity management and development), through REDD+ scheme and sharing revenue	NGOs;		

						gained from sport hunting in the controlled wildlife hunting areas			
						Enhance cross-sectorial collaboration towards biodiversity conservation	EBI; Woreda EFCC		
						Developing and signing of binding laws	EBI; Woreda EFCC		
						Document all events taken place and share results/lesson/of each step followed during the certification process	Universities/ Research institutions; EBI		
			Reduce the impacts of forest fragmentation on biodiversity, including threatened species and forest coffee gene pool by	EFD, Zonal, woreda and kebele office of agriculture, Bo FEPCC, EPA, NGOs,	By 2030, 75% (15% per year from 2026 to 2030) of previously degraded habitats restored within the buffer and transition zones of the biosphere	Identify threatened and/or endemic species that are potentially most impacted from harmful coffee management practices	Universities/ Research institutions	GIS analysis based on Ground truthing and Remote sensing	Area restored; Increased patch size and conn

			increasing patch size and connectivity through restoration of previously degraded habitats within the buffer and transition zones, especially areas	EFD, BoFEPCC, OFWE, OEPA, BoA, NGOs (NABU, EWNRA, ECFF), community, private sectors	reserves; Increased patch size/connectivity to 50% by 2030 (10% increase between 2026 and 2030)	Identify potential species and sites of high conservation importance for restoration within the buffer and transition zones, especially areas degraded due to long years of intensively managed semi-forest and garden coffee production areas	Universities/ Research institutions		ectivity
						Assess and determine suitable restoration approaches (enclosure, enrichment plantation, etc)	Universities/ Research institutions		
						Facilitate implementation of the chosen restoration measure, and conduct monitoring the performance (success/failure history) of the measure and	Universities/ Research institutions; Woreda/Kebele Extension Agents and EFCC; NGOs		

						share lessons learnt			
						Establish baseline data, and undertake monitoring and evaluation and share scientific-based information on the effectiveness of voluntary commitment measures taken in favour of biodiversity conservation, using key biodiversity components (e.g., threatened, rare, endemic species; forest cover status) as indicators of effectiveness	Universities/ Research institutions		
Loss of biodiversity due to unfriendly coffee management practices, including indiscriminate	Vegetation degradation; reduced plant and animal diversity, increased vulnerability of threatened	Loss of ecosystems services such as wild sources of food, water for drinking	Adopt biodiversity friendly modern technology inputs and production practices (application of improved	ECTA, MoA/BoA, NGOs, Extension Agents	90% increase in number of smallholders adopting modern. technologies of production inputs and management practice by 2030 (18% per year	Awareness raising for smallholder producers on the importance of adopting modern technologies in enhancing both	Woreda agri office; Kebele Extension Agents	Household surveys; Office records	Increased Coffee production and prod

vegetation removal during weeding and coffee shade tree management	species to extinction	irrigation, firewood and building materials, along with recycling of wastes into nutrients, and CO2, local extinction of plant and animal species; wild coffee extinction	variety, compost and manure, weeding, pruning, mulching, and tilling) so as to mutually improve both coffee production and productivity, and biodiversity		between 2026 and 2030); 35% increase in Coffee productivity/yield (kg/ha) by 2030 (7% increase between 2026 and 2030)	coffee productivity and biodiversity condition			uctiv ity "
						Support smallholders, technically, materially and financially in Coffee seed production, Coffee nursery development, and Production and adoption of use organic fertilizer and other friendly practices	Woreda agri office; Kebele Extension Agents; NGOs; Traders		
						Integrate climate change adaptation and mitigation actions	Woreda EFCC office		
						Develop biodiversity-friendly forest and semi-forest coffee management practices guideline (Code of Practice) and promote its implementation	Universities/ Research institutions; Woreda/Kebele Extension Agents and EFCC		
						Conduct scientific research on appropriate	Universities/ Research institutions		

						coffee varieties, disease and drought resilience, and coffee agronomy.			
						Certification and promotion of coffee products for suppliers	Zone/Wored a Trade offices; ECX		
						Provide extension services, including training and guidance on modern inputs and practices	Woreda agri office; Kebele Extension Agents		
			Improve coffee quality and income by adopting improved of coffee harvest, post-harvest processing, and marketing	Small scale farmers; Woreda; Extension agents; Traders; cooperatives/unions; ECX	50% increase adoption of coffee harvesting, processing modern technologies by 2030; 30% increase both in coffee quality and income by 2030	Encourage smallholder coffee farmers practice quality coffee harvesting systems (e.g., selective harvesting) and processing (e.g., using sunbed for drying of cherries instead of on the bare ground), and increasing the share of red	Woreda agri office; Kebele Extension Agents	Sales reports; Household survey	Sales reports; Household survey

						cherries (compared to dried cherries) in total sales of coffee			
						Provide extension services, including training and guidance on modern technologies applied for improving coffee quality	Woreda agri office; Kebele Extension Agents		
						Support establishment of smallholder coffee producers associations and cooperatives	Zone/Wored a Micro-finance and Enterprize offices; Extension agents; ECX		
						Seek financial supports required for coffee production/proc essing via	Woreda Finance & Economic development office, and Micro-		

						donations and micro-credit loans	finance and Enterprize office; NGOs		
						Provide basic infrastructure facilities such as support (e.g., roads, electricity, water) in the coffee growing areas, around washing and hulling stations, and roasting facilities	Woreda Rod, Water, Energy and Agri offices; NGOs		
						Improve marketing arrangements for smallholder producers	Zone/wored a Trade offices		

3.2.6 Stakeholder Mapping and Mobilization strategy

As defined in the framework of BIODEV2030, a voluntary commitment (VC) is defined as "a set of forward-looking, strategic, shared and science-based actions that lead to positive and measurable change in biodiversity." Thus, the proposed VC in this Study 2 for the Bale Ecoregion were obtained by consensus following an inclusive process of discussion and negotiation involving the actors and their stakeholders.

This voluntary commitment is part of the implementation of Ethiopia's National Biodiversity Strategy and Action Plan (NBSAP). EBI, as a NBSAP coordinator and CBD focal point, takes the responsibilities to facilitate the processes of implementation and mobilization of actors for the voluntary commitment. Engagement types of each actor for the subsectors in the Bale Ecoregion are shown in Figure 15 below.

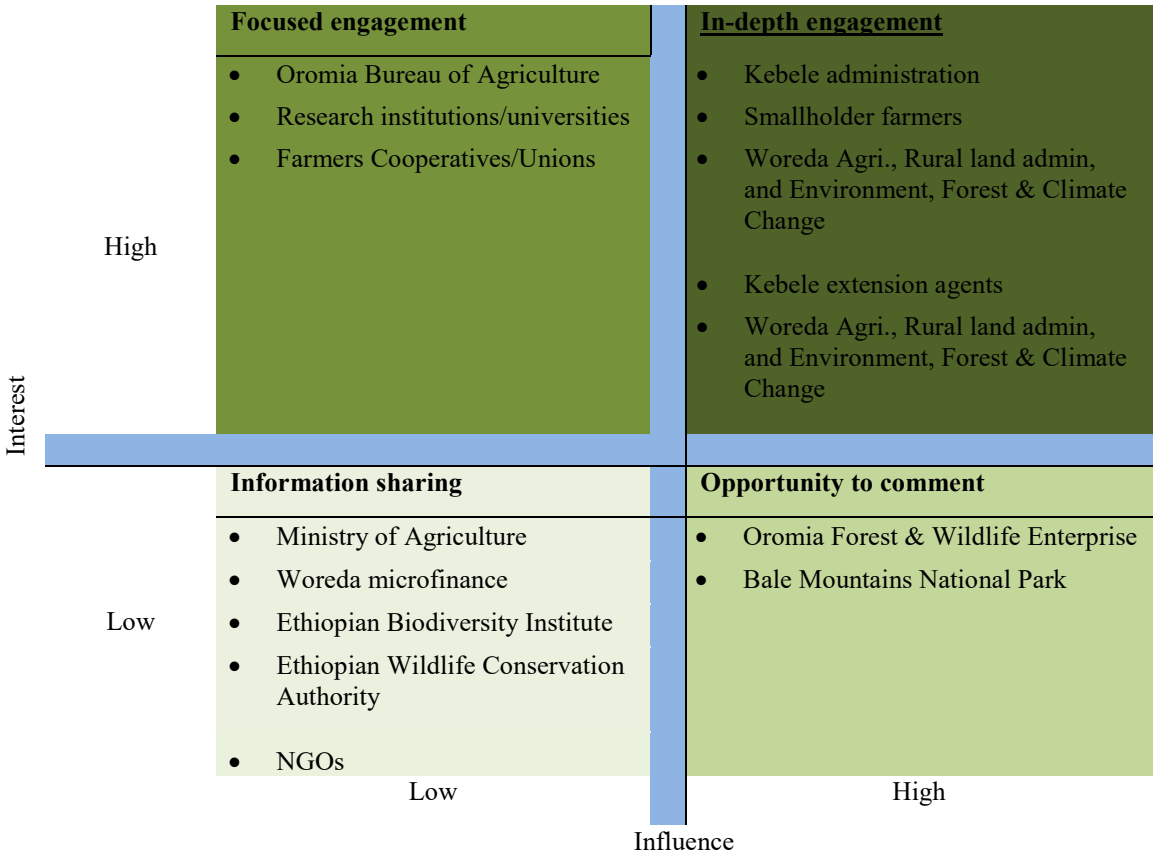


Figure 15. Stakeholder mapping for coffee and logging subsectors showing their levels of influence and interest and proposed engagement type in the Southwest Forest Landscape.

Overall, we suggest the steps for mobilization of actors for the proposed VCs in the Bale Ecoregion:

1. Introduce the concept of VC and framework of BIODEV2030 to all legitimate actors

Inclusiveness (and recognition of the plurality of interests and values) of the process of building a VC is as important as its content. The effective involvement and participation of all relevant stakeholders will enhance the chances of good ownership of the VC, which will increase its chances of implementation, monitoring and evaluation. As such, the VCs should be further discussed as much as necessary by all legitimate stakeholders in the subsectors in the landscape, relying on actors with a capacity to influence other actors ("opinion leaders"). The concept/definition of CV and the need for (findings of Study 1), and the stakes, objectives, means and consequences of the VCs (finings of Study 2) should be understood and appropriate by each stakeholder.

2. Agree on the formulated VC:

a) Refine role of each of the actors in the implementation.
b) Develop Concrete action plan for each of them, including:

- "Counterparts / Enabling conditions": Means to be implemented by other actors (State, NGOs, financial actors...) to enable or accelerate this change

- Other means/actions to be implemented by other stakeholders to promote ambitious change and the adoption of good practice:

- Technical means (change/adaptation of regulation or law, incentives...)

- Financial means (investments, grants...)

- Human resources (training, etc.)

3. Establish Woreda and Kebele VC committee

Establishing a committee composing of relevant individuals representing different social groups (community leaders, religious leaders, youth and women, etc) needed to mobilize and bring together all actors. The composition, roles, responsibilities, mandates, communication strategies should be clearly defined.

4. Develop standard formats of commitments for different types of actors

Standard formats of commitments may differ depending on the type of stakeholders to be mobilised, such as multi-stakeholder agreement, Sectoral commitment, etc. Thus, for each type of actor, the content of their commitments should be prepared, typically describing: a list of "possible" actions to improve practices and reduce pressures on biodiversity for each target sector, based on available knowledge from Study 2.

5. Secure financial sources for mobilization

Here, the VC lists the activities and means that will be implemented to achieve the objectives, in order to be concrete and not to remain at the mere statement of the objective. The means in question may be technical, financial, human, etc. They can be broken down by type of actor (economic sectors and other actors) and must take into account their respective capacities to contribute, as expressed during the dialogue phase (bilateral and multi-stakeholder). An action plan must accompany the VC and detail these means.

6. Establish Monitoring and Evaluation systems

In consultation with universities and research institutions:

- Develop monitoring strategies of the implementation of the voluntary commitment with specific indicators describing the resources to be mobilised

- collect, publish data regularly, and communicate to the public vai workshops, annual conferences, websites, scientific journals, etc

- revise the goal(s) and objectives according to the results;

- ensure that financial means and resources are available for the effective implementation of monitoring and evaluation systems.

3.3 Livestock Subsector in the Bale Mountains Eco-Region Landscape

3.3.1 Key Characteristics of Livestock Subsector Value Chain

3.3.1.1 Historical livestock production systems

With more than 60 million cattle, 30 million sheep, 30 million goats and over 1.5 million camels, Ethiopia is the leading country in Africa in terms of total livestock population. Livestock contributes, on average, over 15% of Ethiopia's GDP and 45% of the agricultural (Planning and Development Commission 2020). In Ethiopia, livestock is a tractor for crop farming, source of cash income for millions, insurance for uncertainties, fertilizer for crops, expression of status for families, store of asset, and source of foreign currency for the country. However, in recent years, the livestock resource is depleting, the price of animal byproducts is rising, and the foreign currency generated from this sector is dwindling, reaching less than USD50 million in 2018, down from more than USD200 million in 2012. Over 1.5 million exportable livestock are smuggled out of Ethiopia to neighboring countries annually, through borders. Policy makers in Ethiopia believe illegal cross border trade remains the main challenge of the livestock sector, especially livestock export[3]. Currently, livestock provide over 3.8 billion litres of milk and roughly one million tonnes of beef per year (FAO 2018). Available projections suggest that consumption of beef and milk will grow from 53 to 193% and from 115 to over 750% in the next 35 years. It is crucial that the rapidly growing cattle sector develops in a climate smart manner: currently 84% of livestock emissions come from cattle (CRGE, 2011), the water footprint per ton of cattle is more than three times the one of small ruminants and poultry, and 40% of land is grasslands (FAO 2018).

In the BER, livestock production has been an integral part of the landscape for centuries and the subsector has been the predominant component of the socio-cultural and economic wellbeing of the community in the ecoregion. Like most Oromo communities elsewhere, herders in the BER are known to practice the traditional livestock movement system, locally called *Godantu* – a system that allows free mobility of small human and livestock populations within the Ecoregion in order to exploit areas away from their permanent settlement sites (Hillman 1986; Watson et al., 2011; Chibssa and Flintan, 2017). The seasonal movements of people with their livestock have obviously been dictated by the lack of water and grazing in low lying areas and also the presence

[3] Ethiopian Business review (2020). Livestock Export: A Sector misunderstood by Policy Makers. https://ethiopianbusinessreview.net/livestock-export/

of livestock diseases that proliferate during the dry season (Chibssa and Flintan, 2017). However, following the replacement the imperial majesty to the socialist degrue regime [1974–1991], there emerged increased ethnic-based rebellion movements against the regime for freedom of self-determination. This had stimulated the then dergue regime to introduce a sedentary policy that restricted the movement of people within the country, prohibiting pastoralist from travelling large distances in search of forage. In the meantime, the dergue government had designated most of the highland areas used to be communal seasonal grazing areas as protected areas: the BMNP (Hillman 1986). This, in turn, had made livestock production more challenging, forcing local communities to increasingly turn to crop farming as an alternative livelihood system. Conversion of pasture land into cultivation and urban and rural settlements had placed further pressure on pastoral resources and the environment, and disputes over communal grazing lands which usually are settled either formally *via* woreda administration or informally by the council of elders (*Jaarsa biyyaa*) or ritual experts known as *Wayyuu* (Chibsa and Flintan, 2017).

Although the imposed restriction of free mobility of people and their livestock, especially into the protected areas, were effective until the downfall of the then dergue regime in 1991, the *Godantu* system was revived then after. Expansion of smallholder crop farming in the lowlands, coupled to weak law enforcements in the protected areas following government turnover in 1991, had favoured livestock producers to seasonally move into the protected areas in the higher altitude zones of the ecoregion (Hillman 1986). Reports show that livestock number usually peaks in the Afroalpine (habitats >3,000m a.s.l.) during the wetter months, from April to August, when livestock are moved from lower pastures where agricultural crops were being grown (OARDB 2007). In the Harenna Forest, however, influxes of pastoralists from the surrounding lowland areas are reported to take place for 3–4 months during the dry season (December-March) (OARDB 2007). Livestock also enter the high-altitude zones of the BMER to access the natural mineral springs, or *Horas*, found in various areas of the park and the Harenna forest that are known to contain high levels of sodium, potassium, calcium, manganese and zinc (Hillman 1986, Chiodi and Pinard, 2011; for detail on *Horas* see Box 3).

Box 3. Mineral springs ("Hora") and mineral lick "Haya" in the BMER

Mineral springs (*Horas*) are used as a salt supplement for livestock and, in combination with availability of grazing, are linked to the seasonal movement of people in the BMER. Horas serve livestock (particularly cattle) as nutrition/health, since they contain minerals, such as Sodium, Potassium, Calcium, Manganese, and Zinc (Hillman 1986; BMNP 2007). Previously, mineral springs are thought to be found only in the central and northern sections of the BER (Hillman 1986; Figure 26, left side). However, Chiodi and Pinard (2011) published the presence and description, for the first time, of the distribution, properties and use of 47 mineral springs (*Horas*) and 3 hot-springs (*Tabalas*) in the Harenna forest (Figure 26, on the right side). *Tabalas* are used occasionally for healing human skin and stomach illnesses and for thanksgiving celebrations. As reported by Hillman (1986) *Hora* uses are often considered as an excuse used by herders to graze within the BMNP and the simplest step for temporary-use housing and caves to become permanent use. Furthermore, use of *Horas* within the BMNP is not regulated, while those outside the boundary were administered by the local communities, with elders controlling access to the springs and keeping them relatively clean.

Where mineral springs are not available (i.e. in lower altitude areas), there tend to be mineral licks instead (Chiodi and Pinard, 2011). Not only are the animals taken to feed directly from the soil, but also the soil is mixed with water and given to the animals. Livestock keepers believe that the minerals improve the health of the livestock, reflected in stronger animals that for example produce more milk.

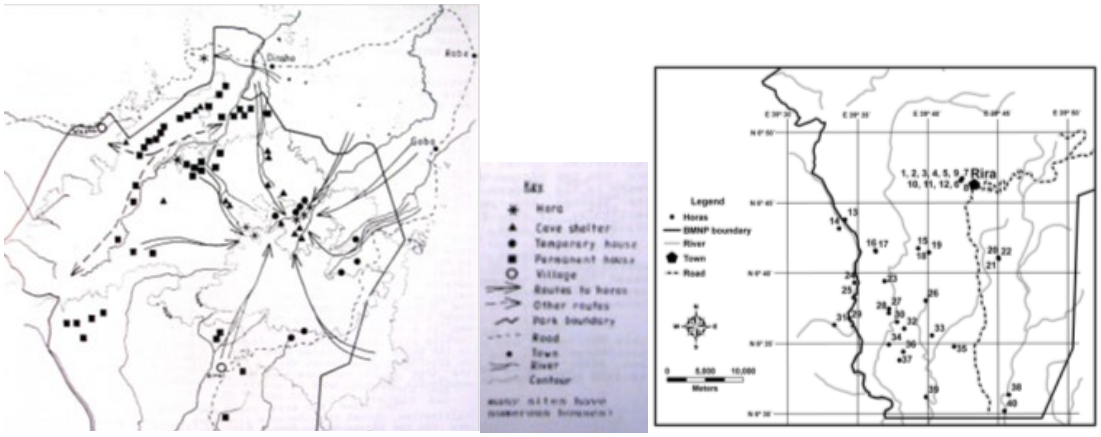


Figure 26. Showing location of *Horas* in the northern section of Bale Mountains National Park (McCarthy 1990; on the left side) and in the Harenna forest (Chiodi and Pinard, 2011; on right side)

3.3.1.2 Current Livestock production and practices

Despite the changes in lifestyle from pastoralism to mixed crop-livestock farming, livestock numbers have still been growing substantially. A review of livestock numbers across the Bale zone (see Annex xx) shows a reduction between 2000 and 2007, but a doubling between 2007 and 2015 from 2,611,618 (number of cattle, shoats, equines and camels) to 5,506,179 in 2015. This trend

has been observed in key protected areas in the region, such as the BMNP: livestock population, and associated human settlements, inside the park has been increasing since the park was established in the 1970s. In 1986, the estimated livestock and human populations were just 10,500 head of livestock and 2500 people, respectively (Hillman 1986) with three main areas inhabited: the Upper Web Valley, the western boundary, and the Harenna escarpment. Estimates made in 2007, however, place the number of livestock and people living in the park permanently and seasonally at approximately 168,300 head of livestock and 60,000 people respectively (OARDB 2007). Today, fewer pastoralists still practice the *Godantu* system, and the majority have settled down with their livestock. The number of permanent pastoralist settlements in the park now represents over 50% of the number of households both in the Afroalpine and the Harenna Forest (BMNP 2017). The explosion in livestock numbers is both a result of human population expansion within the ecoregion and of the immigration of pastoralist communities from the lowlands. This influx of livestock into the park is a direct result of poor land planning outside the park, where grazing land has been ploughed up, forcing livestock higher into the mountains and into the park to graze all year round.

