ISFL Emission Reductions (ER) Program Document (PD)

ER Program Name & Country: Oromia Forested Landscape Program (OFLP), Oromia National Regional State, Federal Democratic Republic of Ethiopia

Date of Submission: December 4, 2019

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Glossary

A/R	Afforestation/Reforestation
AFOLU	Agriculture, Forestry and Other Land Use
ATA	Ethiopian Agricultural Transformation Agency
BioCF	Bio-Carbon Fund
BMERP	Bale Mountains Eco-region REDD+ Project
BoA	Bureau of Agriculture
BoFED	Bureau of Finance and Economic Development
BoLF	Bureau of Livestock and Fisheries
BoLAU	Bureau of Land Administration and Utilization
BoWME	Bureau of Water, Mines and Energy
BSP	Benefit Sharing Plan
CO_2e	Carbon dioxide equivalent
COP	Conference of the Parties of the UNFCCC
CRGE	Climate Resilient Green Economy
CSA	Central Statistical Agency
CSA	Climate Smart Agriculture
CSO	Civil Society Organization
EFCCC	Environment, Forest and Climate Change Commission
EMA	Ethiopian Mapping Agency, currently Ethiopia Geo-Spatial Information Agency
ER	Emission Reduction
ERPA	Emission Reductions Payment Agreement
ERPD	Emission Reductions Project Document
ESS	Ethiopia Rural Socioeconomic Survey
EWCA	Ethiopia Wildlife Conservation Authority
FAO	Food and Agriculture Organization
FDRE	Federal Democratic Republic of Ethiopia
FREL	Forest Reference Emission Level
FRL	Forest Reference Level
GCF	Green Climate Fund
GFOI	Global Forest Observations Initiative
GHG	Greenhouse Gas
GoE	Government of Ethiopia
GRM	Grievance Redress Mechanism
GSIA	Geo-Spatial Information Agency (previously known as EMA)
HWP	Harvested Wood Products
HWSD	Harmonized World Soil Data Base
IPCC	Intergovernmental Panel on Climate Change
ISFL	Initiative for Sustainable Forest Landscape
LULUCF	Land Use, Land Use Change and Forestry
MOA	Ministry of Agriculture
MoF	Ministry of Finance
MoI	Ministry of Industry
MoMPNG	Ministry of Mines, Petroleum and Natural Gas
MoWIE	Ministry of Water, Irrigation and Electricity
MRV	Measuring, Reporting and Verification
MUDHo	Ministry of Urban Development and Housing
NRM	Natural Resource Management
OEFCCA	Oromia Environment, Forest and Climate Change Authority
ORCU	Oromia REDD+ Coordination Unit
ORS	Oromia National Regional State

OFLP	Oromia National Regional State Forested Landscape Program
OFWE	Oromia Forest and Wildlife Enterprise
PDD	Project Description Document
PFM	Participatory Forest Management
RBP	Result Based Payment
RCMRD	Regional Centre for Mapping of Resources for Development
REDD+	Reducing Emissions from Deforestation and Forest Degradation (REDD), Conservation of Forest Stocks, Sustainable Management of Forests and Enhancement of Forest Carbon Stocks'
SLMP	Sustainable Land Management Program
UNFCCC	United Nations Framework Convention on Climate Change
WBISPP	Woody Biomass Inventory and Strategic Planning Project

Section 1: General Information and Guidance

Purpose of the Program Document (PD)

ISFL Emission Reduction (ER) Programs that have been included in the pipeline of the Bio-Carbon Fund Initiative for Sustainable Forest Landscapes (ISFL) are expected to provide detailed information on the design of the ISFL ER Program using the template provided in this document.

ISFL ER Programs must be designed in accordance with the ISFL ER Program Requirements (Requirements). The Program Document (PD), in combination with other documents such as World Bank program documents, demonstrates how an ISFL ER Program conforms with the Requirements. Following receipt of the final PD, ISFL participants (Participants) will decide whether to proceed to negotiating an Emission Reduction Purchase Agreement (ERPA) for the proposed ISFL ER Program.

The PD template is intended to assist an ISFL ER Program to provide information to demonstrate how it conforms with the Requirements. Before a PD may be deemed final, draft PDs will be subject to review and comments by the Trustee, the World Bank, ISFL Contributors, and an independent third-party entity. For ease of reference, and where applicable, the sections in this PD specify the corresponding paragraph numbers specified in the Requirements.

The Requirements document contains a glossary which defines specific terms used in the Requirements. Unless otherwise defined in this PD template, any capitalized term used in this PD template shall have the same meaning ascribed to such term in the Requirements document.

Guidance on completing the PD

The PD should contain the most relevant data and information to assess the ISFL ER Program. Supporting data and information should be presented in specified annexes, when necessary. Please complete all sections of this PD. If sections of the PD are not applicable, explicitly state that the section is left blank on purpose and provide an explanation why this section is not applicable.

If a section specifies that information provided should be 'brief' please limit input to the word count specified for that section.

Provide definitions of key terms that are used and use these key terms, as well as variables etc., consistently using the same abbreviations, formats, subscripts, etc.

The presentation of values in the PD, including those used for the calculation of emission reductions, should be in international standard format e.g. 1,000 representing one thousand and 1.0 representing one. Please use International System Units (SI units – refer to http://www.bipm.fr/enus/3_SI/si.html) and if other units are used for weights/currency (Lakh/crore etc.), they should be accompanied by their equivalent S.I. units/norms (thousand/million).

If the PD contains equations, please number all equations and define all variables used in these equations, with units indicated.