Recent studies have shown that the number of people grazing livestock as well the number of months the area is used for grazing in the Park has increased in the past 15 years (BMNP, unpublished data). A survey conducted in 2015 revealed that 1072 and 2034 households seasonally use the Afro-alpine habitat for grazing whole the year round and Harenna forest for three-six months during dry season (BMNP unpublished data). The number of Livestock grazing during wet and dry season on the afro-alpine and in the central part of the park is 726,000 and 400,000 respectively. Within the Web Valley alone, a prime Ethiopian wolf habitat and breeding site, cattle density is estimated at 250 per km^2 (BMNP unpublished data, see Figure 16). Today, fewer pastoralists still practice the *Godantu* system, and the majority have settled down with their livestock. The number of permanent pastoralist settlements in the park now represents over 50% of the number of households both in the Afroalpine and the Harenna Forest (BMNP unpublished data). The explosion in livestock numbers is both a result of human population expansion within the ecoregion and of the immigration of pastoralist communities from the lowlands.

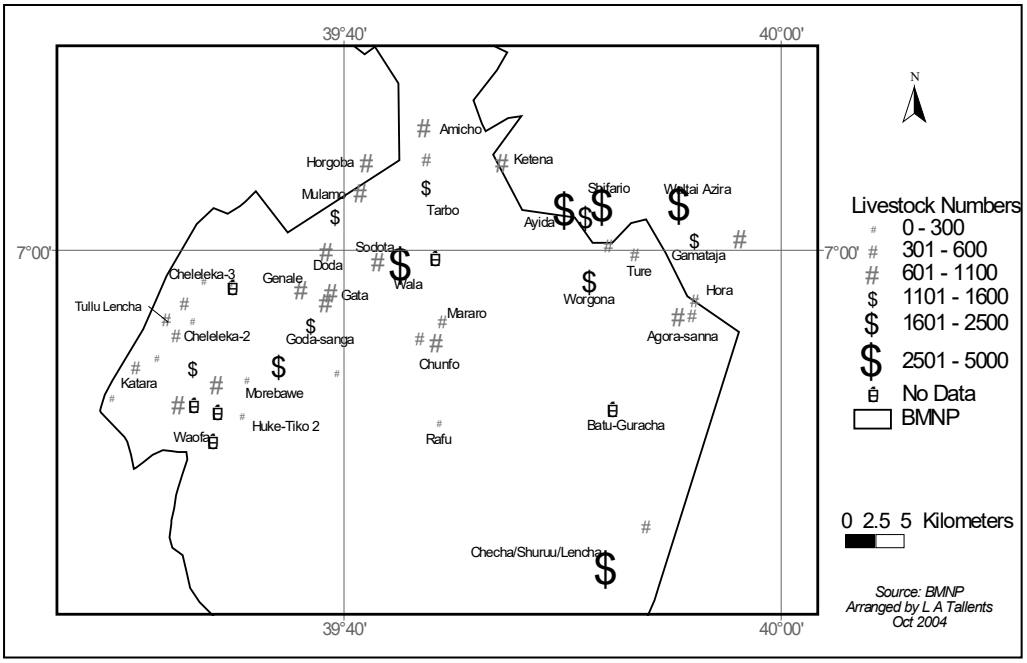


Figure 16. Number of livestock in settlements in BMNP Afroalpine area.

Livestock are kept by 99% of households in the BER for destructive uses (skins, selling and meat), and non-destructive uses (transport, ploughing, reproduction, milk and its products) (Vial et al. 2011). Previous studies reported that livestock inputs are minimal with medicinal costs constrained to, at most, annual cattle vaccinations (0.30 ETB per animal) and ill livestock often slaughtered rather than treated. Additional feed provision was reported in 81% of livestock owning households but was largely a product or by-product of agriculture (Chibssa and Flintan, 2017). Only oil-seed cake and salt were purchased at low cost (2.20 ETB and 0.8 ETB per kg, respectively). Watson et al's. (2011) assessment of the marketed livestock products revealed a mean livestock value of 2,065 ± 148 ETB (median = 1,668) ranging from 0 to 9,020 ETB (Chibssa and Flintan, 2017). Information obtained from key stakeholders consulted during the present fieldwork also support the above previous findings. Although the use of inputs such as vet services, fodder and improved breed has been increasingly improved overtime, the uses of these inputs are relatively higher in villages surrounding towns, such as Goba, likely due to better awareness and market accessibility. Despite this, insufficient use of improved breeds due to lack of access to the sources (higher demand than supply of improved breed), inadequate supply of vet medicine (some treats at home, some brings to vet at woreda), use of illegal vet medicines, shortage of forage and watering during the dry season and low market access are among the major constraints to efficient livestock

production and the efforts to reduce pressure from the sector on biodiversity, as reported by the key stakeholder informants.

3.3.2 Key characteristics of livestock subsector value chain

Like most rural communities in Ethiopia, for communities in the BER livestock is a tractor for crop farming, source of cash income, insurance for uncertainties, fertilizer for crops, expression of status for families and store of asset. As shown on Figure 17, livestock supply value Chain in the BER landscape includes: production, processing, and marketing and distribution, and consumption. Each element of the value chain, including actors and their roles, are briefly summarized as follows:

Production: involves raising livestock by smallholder herders based on regulatory/enabling polices and strategies issued by the Federal MoA and Regional state Bureau of Agriculture (livestock subsector) and with the support obtained from research institutions and universities, such as the Mada Walabu University, to access improved breeds, fodder production and modern technologies. Local private vet clinics are also involved in the production by providing vet services, and Woreda and kebele extension service agents provide technical support, training, provisioning of improved breeds, vet services, fodder development. Small-scale herders provide fodder, water, shelter, treatment (traditional), without which it is impossible to raise livestock and their products.

Processing: This involves producing livestock products for marketing of live, meat, hide/skin, milk, yogurt, butter, etc. These are the roles of small-scale herders and local butcher men.

Marketing and distribution: Herders can either transport live and products to local traders and consumers in nearby towns and markets. Local traders, in turn, sale to livestock local butcher men or transport live animals to Adama and Addis, where they sale to consumers, restaurant owners, or other retailers. Butcher men sale meat directly to local consumers and to restaurant owners.

Consumption: Both urban and rural households and individuals are consumers of livestock products. As shown on figures 17 and 18, over 65% of each type of animal products is used for household consumption, likely suggesting the lack of access to market as most herders spend many months in remote areas. It also suggests that sales from live animals to be the major income generating mechanism from livestock subsector.

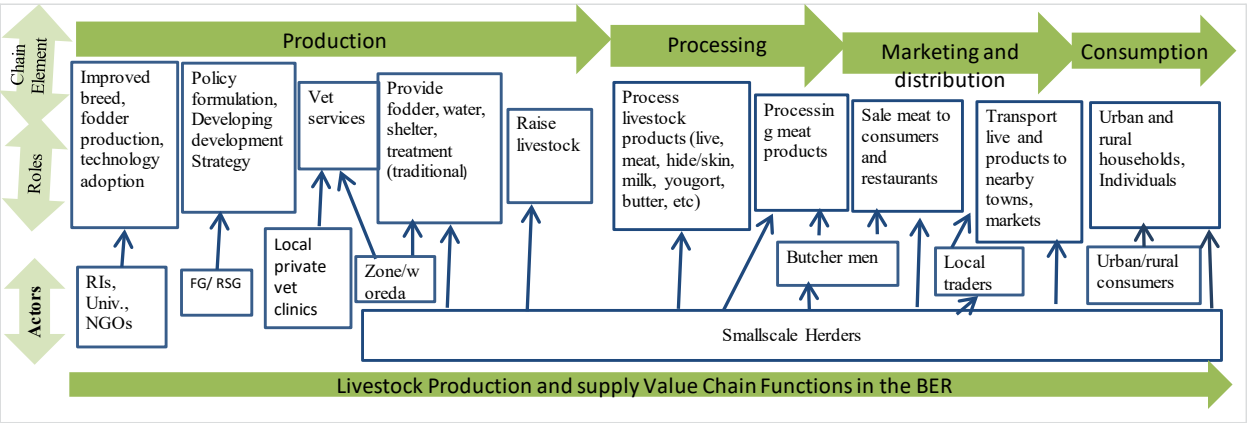


Figure 17. Livestock subsector value chain, showing the major functions, key actors and their roles and responsibilities in each element of the chain (Abbreviations: RIs = research institutions; FG = federal government; RSG = regional state government).

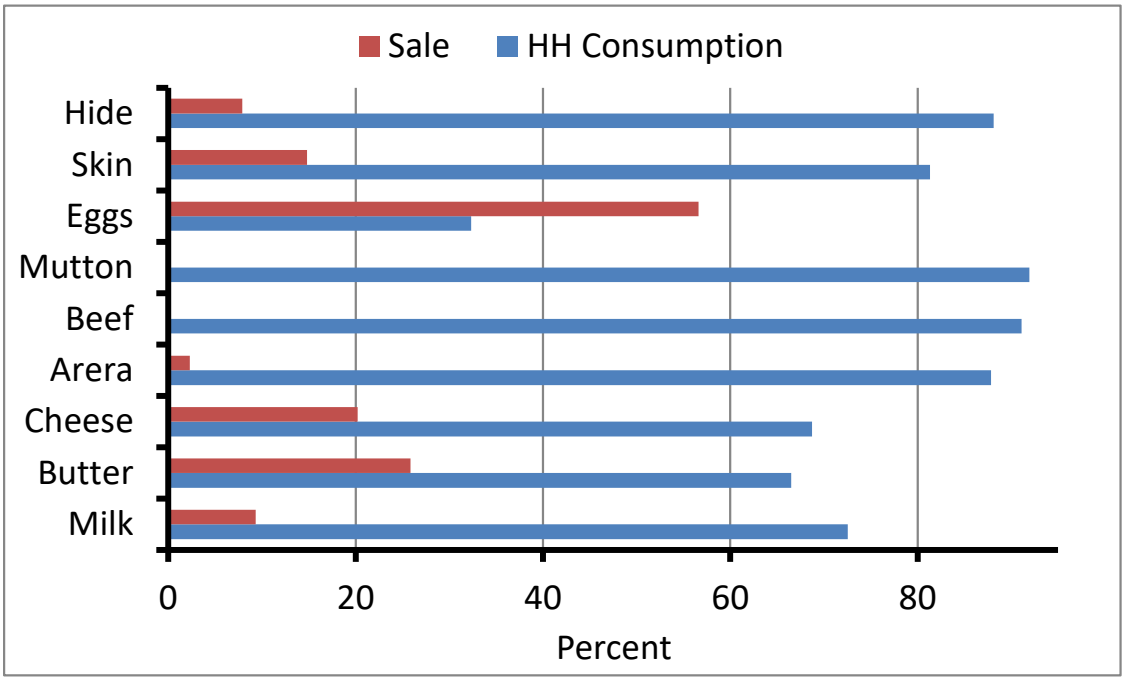


Figure 18. Percent of livestock products sold and used for household (HH) consumption in Bale zone (Source: CSA, 2020/21).

3.3.3 Policy, regulatory and strategic frameworks

Policies, regulatory and strategic plans relevant to the livestock subsector are listed as follow, and detailed description of relevant sections are provided in Annex xxx.

Policies and regulatory frameworks:

- Environmental Policy of Ethiopia (EPE), 1997—a comprehensive document that defines policies for 10 separate environmental sectors, covering soil and agriculture, forest and woodlands, biodiversity, water, energy, minerals, human settlement, industrial waste, climate change, and cultural heritage
- Ethiopian Water Resources Management Policy, 1999
- Ethiopian Water Resources Management Proclamation (No. 197/2000)—focuses on protecting natural water sources from degradation, excessive use, and pollution
- Environmental Impact Assessment Proclamation (No. 299/2002).

Strategic plans:

- The Growth and Transformation Plan II (GTP II) that covers the planning period from 2015 to 2020
- Ethiopian Programme of Adaptation to Climate Change (EPACC) focuses on climate change adaptation—Ethiopia adopted the National Adaptation Programme of Action in 2007. This was updated with the EPACC in 2011.
- CRGE strategy, 2011 focuses on climate change mitigation
- Solid Waste Management Proclamation (No. 513/2007)
- National Adaptation Program of Action (NAPA), 2007
- Environmental and Social Management Framework, 2013
- Agricultural Extension Strategy of Ethiopia. Ministry of Agriculture and Natural Resources, 2017.
- Livestock Master Plan (LMP): Roadmaps for the Ethiopia Growth and Transformation Plan (GTP II – 2015–2020), 2015
- National Adaptation Program of Action (NAPA), 2007
- Climate Change Education Strategy of Ethiopia, 2017Ethiopia National Adaptation Plan, 2018

Despite increasing interest of Ethiopia's government in enhancing livestock production and productivity while reducing adverse negative environmental impacts from the sector, our consultations with local key stakeholders (zone/woreda and farmers) reveal that there a number of

challenges and constraints hindering achievement of the subsector's sustainable development goals. It is apparent that rapid human population growth and the subsequent growth in demand for land required to meet their livelihood needs is the primary causes of landuse changes from grazing land to cultivation and human settlement, the major underlying driving forces of the pressures and impacts on biodiversity arising from the livestock subsector at the BER landscape include: (i) poor implementation of polices and strategies, (ii) lack of clear land use policies and integration among different sectors, and (iii) natural factors, including climate change and drought (EBI, 2014). Smallholder herders and local stakeholders also informed the study team during fieldwork that the major challenges and constraints to be: drought, lack of rangeland management and shortage of fodder, shortage of water, inadequate livestock health facilities, and low level of adopting improved breeds.

3.3.4 Direct and indirect biodiversity impacts of livestock subsector

Livestock and the environment have a close yet complex relationship. Livestock depends on the availability of water and feed, and can generate solid, liquid and gaseous "by-products" that have a negative impact on the environment. They rely on land and water for the provision of feed, thereby determining land use with further environmental consequences (FAO 2018). If not managed properly, livestock production can have negative impacts on the environment through: (i) overgrazing and improper land conversion resulting to wetland, grassland and forest degradation; (ii) poor livestock waste mismanagement resulting in water pollution (chemical and microbiological); (iii) greenhouse gas (GHG) emissions from dung accumulations contributing to climate change; and (iv) land use change and all the above leading to biodiversity loss and reduced eco-system services (FAO 2018; EBI, 2020).

Based on scientific studies and stakeholders opinions, the direct and indirect impacts of livestock on biodiversity of livestock subsector in the BER are summarized as follows:

Impacts on vegetation

Livestock herbivory activities, such as grazing/browsing and trampling, individually and/or interactively with other human activities (e.g. settlement, road), in the BER have been known to profoundly affecting vegetation cover, floristic composition and diversity, and tree population structure and regeneration of tree species. For example, increasing livestock grazing intensity at the lower-altitude horas, or mineral springs, in the region has resulted to reduced vegetation cover

and a shift from shrubs and perennial grasses to annual grasses and forbs (Tallents and Macdonald 2011). Moreover, grazing in the forest removes understory vegetation while patches of forest are burned down regularly to increase the area of grazing land. Afromontane grasslands have decreased in size by more than half (going from 19.3% to 8.77%). Closed Erica Forest also shrank from 15.0% to 12.37%, and isolated Erica shrubs have decreased from 6.86% to 5.55%, and Afroalpine dwarf shrubs and herbaceous formations reduced from 5.2% to 1.56% over three decades (between 1980s–2010s; Teshome *et al.* 2011). Conversely, glades, clearings within montane forest, steadily increased in area at an average annual rate of 1.14 km^2. Such dynamics were also observed in the Afroalpine where pasture lands are expanding very rapidly at a rate of 28 km^2 per year, particularly between 2000 and 2005, at a cost of Erica, montane forest and woodlands which in turn are shrinking at a rate of 13 km^2, 15 km^2 and 1.77 km^2 every year throughout this period. Moreover, their study also found that the numbers of patches in all the land cover classes were increasing while average patch size decreased. Their results particularly show that forest and woodlands are being transformed into grasslands across the study area as well as nearly all land cover classes experiencing fragmentation.

Furthermore, livestock herbivory activities have reported to cause reduced tree regeneration in different vegetation types of the BER (e.g., Asefa *et al*., 2015b). Livestock grazing has also caused changes in species composition of woody plants, by fostering the expansion of invasive (weedy) species, such as the shrub *Solanum marginatum* and herbaceous species such as *Urtica simensis* in the northern woodlands (Asefa, 2005; Asefa *et al*., 2015b) and *Kniphofia foliosa* and *Ferula communis* in the northern montane grassland (Mamo *et al*., 2015). Finally, Assefa *et al*. (2011) have reported reduced plant species diversity of the Ericaceous belt of the Bale Mountains as a result of the increasing impact of human activities through livestock grazing and browsing and associated frequent burning by the local people.

Impacts on mammals

Notable impacts of livestock production on vertebrates include habitat modification and direct interactions between wildlife and livestock through trophic (food competition and predation) and non-trophic interactions. For example, livestock grazing-induced habitat change and competition for food have been found to impact the distribution, abundance and movement patterns of many conservation concern ungulates such as the endangered endemic Mountain Nyala (*Tragelaphus*

buxtoni) (Stephens et al., 2011). The Afroalpine habitat of BMNP has a simple and visible trophic structure with Ethiopian wolves and a diverse assemblage of raptors feeding almost exclusively upon a guild of herbivorous burrowing rodents, including 10 species endemic to Ethiopia (Sillero-Zubiri *et al*., 1995). There is evidence to suggest that cattle compete with rodents (Stephens *et al*., 2001), reducing the prey base of wolves and raptors in BER.

Most households keep one or more dogs to protect livestock from Hyaenas, but most of the dogs are inadequately provisioned and only loosely controlled and free ranging. The increasing number of domestic dogs in the BMNP has caused various threats to wild mammals of the park. Firstly, they compete for food with wild carnivores, including the Ethiopian wolves (Sillerio-Zubiri and Gottelli, 1995). Second, dogs act as reservoirs for rabies and canine distemper virus (CDV) and transmitting to the wolves (Sillero-Zubiri and Gottelli, 1995). According to (EWCP Annual Report, 2016), rabies outbreak in 2015 killed more than 50 adult wolves and the 2016 CDV outbreak swept out over 45% of the total population of adult wolf population of BMNP, and currently only less than 130 wolves (adult, and sub adult) surviving in the park (EWCP annual report, 2016). Domestic dogs also hunt on ungulates juveniles. Asefa's (2008b) indicated that over 90% mortality cases of Mountain Nyala calves reported between 2000 and 2005 was due to predation by domestic dogs. Lastly, livestock depredation has motivated herders to practices illegal poaching of wildlife and illegal trade in wildlife products, such as Leopard and Lion skins and claws (OBARD, 2007; Asefa, 2008b).

In sum, livestock grazing-induced threats to biodiversity have led to increased vulnerabilities of several species to extinction, particularly those endemic ones. About 4, 12 (15% of BMNP's mammals; or 39% of Ethiopia's threatened mammal species) species of mammals are currently listed as globally threatened to extinction (see IUCN, 2017; Tessema et al. 2020, for detail on this).

Impacts on Birds

The consequences of livestock pressures on birds in the BER have been less understood compared to on mammal fauna of the park. Shimelis *et al*. (2013) have reported a negative relationship of bird species richness with amount of tree logging in the Harenna forest. In their first study, Asefa *et al*. (2015c) reported decline in species richness, diversity and abundances of bird species groups that require tall grass habitat.

Impacts on Reptiles and Amphibians

Bale mountains are recognized as the centre of speciation of herps, particularly amphibians (Largen and Spawls 2011; Gower *et al*., 2013). Gower *et al*. (2013) have published a long-term quantitative data for four monotypic frog genera in the Bale mountains: one endemic to the Ethiopian highlands (*Spinophrynoides osgoodi*) and three endemic to the Bale Mountains (*Altiphrynoides malcolmi*, *Balebreviceps hillmani*, *Ericabatrachus baleensis*), collected during 15 field trips to the Bale Mountains between 1971 and 2009. Their results show that populations of all the four genera have showed alarming decline, with only a single confirmed sighting of *S. osgoodi* has been made since 1995. Apart from population decline, *E. baleensis* has reported to been extirpated at its type locality (Gower *et al*., 2013). These authors attributed these declines to the substantial habitat degradation caused by livestock grazing. In this regard, Largen and Spawls (2011) have suggested that the two critically endangered frogs (*Balebreviceps* and *Ericabatrachus*) to deserve special attention for conservation, because currently they are known from only two sites, including the narrow belt of Erica woodland lying just below the timberline at 3200 m. Similarly, two chameleon species (*Chamaeleo balebicornutus* and *C. harennae*) whose ranges of distributions are confined to the BMNP are currently classified as vulnerable threat category mainly due to loss of forest habitat within their limited ranges (Largen and Spawls, 2011).

Impacts on Ecosystem structure and functions

Livestock affect ecosystem structure and functioning both directly and indirectly through their impact on biodiversity. The impacts of biodiversity degradation due to livestock production practices on ecosystem structure and functioning and the implications thereof for sustainable development of biodiversity and humans in the BER are briefly described as follows:

a) **Provisioning services -** Disturbance to biodiversity in the BMNP has impaired appropriate provisioning of services. For example, shortage of fuelwood, scarcity of wild medicinal plants, and livestock and bee forage has been reported from the area (Asefa, 2008a, Asefa *et al*., 2015a). Furthermore, freshwater scarcity is becoming an accelerating condition for hundreds and thousands of people living in the surrounding towns (e.g., Goba and Adaba towns). Siltation of dams at Melka Wakena and Yato, where over one-thirds of the reservoirs are thought to be filled by siltation, has been the main reason for power

interruptions (OBARD, 2007). Sedimentation has led some of important horas to dry-out (Chiod and Pinard, 2011).

b) **Supporting Services -** Vegetation cover loss in the BMNP due to overgrazing have caused serious soil erosion, reduced soil infiltrations and increased surface water runoff. Fire burning associated with rangeland improvement causes soil nutrient loss as smoke and direct wildlife fatalities, and livestock trampling causes soil compaction and prevent soil formation and nutrient recycling (OBARD, 2007; Vial et al. 2011). Declining soil fertility adversely impacts the socio-economy of poor farmers, including declining crop yields resulting in increased food insecurity, under- and mal-nutrition. Food insecurity and under-nutrition have further ramifications such as: (i) reduced health and hence increased susceptibility to disease, (ii) reduced dietary diversity, (iii) possible disintegration of the family resulting in migration, (iv) reduced crop surplus for sale, thereby eliminating a source of much-needed cash resources, (v) diversion of scarce cash resources from e.g. education, health to purchase food and/or fertilizers, and (vi) clearance of natural lands for new fields.

c) **Regulating services -** Among undesirable ecosystem consequences of biodiversity loss in the BER loss reduced regulatory ecosystem services they provide to humans, such as pollination, seed dispersal and pest control. Increased erosion and reduced water infiltration rate in the area, due to vegetation destruction and degradation, have resulted to drying out of several perennial rivers, siltation of dams and increased CO2 concentration (OBARD, 2007).

3.3.5 Existing best practices to reduce pressures/impacts on biodiversity

National level:

In the current National development Plan (2021–2030), the government has planned to increase the average contribution of the livestock subsector from 2.5% base year (2020) to 3.7% in between 2021 and 2030. This ambition is expected to be achieved by increasing production and productivity through reducing number of livestock by replacing with improved breeds, rangeland management, fodder provision and adequate vet services. This plan has a positive effect for biodiversity as it

reduces pressures from livestock arising from high number and encroachment into KBAs and protected areas.

Local level best experiences and commitments

The fact that the Bale Eco-Region has national, regional and global importance in terms of both biodiversity conservation and as a source of diverse ecosystem services, but the ever-increasing threats that the region has been facing have attracted due attentions from government and international conservation and development NGOs. As a result, several NGOs have been devoted technical and financial supports to ensure sustainable biodiversity conservation and livelihood development of local communities. Among those currently operating includes:

Frankfurt Zoological Society Bale Mountains Conservation Project – FZS-BMCP has been implemented since 2006, focusing on capacity building for effective conservation of the BMNP via building infrastructure, equipment provision and training on skills required for effective law enforcement, research and ecological monitoring, and tourism development. Management plan, zonation and agreement signed with communities for grazing reductions, ecological monitoring, etc.

Farm Africa and SOS Sahel – Farm Africa has been implementing a project named "Sustainable management of the Bale Ecoregion" since 2007. This project operates outside the BMNP, mainly in the Harenna forest, and currently implementing the third phase of the project.

SHARE Ethiopia Bale Ecoregion Project – Natural resources base of the BER is declining due to human actions (e.g., deforestation, expansion of agricultural land and overgrazing and forest fire) and natural factors (e.g., drought). For example, the conversion of grazing lands to agricultural lands in the highlands of BER is increasing livestock pressure on the remaining grazing lands and affecting the traditional transhumance practice. Degradation of grassland and forest resources as well as land conversion have resulted in soil erosion, flooding, drought, and depletion of ground water. This in turn has led to chronic food insecurity and vulnerability to increased land degradation and recurring drought. The impacts of inappropriate land management practices on the livelihood of communities in the BER are aggravated by climate change/variability.

The major drivers of the natural resources problems in the co-region are population growth, poverty, lack of cross-sectoral integrated actions and policies, and capacity gaps at human and institutional levels for responsible natural resources management. Also, most of the programs and projects implemented and are being implemented in the BER fail to recognize the upstream downstream linkages through ecosystem services flow and how these are intimately linked to community livelihoods and resilience at a broad landscape scale.

Further, most of the projects were not comprehensive and fail to address the complex issues in natural resources management. For example, the fundamental drivers of landscape change such as human population growth, and how this affects present and future sustainable management of NRM (demography-environment nexus) in the entire Eco-region are not addressed yet.

The SHARE BER project was initiated following the recognition of the multi-faceted nature of NRM problems and the ineffectiveness of sector-based approach. The project is unique in many ways. First it takes into consideration an Eco-regional approach to address drivers of natural resources degradation at scale by considering the interdependence and interaction between highland and lowland resource users. Second, it adopted a multi-sector approach including integration of population and demographic aspects, which often is overlooked in many projects. Third; it is implemented by a consortium of five partners that were brought together based on their excellence in different development areas: Farm Africa (leading), SOS Sahel Ethiopia, International Water Management Institute (IWMI), Frankfurt Zoological Society (FZS), and Population, Health and Environment Ethiopia Consortium (PHEEC).

The project activities are implemented in partnership with Ministry of Agriculture and Natural Resources, Ministry of Environment, Forest and Climate Change (MEFCC), Ethiopian Wildlife and Conservation Authority (EWCA), Oromia Forest and Wildlife Enterprize (OWFE), Oromia Pastoralist Development Commission, and other governmental organizations of all levels.

The overall goal of the project is to enhance drought resilience, food and nutrition security of vulnerable populations in southern and eastern Ethiopia, through achieving the project's specific objectives such as improving biodiversity conservation and ecosystems functions and services in BER and increasing the resilience and well-being of communities living in the BER. The project activities are carried out in seven Woredas located in the BER and project activities are expected to benefit a total of 878,000 people living in 16 woredas.

The activities of the project can be grouped into three categories: natural environment and ecosystems, markets and economic sustainability, and building responsive and strong institutions. It uses key tools such as building an evidence-based strategic engagement with decision-makers in a way that meets their needs and demands, a strong focus on population dynamics, health and gender issues, and piloting new practices and drawing on best existing practices to foster genuine innovations.

Detailed stories of some examples of best practices from SHARE BER project to reduce the impacts of livestock subsector on biodiversity and relevant to initiate voluntary commitment in the BIODEV2030 project are provided in Box 4 and b. Key achievement include: establishment of Participatory Rangeland Management Cooperatives Initiation of National Park Shared Management Practices in the BMNP, Water management platform for improved water management, and Training Community Animal Health Workers and Experts.

Box 4a. Some examples of best practices from SHARE BER project to reduce the impacts of livestock subsector on biodiversity.

Establishment of Participatory Rangeland Management (PRM) Cooperatives: PRM system is a resource management system through which organized community members take the major managerial responsibility with the recognition and support from relevant Government offices. The project has supported establishment of PRM cooperatives in many kebeles (=peasant associations, the lowest admin unit) who are responsible for the management, use and protection of the rangelands. For example, the cooperatives conduct rangeland resource assessment, determine the status and potential of the resources and delineate rangelands by blocks and manage it. They have developed their bylaws and get it ratified. Currently, the PRM cooperatives are managing a total of 338,337.8 ha of rangelands with the support of woreda pastoralist development, woreda rural land and environmental protection and woreda cooperative promotion offices. The PRM cooperatives could support to maintain fodder availability, reduce the conversion of rangelands to other land uses such as agricultural lands, increase the production of non-timber forest products (e.g., gum, incense, honey), and maintain ecosystem services (e.g., soil carbon sequestration, groundwater recharge). It is also envisaged to contribute for the overall sustainable management of the Eco-region.

National Park Shared Management Practices Initiated: SHARE BER has provided technical and financial supports to BMNP to strengthen resource protection in controlling illegal activities in the park such as illegal settlement, grazing and coffee planting, and strengthened through considerable follow up with local administrators, police and courts through actively engaging kebele and woreda multi-sectoral taskforces within the national park to have shared management.

Box 4b. Some examples of best practices from SHARE BER project to reduce the impacts of livestock subsector on biodiversity.

Water management platform for improved water management: Poor management of constructed water harvesting structures such as ponds was one of the problems identified by the SHAREBER project. In response to these problems, the SHARE-BER project together with government bodies has rehabilitated 'Haro Chama' pond located in Naniga Dhera kebele, Dello Mena wereda; established water management platform and assisted the development of bylaws used to manage the constructed pond. Following such interventions, the management of the pond was officially transferred to the PRM cooperative by signing agreement among the woreda water, mineral and energy office, Naniga dera kebele administrator and '*Hurufa Dero*' PRM cooperative.

The rangeland management cooperative first constructed fence around the pond by involving members and adopted the water tariff system to the water users. Accordingly, water users are fetching water from the public water point by paying One Ethiopian Birr for four jerry cans. The money collected from the service fee was agreed to be used to pay monthly salary for the guard hired and for the maintenance of the pond structures.

The establishment of water management platform and the construction and protection structure such as the silt trap has contributed to the rehabilitation of the pond and improving the sanitation. In addition, the potential damage from direct entrance of livestock and human in to the pond is totally avoided. People are paying service fee for the service they are getting from the pond-which is one of the potential for payment for eco-system services in the pastoral areas.

Training Community Animal Health Workers and Experts (CAHWs): CAHWs are integral component of primary animal health service delivery in remote and inaccessible pastoralist areas of Ethiopia. SHARE BER project had organized initial training. The trained CAHWs have been engaged in providing community-based primary animal health services by diagnosing and treating simple common diseases with the main focus on the extension service related to prophylactic measures to rural livestock owners and also involved in the vaccination campaign in their respective kebeles together with woreda animal health experts.

The following are other local and national standards and best practices to reduce pressures on biodiversity available for learning and mainstreaming:

- At local level, the BMNP management plan has planned to reducing grazing pressure over the coming decade through implementation of "Grazing Reduction Strategy".
- REDD+ BER has planned to reduce forest loss due to grazing and other related agricultural activities by about 2.5% in the upcoming decade.

- The Ethiopian Biodiversity Institute has stated in the NBSAP, highlighting that improving livestock sector is needed to reduce the sector's impact of biodiversity. The NBSAP also stated the need to mitigate the impacts of livestock sector on biodiversity via:
    - Effective law enforcement,
    - Restoration,
    - Rehabilitation

3.3.6 SWOT Analysis for voluntary commitment to address the impacts on biodiversity of Livestock subsector in the Bale ecoregion

Table 13 shows preliminary results of SWOT analysis on the livestock subsector in the BER. Strengths to implement voluntary commitments to reduce the impacts of logging and wood harvesting subsector on biodiversity in the BER subsector include conducive forestry/energy/construction policies, laws and institutions, high government commitment to international sustainable development goals (e.g., UN SDGs, CBD) including access to safe and clean energy sources; logging impact and its mitigation measures are being well-recognized in the National development plan and NBSAP; National-wide movement for afforestation, reforestation program; and increasing adoption of alternative (e.g. solar, biogas) and energy-efficient stoves. Weaknesses include overlapping and unclear responsibilities among some related sectors; lack of coordination among different sectors and with development and conservation organizations, NGOs, Civic societies, and local communities; and low level of supply and adoption of modern energy saving cooking stoves. Yet, there are opportunities to maintain the strengths and turn the weakness into strengths. This includes existence of increasing interest of national and international donor and development agencies in sustainable development of both socioeconomic and biodiversity (Table 13).

Table 13. SWOT Analysis for the voluntary commitment to reduce the impacts of logging and wood harvesting on biodiversity in the Bale ecoregion.

Strengths	Weakness
• The economic importance and environmental impacts of livestock production being recognized in the National development plan and NBSAP • High motivation at all levels of government authorities for the subsector's environmentally friendly development • Increasing adoption of improved breeds and use of vet services	• Ineffectiveness of implementation of livestock policies and strategies • High number of livestock per household with low productivity but high environmental/biodiversity impacts • Shortage of fodder, watering • Inadequate supply of improved breed and vet services • Lack of market access
Opportunities	**Threats**
• Presence of livestock policies, laws and institutions • Increasing interest of national and international donor and development agencies in sustainable development of both socioeconomic and biodiversity	• Drought • Erratic rainfall • Political instability and peace insecurity • Disease outbreaks

3.3.7 Synthesis: Recommendations and scenarios of commitments for livestock subsector

Overgrazing in the Bale Mountains Ecoregion, partly due to seasonal movement of pastoralists from lowland areas during drought period in the search of pasture and water, has been posing severe pressure on ecosystem of the region. Through vegetation biomass removal, soil compaction and dung accumulation, overgrazing by livestock has resulted to increased soil erosion, reduced soil fertility, pollution of rivers and wetland degradation, expansion of invasive species, deterioration of wildlife habitat quality, food competition with wildlife. This in turn has led to impaired proper ecosystem service provision, increased contributed to atmospheric GHGs (Methane emissions from dung) and deterioration of human wellbeing. To address this issue, actors of the subsector have agreed to make the following voluntary commitments:

VC1: Reduce the impacts of livestock overgrazing on biodiversity in KBAs, including the BMNP, through formal and informal regulatory mechanisms

The Afroalpine region and upper Harenna forest are critical sites for many of the locally endemic critically endangered mammal and amphibian species, all of which, directly or indirectly, are impacted from livestock overgrazing. In response to this problem, actors of livestock subsector have agreed to reduce the number of livestock heads grazing in the Core zones of the park to 30% by 2025 compared to the average number in the last 5 years (2015-2020) and to completely avoid grazing in this zone by 2030. Here, to achieve this funding support is supposed to be provided by NGOs working in the ecoregion to cover field costs for ranger-based monitoring.

VC 2: Improve rangeland and water sources management and water harvesting systems in semi-arid areas to copeup with livestock feed and water shortage

Rangeland degradation is one of the major reasons for expansion of grazing into KBAs. Thus, to reduce this pressure to KBAs, compared to the average rangeland condition in the last decade, the actors have agreed to improve rangeland condition to 25% by 2025 and 60% by 2030. Conservation and development NGOs and universities are expected to provide funding supports and capacity building training for herders on better rangeland management approaches.

VC 3: Reduce number of livestock while improving production and productivity through application of modern husbandry practices such as genetically improved breeds, fodder production and modern vet services

While the number of livestock in the region has been increasing overtime, productivity has been declining. Therefore, the actors have agreed to reducing number of livestock while improving production and productivity through application of modern husbandry practices such as genetically improved breeds, fodder production and modern vet services. As such, they have proposed to achieve awareness raising and training of 20% of smallholders by 2025 on the adoption of improved breed cattle, importance of vet service, fodder production and livestock products processing. By 2030, at least 20% smallholders adopted improved breed cattle; 100% vet service coverage achieved; 5000 ha land of communal fodder established; 30% of herders adopted livestock products processing and got marketing access. Other actors, such as local micro-credit financing, farmers cooperatives and NGOs are expected provide financial aids/loan to smallholder herders.

Table 14. Potential biodiversity voluntary commitments of livestock subsector and expected changes under low level of ambition (2023-2025).

Problem to be addressed [Pressure]	**State**	**Impacts**	**Response: VC**	**Actors**	**Expected change**	**Actions by other actors [+ Actors]**	**Responsible Actors**	**Monitoring measures and reporting**	**Broad Indicators**
Overgrazing in the Bale Mountains Ecoregion due to seasonal movement of pastoralists from lowland areas during drought period in the search of pasture and water	Increased soil erosion, reduced soil fertility, pollution of rivers and wetland degradation, expansion of invasive species, deterioration of wildlife habitat quality, food competition with wildlife	Deterioration of ecosystem services, increased atmospheric GHGs (Methane emissions from dung), deterioration of human wellbeing	Reduce the impacts of livestock overgrazing on biodiversity in KBAs, including the BMNP, through formal and informal regulatory mechanisms	BMNP management; OFWE, Pastoralists; PFM groups	Number of livestock heads grazing in the Core zones of the park reduced to 30% by 2025 compared to the average number in the last 5 years (2015-2020)	Funding support	NGOs, Government	Ranger-based monitoring	Ranger-based monitoring report
			Improve rangeland and water sources management and water harvesting systems in semi-arid areas to cope feed and water shortage	Smallholder herders, Woreda Agriculture office and development offices, Kebele Extension Agents	Rangeland condition improved to 25% by 2025 compared to the average condition in the last decade	Funding support	NGOs, Government		
						Capacity building training on better rangeland management approaches	Agricultural research center, Mada Walabu University, Agri. office		

			Reduce number of livestock while improving production and productivity through application of modern husbandry practices such as genetically improved breeds, fodder production and modern vet services	Herders, Woreda livestock sector and vet service, Kebele Extension Agents	At least 20% small herders trained on the adoption of improved breed cattle, importance of vet service, fodder production and livestock products processing"	Research and capacity building training for herders on better fodder plants	Agricultural research center, Mada Walabu University, Agri. office		
						Provide training on livestock products processing and marketing mechanisms	Woreda Agriculture office, NGOs		
						Provide financial aid/loan	Woreda Micro-finance, Private investors; Farmers cooperatives; NGOs		

Table 15. Potential biodiversity voluntary commitments of livestock subsector in the Bale Mountains Ecoregion and expected changes under high level scenario ambition (2026-2030).

High level ambition scenario (2026-2030)									
Problem to be addressed [Pressure]	**State**	**Impacts**	**Response: VC**	**Actors**	**Expected change**	**Actions by other actors [+ Actors]**	**Responsible Actors**	**Monitoring measures and reporting**	**Broad Indicators**
Overgrazing in the Bale Mountains Ecoregion due to seasonal movement of pastoralists from lowland areas during drought period in the search of pasture and water	Increased soil erosion, reduced soil fertility, pollution of rivers and wetland degradation, expansion of invasive species, deterioration of wildlife habitat quality, food competition with wildlife	Deterioration of ecosystem services, increased atmospheric GHGs (Methane emissions from dung), deterioration of human wellbeing	Reduce the impacts of livestock overgrazing on biodiversity in KBAs, including the BMNP, through formal and informal regulatory mechanisms	BMNP management; OFWE, Pastoralists; PFM groups	Livestock grazing in the Core zones of the BMN park completely avoided by 2030.	Funding support	NGOs, Government	Ranger-based monitoring	Ranger-based monitoring report
			Improve rangeland and water sources management and water harvesting systems in semi-arid areas to cope feed and water shortage	Smallholder herders, Woreda Agriculture office and development offices, Kebele Extension Agents	Rangeland condition improved 60% by 2030 compared to the average condition in the last decade	Funding support Capacity building training on better rangeland management approaches	NGOs, Government Agricultural research center, Mada Walabu University, Agri. office	Field assessment	Reports

			Reduce number of livestock while improving production and productivity through application of modern husbandry practices such as genetically improved breeds, fodder production and modern vet services	Herders, Woreda livestock sector and vet service, Kebele Extension Agents	At least 20% small herders adopted improved breed cattle by 2030; 100% vet service coverage achieved by 2030; 5000 ha land of communal fodder; 30% increase in livestock products processing and market access by 2030 "	Research and capacity building training for herders on better fodder plants	Agricultural research center, Mada Walabu University, Agri. office	Office records review	
						Provide training on livestock products processing and marketing mechanisms	Woreda Agriculture office, NGOs		
						Provide financial aid/loan	Woreda Micro-finance, Private investors; Farmers cooperatives; NGOs		

3.3.9 Stakeholder mapping and Mobilization Strategy

Results of stakeholders mapping exercise, showing their direction of interactions [influence, collaboration (alliance) and information exchange] are shown on Figure 19, and level of engagement for each actor is shown on Figure 20.