Assessment process for the PD

ISFL ER Programs and related PDs are to be prepared by ISFL host countries and submitted to the Trustee. The World Bank will review draft PDs for completeness check purposes before making the draft PD document public, sharing it with ISFL Contributors for comment, and seeking assessment of the PD by the World Bank and an independent third-party entity (to be selected by the Trustee). Considering comments received from the public, the Trustee, the World Bank, ISFL Contributors, and the independent third-party entity (this assessment will be made public), the ISFL host country will revise the PD for resubmission. The revised PD will be made public and shared with ISFL Contributors for comment and be assessed by the World Bank and the independent third-party entity (this review will be made public). The final PD will also be made public.

Section 2: Executive Summary

2.1 ISFL ER Program Description

2.1.1 Program Area Information

Table 1. Program Area Information.

Name of the ISFL ER Program	**Oromia Forested Landscape Program (OFLP)[1]**
Name of the Program Area	Oromia National Regional State
Geographic area of the Program Area (hectares)	29.991 million ha
Population of the Program Area	over 30 million
Ex-ante estimate of emission reductions (ERs) for the ISFL ER Program (tonnes of CO_2e)	45 million tCO_2e, without considering the ambitious plan proposed under the vision in 2.1.3

2.1.2 Selection of the Program Area

The spatial coverage of the proposed Oromia National Regional State Forested Landscape Program (OFLP) includes the entire Oromia, one of the nine regional sates under the Federal Democratic Republic of Ethiopia. Oromia shares a boundary with almost every region except for Tigray. It is the largest region in terms of area (about 30 million ha) and population over 30 million. Agriculture, livestock and service constitute the dominant economic sectors of the region. The administrative map of Oromia is given in Annex 1.

The design of OFLP is based on the premises that Ethiopia's GHG emissions are mainly due to agriculture expansion, livestock and associated land-use changes which can be managed by adopting smarter land use practices to minimize forest loss, as well as greenhouse gas emission. Through implementation of the OFLP, the Oromia Regional State take a lead and embarked on harnessing a large-scale landscape level initiative to address the major challenges threatening the sustainability of Ethiopia's major forested landscapes.

Ethiopia's largest forested landscapes are found in Oromia National Regional State which provides critical ecosystem services to the country and the region. Most of Oromia's high forest (moist montane forests) is found in the Bale landscape in the southeast and the Jimma/Wollega/Ilubabor landscape in the west. Bale serves as the water tower for Ethiopia's eastern dry lands in Oromia and the Ethiopia Somali Regional State as well as the Federal Republic of Somalia. Oromia contains globally important biodiversity with endangered endemic species such as the Abyssinian wolf and the mountain nyala. Oromia's western forests are home to endemic coffee (*Coffea arabica*) that has high potential as a value-added export and harbor wild varieties of the species. Important rivers also originate in or are affected by Oromia's forests, including those flowing into the new Renaissance Dam, which is under construction.

Oromia is also home for the most productive rural landscapes in Ethiopia. Apart from the forest, agriculture, livestock and settlement mosaics are the dominant characteristic feature of these landscapes. More than 88% of the human population of the region makes a living from the land in rural areas. The

[1] Webpage: https://oflpethiopia.home.blog/

Oromia region is also home for the largest livestock population in Ethiopia (24.4million) CSA, 2018[2] However, the practice of unsustainable management of land resources in Oromia has resulted in changes in land use and affects the livelihoods and welfare of the local community.

The OFLP is designed to serve as Oromia National Regional strategic programmatic umbrella and coordination platform for multi-sector, multi-partner interventions on all forested landscapes in Oromia.

2.1.3 Description of ISFL ER Program vision, design, and expected outcomes

The OFLP is well aligned with Climate Resilient Green Economy Strategy and the Growth and Transformation Plan (GTP), which are the key national strategies of the Federal democratic Republic of Ethiopia (FDRE). Both strategies aim at achieving a middle-income country status by 2025 while maintaining the 2010 GHG emissions level which otherwise would double from 150 to 400 Mt CO_2 under the business-as-usual scenario. The CRGE indicates that about 87% of national emissions come from the land use sectors (See Fig 1 below). Given the size of Oromia, the implementation of the OFLP alone could result in lion's share of GHG emissions reduction targets of the government of Ethiopia. The OFLP interventions cut across key sectors of the CRGE such as forestry and agriculture (crop and livestock).

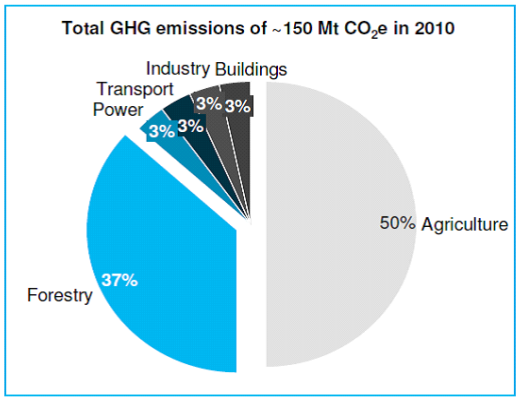


Figure 1. Ethiopia's GHG emission by sources, 2010

OFLP ER Program's vision is to contribute to the realization of the regional and national goals of the Climate Resilient Green Economy Strategy (CRGE), subsequent phases of the Growth and Transformation Plan (GTP), the National REDD+ Strategy and the sector strategies for forest, agriculture (livestock and crop) and renewable energy. The long-term program will contribute to a transformation in how forested landscapes are managed in Oromia to deliver multiple benefits such as poverty reduction and resilient livelihoods, climate change mitigation, biodiversity conservation, and water provisioning.

Operating at the scale of the jurisdictional landscape, OFLP would also seek to achieve ISFL's vision of promoting climate-smart agricultural and low-carbon land-use practices that have significant impact and transform rural areas by protecting forests, restoring degraded lands, enhancing agricultural productivity, and by improving livelihoods and local environments while considering trade-offs and synergies between different land uses competing in a jurisdiction.

OFLP is the first of its kind in Ethiopia designed in a way to leverage ISFL grant resources to attract new financing, expanding the total envelope toward improved land use system, forest retention, and forest gains. The OFLP therefore, serves as a "scale-up engine", as seen in Fig.2 below.