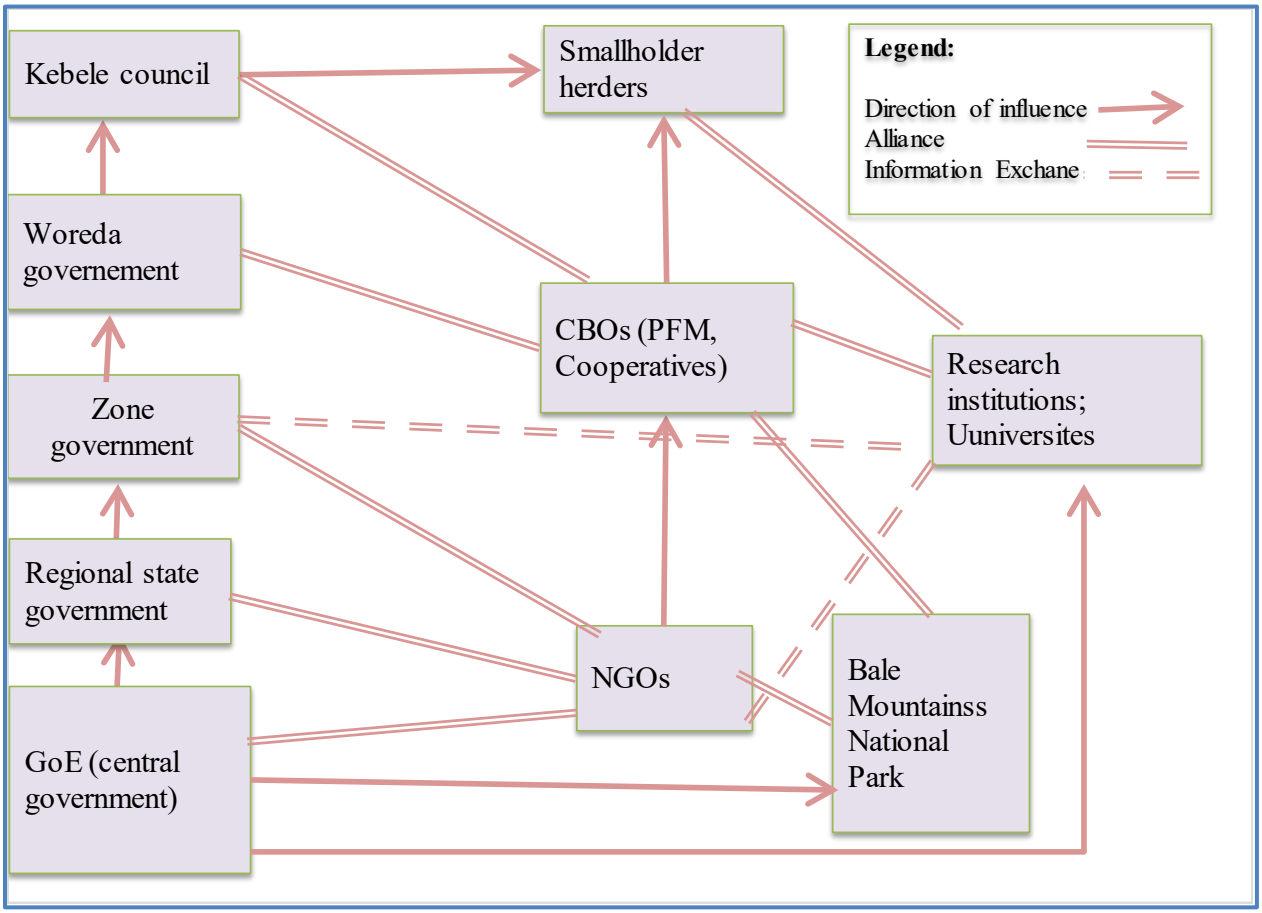
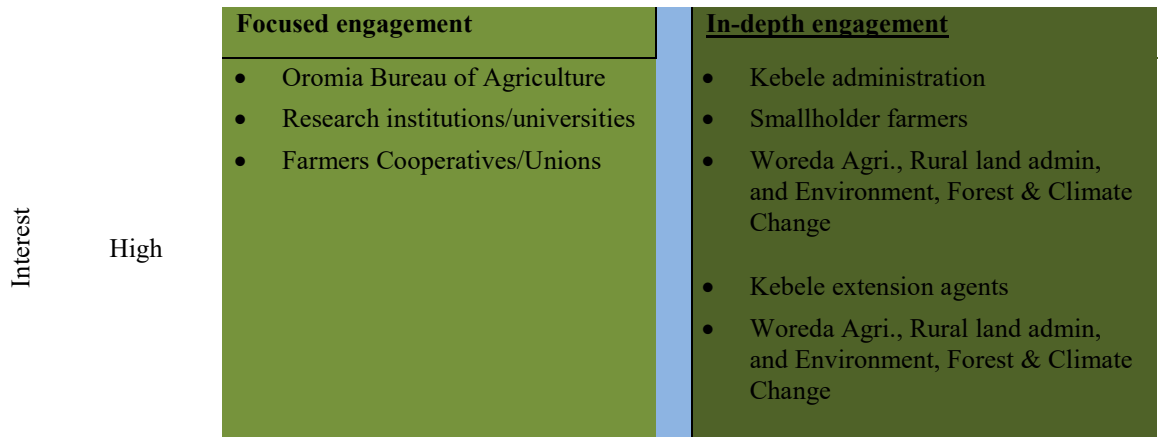


Figure 19. Stakeholders mapping of Livestock subsector in the Bale Ecoregion.



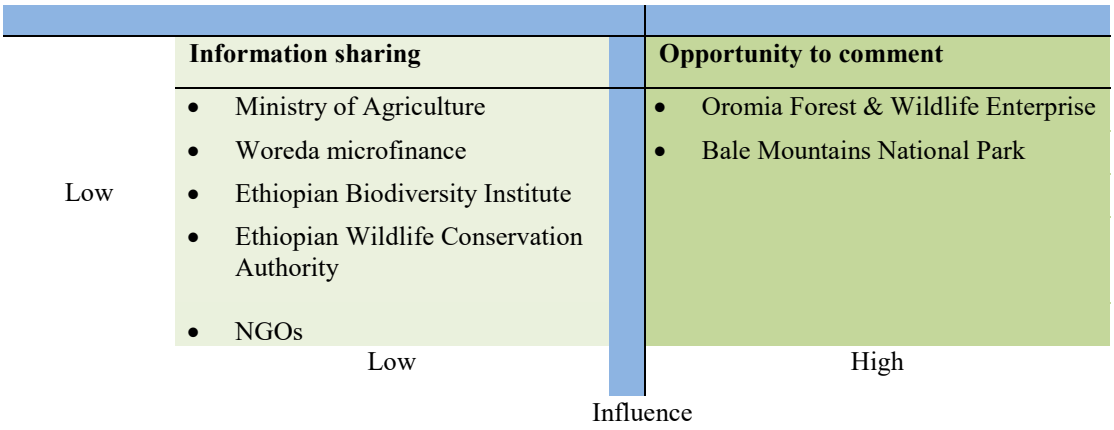


Figure 20. Stakeholder mapping of livestock subsector in the Bale Ecoregion showing their levels of influence and interest and proposed engagement level.

Stakeholder mobilization for implementation of the CVs of the livestock subsector in the Bale Mountains Ecoregion should be combined with that fo cereal and logging subsectors, and broadly should follow the following steps:

1. Introduce the concept of VC and framework of BIODEV2030 to all legitimate actors

2. Agree on the formulated VC:

   a) Refine role of each of the actors in the implementation.
   b) Develop Concrete action plan for each of them, including:

3. Establish Woreda and Kebele VC committee

4. Develop standard formats of commitments for different types of actors

5. Secure financial sources for mobilization

6. Establish Monitoring and Evaluation systems

4.4 Small-scale logging and wood harvesting Subsector in the Bale Ecoregion Landscape

4.4.1 Key characteristics of the Small-scale logging and wood harvesting subsector in the BER

4.4.1.1 Current status of forest and forest land

According to the 2007 National Forest Law "Forest Development, Conservation and Utilization Proclamation, Proclamation No. 542/2007" (FDRE 2007), forest is defined as:

> *"Forest" means a community of plants, either naturally grown or developed by planting and mainly consisting of trees and other plants having woody character.*

This forest definition lacks description of the thresholds of percent canopy cover, ha area and canopy height adopted in the definitions used for international organizations such as FAO's forest definition where the thresholds of 10% canopy cover, a 0.5 ha area and a 5 m height are used as minimum criteria to consider a vegetated land lot as forest. Nonetheless, Ethiopia adopted a clear forest definition (MEFCC, 2015), used in the assessment of forest area change and reporting greenhouse gas (GHG) emissions and removals from the forestry sector, as follows:

> *'Land spanning more than 0.5 ha covered by trees (including bamboo) (with a minimum width of 20m or not more than two-thirds of its length) attaining a height of more than 2m and a canopy cover of more than 20% or trees with the potential to reach these thresholds in situ in due course (*MEFCC*, 2015).*

The 2018 National Forest Law – a revised version of the 2007 forest law (Forest Development, Conservation and Utilization Proclamation No. 1065/2018; FDRE 2018a) defines forest as:

> *"Forest" means trees, plants and other bio-diversity accumulation at and in the surrounding of forest lands, roadsides, riverside, farm and grazing lands as well as residential areas or parks that grow naturally or developed in some other ways.*

According to this law, three types of forest are distinguished in terms of origin: 1) "Plantation forest" means a forest developed by humans; 2) "Natural forest" means a forest which is composed of naturally grown trees, shrubs and other woody and non-woody plants; and 3) "Agro-forestry"

means a forest to be developed or developed through integrated land utilization methods which combine the developing of crops with trees or animal fodder with trees or all three on the same plot of land simultaneously or through shifting [FDRE, 2018; see Proclamation No. 542/2007, Article 2(14)–2(16)].

4.4.1.2 Forest ownership and management types

Currently there are four types of forest ownership in Ethiopia, according to the 2018 National Forest Law: 1) Private forest" means a forest other than State or community, and developed on private or institutions' holdings; 2) "Community forest" means a forest developed, conserved, utilized and administered by the community on its private or communal possession based on by laws and plans developed by the community; 3) "Association forest" means a forest developed, conserved, utilized and administered by associations established to develop forest; and 4) "State forest" means any exclusively, conserved, and productive forest, which is under the ownership of the Federal Government or a Regional State. State Forest is categorized into three types in terms of management purposes: a) "Preserved forest" means a forest that is free from human and domestic animal intervention preserved for the purpose of conservation of biological diversity, historical and research purpose; b) "Protected forest" means a forest that provides various ecosystem services and is utilized in accordance with a forest management plan developed by the responsible body without affecting the sustainability of the forest eco-system value; and c) "Production forest" means a forest that is mainly developed for economic purpose. Preserved forests are managed by designated State entity, by demarcating into national parks, for example, while protected forests can be managed by State entity, through "Participatory forest management" – a forest management approach executed through the agreement between the state and the local community that inhabit inside or around the forest area over the management, protection and utilization of forests owned by the state on the basis of predefined responsibilities and benefit sharing mechanisms; or "Concession" – a contract given to a person with legal standing to develop, conserve or to utilize a given State forest for a defined period of time (FDRE, 2018).

Forests in BER are classified into three types in accordance with management purposes: (i) preserved forests that are designate for biodiversity conservation; (ii) protection forests that are designated for protection functions (e.g., in watershed areas); and (iii) production forests that are

designated for wood supply. Currently, forests in the ecoregion are managed by 9 major groups, namely: (1) Ethiopian Wildlife Conservation Authority/BMNP management office – responsible to manage part of the Harenna forest falling inside the BMNP boundary; (2) OFWE – manages protected and production forests within its concession areas; (3) OEFCCA – manages protected/unprotected state forests outside OFWE's concession areas; (4) OBANRM – manages forests within agricultural landscape; (5) local communities (community forests); (6) community cooperatives – manages state forests; (7) Participatory forest management (state-community partnership); (8) hunting safaris – manages protected state forests designated as controlled hunting areas, via concession; (9) private households and/or individuals. The rights and incentives and obligations of each forest ownership type are provided in Annex xxx

Laws and policies on benefit sharing in Ethiopia

National laws and policies in relation to forestry resources benefit sharing in Ethiopia are summarized in Table 16 and 17.

Table 16. Major domestic policies regarding benefit sharing in Ethiopia.

Policies	Government views on a benefit sharing mechanism
Access to Genetic Resources and Community Knowledge, and Community Rights Proclamation No. 482/2006 (FDRE 2006a) and Council of Ministers Regulation (FDRE 2009)	Access to genetic resources is subject to a clear benefit-sharing agreement to protect community rights in terms of access to a benefit-sharing mechanism connected to genetic resources.
Second Growth and Transformation Plan/GTP II (FDRE 2016)	Establish democratic and developmental good governance through mobilization of public participation; promoting empowerment of women and youth, and ensuring their participation in the development process, enabling them to benefit equitably from the outcomes of development; and equitable benefit sharing for the community.
National Biodiversity Strategy and Action Plan (2005)	Costs and benefits of biodiversity conservation are shared amongst public, private, community and civil society organizations.
National Biodiversity Action Plan (EBI 2015)	Equitable benefit sharing for commercial gains, and support women in accessing benefit-sharing mechanisms.

Convention on Biological Diversity (CBD) in 1994 (FDRE 1994), the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) in 2003 and the Nagoya Protocol on Access and Benefit Sharing in 2012	The conservation, sustainable utilization and equitable benefit sharing
Environmental Policy of Ethiopia - 1997	Park, forest and wildlife conservation and management programs that conserve biological diversity on behalf of the country allow for a major share of any derived economic benefits to be channelled to local communities affected by such programs.
The 2018 National Forest Law – a revised version of the 2007 forest law	Recognizes the rights of communities and acknowledges their role in managing natural forests and establishing plantations, without unduly compromising ecological services or biodiversity. It also recognizes participatory forest management as a vehicle to enhance the role of communities in sharing responsibilities and benefits of managing natural forests in accordance with agreed-upon management plans, and create incentives for private forest developers through mechanisms such as lease-free land, better access to land use and forest ownership certificates, and tax holidays until and including the first harvest (for private investors and associations) and the second harvest (for communities).

Table 17. Forest and REDD+ laws and policies on benefit sharing in Ethiopia.

Document	Government views on a benefit-sharing mechanism, as outlined in relevant policies
Forest Development, Conservation and Utilization Proclamation No. 1065/2018 (FDRE 2018a)	• Benefit sharing is defined as "the allocation of benefits between the government and communities, and between communities from forests which have been developed collectively" (FDRE 2018a, Art.1.31). • A private and association forest developer shall have the right to benefit from carbon sales and ecosystem services generated from the forest they develop, or which is under their possession (FDRE 2018a, Art 5.1.c; Art. 9.1.a). Community forest developers can share benefits generated from forest development as per community by-laws, and share benefits generated from the natural forests surrounding them without affecting their sustainable existence (FDRE 2018a, Art 7.1.c & g). • The MEFCC is responsible for developing a system in order to determine benefit-sharing rights over forest products (Art 16.7); Regional governments "Shall establish or provide the institutional arrangements, budget allocation and manpower required for the implementation of this Proclamation" (Art. 17.6). The government can demarcate areas for forest carbon trade, with the participation of the local community (FDRE 2018a, Art. 19.3 & 3).
Development, Management, and Utilization of Community Watersheds Proclamation No. 1223/2020 (FDRE 2020)	• The proclamation is enacted to enable communities living in a given watershed to form "community watershed users' cooperative societies" to manage, protect and utilize community watersheds democratically (FDRE 2020, p. 12734).
National REDD+ Strategy 2018–2030 (FDRE 2018b)	• REDD+ serves to improve forest governance, including operationalizing transparent, fair and equitable REDD+ financial management mechanism and benefit-sharing schemes (FD RE 2018b, p. 21); • Provides general principles for an Ethiopian REDD+ benefit-sharing mechanism, such as: payments based on results; transparent, decentralised and inclusive decision making; equity (fair distribution of costs and benefits including procedural aspects of participatory decision making); effectiveness (benefits should act as an incentive); and efficiency (benefit sharing in terms of costs); and supported by clear legal frameworks that govern rights and responsibilities, and safeguards (FDRE 2018b, pp. 58–59).

National REDD+ Consultation and Participation Plan (MEFCC 2016)	• The benefit-sharing mechanism is a priority area under consultation with principles of equitable access and sharing of benefits by all stakeholders and sectors, at all levels in Ethiopia (MEFCC 2016, p. 68). • Although defining REDD+ beneficiaries is critical to the mechanism, the government only provides general descriptions and refers to beneficiaries as those benefiting or having the potential to benefit from the REDD+ process (MEFCC 2016, p. vii).
Forest Carbon Partnership Facility's Readiness Preparation Plan (FCPF's R-PP) (FDRE 2011b)	Formalized benefit sharing between the government and communities and where communities can negotiate forest resource ownership, management and benefit sharing. Benefits of the REDD+ program is shared equally among all relevant rights holders and stakeholders. REDD+ payments are planned to go to legal entities or recognized local community organizations. Payments to actors will be based on the following formula: benefit sharing indicators (USD/kg/ha) = Investment or reward/Carbon emissions X Area. However, clarity is still lacking on how carbon revenues will be shared between different cooperatives and, once revenues reach communities, how they will be distributed (FDRE 2011b).
Proposed REDD+ Investment Plan (2017–2020) (MEFCC 2017a)	This proposed investment plan acknowledges that forests generate environmental and economic benefits; notes the "absence of clear benefit-sharing mechanisms" (MEFCC 2017a, p.13); and has goals of "Establishing and operationalizing a transparent REDD+ financial management mechanism and a fair benefit-sharing scheme" (MEFCC 2017a, p.14). Clarifying BSM is reiterated in other parts of the document (MEFCC 2017a, p. 36; 40).

4.4.1.3 The importance of small-scale logging and wood harvesting

According to local key informants, wood logging and wood harvesting is undertaken for timber products used for construction (house and fence), furniture, house equipment, and for energy sources (firewood and charcoal). Wood products are partly logged and harvested legally from community, private and PFM groups' forest lands, they partly are illegally logged and harvested from state forests that are strictly preserved (e.g. forests demarcated into the BMNP) and protected forests. Fuelwood harvested for sale is practiced by rural poor women who sale to hotel owners and urban households. Charcoal and timber resources are produced by poor households and jobless male youth. Timber materials (roundwood, lumber and pole) are directly sold, via local collectors,

to carpenters, local wood processors in the nearby towns and households constructing houses. In the case of illegal harvesters, market transactions are done in secrete.
In BER wood is harvested for use for:

- energy source (wood fuel) for households and by small businesses, either directly as firewood or after conversion first into charcoal
- construction materials (lumber, pole, bamboo)
- raw materials for sawn lumber and other processed wood products (chipboard, fibreboard and plywood)
- furniture manufacturing, and
- production of utility poles to carry utility power and telecommunications cables.