[2] CSA (2018) Agricultural sample survey 2017/18, Volume II report on livestock & livestock Characteristics (Private peasant holding)

Figure 2. OFLP as a scale-up engine

OFLP aims to programmatically support the FDRE to strategically mobilize, coordinate, and scale up funding from diverse sources. The success of the OFLP and the achievement of the FDRE's broader forest, land-use, and climate ambitions depend on the OFLP's ability to leverage financial resources from existing and future relevant initiatives. Activities financed by OFLP grant proceeds, together with other interventions that the OFLP coordinates and that are already budgeted in Oromia Region, will have an estimated emission reduction of about 45 million tons of CO_2 between 2020 and 2030.

2.1.4 Summary of OFLP ER Program financial plan and financing gap

Existing interventions have been identified as activities that will generate emission reductions within the region in the coming ten years period. Total emission reduction potential is about 45 million tCO_2. The relative cost value of this emission reduction is approximately 7.7 US$/$tCO_2$. Apart from these interventions, additional activities with unquantified ERs and considerable own budget are expected to contribute directly/indirectly to more emission reductions.

There is always an implementation or performance risk that could result in lower emission reduction, a reason why to have a more ambitious goal for the OFLP. The total forest area under OFWE natural forest is currently 3.2 million ha, out of which 1.3 million ha are under PFM activity. The ambitious goal is to cover all the remaining forest area with PFM together with the implementation of additional A/R activities in the region (A/R outside OFWE concession area). In this case, the total financial need for these new activities is approximately US$ 98,485,511 (gap) with a relative cost value of 2.04 US$/$tCO_2$. The following table is a summary of OFLP ER financial plan and gap.

Table 2. Summary of OFLP ER Program financial plan and financing gap

Estimate of costs and revenues of planned actions and interventions, including institutional, implementation, and transaction costs	**US$ 1,156,621,494** for the total ERPA period (10 years) plus the period prior to ERPA phase
Amount of financing identified/secured financing for planned actions and interventions (OFLP Grant, REDD+ Investment Program Grant and others)	**total US$ 1,058,135,983** capable of generating approximately 45 million tCO_2

Amount of financial leverage (from other most relevant on-going interventions REDD+/PFM; CSA; livelihoods/institutions)	**N/A**
Financing gap amount (over 10 years implementation period 2020-2030)	**US$ 98,485,511**

The complete financing plan for OFLP ER Program is presented in Annex 2: Financing Plan for ISFL ER Program.

2.2 OFLP ER Program Implementation Arrangements

2.2.1 Program entity authorized to negotiate/sign the ERPA with the ISFL:

Name of entity: Ministry of Finance and Economic Cooperation

Type and description of organization: Federal Government Ministry

Website: www.mofec.gov.et

Main contact person:

Name: Mr. Admasu Nebebe

Title: State Minister

Address: P.O.Box: 1037 Or 1905 Addis Ababa, Ethiopia

Telephone: +251111552400

Email: Admasugedamu@yahoo.com

2.2.2 Organization(s) responsible for managing/implementing the Oromia OFLP ER:

Name of entity: Environment, Forest and Climate Change Commission (EFCCC)

Type and description of organization: Federal Government Commission

Organizational or contractual relationship between the organization and the ISFL ER Program Entity identified above: Joint implementer

Website: N/A

Main contact person:

Name: H.E. Ato Kebede Yimam

Title: Deputy Commissioner, Forest Sector

Address: P.O. Box: 12760 Addis Ababa, Ethiopia

Telephone: N/A

Email: yimam2014@gmail.com

Name of entity: Oromia Environment, Forest and Climate Change Authority (OEFCCA)

Type and description of organization: Regional Government Agency

Organizational or contractual relationship between the organization and the ISFL ER Program Entity identified above: Joint implementer

Website: N/A

Main contact person:

Name: Dr. Negeri Lencho

Title: Director General

Address: P. O. Box 10633 Addis Ababa, Ethiopia

Telephone: +251113852040

Email: dinamoylencho222@gmail.com

Note: there are other five regional entities with shared roles and responsibilities in rolling out OFLP activities with a coordination platform to achieve OFLP goals, see section 2.2.4.

2.2.3 Partner organizations involved in the ISFL ER Program

Table 3. Partner organizations involved in the ISFL ER Program.

Please list existing partner agencies and organizations involved in the design and implementation of the ISFL ER Program or that have executive functions in financing, implementing, coordinating and/or controlling activities that are part of the proposed ER Program. Add rows as necessary.		
Royal Norwegian Embassy, Addis Ababa	Tore +251 93010048	Finance program design and implementation of OFLP and related programs like SLMP; invest in program activities (e.g., REDD+ Investment Program - RIP). Strong and reliable partner in the areas of climate finance and green economy; strong program monitoring and support team.
Oromia Forest and Wildlife Enterprise (OFWE)	Mr. Didha Diriba P.O.BOX 6182, Addis Ababa, Ethiopia Tele: (+251)114403550/89 Email: ddirriba@yahoo.com	Involved in the design and implementation of the program, manages all state forests and protected areas in Oromia; has strong technical and management capacity, with presence in all forest areas of the region.
Farm and SOS	Yasmin Abdulahi Fayera Abdi	Bale Eco-Region REDD+ program activities implementation; demonstration of PFM practices; consultation and participation plan preparation. Strong technical and program management capacity; trusted by community and partners alike.