Households in the BER rely on fuelwood, leaves, charcoal, animal dung and electricity (used by a very few households residing in towns) as sources of energy for cooking/baking, heating, and lighting. Although the consumption pattern varies among woredas and within woreda, depending on purchasing power of households, the availability and reliability of the fuel suppliers, prices, family size and cooking habits, distance to forests, and urban vs rural residence, 75%-90% households in the BER use fuelwood (firewood and charcoal) for cooking, heating and lighting, and the remaining use cow dung and crop residue, as well as electricity in towns (Urge and Feyisa 2018; Mohammed et al. 2020). Fuel collection for household consumptions is usually a shared responsibility of family members, 51% shared by mother, 36% by girls, 8% by boys and 5% by father (Urge and Feyisa, 2018). Most households (59%) collect fuelwood from natural forests, 22% households collect from their own plantation/homesteads and 19% purchase fuelwood, particularly among urban dwellers. Communities in villages located relatively far from forests tend to own plantations or homestead garden trees to meet their fuelwood demand compared to those villages closer to forests (Urge and Feyisa, 2018; Mohammed et al., 2020).
The average annual per capita fuelwood consumption is estimated to be 4361.75 kg/person/year, and this per capita consumption rate decreases as a function of decreasing distance of household villages from nearby town, which likely reflects increasing availability of alternative energy sources (solar, electricity) in the urban areas and their peripheries (Mohammed et al., 2020). Accordingly, annual quantity of fuel wood consumed by households in the Agarfa woreda is estimated at 65.14m3 (39,084 kg/year), with average fuelwood consumption per household

estimated at 1.36m3 814.25kg per months (Mohammed et al. 2020). In their fuelwood consumption study in Adaba woreda, Urge and Feyisa (2019) also found that the average monthly fuelwood consumption per household in the study area to be 52.8 tonnes (SD = 19.2) and ranges between 26.4 and 105.6 tonnes during the wet season (June -September), while 30.0 tonnes (SD=15.6) and ranges between 13.2 and 52.8 tons during the dry season (December- March). They attributed their findings of higher wet season fuelwood consumption to the additional requirements of fuel energy to keep their houses warm and to the fact that schools are closed during the wet season whereby children have time to collect more fuelwood for their family (Urge and Feyisa, 2018).

4.4.1.4 Key Forest supply chains

The wood supply chain in the BER consists of five stages (Figure 21). These stages, actors involved, and biodiversity impacts of each stage are described as follows:

Production: Production essentially entails cutting the trees, chopping to a practical or required size, drying and packing for transport. Fuelwood can be sourced from a number of places, including natural forests, public plantations, trees on farms, and household woodlots. The large proportion of source of fuelwood and timber for construction and furniture are that sourced from protected forests. The main actors involved at the level of production are households, and formal government authorities. Logging and wood cutting are done by axes and wedges.

In the study landscape, firewood harvesting for subsistence use and urban market is a task carried out by women and children, while charcoal production and timber production for construction and furniture are carried-out by adult men. Wood production is an important part of the overall revenues of poor rural households. Profits at the level of production can be ascribed to high demand and the low costs of investment, including the use of low cost labour and cheap resources. Local authorities, mainly woreda forestry officers, exercise control over tree resources and commercialization, access to protected and state forests, and monitor production and trade regulations. In addition, PFM groups also control access to forest resources. Federal and regional state government bodies like environmental and environmental protection authority, EBI, etc are responsible to provide regulatory framework, while universities and research institutions and NGOs provide supports in terms of scientific knowledge, technologies and financial aids for the conservation and livelihood development.

***Processing*:** Processing fuelwood and/or timber involves cutting trees, drying, chopping/splitting, carbonization in case of charcoal, and packing. However, processing timber/poles for construction and furniture is mainly carried-out by carpenters and furniture makers.

***Transport and trade*:** Depending on the source, type of fuelwood, amount of product and distance between source and destination, mode of transport can be done from head-loading, donkey carts and vehicles (cars, pick-up trucks). Firewood harvested for household use and nearby towns are transported from source location to villages by back- (women/girls) and head- (men/boys) loading and donkey cats. Charcoal is mainly produced for urban households and is transported by trucks/cars.

Traders fulfil some role in transporting from producers to retailers. There are no wholesalers in the wood product value chain, but retailers can be of two types. For example, in the case of charcoal, there are retailers who sale a sack of charcoal and those who sale in plastic bags to daily consumption. As charcoal production and trade are mostly illegal activities, involvement in transport and trade is relatively expensive.

***Distribution and retail*:** There are no wholesalers in the fuel wood value chain. Firewood is directly sold by producers to consumers at common markets and at roadsides. The exception here is the case of large service provider sectors, such as restaurants, who buy trees from farmers woodlots, and carryout processing and transportation activities. In the case of charcoal, however, two types of retailers are recognized in the Southwest Forest Landscape. The first group is retailers who buy charcoal directly from producers and/or traders and sell directly to consumers and to other retailers relatively large in quantities (i.e., in sacks). In this case, sales are organized via depots. The second type of group is retailers who buy from producers or the first type of retailers in sacks, but they repack into small quantities, mainly plastic bags, and sale to poor households for daily consumption. Here, sales are organized at common markets, at roadsides in local neighbourhoods or in small kiosks.

***Consumption*:** Households are the main consumers of wood products (fuelwood for cooking, construction and furniture) followed by construction and furniture producers, and the services sector, which includes businesses such as bakeries, breweries, and restaurants. However, a different mix of energy can be identified between rural and urban households. Rural households

are more likely to depend on naturally available fuels such as fuelwood, agriculture waste and cow dung. Urban households use fuelwood, charcoal and petroleum or LPG, butane gas or electricity depending on the availabilities. At a household level, the choice for energy is part of a complex decision-making process influenced by size of household, area of residence, fuel availability, income, education, available labour, cultural preferences and oil price.

3.4.2 The impacts on biodiversity of the wood supply value chain

The impacts on biodiversity of the wood supply value chain in the BER vary depending on the stage of the chain. Overall, production of wood products entails complete or partial removal of woody plants. In wood harvesting stage, negative impacts on biodiversity come from the fallen branches and leaves that damages understory vegetation; indiscriminate harvesting, including rare and threatened indigenous tree species with poor regeneration status; and micro-environment modification. These all can lead to forest degradation and changes in vegetation diversity and composition. Furthermore, individuals and households arrange to harvest their plantations by themselves without apply measures to minimize impacts on the environmental in general and on biodiversity in particular. Urge and Feyisa (2019) have estimated that the use of firewood is emits 8,733 tons of carbon, which corresponds to removal/deforestation of about 92 ha of forest per year. In the wood processing stage, negative impacts on biodiversity are generated from sawdust, wood chips which cause environmental pollutions, affecting the living environment of plants and animals nearby the processing areas. In the consumption stage, the main impacts from fuelwood consumption are environmental pollution due to CO2 and organic particles released to the atmosphere via smoke. However, the rising prices of fuelwood and other wood products may encourage consumers to efficiently use fuelwood and to adopt alternative energy sources. These practices could favour of biodiversity.

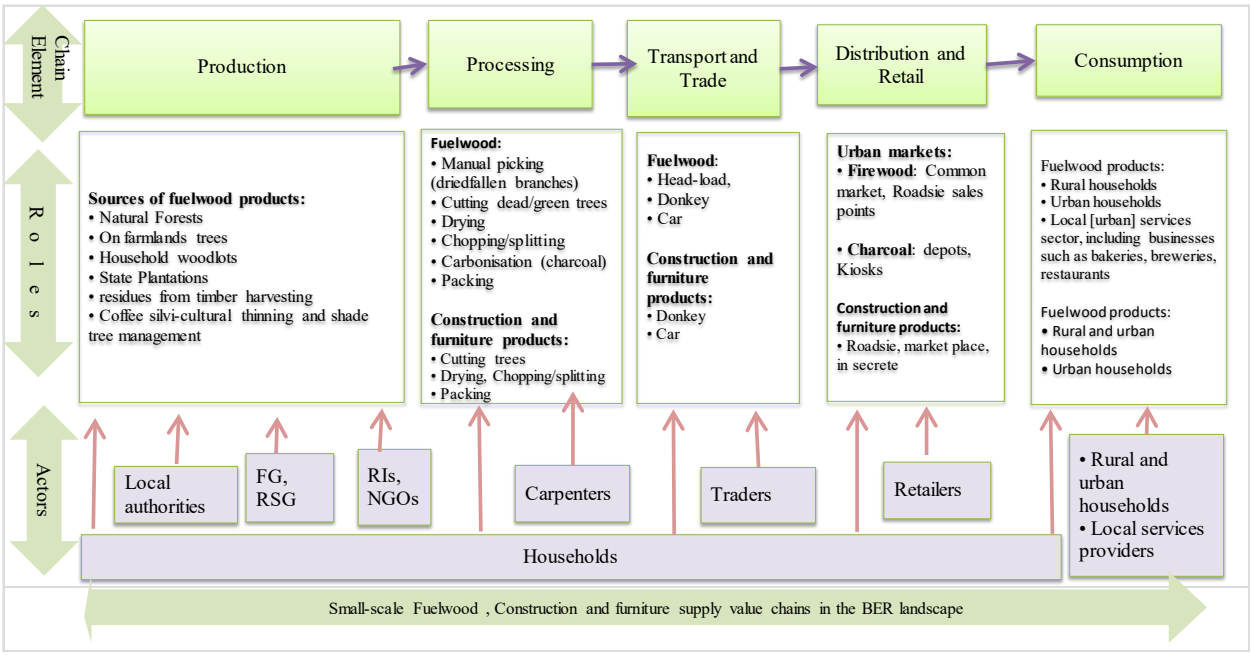


Figure 21. Elements, actors and roles of each actor group in each element of small-scale wood (fuelwood, construction and furniture) supply value chain in the Bale Ecoregion Landscape (FG = Federal government; RSG = Regional state government; RIs = research institutions).

3.4.3 Best experiences and existing commitments

Local level (by woreda and community) commitments:

The following are currently existing commitments and best practices at local level (see also Figures 22 and 23):

- Agroforestry practice via multipurpose tree plantation
- Awareness raising and training by government together with PFM groups
- Biogas production as alternative energy source
- Introducing and promoting the use of solar energy panel
- Distributing energy efficient stove
- Forest demarcation and development
- Implementing carbon credit
- Livelihood improvement via provision of improved seeds such as potatoes, barley, apple, poultry, hives, etc
- Planting tree seedlings

Local level by NGOs:

- Adoption of alternative energy sources, such as biogas and solar panel
- Working together to protect natural resources in the park.
- An essential part of conservation efforts in the Bale Mountains National Park (BMNP) is engaging in effective Park and Community Agreement (PCA) to conserve the ecological and hydrological systems of the Bale mountains.
- Joint communication between the BMNP and the community around the park is important so that everyone can work together towards the common aim of sustainable protection of the park.

Figure 22. Biogas technology use in the BER.

Provisioning of solar energy panels: Using solar energy instead of open fires, dramatically reduces the carbon emissions in the air that you breathe, which improves overall health. Using solar energy also protects the woodlands and forests, by reducing the need to cut native trees for firewood, in and around the Bale Mountains National Park. To encourage communities to take advantage of the benefits of solar energy, FZS has been providing 25 W solar panels, with full

accessories, for a total of 120 households in the kebeles (villages) of Dinsho and Goba Woredas that surround the BMNP (see Figure 23).

Figure 23. Solar panels provided to the local communities by FZS in the BER.

National/regional level commitments:

Ethiopia recognizes the key role forestry plays in setting the country on a sustainable and green development path. The current 15.5% forest cover is inadequate to provide an economic and ecological support system in this mountainous and climatically precarious country. While protecting the existing 17.35 million ha of forest, Ethiopia also intends to undertake large-scale afforestation and reforestation to increase total forest cover to 30% by 2030. Afforestation and reforestation are also keys to alleviating the pressure on natural forests (MoFECC, 2017).

To achieve this long-term target, Ethiopia committed to restore degraded lands across different parts of the country and pledged to the Bonn Challenge and AFR100 to restore 15 million ha of degraded land by 2030. The progress is encouraging with involvement of high-ranking government officials including the Prime Minister and other ministers. This commitment is included in the country's Growth and Transformation Plan II (GTP II), Climate Resilient Green Economy Strategy (CRGE), Nationally Determined Contribution (NDC), National Forest Sector Development Program (NFSDP), and others. Some of these commitments from CRGE strategy document include:

- Increase forest cover to 20% by 2020 focusing on the improvement of existing natural forests and large-scale afforestation and reforestations activities;
- Increase forestry's contribution to GDP to 8% by 2020; and
- Achieve 130 Mt CO2e reduction by 2030 to achieve 50% carbon sequestration and emissions reductions goals by reducing deforestation and forest degradation.

To catalyse the effort, the Forest Sector Transformation Unit (FSTU) has been established as a unit under the then EFCCC (Environment, Forest and Climate Change Commission) to support the sector transformation that would be required in order to achieve the ambitious targets set out in the CRGE, NFSDP (National Forest Sector Development Program) and GTP II goals. Greater scale is required to achieve forestry sector goals, developing rigorous project execution capabilities (early large-scale successes will be critical to both gain momentum and to generate buy-in from government and other stakeholders), creating improved coordination to facilitate cross-sectorial collaboration.

The FSTU mandated to support these shifts through three objectives:

- Build a pipeline of transformative, high-value forestry models. This entails incubating and piloting innovative projects, evaluating pilots, and scaling up successful innovations.
- Support the CRGE facility in proactively "crowding in" funding.
- Support implementation of selected investment initiatives. Support would focus in several areas including managing and running the pilots, as well as capacitating the forestry sector by providing targeted, hands-on support to national, regional and woreda teams in implementing investment initiatives. Woreda (also called district) is the third-level

administrative divisions of Ethiopia. They are further subdivided into several kebeles or neighborhood associations, which are the smallest unit of local government in Ethiopia.

National Tree-Based Landscape Restoration Potential and Priority Maps

In 2018, the then Ethiopian Ministry of Environment, Forest and Climate Change, now Forest Development Institute, produced the National Tree-Based Landscape Restoration Potential and Priority Maps in collaboration with the World Resources Institute (WRI), which are available on EFCCC's website. The maps aim to guide decision-makers about where more trees could benefit Ethiopian landscapes, which tree-based landscape restoration options could be implemented in these landscapes, and where to prioritize cross-sectoral implementation (MEFCC 2018a). Based on national and regional experts' input, 73% of Ethiopia's land area was identified as having potential for at least one of the eight tree-based landscape restoration options identified as crucial for Ethiopia's economic, social and environmental goals:

- Restoration of secondary forests
- Restocking of degraded natural forests
- Agri-silviculture and agro-silvo-pastoralism
- Silvo-pastoralism
- Woodlots and home gardens
- Commercial plantations for products other than industrial roundwood (mapping specific to industrial planation forest is covered in ''Ethiopia Commercial Planation Forest Industry Investment Plan" report)
- Buffer plantations around protected areas and national forest priority areas
- Tree-based buffer zones along rivers, lakes, and reservoirs

Revising National Forest Law

The government has proclaimed "The 2018 National Forest Law" – a revised version of the 2007 forest law – which now clearly recognizes the rights of communities and acknowledges their role in managing natural forests and establishing plantations, without unduly compromising ecological services or biodiversity. The new law contains the following three key changes:

- Recognizing participatory forest management as a vehicle to enhance the role of communities in sharing responsibilities and benefits of managing natural forests in accordance with agreed-upon management plans;
- Providing incentives for the private forest developers through mechanisms such as lease-free land, better access to land use and forest ownership certificates, and tax holiday until and including the first harvest (for private investors and associations) and the second harvest (for communities); and
- Putting severe penalties on those who expand farming into forests; tamper with forest boundaries; or set fire, harm endangered species, settle, or hunt or graze animals in state, communal, association or private forests.

3.4.4 SWOT Analysis for voluntary commitment to address the impacts on biodiversity of Logging and wood harvesting in the Bale ecoregion

Results of the SWOT analysis are presented on Table 18. Strengths to implement voluntary commitments to reduce the impacts of logging and wood harvesting subsector on biodiversity in the BER subsector include conducive forestry/energy/construction policies, laws and institutions, high government commitment to international sustainable development goals (e.g., UN SDGs, CBD) including access to safe and clean energy sources; logging impact and its mitigation measures are being well-recognized in the National development plan and NBSAP; National-wide movement for afforestation, reforestation program; and increasing adoption of alternative (e.g. solar, biogas) and energy-efficient stoves. Weaknesses include overlapping and unclear responsibilities among some related sectors; lack of coordination among different sectors and with development and conservation organizations, NGOs, Civic societies and local communities; and low level of supply and adoption of modern energy saving cooking stoves. Yet, there are opportunities to maintain the strengths and turn the weakness into strengths. This includes existence of increasing interest of national and international donor and development agencies in sustainable development of both socioeconomic and biodiversity (Table 18).

Table 18. SWOT Analysis for the voluntary commitment to reduce the impacts of logging and wood harvesting on biodiversity in the Bale ecoregion.

Strengths	Weakness
• High government commitment to international sustainable development goals (e.g., UN SDGs, CBD) • Logging impact and its mitigation measures well recognized in the National development plan and NBSAP • High commitment at all levels of government authorities for socioeconomic and environmental development • National-wide movement for afforestation, reforestation • Increasing adoption of alternative (e.g., solar, biogas) and energy-efficient stoves	• Sectorial policies often conflicting • Overlapping and unclear responsibilities among some related sectors • Lack of coordination among different sectors and with development and conservation organizations, NGOs, Civic societies and local communities • Poor law enforcement among judiciaries • Low level of plantation seedling supply • Low level of supply and adoption of modern energy saving cooking stoves • Low access of alternative energy sources, such as solar energy
Opportunities	**Threats**
• Conducive forestry/energy/construction policies, laws and institutions • Increasing interest of national and international donor and development agencies in sustainable development of both socioeconomic and biodiversity	• Drought • Erratic rainfall • Political instability and peace insecurity • Poverty • Increasing number of jobless youth

3.4.5 Synthesis: Recommendations and Scenarios

Excessive Logging and wood harvesting for fuelwood, furniture and construction purposes has been among the major pressures causing forest and ecosystem degradation in the Bale Mountains Ecoregion through soil erosion, change in population structure and composition of vegetation, increased threat status of rare endemic plant and animal species. This, ultimately, has resulted to deterioration of ecosystem services, shortage of fuelwood and construction materials. To address this pressure and its impacts on biodiversity and human socioeconomic wellbeing, two voluntary commitment intervention strategies are proposed: ***Reduce the dependence on natural forests of urban and rural households and service providers (hotels/restaurants, bakeries, etc) on wood products for energy, construction and/or furniture production, and Strengthen sustainable***

forest protection, development and utilization by developing management plan, PFM, and ownership certification of private, association and cooperative forests. Milestones and expected changes of low (Table 19) and high (Table 20) ambition scenarios of these voluntary commitments are described as follows:

VC 1: Reduce the dependence on natural forests of urban and rural households and service providers (hotels/restaurants, bakeries, etc) on wood products for energy, construction and/or furniture production

Reducing the dependence on natural forests of urban and rural households and service providers (hotels/restaurants, bakeries, etc) on wood products for energy, construction and/or furniture production may be achieved through: (a) establishing industrial plantations around urban areas, encouraging urban households to use other alternative energy sources for cooking, such as electric energy and biogas; (b) promoting agro-forestry and small-scale plantations at household levels in the rural areas; (c) promoting the use of energy-saving cooking stoves both for urban and rural households, and rural households access to solar energy for lighting. Accordingly, compared that in 2020, under high level of ambition scenario, it is expected by 2030 that: a) 50% (10% each year between 2026 and 2030) increase in number of households adopted energy-efficient cooking stoves; b) 75% (15% per year between 2026 and 2030) rural households provided solar panels; c) 15,000 ha buffer zone and urban plantations established; d) 75% of households practiced small private plantations and agroforestry; d) Number of households practicing government staff trained on adoption of modern energy and construction uses increased to 80% of the total actors. To achieve this, other actors will contribute their commitments, including universities will undertake awareness raising and capacity building training for key actors found at all levels on the need and processes of adoption of energy and construction technologies, and NGOs provide technical and financial supports

VC 2: Strengthen sustainable forest protection, development and utilization by developing management plan, PFM, and ownership certification of private, association and cooperative forests

Sustainable forest protection, development and utilization requires implementation of management plan and practising various kinds of forest ownership and management systems. Thus, developing

functional management plans, establishing and building capacities of PFM groups, benefit sharing, and implementation of forest ownership certification schemes are required. In this regard, under high major scenario, 3 forest management plans are implemented by 2030; number of households sharing benefits from forest conservation related initiatives (e.g., REDD+) will increased by 50% (10% a year from 2026 to 2030). Reviewing sectorial proclamations and regulations and propose amendments are needed to avoid overlaps in mandates across sectors related to forestry and biodiversity, which will be undertaken by universities. Mada Walabu University will also be responsible to establish biodiversity geo-data base and reporting systems. NGOs and microfinance sectors will provide financial aids and loans to households in implementation of forest protection, development and utilization in the ecoregion.

Table 19. Potential voluntary commitments of Logging subsector and low level of ambition for biodiversity (2023-2030) in the Bale Ecoregion.

Low level of ambition (2023-2025)									
Problem to be addressed [Pressure]	**Sate**	**Impacts**	**Response: VC**	**Actors**	**Expected change**	**Actions by other actors [+ Actors]**	**Responsible Actors**	**Monitoring measures and reporting**	**Broad Indicators**
Excessive Logging and wood harvesting for fuelwood, furniture and construction	Forest degradation, ecosystem degradation through soil erosion, change in population structure and composition of vegetation, increased threat status of rare endemic plant and animal species	Deterioration of ecosystem services, shortage of fuelwood and construction materials	Reduce the dependence on natural forests of urban and rural households and service providers (hotels/restaurants, bakeries, etc) on wood products for energy, construction and/or furniture production by: (a) establishing industrial plantations around urban areas, encouraging urban households to use other alternative energy sources for cooking, such as electric energy and biogas; (b) promoting agro-forestry and small-scale plantations at	Households; Woreda Agri, Energy, Forestry, and Construction and building offices; Town municipalities; Kebele Extension agents	10% increase in number of h households adopted energy-efficient cooking stoves by 2025 compared that before 2020; 25% rural households provided solar panels; Number of households practicing government staff trained on adoption of modern energy and construction uses increased to 50% of the total actors by 2025	Awareness raising and capacity building training for actors found at all levels on the need and processes of adoption of energy and construction technologies	Mada Walabu University; REDD+ programme; NGOs	Household survey, document review, Ground truthing (GIS analysis) and mapping	Documents, photos, videos, No. stoves and solar panels disseminated
						Support establishment of industrial plantations around urban areas, encouraging	Mada Walabu Univeristy; REDD+ programme; NGOs		
						Encourage urban households to use other alternative energy sources for cooking, such as electric energy and biogas	Mada Walabu University; REDD+ programme; NGOs		

			household levels in the rural areas; (c) promoting the use of energy-saving cooking stoves both for urban and rural households, and rural households access to solar energy for lighting			Support buffer zone plantations, agro-forestry and small-scale plantations at household levels in the rural areas	Mada Walabu University; REDD+ programme; NGOs		
						Provide technical, material and financial supports to rural households to adopt the use of energy-saving cooking stoves and solar energy	Mada Walabu University; REDD+ programme; NGOs		
			Strengthen sustainable forest protection, development and utilization by developing management plan, PFM, and ownership certification of private, association and cooperative forests	BMNP; OFWE; Zone/woreda EFCC, Cooperative offices; households	3 management plans developed and implementation started by 2025; 4 LE taskforces established and functional by 2025 1 document of benefit sharing mechanisms produced; 25% CBOs supported; 8 proclamations/regulations reviewed and amended by 2025; 1 geospatial, socioeconomic	Review proclamations and regulations and propose amendments needed to avoid overlaps in mandates across sectors related to forestry and biodiversity	Mada Walabu University; woreda Judiciaries	Household survey, document review	Documents, photos, videos, No. stoves and solar pannels disseminated
						Promote of forest based and alternative rural livelihood options	Mada Walabu University; REDD+ programme; NGOs		
						Assess capacity gaps and undertake capacity building interventions accordingly	Mada Walabu University		

					and ecological databases developed by 2025	Establish biodiversity geo-data base and reporting systems and create linkage with geospatial institutes	Mada Walabu University		

Table 20. Potential voluntary commitments of Logging subsector and High level of ambition for biodiversity (2023-2030) in the Bale Ecoregion.

Low level of ambition (2023-2025)									
Problem to be addressed [Pressure]	**Sate**	**Impacts**	**Response: VC**	**Actors**	**Expected change**	**Actions by other actors [+ Actors]**	**Responsible Actors**	**Monitoring measures and reporting**	**Broad Indicators**
Excessive Logging and wood harvesting for fuelwood, furniture and construction	Forest degradation, ecosystem degradation through soil erosion, change in population structure and composition of vegetation, increased threat status of rare endemic	Deterioration of ecosystem services, shortage of fuelwood and construction materials	Reduce the dependence on natural forests of urban and rural households and service providers (hotels/restaurants, bakeries, etc) on wood products for energy, construction and/or furniture production by: (a) establishing industrial plantations around urban areas, encouraging urban households to use	Households; Woreda Agri, Energy, Forestry, and Construction and building offices; Town municipalities; Kebele Extension agents	By 2030: a) 50% (10% each year between 2026 and 2030) increase in number of h households adopted energy-efficient cooking stoves compared that before 2020; b) 75% (15% per year between 2026 and 2030) rural households provided solar panels; c) 15,000 ha buffer zone and urban plantations	Awareness raising and capacity building training for actors found at all levels on the need and processes of adoption of energy and construction technologies	Mada Walabu University; REDD+ programme; NGOs	Household survey, document review, Ground truthing (GIS analysis) and mapping	Documents, photos, videos, No. stoves and solar panels disseminated
						Support establishment of industrial plantations around urban areas, encouraging	Mada Walabu Univeristy; REDD+ programme; NGOs		

	plant and animal species		other alternative energy sources for cooking, such as electric energy and biogas; (b) promoting agro-forestry and small-scale plantations at household levels in the rural areas; (c) promoting the use of energy-saving cooking stoves both for urban and rural households, and rural households access to solar energy for lighting		established; d) 75% of households practiced small private plantations and agroforestry; d) Number of households practicing government staff trained on adoption of modern energy and construction uses increased to 800% of the total actors by 2025	Encourage urban households to use other alternative energy sources for cooking, such as electric energy and biogas	Mada Walabu University; REDD+ programme; NGOs		
						Support buffer zone plantations, agro-forestry and small-scale plantations at household levels in the rural areas	Mada Walabu University; REDD+ programme; NGOs		
						Provide technical, material and financial supports to rural households to adopt the use of energy-saving cooking stoves and solar energy	Mada Walabu University; REDD+ programme; NGOs		
			Strengthen sustainable forest protection, development and utilization by developing management plan, PFM, and ownership certification of private, association and cooperative forests	BMNP; OFWE; Zone/woreda EFCC, Cooperative offices; households	Implementation of 3 forest management plans; Number of households shared benefits from conservation programmes (e.g., REDD+) increased by 50% (10% a year from 2026 to 2030) document of 5	Review proclamations and regulations and propose amendments needed to avoid overlaps in mandates across sectors related to forestry and biodiversity	Mada Walabu University; woreda Judiciaries	Household survey, document review	Documents, photos, videos, No. stoves and solar pannels dissemination
						Promote of forest based and alternative rural	Mada Walabu University; REDD+		

						livelihood options	programme; NGOs		
						Assess capacity gaps and undertake capacity building interventions accordingly	Mada Walabu University		
						Establish biodiversity geo-data base and reporting systems and create linkage with geospatial institutes	Mada Walabu University		

3.4.7 Stakeholders mapping and Mobilization strategy

Result of stakeholder analysis of stakeholder mapping, showing their direction of interactions [influence, collaboration (alliance) and information exchange] are shown on Figure 24. In addition, the type of engagement for each actor is shown on Figure 25.

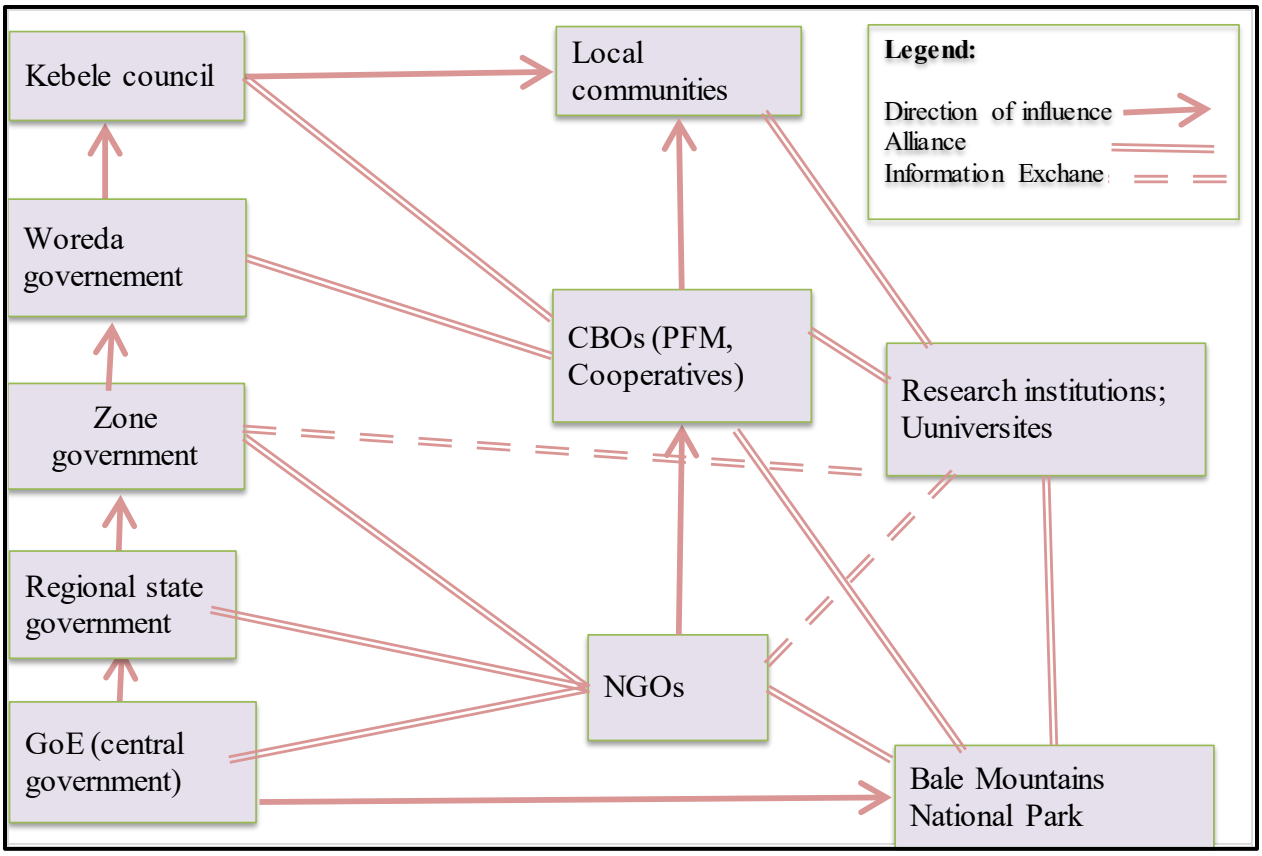
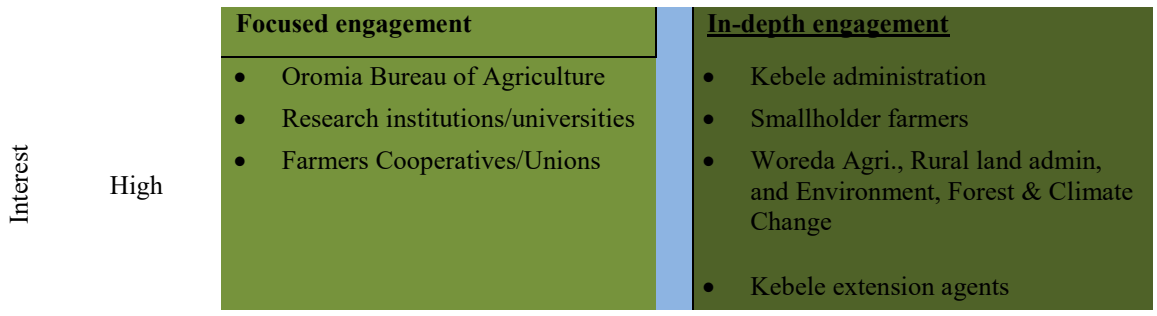


Figure 24. Preliminary Stakeholders mapping of Logging and wood harvesting subsector in the Bale Ecoregion.



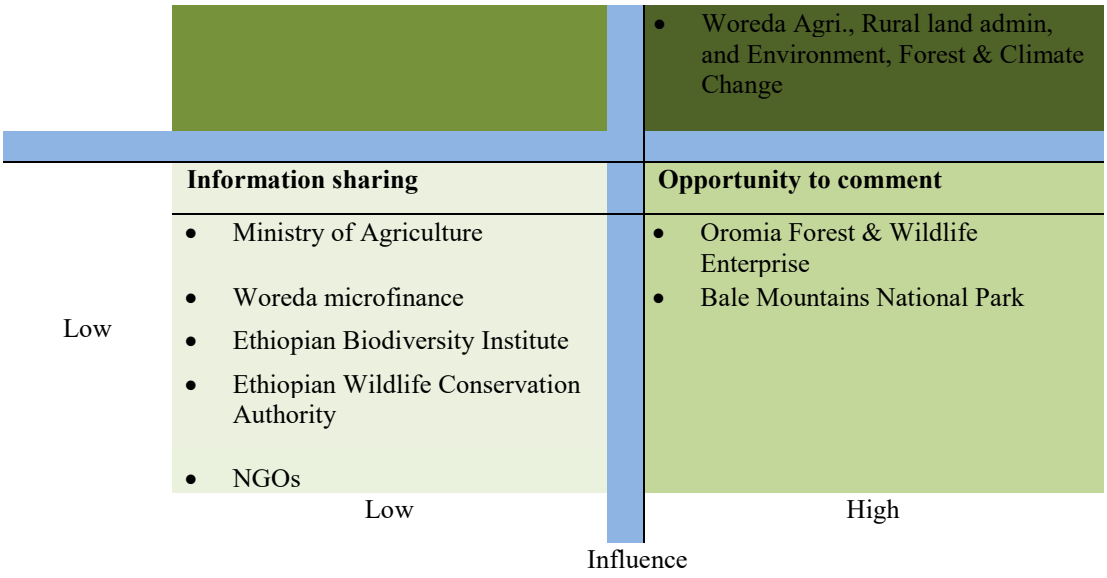


Figure 25. Stakeholder mapping for small scale logging and wood harvesting subsector in the Bale Ecoregion, showing their levels of influence and interest and proposed engagement type in the Southwest Forest Landscape.

Stakeholders mobilization strategy for the Logging subsector is also similar to that for Cereal subsector in the Bale Ecoregion and thus can be lumped tother. Overall, we suggest the steps for mobilization of actors for the proposed VCs in the Bale Ecoregion (for detail, see mobilization strategy proposed for Cereal Subsector):

1. Introduce the concept of VC and framework of BIODEV2030 to all legitimate actors

2. Agree on the formulated VC:

a) Refine role of each of the actors in the implementation.
b) Develop Concrete action plan for each of them, including:

- Technical means (change/adaptation of regulation or law, incentives...)

- Financial means (investments, grants...)

- Human resources (training, etc.)

3. Establish Woreda and Kebele VC committee

4. Develop standard formats of commitments for different types of actors

5. Secure financial sources for mobilization

6. Establish Monitoring and Evaluation systems

3.5 Small-scale Logging and Wood Harvesting Subsector in the Southwest Forests Landscape

3.5.1 Key characteristics of the forestry sector - overview

3.5.1.1 Current status of forest, ownership and management

The Southwest Forest Landscape encompasses four of the five Biosphere reserves currently designated in Ethiopia: Kaffa Coffee Forest, Yayu Coffee Forest, Sheka Coffee Forest and Majang Forest Biosphere Reserves (Table 21). The landscape (the reserves) covers a total area of 1,171,892 ha, of which 168,185 ha has been demarcated as Core area(s), 333,252 ha Buffer zone(s) 670,933 ha Transitions zone(s). Detailed description of the differences and characteristics of the three management zones of the reserves are presented in Box 5.

Table 21. Summary of the four Biosphere reserve in the southwest landscape.

Biosphere reserve	**Year**	**Total area (ha)**	**Core area(s) (ha)**	**Buffer zone(s) area (ha)**	**Transitions zone(s) (ha)**	**Location (admin zone/regional state)**
Kaffa Coffee Forest	**2010**	540,631	41,319	161,427	337,885	Kaffa zone of Southwest RS
Yau Coffee Forest	2010	167,021	27,733	21,552	117,736	Illubabor and Buno Bedele zones of Oromia RS
Sheka Coffee Forest	2012	238,750	55,255	76,395	107,100	Sheka zone of Southwest RS
Majang forest	2017	225,490	43,878	73,878	108,212	Majang zone of the Gambella RS
Grand total		1,171,892	168,185	333,252	670,933	

Despite their immense biological, ecological and socioeconomic importance these Biosphere reserves, recent studies show significant changes in land use/land cover types. For example, Abera et al. (2021) reported a 105 km^2 loss of forest cover in the Yayu Coffee Forest Biosphere Reserve between1986 to 247 km^2 in 2017. This loss was found to be in the expense of cultivated landscape

that considerably increased from 132 km^2 to 247 km^2 between the two periods. Furthermore, area of managed coffee forest in the Yayu reserve increased from 8.3 km^2 to 356.5 km^2 (Abera et al. 2021). Forest coverage in the present boundary of Kaffa Coffee Forest reserve in 1986 was about 50% but declined to 31% of the total reserve area in 2019 (Mengist et al. 2021). Tadese et al. (2021b) reported a 77.8% decrease in forest cover in the Majang reserve between 1987 and 2017. This rapid forest cover loss in the Southwest Forests Landscape has been attributed to the combined effects of drought, migration, change in settlement and land tenure policy.

Box 5. Zonation scheme of Biosphere Reserves in Ethiopia

The designation as a biosphere reserve is expected to enhance ecologically sound and traditional agriculture, to foster ecotourism and to create new jobs in small businesses such as coffee, beekeeping, spices and horticulture activities. Within the biosphere reserve framework, local communities are familiarized with the wise use of natural resources and sustainable development techniques, and the implementation of conservation projects. Accordingly, biospheres have three zones: core, buffer, and transition zones (Tadese et al. 2021).

Core zone: every biosphere reserve must contain one or more core areas. These have strong legal protection and serve as a shelter for wild plants and animals free from any human disturbances. Activities that are allowed in this zone are monitoring, research, and traditional non-destructive uses, while activities like agriculture, settlement, grazing of domestic animals, and harvesting products are not allowed (Tadese et al. 2021).

Buffer zone: this zone is the guard keeping of the core zone by enclosing and protecting from the anthropogenic impacts. This zone functions as essential ecological corridors, connecting the core zone to the transitional zone. Activities that are allowed in the buffer zone include tourism, recreation, research, and education training (Tadese et al. 2021).

Transition zone: in this zone, people are allowed to live and make livings. In this zone, local residents, NGOs, scientists, cultural groups, economic stakeholders, and others work together to manage and sustainably develop the area's resources. Activities like farming, fishing, tourism, beekeeping, settlements, urban and villages, industry, and enterprise are permitted in this zone (Tadese et al. 2021).

3.5.1.2 Forest ownership and management types in the landscape

Currently there are four types of forest ownership in Ethiopia, according to the 2018 National Forest Law: 1) "Private forest" means a forest other than State or community, and developed on private or institutions' holdings; 2) "Community forest" means a forest developed, conserved,

utilized and administered by the community on its private or communal possession based on by laws and plans developed by the community; 3) “Association forest" means a forest developed, conserved, utilized and administered by associations such as PFM groups established to develop forest; and 4) “State forest” means any exclusively, conserved, and productive forest, which is under the ownership of the Federal Government or a Regional State. Following the 2018 National Forest Law (FDRE, 2018), State Forests in the Southwest Forests Landscape fall under two categories in terms of management purposes: a) "Protected Forest" such as Biosphere reserves; and “Production Forest" managed by OFWE.

Table 22. Administrative authorities and supporters/advisors of the Biosphere reserves in the Southwest Forests Landscape.