Ethio-Wetlands and Natural Resources Association	Afework Hailu (+251)911635720 ethio.wetland@gmail.com	Implement PFM activities in some districts within the program area. Strong technical capacity and practical experiences.
Japan International Cooperation Agency (JICA)	P.O.Box 5384, Addis Ababa, Ethiopia Tel : (+251)-11-5504755 Fax : (+251)-11-550446	Implement PFM activities in some districts within the program area. Strong technical capacity and practical experiences.
Ministry of Agriculture	Ato Umer Husen	Implementer
Oromia Bureau of Agriculture and Natural Resources	P. O. Box 8770 Addis Ababa, Ethiopia Tel: (+251) 11-3717440 (+251) 112717438	It is implementing different programs like SLMP, Land Investment for Transformation (LIFT), AGP and different climate smart agriculture in both crops and livestock sectors. It is the sector with 2nd highest mitigation potential after forestry.
Oromia Bureau of Water and Energy Resource Development	P.O. Box 8630 Addis Ababa, Ethiopia Tel: (+251)11 5516938	The Bureau oversees programs that are relevant for OFLP like promotion of renewable energy and energy saving technologies.
Oromia Bureau Land Administration and Use	P. O. Box 2273 Addis Ababa, Ethiopia Tel: (+251) 11 3690159	It oversees administering land in the region, including preparation of land-use plan, developing policy and laws and issuing land right certificates.
Oromia Livestock and Fishery Resource Development Agency	Dr. Kefena Kerdesa	The Agency is implementing different climate smart livestock

2.2.4 Description of coordination between entities involved in ISFL ER Programs

OFLP is the programmatic umbrella and coordination platform for multi-sector, multi-partner intervention in Oromia. It is coordinating all relevant agriculture-forested landscape related initiatives in the region. OEFCCA/ORCU is coordinating with regional government line institutions, agriculture & forest-based unions, the private sectors, the civil societies and research & academia, which may: (a) provide services of implementing program activities directly financed by the grant and (b) implement their own project activities financed by themselves contributing to the overall OFLP objectives.

OFLP is being led by OEFCCA, with ORCU as the implementing unit within it, which is also being coordinated under the National REDD+ Secretariat of the Environment, Forest and Climate Change Commission (EFCCC). ORCU also gets strategic and tactical guidance from the Oromia National Regional

State Vice President, for ease of coordinating among relevant sectors (forest, agriculture, livestock, land administration and use, water, energy, and finance). The regional state's Steering Committee chaired by the Regional Vice President and the Technical Working Group is providing strategic guidance and technical support to program implementation.

The OEFCCA, Oromia Forest and Wildlife Enterprise (OFWE) and other relevant sector Bureaus will implement and coordinate activities on the ground through their woreda offices and kebele DAs (extension agents). In this regard, a Memorandum of Understanding (MoU) was signed among six regional entities including OEFCCA, OFWE, Bureau of Agriculture and Natural Resource (BoANR), Livestock and Fisheries Resource Development Agency (LFRDA), Bureau of Rural Land administration and Use (BoLAU), and Bureau of Water and Energy Resource Development (BoWERD). The MoU defines the shared roles and responsibilities of stakeholders in rolling out OFLP activities by the government sectors and it also serves as a coordination platform to achieve OFLP goals.

The purpose of the MoU is to ensure each of the implementing institutions identified as parties to the agreement discharge their respective responsibilities and mandates towards the successful implementation of the OFLP at a landscape level in a coordinated manner by mobilizing staff, providing leadership and required technical support at all levels to achieve the program´s objective of reducing emissions from land use in Oromia through improving the enabling environment for sustainable forest management and investment.

For the implementation of related activities, implementing NGOs are working with relevant Bureaus/Authority/Agencies to: (a) prepare, implement, and report on activities in joint annual OFLP work plans through the coordination, and (b) ensure synergies between existing sector initiatives that affect OFLP objectives. Similarly, private sector businesses implementing or investing in forested landscape friendly initiatives will coordinate their works with OEFCCA and ORCU. Such private sector entities include, those involved in commercial forest development activities (they are not many now, but it is expected some more to join in this investment due to a more conducive policy environment for private investment now)[3]; wood processing industries (small, medium and large); entities investing in commercial coffee plantations and processing (such as Nespresso and other locally based firms); commercial agricultural firms including cattle ranchers (for milk and beef); commercial honey harvesters and processers (such as *Beza Mar*); commercial gum, spice other forest product collectors and processors; improved cook stove and biogas producers and distributers. All these are located in zones and woredas of Oromia and fall in different clusters as identified by OFLP (see paragraphs below). Coordination of activities at local level will be extended to these private entities too in order these entities' commercial activities bring landscape level sustainability, where feasible, contributing to more ER at landscape level.

For learning and experience sharing of best practices, OEFCCA and ORCU are actively participating on REDD+ Learning Network, which includes government, civil societies and private sector actors.

In addition, three lower level (Zonal level) coordination platforms are established to create synergy among implementation of activities by government and other relevant interventions undertaken by NGOs, Civil Society Organisations (CSOs) and the private sector as identified above. To make coordination effective at lower levels, the coordination platforms are organized into South Western Oromia Cluster; Central and Eastern Oromia Cluster; and South and South Eastern Oromia Cluster following the intervention clusters of OFLP. The relevant private sector representatives are participating on the coordination platforms meetings and share their lessons to participants. It is doing to scale-up the participation more. The MOU entered among regional stakeholders will also be extended to these clusters bringing in the platform the government, NGOs, CSOs and the private sector actors to coordinate their activities for the same objectives as outlined above.

[3] About four commercial forest developers having more than 379 hectares of forests jointly, are identified to date from South-Western Cluster, Kellem Wollega Zone and further identification/assessment is ongoing

Figure *3* below presents the institutional arrangements for the OFLP, aims at coordination of interventions by various actors, financed by multiple sources and partners to scale-up action. The OFLP's programmatic approach requires cross-sectoral coordination with all related policies in other sectors to maximize synergies and mitigate trade-offs. Thus, OFLP institutional arrangement is anchored in the following principles: (i) the institutional set-up would be based on existing federal and state government structures; (ii) clear institutional roles, responsibilities and procedures based on existing institutional mandates; (iii) extensive multi-sectoral coordination to plan and implement related projects and activities critical for OFLP success; and (iv) coordinating and leveraging selected associated initiatives (financed by the World Bank (WB) and/or others). The overall description of these actors/entities are presented following Figure 3.

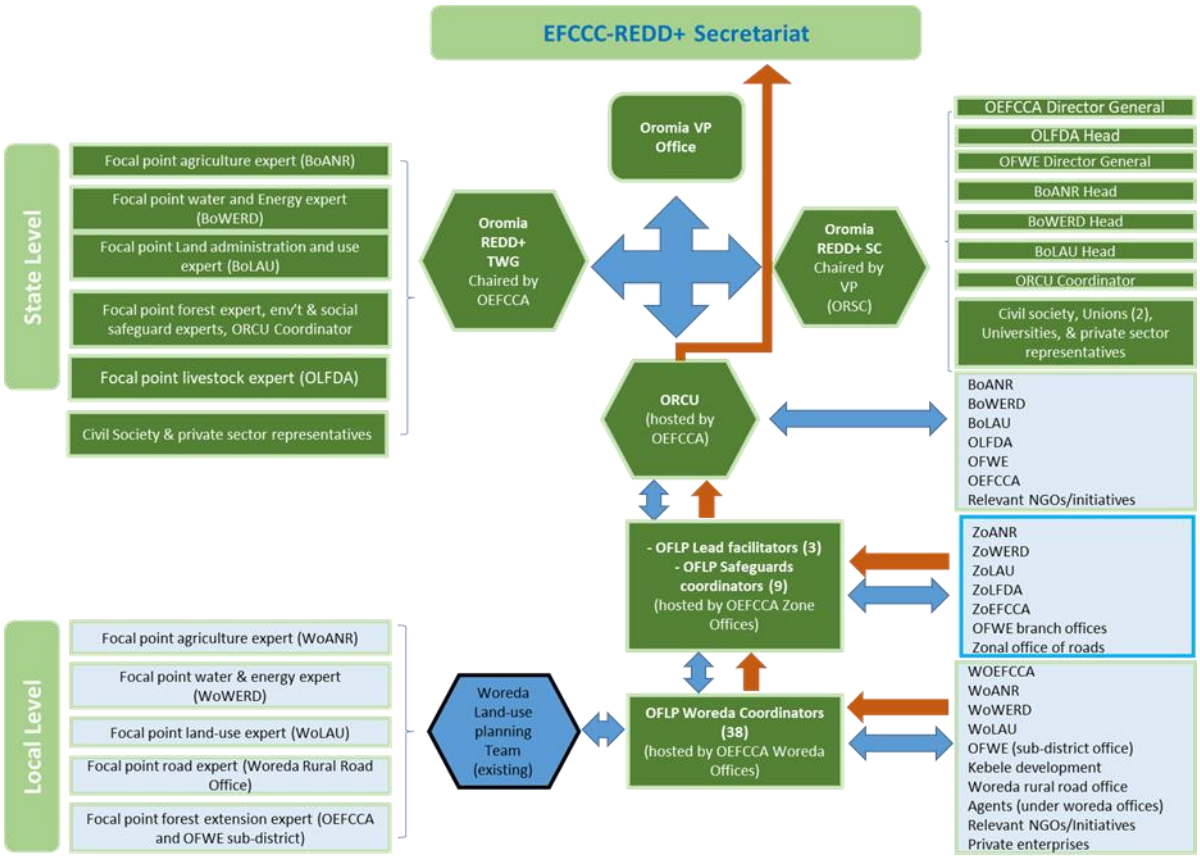


Figure 3. Overall OFLP Institutional Arrangement and Implementing Institutions (Source: OFLP program implementation manual). Note: Blue arrows indicate flow of Information, while Red arrows are OFLP reporting

Federal Level

Environment, Forest and Climate Change commission (EFCCC)

The EFCCC will provide strategic and policy guidance to OEFCCA (and as needed, to the vice president's office) and partners supporting the forest sector and land use to ensure coordination through the OFLP platform consistent with the REDD Strategy, GTP-2, CRGE Strategy, OFLP Financing Agreement, and OFLP PIM. The EFCCC will carry out a fiduciary oversight role through its National REDD+ Secretariat, in particular on MRV, project M&E, safeguards, financial management and procurement. Specifically, MEFCC will provide quality control, guidance and resolution of issues. The EFCCC will have ownership of the OFLP given that the program will be implemented in a pilot region from where lessons can then be learned and transferred and scaled up to other regions. The EFCCC will also administer the transfer of OFLP grant funds upon receipt from the Bank. It also convenes other relevant national and international stakeholders and

will help guide additional financing for forest related work toward the regional government's OFLP as the coordinating as needed.

The National REDD+ Secretariat

The National REDD+ Secretariat of the EFCCC will provide strategic and technical guidance on REDD+ issues, consolidate lessons learned from OFLP and disseminate experience in other regional states, and lead the development and implementation of the REDD+ MRV system which is key for the OFLP ERPA. The secretariat will need to work at the technical level with other relevant national stakeholders such as the Ethiopian Wildlife Conservation Authority (EWCA, as needed.

Ethiopian Wildlife Conservation Authority (EWCA)

EWCA is a key OFLP partner that is responsible for managing conservation lands such as in Bale Mountains National Park in the eastern Oromia. OFLP supports an emerging partnership between EFCCC, EWCA, the Oromia government, and woredas and kebeles bordering the park to coordinate actions on environmental and social sustainability. During OFLP preparation, a letter of understanding was signed between EWCA and OFWE outlining areas for cooperation in OFLP implementation including on the government's OFLP safeguards commitments.