Biosphere reserve	**Administrative Authorities**	**Supporters/Advisors**
kaffa Forest	SNNP Region Bureau of Agriculture, Sheka Zone Administration, Sheka Zone Department of Agriculture, Masha Woreda Office of Agriculture, Anderacha Woreda Office of Agriculture, Yeski Woreda Office of Agriculture	GTZ-SLM/PPP Coffee Project
Yayu Forest	Oromia National Regional State, Oromia Forestry and Wildlife Enterprise, Illu Ababor Branch, Illu Ababor Zone Land and Environmental Protection, Six Districts Administration, Oromia Bureau of Land and Environmental Protection, Oromia Bureau of Agriculture and Rural Development and Ministry of Science and Technology	Ethiopia Coffee Forum
Sheka Forest	SNNP Region Bureau of Agriculture, Sheka Zone Administration, Sheka Zone Department of Agriculture, Masha Woreda Office of Agriculture, Anderacha Woreda Office of Agriculture, Yeski Woreda Office of Agriculture	MELCA-Ethiopia
Majang Forest	Gambella Regional State; Majang Zone Department of Land Administration, Environment and Forest	MELCA-Ethiopia

3.5.1.3 Laws and policies on benefit sharing in Ethiopia

The following National Forestry Laws and Policies in relation to forestry resources benefit sharing in Ethiopia (summarized in Table 22 and 23) are also relevant to the Southwest landscape:

- Access to Genetic Resources and Community Knowledge, and Community Rights Proclamation No. 482/2006 (FDRE 2006a) and Council of Ministers Regulation (FDRE, 2009)
- Second Growth and Transformation Plan/GTP II (FDRE, 2016)
- National Biodiversity Strategy and Action Plan (EBI, 2005)
- National Biodiversity Action Plan (EBI, 2015)
- Convention on Biological Diversity (CBD) in 1994 (FDRE, 1994), the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) in 2003 and the Nagoya Protocol on Access and Benefit Sharing in 2012
- Environmental Policy of Ethiopia - 1997
- Forest Development, Conservation and Utilization Proclamation No. 1065/2018 (FDRE, 2018a)
- Development, Management, and Utilization of Community Watersheds Proclamation No.
- 1223/2020 (FDRE, 2020)
- National REDD+ Strategy 2018–2030 (FDRE, 2018b)
- National REDD+ Consultation and Participation Plan (MEFCC, 2016)
- Forest Carbon Partnership Facility's Readiness Preparation Plan (FCPF's R-PP) (FDRE, 2011b)
- Proposed REDD+ Investment Plan (2017–2020) (MEFCC, 2017a)

3.5.1.4 The importance of small-scale logging and wood harvesting

In the Southwest Forest Landscape wood is harvested for use for:

- energy source (wood fuel) for households and by small businesses, either directly as firewood or after conversion first into charcoal
- construction materials (lumber, pole, bamboo)

- raw materials for sawn lumber and other processed wood products (chipboard, fibreboard and plywood)
- furniture manufacturing, and
- production of utility poles to carry utility power and telecommunications cables (UNIQUE Forestry and Land Use and Conscientia, 2015; UNEP, 2016).

Some people practice logging for selling specially to reduce the shade from coffee, produce log and sell it to bakery. Those for sale sell to nearby urban and the revenue they generated annually from timber, fuelwood, charcoal, selling.? Although it is difficult to predict the revenue as it vary from place to place but the minimum revenue per year can go up to 9000ETB, generating about 35% of their household income from the wood sell only (specially poor people who depend only on wood product sell).

According to Mohamed and Tesfaye (2020) report, fuelwood (firewood and charcoal) is the third top income generating forest products among Yeki Woreda community in the Kaffa Forest. Fuelwood is reported to be sold by 13% of the respondents and, on average, the income from firewood was about ETB 1932 per user household per annum that constitutes about 14% of total income of user households collecting the product.

According to local key informants, wood logging and wood harvesting is undertaken for timber products used for construction (house and fence), furniture, house equipment, and for energy sources (firewood and charcoal). Wood products are partly logged and harvested legally from community, private and PFM groups' forest lands, they partly are illegally logged and harvested from state forests that are strictly preserved (e.g., forests demarcated into the BMNP) and protected forests. Fuelwood harvested for sale is practiced by rural poor women who sale to hotel owners and urban households. Charcoal and timber resources are produced by poor households and jobless male youth. Timber materials (roundwood, lumber and pole) are directly sold, via local collectors, to carpenters, local wood processors in the nearby towns and households constructing houses. In the case of illegal harvesters, market transactions are done in secrete.

3.5.2 Characteristics of Small-scale wood supply value chains

Wood products include fuelwood (firewood and charcoal) and timber/pole used for construction and furniture producing purposes. People in the study landscape practice Logging & Wood Harvesting for supply to meet the demands for fuelwood, construction of houses/buildings and furniture. Accordingly, we identified and broadly described characteristics of the value chain of small-scale logging and wood harvesting subsector in the landscape.

As shown on Figure 26, the basic steps of small-scale wood supply value chain in the Southwest Forests Landscape include: Production, Processing, Transport and Trade, Distribution and Retail, and Consumption. The major groups of actors involved in the value chain are producers, transporters, traders, retailers, consumers and local government authorities. Each element of the wood supply value chain is briefly described below.

[A] Production

Production essentially entails cutting the trees, chopping to a practical or required size, drying and packing for transport. Fuelwood can be sourced from a number of places, including natural forests, plantations, trees on farms, and household woodlots. The large proportion of source of fuelwood and timber for construction and furniture are that sourced from practices related to semi-wild coffee management in the buffer zones of the reserves – i.e., residues from silvi-cultural thinning and coffee shade tree management. The main actors involved at the level of production are households, and formal government authorities (Figure 26). Logging and cutting are done by axes and wedges.

In the study landscape, firewood harvesting for subsistence use and urban market is a task carried out by women and children, while charcoal production and timber production for construction and furniture are carried-out by adult men. Wood production is an important part of the overall revenues of poor rural households. Profits at the level of production can be ascribed to high demand and the low costs of investment, including the use of low cost labour and cheap resources. Local authorities, mainly woreda forestry officers, exercise control over tree resources and commercialization, access to protected and state forests, and monitor production and trade regulations. In addition, PFM groups also control access to forest resources. Federal and regional state government bodies like environmental and environmental protection authority, EBI, etc are

responsible to provide regulatory framework, while universities and research institutions and NGOs provide supports in terms of scientific knowledge, technologies and financial aids for the conservation and livelihood development.

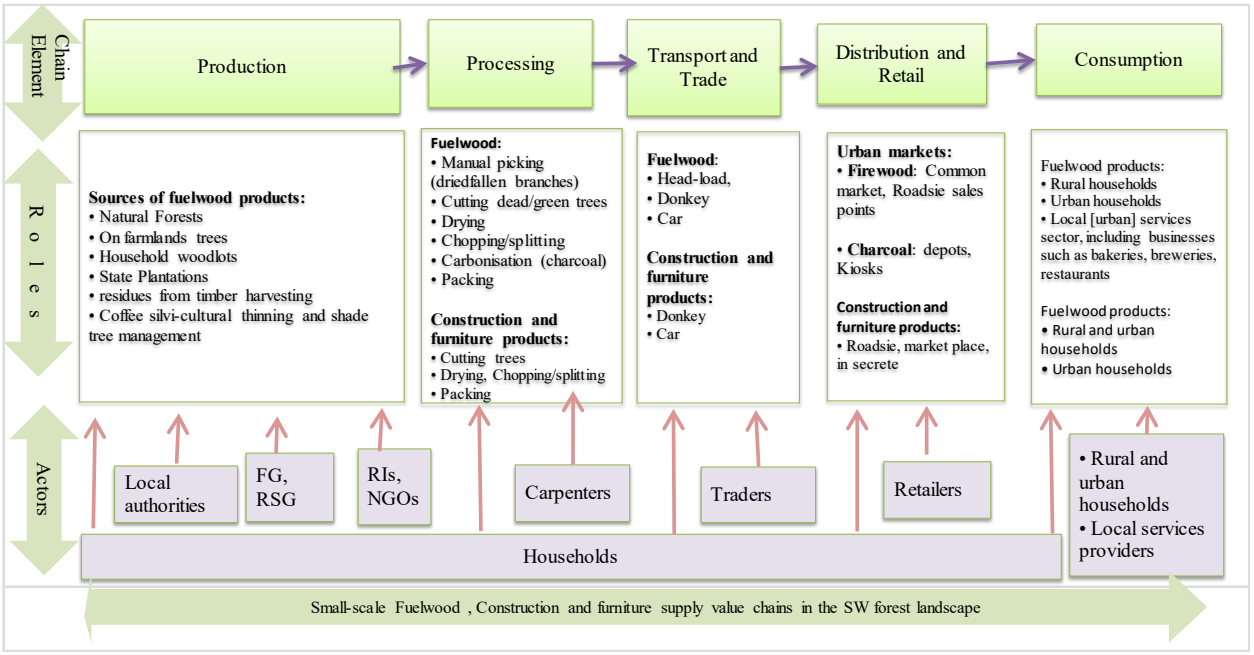


Figure 26. Elements, actors and roles of each actor group in each element of small-scale wood (fuelwood, construction and furniture) supply value chain in the Southwest Forests Landscape (FG = Federal government; RSG = Regional state government; RIs = research institutions).

[B] Processing

Processing fuelwood and/or timber involves cutting trees, drying, chopping/splitting, carbonization in case of charcoal, and packing. In the case of fuelwood, this is carried out by the same people involved in production. In charcoal processing, carbonisation takes place in traditional earth kilns with an energy efficiency of around 13-15%. Thus, although charcoal is popular for its energy density (it contains around 33 MJ/kg, or twice that of wood) and it is easier to store and transport compared to fuelwood, the low energy efficiency of traditional earth charcoal kilns means that around 7 kg of wood is needed to produce 1 kg of charcoal. However, processing timber/poles for construction and furniture is mainly carried-out by carpenters and furniture makers.

[C] Transport and trade

Depending on the source, type of fuelwood, amount of product and distance between source and destination, mode of transport can be done from head-loading, donkey carts and vehicles (cars, pick-up trucks). Firewood harvested for household use and nearby towns are transported from source location to villages by back- (women/girls) and head- (men/boys) loading and donkey cats. Charcoal is mainly produced for urban households and is transported by trucks/cars.

Traders fulfil some role in transporting from producers to retailers. There are no wholesalers in the wood product value chain, but retailers can be of two types. For example, in the case of charcoal, there are retailers who sale a sack of charcoal and those who sale in plastic bags to daily consumption. As charcoal production and trade are mostly illegal activities, involvement in transport and trade is relatively expensive.

[D] Distribution and retail

There is no wholesaler in the fuel wood value chain. Firewood is directly sold by producers to consumers at common markets and at roadsides. The exception here is the case of large service provider sectors, such as restaurants, who buy trees from farmers woodlots, and carryout processing and transportation activities. In the case of charcoal, however, two types of retailers are recognized in the Southwest Forest Landscape. The first group is retailers who buy charcoal directly from producers and/or traders and sell directly to consumers and to other retailers relatively large in quantities (i.e., in sacks). In this case, sales are organized via depots. The second type of group is retailers who buy from producers or the first type of retailers in sacks, but they repack into small quantities, mainly plastic bags, and sale to poor households for daily consumption. Here, sales are organized at common markets, at roadsides in local neighbourhoods or in small kiosks.

[E] Consumption

Households are the main consumers of wood products (wood-fuel for cooking, construction and furniture) followed by construction and furniture producers, and the services sector, which includes businesses such as bakeries, breweries, and restaurants. However, a different mix of energy can be identified between rural and urban households. Rural households are more likely to

depend on naturally available fuels such as fuelwood, agriculture waste and cow dung. Urban households use fuelwood, charcoal and petroleum or LPG, butane gas or electricity depending on the availabilities. At a household level, the choice for energy is part of a complex decision-making process influenced by size of household, area of residence, fuel availability, income, education, available labour, cultural preferences and oil price.

3.5.3 The impacts on biodiversity of the wood supply value chain

The impacts on biodiversity of the wood supply value chain in the Southwest Forest Landscape vary depending on the stage of the chain. Overall, production of wood products entails complete or partial removal of woody plants. This affects tree cover, regeneration, species diversity and density. A recent study by Berhanu et al. (2022), who examined woody species dynamics between 2000 and 2021, found that 47 woody species from the 2000 inventory list including three endemics were not encountered, while eight new species were recorded. The aggregated density and total basal area of woody species also decreased from 2590 ± 536 ha^{-1} to 2454 ± 300 ha^{-1}, and 101.3 m^2ha^{-1} to 72m^2ha^{-1}, respectively. The dominant woody species was *Ficus sur* in 2000, while it was shifted to *Coffea arabica* in 2021. Woody species richness, evenness, and diversity significantly reduced during the study period. Their study also highlighted that the greatest decline in woody species richness, diversity, and evenness, and highest turnover were recorded in the mid and lower altitudes where settlement and agricultural expansion have been prevalent. Unsustainable use for construction, energy production, creation of job opportunities (income generation), as well as the conversion of forestland to farmland resulted in the rapid decline and massive turnover of woody species diversity (Berhanu et al. 2022).

In the wood processing stage, negative impacts on biodiversity are generated from sawdust, wood chips which cause environmental pollutions, affecting the living environment of plants and animals nearby the processing areas. In consumption stage, the rising prices of fuelwood and other wood products may encourage consumers to efficiently use fuelwood and to adopt alternative energy sources. These practices could favour of biodiversity.

In the consumption stage, the main impacts from fuelwood consumption are environmental pollution due to CO2 and organic particles released to the atmosphere via smoke.

3.5.4 Best experiences and existing commitments

Local level (by woreda and community):

The following are currently existing commitments and best practices at local level:

- Agroforestry practice via multipurpose tree plantation
- Awareness raising and training by government together with PFM groups
- Introducing and promoting alternative energy and construction sources
- Forest demarcation and development
- Livelihood improvement via provision of improved production of NTFPs
- Planting tree seedlings

Local level by NGOs:

The Nature and Biodiversity Conservation Union (NABU), in cooperation with the Ethiopian Government and other partners, has been implementing the following projects in Kafa:

Biodiversity under Climate Change: Community-based Conservation, Management and Development Concepts for the Wild Coffee Forests" (2014-2017); and "Climate Protection and Preservation of Primary Forests - A Management Model using the Wild Coffee Forests in Ethiopia as an Example" (2009-2013)

The central aim of the projects mentioned above is the conservation of forests in order to protect the biodiversity and maintain ecosystem services for the local people as well as to combat climate change, as forests are crucial carbon sinks. The projects are based on three main pillars: Restoration and management of ecosystems; Regional development and sustainable use of natural resources; and Communication and environmental education.

So far, the projects have achieved the restoration of around 750 ha of natural forest with indigenous species. Ongoing measures focus on the reforestation of another 500 ha of fragmented forest area. Additionally, almost 300 ha of agroforestry areas have been established as well as 1,700 ha of community plantations with fast-growing tree species, which help to satisfy people's wood demand and release pressure from natural forests. On an area of 11,600 ha, a Participatory Forest Management (PFM) system has been set-up, which involves almost 7,800 local people. An

additional 4,500 ha are still in the process of being transferred into a PFM system. Furthermore, as many as 11,200 wood-saving stoves have been introduced to almost 900 villages in Kafa and 54 locals were trained to produce these stoves as a new source of income. Special tourist infrastructures, such as animal and bird watching towers as well as hiking trails have also been built to promote ecotourism in the Kafa Biosphere Reserve.

When the project was initiated, the prime forest product of Kafa – wild Arabica coffee – had no access to the international market. Through the project, 27 cooperatives joined the Kafa Coffee Farmers Union and organized a professional processing and quality control of the coffee beans. Since 2005, wild beans have been exported to Europe at a price that benefits the farmers. This development was possible because Original Food imported the sun-dried beans and established an access to the specialty coffee market. From the 2006/7 harvest onwards, "wild collection" and "fair for life" certification enhanced the marketing success.

National/regional level commitments:

Ethiopia recognizes the key role forestry plays in setting the country on a sustainable and green development path. The current 15.5% forest cover is inadequate to provide an economic and ecological support system in this mountainous and climatically precarious country. While protecting the existing 17.35 million ha of forest, Ethiopia also intends to undertake large-scale afforestation and reforestation to increase total forest cover to 30% by 2030. Afforestation and reforestation are also keys to alleviating the pressure on natural forests (MoFECC, 2017).

To achieve this long-term target, Ethiopia committed to restore degraded lands across different parts of the country and pledged to the Bonn Challenge and AFR100 to restore 15 million ha of degraded land by 2030. The progress is encouraging with involvement of high-ranking government officials including the Prime Minister and other ministers. This commitment is included in the country's Growth and Transformation Plan II (GTP II), Climate Resilient Green Economy Strategy (CRGE), Nationally Determined Contribution (NDC), National Forest Sector Development Program (NFSDP), and others. Some of these commitments from CRGE strategy document include:

- Increase forest cover to 20% by 2020 focusing on the improvement of existing natural forests and large-scale afforestation and reforestations activities;

- Increase forestry's contribution to GDP to 8% by 2020; and
- Achieve 130 Mt CO2e reduction by 2030 to achieve 50% carbon sequestration and emissions reductions goals by reducing deforestation and forest degradation.

To catalyze the effort, the Forest Sector Transformation Unit (FSTU) has been established as a unit under EFCCC (Environment, Forest and Climate Change Commission) to support the sector transformation that would be required in order to achieve the ambitious targets set out in the CRGE, NFSDP (National Forest Sector Development Program) and GTP II goals. Greater scale is required to achieve forestry sector goals, developing rigorous project execution capabilities (early large-scale successes will be critical to both gain momentum and to generate buy-in from government and other stakeholders), creating improved coordination to facilitate cross-sectorial collaboration.

The FSTU mandated to support these shifts through three objectives:

- Build a pipeline of transformative, high-value forestry models. This entails incubating and piloting innovative projects, evaluating pilots, and scaling up successful innovations.
- Support the CRGE facility in proactively "crowding in" funding.
- Support implementation of selected investment initiatives. Support would focus in several areas including managing and running the pilots, as well as capacitating the forestry sector by providing targeted, hands-on support to national, regional and woreda teams in implementing investment initiatives. Woreda (also called district) is the third-level administrative divisions of Ethiopia. They are further subdivided into several kebeles or neighborhood associations, which are the smallest unit of local government in Ethiopia.

In 2018, the then Ethiopian Ministry of Environment, Forest and Climate Change, now Forest Development Institute, produced the National Tree-Based Landscape Restoration Potential and Priority Maps in collaboration with the World Resources Institute (WRI), which are available on EFCCC's website. The maps aim to guide decision-makers about where more trees could benefit Ethiopian landscapes, which tree-based landscape restoration options could be implemented in these landscapes, and where to prioritize cross-sectoral implementation (MEFCC, 2018a).

Based on national and regional experts' input, 73% of Ethiopia's land area was identified as having potential for at least one of the eight tree-based landscape restoration options identified as crucial for Ethiopia's economic, social and environmental goals:

- Protection of preserved forests
- Restoration of degraded forests
- Restocking of degraded natural forests
- Agri-silviculture
- Woodlots and home gardens
- Commercial plantations for products other than industrial roundwood (mapping specific to industrial planation forest is covered in ''Ethiopia Commercial Planation Forest Industry Investment Plan" report)
- Promoting plantations in the transition and buffer zones

The government has proclaimed "The 2018 National Forest Law" – a revised version of the 2007 forest law – which now clearly recognizes the rights of communities and acknowledges their role in managing natural forests and establishing plantations, without unduly compromising ecological services or biodiversity. The new law contains the following three key changes:

- Recognizing participatory forest management as a vehicle to enhance the role of communities in sharing responsibilities and benefits of managing natural forests in accordance with agreed-upon management plans;
- Providing incentives for the private forest developers through mechanisms such as lease-free land, better access to land use and forest ownership certificates, and tax holiday until and including the first harvest (for private investors and associations) and the second harvest (for communities); and
- Putting severe penalties on those who expand farming into forests; tamper with forest boundaries; or set fire, harm endangered species, settle, or hunt or graze animals in state, communal, association or private forests.

3.5.5 SWOT Analysis for voluntary commitment to address the impacts on biodiversity of Logging and wood harvesting in the Southwest Forest Landscape

As shown on Table 24, key strengths to implement voluntary commitments to reduce the impacts of logging and wood harvesting subsector on biodiversity in the Southwest forest landscape include conducive forestry/energy/construction policies, laws and institutions, high government commitment to international sustainable development goals (e.g., UN SDGs, CBD) including access to safe and clean energy sources; logging impact and its mitigation measures are being well-recognized in the National development plan and NBSAP; National-wide movement for afforestation, reforestation program; and increasing adoption of alternative (e.g. solar, biogas) and energy-efficient stoves. Weakness include overlapping and unclear responsibilities among some related sectors; lack of coordination among different sectors and with development and conservation organizations, NGOs, Civic societies and local communities; and low level of supply and adoption of modern energy saving cooking stoves. Yet, there are opportunities to maintain the strengths and turn the weakness into strengths. This includes existence of increasing interest of national and international donor and development agencies in sustainable development of both socioeconomic and biodiversity (Table 23).