Regional State Level

Executive of the Oromia Regional State (Vice President's Office)

Executive Oromia Regional State (Vice President's Office). The Vice President's Office will be the highest-level institution to provide political leadership and decisions to the OFLP, in particular on multi-sector implementation, policy development and strategy. The existing "advisor designated as bureau head" is the OFLP focal point assigned by the vice president. A second advisor will serve as a secondary OFLP focal point. This team will work closely with the OEFCCA/ORCU to help the OEFCCA fulfill its mandate to coordinate across sectors and stakeholders on OFLP implementation, leveraging of existing and future initiatives, strategic planning, funds mobilization and will advise on the functioning of the ORCU.

Oromia REDD+ Steering Committee (ORSC)

The ORSC will oversee and provide strategic guidance and leadership support to the OFLP, including by mobilizing sectors to coordinate and collaborate under the OFLP umbrella on "REDD+ relevant interventions" that affect OFLP goals. The ORSC will be chaired by the Oromia vice president and members will include Director General of OEFCCA (Member & Secretary), Director General of OFWE Head of Oromia Bureau of Agriculture and Natural Resource, Head of Oromia Public Enterprises Supervising Authority, Head of Oromia Bureau of Land Administration and Use, Head of Oromia Bureau of Water & Energy Resource Development Head of Oromia Bureau of Youth & Sport's Affairs, Director of Oromia Institute of Agricultural Research, President of Adama University, Dean of Wondo Genet College of Forestry & Natural Resources, Head of Chilimo Gaji Forest Management Union, Head of Farachu Forest Management Union (Adaba Dodola), Head of Oromia Bureau of Women's Affairs, ORCU Coordinator, Others if deemed necessary (members)

Representatives from civil societies, unions, universities, and the private sector will also participate. The coordinator of ORCU at OEFCCA will serve as the secretary of ORSC. The Oromia REDD+ Steering Committee will convene at least twice per year.

Oromia Environment, Forest and Climate Change Authority

The OEFCCA[4], through ORCU, will lead Statewide OFLP implementation. Specifically, OEFCCA will: (i) administratively host ORCU; (ii) administer the technical, financial and human resources of OFLP to be responsible for fiduciary management of OFLP; (iii) coordinate relevant bureaus, agencies and

[4] OEFCCA is established by the proclamation No. 199/2016 issued by the Oromia National Regional State council on July 20, 2016, its mandated include overseeing the forest sector in Oromia.

organizations implementing OFLP activities at regional, woreda and kebele levels; (iv) hire and maintain three OFLP lead facilitators and six OFLP safeguards coordinators in selected zones, and 38 OFLP woreda coordinators in selected woredas, and, and other OFLP staff with OFLP grant funds; and (v) with OFWE jointly implement grant-financed PFM and livelihoods activities in 51 deforestation hotspots woredas (sites not covered under OFWE concessions; sites are yet to be identified); and (iv) report on OFLP coordination and OEFCCA-led activities financed by OFLP.

Oromia REDD+ Coordination Unit

The ORCU[5] is OEFCCA`s OFLP implementing unit. In addition to implementing OFLP on a day-to-day basis, the ORCU serves as the secretariat for coordinating and aligning various sector initiatives under the OFLP umbrella. ORCU reports administratively to the OEFCCA, and also seeks strategic and tactical guidance from the Oromia National Regional State vice president, given the multi-sector nature of OFLP and land use challenges in the regional state. The OEFCCA/ORCU will be supported by the National REDD+ Secretariat at EFCCC which will carry out fiduciary oversight and quality assurance role, in particular on MRV, project monitoring, safeguards, financial management and procurement. Specifically, the EFCCC will focus on providing operational guidance to the OEFCCA to carry out OFLP related procurement, Financial Management (FM), and safeguards activities, quality control, guidance and assistance to resolve implementation issues. Specific accountabilities of ORCU include:

As the OFLP implementing unit within OEFCCA, coordinates and manages OFLP implementation including all day-to-day fiduciary requirements, regularly liaising technically with all partner agencies, NGOs and private sector actors involved in OFLP implementation.

- Carries out and consolidates safeguards implementation and reporting (assisted by OEFCCA).
- Carries out and consolidates FM and reporting (assisted by OEFCCA).
- Carries out and consolidates procurement management and reporting (assisted by OEFFCA).
- Carries out and consolidates Monitoring and Evaluation (M&E) for OFLP (each indicator in results framework and others, as government requires, and the program team desires).
- Directly implements specific Technical Assistance (TA) activities financed by the OFLP grant.
- Carries out joint annual work programming and budget process (with inputs from OEFCCA, OFWE, bureaus and other relevant entities) and preparation of the procurement plan.
- Sub-state ORCU OFLP team engages with woreda- and kebele-level officials (woreda administrators and experts, DAs) and other actors to coordinate OFLP interventions and related initiatives across sectors that have an impact on forests (promoting a landscape management approach).
- Facilitates coordination with OFLP-related initiatives (liaising with executive-level focal points and OEFCCA above, as needed).
- Ensures that ER verification is carried out through a third party.
- Ensures delivery, implementation, and reporting on the agreed Benefit Sharing Plan (BSP) for the OFLP ERPA.
- Carries out strategic communication through OEFCCA.
- Acts as secretariat for the REDD+ Steering Committee and REDD+ Technical Working Group and participates actively in meetings

Oromia Forest and Wildlife Enterprise (OFWE)

The OFWE remains a key implementing partner in OFLP owing to its experience with implementing PFM, preparing OFLP, hosting ORCU for two years, managing plantations, and large concessions where carbon-rich high forest and deforestation hotspots are located. Moreover, given its dual public and private mandates, the OFWE is cultivating private sector relationships. OFWE will be responsible for; (a)

[5] ORCU was set-up in May 2014 administratively hosted by OFWE to coordinate the preparation of OFLP until it was transferred to OEFFCA in December 2016.

implementing part of the OFLP financed PFM activities (only in sites within OFWE concessions) in accordance with the MoU signed between OEFCCA and OFWE; (b) planning, preparing, implementing, and reporting on activities financed by OFLP and reflected in the joint annual OFLP work plans and budgets; and (c) ensuring synergies between existing sector initiatives that affect OFLP and sector objectives. OFWE's structure is different from that of OEFCCA where the Branch level is the higher level, beneath which are the district and sub-district offices (there are eight branch offices in OFWE concession areas, one branch office may contain four to six district offices, but one district office may cover two to seven woredas. In OFWE concession areas, in total there are nearly 130 woredas.

Other regional OFLP implementing entities

Concerned regional bureaus include the Bureau of Agriculture and Natural Resources (BoANR), Bureau of Water and Energy (BoWE) and Bureau of Land Administration and Use (BoLAU). These bureaus will: (a) prepare, implement, and report on activities in the joint annual OFLP work plans through the coordination of the OEFCCA/ORCU; and (b) ensure synergies between existing sector initiatives that affect OFLP and sector objectives. These bureaus will also provide oversight support to their respective zonal and woreda offices.

The Oromia REDD+ Technical Working Group

The Oromia REDD+ technical working group (ORTWG) will be responsible for providing technical guidance and support in design, implementation, and monitoring, and ensure that the OFLP and REDD+-relevant interventions under the OFLP umbrella meet REDD+ technical requirements through a transparent review and outreach process. The ORTWG will be chaired by OEFCCA and members include sector experts from: OEFCCA (Chair Person), ORCU (Secretary) Oromia Vice President Office, Oromia Bureau of Agriculture and Natural Resources, Oromia Bureau Land Administration and Use, Oromia Enterprises' Supervising Agency, Oromia Bureau of Water & Energy resource Development, Oromia Agricultural Research Institute, Oromia Bureau of Livestock and Fishery Development, Oromia Bureau of Investment, FARM Africa, SoS Sahel, Environment & Coffee Forest Forum, Climate Change Forum – Ethiopia, Forum for Environment, Ethio-wetlands and Natural Resource Association, Ethiopian Environment & Forest Research Institute, Horn of Africa Regional Centre for Environment & Networking, Wondo Genet College of Forestry and Natural Resources, Farachu Rayya Forest Union, Chilimo Gaji Forest Union, National REDD+ secretariat, Other institutions if deemed necessary (members)

<u>Zone level</u>

Zonal OEFCA Office

OEFCCA will provide administrative and technical support to respective offices at zone clusters (each cluster is composed of seven zones and will be served by one OFLP lead facilitator) and woreda level as deemed necessary and share information that will improve and ensure coordination with other entities (that is, bureaus, zone offices and NGOs) operating at regional, zone, and woreda levels. Currently, there are 20 zone offices in the region.

Zone Administrations

Zone administrations include the zone administration offices and sector offices such as the zone office of Agriculture (ZoANR), zone office of water and and energy (ZoWE), zone office of land administration and use (ZoLAU), zone office of environment, forest and climate change authority (ZoEFCCA). These offices work closely together on day-to-day affairs, such as by overseeing the work of their respective woreda offices (agriculture, forests, water, household energy, and land use planning). Each office will also provide administrative and technical support to respective woreda offices who are directly implementing sector-specific OFLP activities (some directly financed by the OFLP and some REDD+-relevant initiatives). The zone level OFLP partner sector offices and their experts will be trained on the safeguards requirement of the program to ensure understanding and consistency in all sector operations. The heads of the ZoEFCCAs together with OFLP lead facilitators will lead the facilitation of the inter-sectoral coordination activities.

Progress will be compiled by the OFLP lead facilitators hosted at three selected ZoEFCCAs who will then aggregate the information to report to the ORCU.

OFLP lead facilitators

OFLP lead facilitators will be based in three selected ZoEFCCAs and will facilitate OFLP implementation to ensure that work on the ground is implemented as per the plan (the number of positions for the OFLP lead facilitators is three). The OFLP lead facilitators together with the heads of ZoEFCCAs will work closely with zone sector offices (one lead facilitator will serve zone cluster composed of seven zones) and ensure the required leadership support is being provided by the respective sector office heads to the OFLP woreda coordinators and that resources for the implementation of OFLP are provided in a timely manner. They will also provide technical and operational support to OFLP woreda coordinators and OFLP safeguards coordinators.

OFLP safeguards coordinators

OFLP safeguards coordinators will be based in six selected ZoEFCCAs and will closely work with the OFLP lead facilitators and respective zone environmental impact assessment (EIA) experts. They will all report to the heads of the ZoEFCCAs and ORCU's safeguards specialists to ensure that environmental and social safeguards are implemented according to the OFLP environmental and social safeguards instruments. They will also oversee the safeguards work of the OFLP woreda coordinators.

Local level (woreda, kebele)

The OFWE district office

The OFWE district office (covering two to seven woredas on average) will: (a) implement work on the ground financed directly by the OFLP, such as PFM within OFWE concessions in accordance with the MoU to be signed between OEFCCA and OFWE; and (b) report on implementation progress to OEFCCA/ORCU though OFWE.

OEFCCA woreda offices

OEFCCA woreda office together with other relevant woreda sector experts, including the DAs under them, will coordinate, oversee and implement a range of sector programs and operations. The OFLP woreda coordinators and the head of the OEFCCA woreda offices, together with the woreda administrators will: (a) reinforce woreda capacity to coordinate the implementation of land use related projects and operations that affect or are affected by the forest sector; (b) lead implementation of OEFCCA and other relevant sectors activities directly funded by OFLP financing; and (c) support safeguards management.