Table 23. SWOT Analysis for the voluntary commitment to reduce the impacts of logging and wood harvesting on biodiversity in the Southwest Forest landscape.

Strengths	**Weakness**
• Organized community, making ease for mobilization • Logging impact and its mitigation measures well recognized in the National and regional development plans and NBSAP • High commitment at all levels of government authorities for socioeconomic and environmental development • Following the national-wide movement, growing level of afforestation and reforestation actions in the landscape • Increasing adoption of alternative (e.g., solar, biogas) and energy-efficient stoves	• Sectorial laws often conflicting • Overlapping and unclear responsibilities among some related sectors • Lack of coordination among different sectors and with development and conservation organizations, NGOs, Civic societies and local communities • Poor law enforcement among judiciaries • Low level of plantation seedling input supply • Low level of supply and adoption of modern energy saving cooking stoves
Opportunities	**Threats**

• Increasing interest of national and international donor and development agencies in sustainable development of both socioeconomic and biodiversity • Current forestry law clearly defines management types, ownership types and roles of stakeholders	• Drought • Erratic rainfall • Political instability and peace insecurity • Poverty • Increasing number of jobless youth

3.5.6 **Synthesis: Recommendations and scenarios**

Excessive Logging and wood harvesting for fuelwood, furniture and construction purposes has been among the major pressures causing forest and ecosystem degradation in the Southwest Forest landscape through soil erosion, change in population structure and composition of vegetation, increased threat status of rare endemic plant and animal species. This, ultimately, has resulted to deterioration of ecosystem services, shortage of fuelwood and construction materials. To address this pressure and its impacts on biodiversity and human socioeconomic wellbeing, two voluntary commitment intervention strategies are proposed: ***Reduce the dependence on natural forests of urban and rural households and service providers (hotels/restaurants, bakeries, etc) on wood products for energy, construction and/or furniture production, and Strengthen sustainable forest protection, development and utilization by developing management plan, PFM, and ownership certification of private, association and cooperative forests***. Milestones and expected changes of low (Table 25) and high (Table 26) ambition scenarios of these voluntary commitments are described as follows:

VC 1: Reduce the dependence on natural forests of urban and rural households and service providers (hotels/restaurants, bakeries, etc) on wood products for energy, construction and/or furniture production

Reducing the dependence on natural forests of urban and rural households and service providers (hotels/restaurants, bakeries, etc) on wood products for energy, construction and/or furniture production may be achieved through: (a) establishing industrial plantations around urban areas, encouraging urban households to use other alternative energy sources for cooking, such as electric energy and biogas; (b) promoting agro-forestry and small-scale plantations at household levels in the rural areas; (c) promoting the use of energy-saving cooking stoves both for urban and rural

households, and rural households access to solar energy for lighting. Accordingly, compared that in 2020, under high level of ambition scenario, it is expected by 2030 that: a) 50% (10% each year between 2026 and 2030) increase in number of households adopted energy-efficient cooking stoves; b) 75% (15% per year between 2026 and 2030) rural households provided solar panels; c) 15,000 ha buffer zone and urban plantations established; d) 75% of households practiced small private plantations and agroforestry; d) Number of households practicing government staff trained on adoption of modern energy and construction uses increased to 80% of the total actors. To achieve this, other actors will contribute their commitments, including universities will undertake awareness raising and capacity building training for key actors found at all levels on the need and processes of adoption of energy and construction technologies, and NGOs provide technical and financial supports

VC 2: Strengthen sustainable forest protection, development and utilization by developing management plan, PFM, and ownership certification of private, association and cooperative forests

Sustainable forest protection, development and utilization requires implementation of management plan and practising various kinds of forest ownership and management systems. Thus, developing functional management plans, establishing and building capacities of PFM groups, benefit sharing, and implementation of forest ownership certification schemes are required. In this regard, under high major scenario, 3 forest management plans are implemented by 2030; number of households sharing benefits from forest conservation related initiatives (e.g., REDD+) will increased by 50% (10% a year from 2026 to 2030). Reviewing sectorial proclamations and regulations and propose amendments are needed to avoid overlaps in mandates across sectors related to forestry and biodiversity, which will be undertaken by universities. Universities and agricultural/forestry research centres will also be responsible to establish biodiversity geo-data base and reporting systems. NGOs and microfinance sectors will provide financial aids and loans to households in implementation of forest protection, development and utilization in the landscape.

Table 24. Potential voluntary commitments of Logging subsector and low level of ambition for biodiversity (2023-2030) in the Southwest Biosphere Reserves Landscape.

Low level of ambition (2023-2025)									
Problem to be addressed [Pressure]	**Sate**	**Impacts**	**Response: VC**	**Actors**	**Expected change**	**Actions by other actors [+ Actors]**	**Responsible Actors**	**Monitoring measures and reporting**	**Broad Indicators**
Excessive Logging and wood harvesting for fuelwood, furniture and construction	Forest degradation, ecosystem degradation through soil erosion, change in population structure and composition of vegetation, increased threat status of rare endemic plant and animal species	Deterioration of ecosystem services, shortage of fuelwood and construction materials	Reduce the dependence on natural forests of urban and rural households and service providers (hotels/restaurants, bakeries, etc) on wood products for energy, construction and/or furniture production by: (a) establishing industrial plantations around urban areas, encouraging urban households to use other alternative energy sources for cooking, such as electric energy and biogas; (b) promoting agro-forestry and small-scale plantations at	Households; Woreda Agri, Energy, Forestry, and Construction and building offices; Town municipalities; Kebele Extension agents	10% increase in number of h households adopted energy-efficient cooking stoves by 2025 compared that before 2020; 25% rural households provided solar panels; Number of households practicing government staff trained on adoption of modern energy and construction uses increased to 50% of the total actors by 2025	Awareness raising and capacity building training for actors found at all levels on the need and processes of adoption of energy and construction technologies	Metu, Teppi and Jimma Universities; REDD+ programme; NGOs	Household survey, document review, Ground truthing (GIS analysis) and mapping	Documents, photos, videos, No. stoves and solar panels disseminated
						Support establishment of industrial plantations around urban areas, encouraging	Metu, Teppi and Jimma Universities; REDD+ programme NGOs		
						Encourage urban households to use other alternative energy sources for cooking, such as electric energy and biogas	Metu, Teppi and Jimma Universities; REDD+ programme NGOs		

			household levels in the rural areas; (c) promoting the use of energy-saving cooking stoves both for urban and rural households, and rural households access to solar energy for lighting			Support buffer zone plantations, agro-forestry and small-scale plantations at household levels in the rural areas	Metu, Teppi and Jimma Universities; REDD+ programme; NGOs		
						Provide technical, material and financial supports to rural households to adopt the use of energy-saving cooking stoves and solar energy	Metu, Teppi and Jimma Universities; REDD+ programme; NGOs		
			Strengthen sustainable forest protection, development and utilization by developing management plan, PFM, and ownership certification of private, association and cooperative forests	BMNP; OFWE; Zone/woreda EFCC, Cooperative offices; households	3 management plans developed and implementation started by 2025; 4 LE taskforces established and functional by 2025 1 document of benefit sharing mechanisms produced; 25% CBOs supported; 8 proclamations/regulations reviewed and amended by 2025; 1 geospatial, socioeconomic	Review proclamations and regulations and propose amendments needed to avoid overlaps in mandates across sectors related to forestry and biodiversity	Metu, Teppi and Jimma Universities; REDD+ programme; NGOs	Household survey, document review	Documents, photos, videos, No. stoves and solar panels disseminated
						Promote of forest based and alternative rural livelihood options	Metu, Teppi and Jimma Universities; REDD+ programme; NGOs		
						Assess capacity gaps and undertake capacity building interventions accordingly	Mada Walabu University		

					and ecological databases developed by 2025	Establish biodiversity geo-data base and reporting systems and create linkage with geospatial institutes	Metu, Teppi and Jimma Universities		

Table 25. Potential voluntary commitments of Logging subsector and High level of ambition for biodiversity (2023-2030) in the Southwest Forests Landscape.

High level of ambition (2026-2030)									
Problem to be addressed [Pressure]	**Sate**	**Impacts**	**Response: VC**	**Actors**	**Expected change**	**Actions by other actors [+ Actors]**	**Responsible Actors**	**Monitoring measures and reporting**	**Broad Indicators**
Excessive Logging and wood harvesting for fuelwood, furniture and construction	Forest degradation, ecosystem degradation through soil erosion, change in population structure and composition of vegetation, increased threat status of rare endemic	Deterioration of ecosystem services, shortage of fuelwood and construction materials	Reduce the dependence on natural forests of urban and rural households and service providers (hotels/restaurants, bakeries, etc) on wood products for energy, construction and/or furniture production by: (a) establishing industrial plantations around urban areas, encouraging urban households to use	Households; Woreda Agri, Energy, Forestry, and Construction and building offices; Town municipalities; Kebele Extension agents	By 2030: a) 50% (10% each year between 2026 and 2030) increase in number of h households adopted energy-efficient cooking stoves compared that before 2020; b) 75% (15% per year between 2026 and 2030) rural households provided solar panels; c) 15,000 ha buffer zone and urban plantations	Awareness raising and capacity building training for actors found at all levels on the need and processes of adoption of energy and construction technologies	Metu, Teppi and Jimma Universities; REDD+ programme; NGOs	Household survey, document review, Ground truthing (GIS analysis) and mapping	Documents, photos, videos, No. stoves and solar panels disseminated
						Support establishment of industrial plantations around urban areas, encouraging	Metu, Teppi and Jimma Universities; REDD+ programme, NGOs		

	plant and animal species		other alternative energy sources for cooking, such as electric energy and biogas; (b) promoting agro-forestry and small-scale plantations at household levels in the rural areas; (c) promoting the use of energy-saving cooking stoves both for urban and rural households, and rural households access to solar energy for lighting		established; d) 75% of households practiced small private plantations and agroforestry; d) Number of households practicing government staff trained on adoption of modern energy and construction uses increased to 800% of the total actors by 2025	Encourage urban households to use other alternative energy sources for cooking, such as electric energy and biogas	Metu, Teppi and Jimma Universities; REDD+ programme; NGOs		
						Support buffer zone plantations, agro-forestry and small-scale plantations at household levels in the rural areas	Metu, Teppi and Jimma Universities; REDD+ programme		
						Provide technical, material and financial supports to rural households to adopt the use of energy-saving cooking stoves and solar energy	Metu, Teppi and Jimma Universities; REDD+ programme; NGOs		
			Strengthen sustainable forest protection, development and utilization by developing management plan, PFM, and ownership certification of private, association and cooperative forests	BMNP; OFWE; Zone/woreda EFCC, Cooperative offices; households	Implementation of 3 forest management plans; Number of households shared benefits from conservation programmes (e.g., REDD+) increased by 50% (10% a year from 2026 to 2030) document of 5	Review proclamations and regulations and propose amendments needed to avoid overlaps in mandates across sectors related to forestry and biodiversity	Metu, Teppi and Jimma Universities; REDD+ programme; NGOs	Household survey, document review	Documents, photos, videos, No. stoves and solar panels disseminated
						Promote of forest based and alternative rural	Metu, Teppi and Jimma Universities; REDD+		

						livelihood options	programme; NGOs		
						Assess capacity gaps and undertake capacity building interventions accordingly	Metu, Teppi and Jimma Universities; REDD+ programme		
						Establish biodiversity geo-data base and reporting systems and create linkage with geospatial institutes	Metu, Teppi and Jimma Universities		

3.5.8 Stakeholders mapping and Mobilization Strategy

Stakeholder mapping, showing their direction of interactions [influence, collaboration (alliance) and information exchange], is shown on Figure 27, while engagement types given on Figure 28.

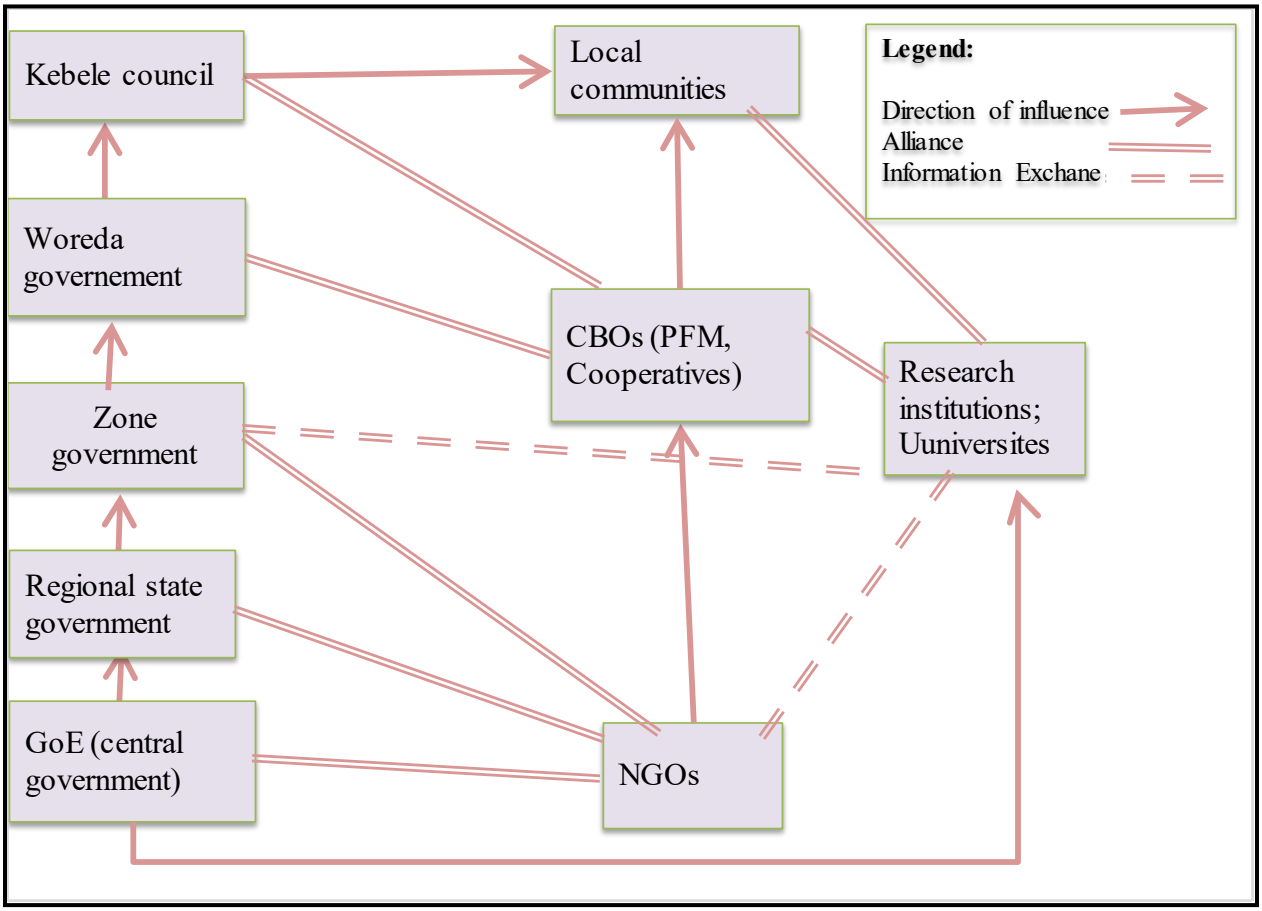
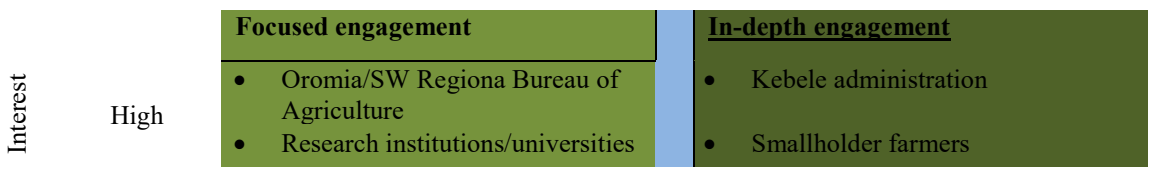


Figure 27. Stakeholder mapping, showing their direction of interactions [influence, collaboration (alliance) and information exchange.



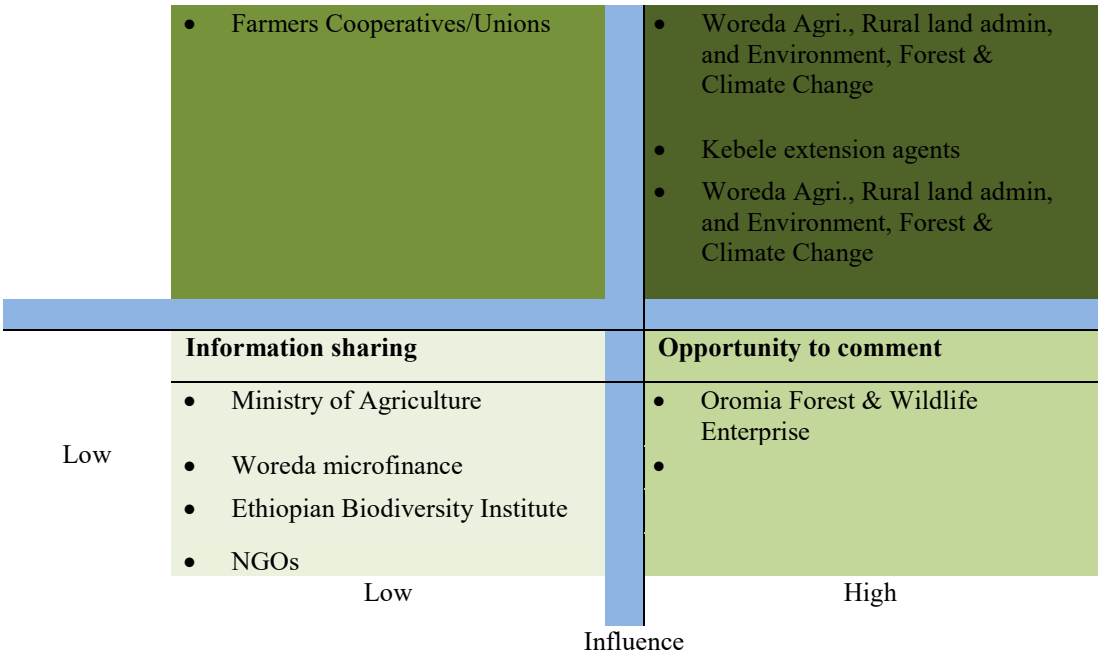


Figure 28. Stakeholder mapping for logging and wood harvesting subsector in the Southwest Forest landscape, showing their levels of influence and interest and proposed engagement type in the Southwest Forest Landscape.

Stakeholder mobilization for logging subsector in the southwest landscape can be lumped with that of Coffee subsector, since their actors are most the same and logging is largely the by-product of coffee management practices. Here, we suggest the following steps for mobilization of actors for the proposed VCs of the subsector:

1. Introduce the concept of VC and framework of BIODEV2030 to all legitimate actors

2. Agree on the formulated VC:

a) Refine role of each of the actors in the implementation.
b) Develop Concrete action plan for each of them, including:

- "Counterparts /Enabling conditions": Means to be implemented by other actors (State, NGOs, financial actors...) to enable or accelerate this change

- Other means/actions to be implemented by other stakeholders to promote ambitious change and the adoption of good practice:

- Technical means (change/adaptation of regulation or law, incentives...)

- Financial means (investments, grants...)

- Human resources (training, etc.)

3. Establish Woreda and Kebele VC committee

4. Develop standard formats of commitments for different types of actors

5. Secure financial sources for mobilization

6. Establish Monitoring and Evaluation systems

.

4. Overall Conclusions and Recommendations on the way forward

Results of the study show that all the subsectors analysed have significant biodiversity impacts and also there are opportunities to reduce these impacts while improving productivity of each subsector. In order to effectively implement the voluntary commitments agreed by actors of the subsectors, we recommend the following three key actions, in additions those recommended under mobilization strategy:

- Appointment of a facilitator at each landscape is required to mobilize actors and follow-up implementation of their commitments
- Mobilization for subsectors at each landscape should be lumped together, as almost the actors are the same and the interventions are inter-related
- Implementation monitoring database, including baseline data from literature review and new field surveys, should be setup at the beginning of implementation of the commitments

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Annexes