OFLP woreda coordinators

OFLP woreda coordinators is based in 38 selected WOEFCCAs and will be responsible for implementing OFLP at the woreda level, with each coordinator covering approximately seven to eight woredas. This work includes supporting the coordination of REDD+-relevant interventions across sectors/experts at the woreda level and NGOs (initiatives). Each OFLP woreda coordinator, in consultation with the head of WoEFCC, will be responsible for facilitating overall planning, implementation, and monitoring of the OFLP at the woreda level to ensure harmonization and integration of activities that are: (a) financed by OFLP directly; and (b) related initiatives in the woredas covered by the position. This requires working closely with the woreda administrators and various government officials and project teams that may be present in a particular woreda. They will also serve as the woreda-level safeguards focal persons of the OFLP to ensure safeguards implementation and compliance at the community levels (the estimated number of positions for OFLP woreda coordinators is 38). Their safeguards work will be overseen by OEFCCA/ORCU through its OFLP safeguards coordinators.

Woreda administrations

Woreda administrations include the woreda administration offices and sector offices such as the WoANR, WoWE, WoLAU, WoEFCC, and the OFWE district office where relevant. These offices are meant to work closely together on day-to-day affairs, such as by overseeing the work of the DAs in agriculture, water, household energy, and forests, working at the lowest administrative unit called kebele (village level). Each office will also implement sector-specific OFLP activities (some directly financed by the OFLP and some REDD+-relevant initiatives). The woreda-level OFLP partner sector offices and their experts will be trained on the safeguards requirement of the program to ensure understanding and consistency in all sector operations. Progress will be compiled by the OFLP woreda coordinator supported by the head of each WoEFCC, who will then aggregate the information to report to the OFLP lead facilitators at the ZoEFCCAs.

Land Use Planning Teams (LUPT)

LUPTs currently exist at the woreda level as part of a national land use planning initiative and are staffed by teams from the respective woreda sector offices. Given that rational land use is critical for the success of OFLP, the LUPTs can be strengthened by OFLP, as relevant, and used as a platform for coordination through the OFLP woreda coordinator together with the head of the WoEFCC and woreda administrator. As one of the key OFLP safeguards implementation arrangements, the existing environmental expert at WoEFCC will be trained and become part of the woreda LUPTs to support mainstreaming of the safeguard's requirements in all land use-planning-related issues of OFLP.

Development Agents

OEFCCA will, in the near term, rely on DAs under the authority of BoANR, who are located at kebele level to mobilize communities for natural resource development and forest and land management at the grass root level, until such time as OEFCCA has its own core of DAs in place under the respective woreda offices. The MoU is signed between OEFCCA and BoANR detailing how to deploy DAs to implement OFLP activities. The DAs will be in charge of engaging with communities for planning, implementation, and reporting relevant OFLP activities on the ground.

Civil societies, unions, and universities

Civil societies, unions, and universities in the OFLP structure can: (a) provide services to government institutions to implement projects or activities or (b) implement activities directly, outside the financial support of the Bank. One example of the former is Farm Africa, which is currently implementing the Bale Mountains Eco-regional REDD+ Project on behalf of the Federal Democratic Republic of Ethiopia (FDRE). In the case of the latter, the NGOs will work alongside the bureaus as above to: (a) prepare, implement, and report on activities in joint annual OFLP work plans through the coordination of the OEFCCA/ORCU, and (b) ensure synergies between existing sector initiatives that affect OFLP objectives.

The Private Sector

Private sector entities among others include, those involved in commercial forest development activities; wood processing industries (small, medium and large); entities investing in commercial coffee plantations and processing; commercial agricultural firms including cattle ranchers (for milk and beef); commercial honey harvesters and processers; commercial gum, spice and other forest product collectors and processors. Similar to activities of government entities and NGOs/CSOs, the private sector's investment work in Oromia shall be coordinated with the OFLP activities at cluster, zonal and woreda level working within these planning platforms ensuring landscape level sustainability and therefore, contributing to the objectives of the OFLP as same time ensuring sustained benefits to the program and the private sector themselves. Coordination also includes joint planning and monitoring of activity implementation. The MoU developed and signed at regional level will be extended to cluster levels bringing in the private sector to commitments and defined roles to play.

The analytics[6] commissioned by ORCU on Strategic Action Plan for Private Sector Engagement in the value-chains of selected commodities/products has revealed existence of several private sector investments activities in Oromia need to be coordinated with OFLP to get desired results. The commodities for which the value-chain analysis has been done include coffee, mango, Livestock (honey, poultry, forage and dairy), bamboo, spices, Improved Cook Stove (ICS) and charcoal. In addition, the challenges of private sector on its investment activities, the strategic options and implementation action plans have been elaborated in this study; the paragraphs given below briefly discuss on selected key private sector initiatives.

Private sector in coffee value chain

There are a large number of private companies, cooperatives, investors, individual farmers engaged in coffee production, and processing and marketing. According to data obtained from Oromia Investment Commission, there are about 120 investors engaged in medium and large-scale coffee farms, 164 private companies engaged in dry processing and 262 private companies engaged in wet coffee pulping. Relatively less number, about 60 private companies are engaged in export of coffee from the region. Only very few of these companies are involved in coffee roasting; the country exports most of its coffee as green beans.

The ISFL's partnership with Nespresso (PS) and Techno Serve through the IFC in Ethiopia, has been investing in the coffee sector since 2016. For instance, in calendar year 2018, 35 new wet mills were selected to enter the Nespresso AAA Sustainable Quality Program (AAA) 2018 cohort, the total between the 2017 and 2018 cohorts being 69 AAA wet mills. They received a full package of sustainability trainings, which included: Sustainability Standards Overview, Environmental Responsibility, Social Responsibility and Ethics, Occupational Health and Safety, and Gender Sensitivity. Over 18,000 AAA farmers from the 2017 Cohort are now considered fully trained as they have each attended at least seven of the 13 training topics. Over 31,000 farmers in the 2017 Cohort are registered as AAA farmers and have attended at least one training. 31 percent of the trained farmers in the 2017 cohort are women. The program seeks to hire many of the women it trains in its field school as agronomists who will later run trainings, in the hope that hiring female trainers will make other women more comfortable attending training sessions.

The AAA program also incorporated shade tree planting in the program design through distribution of shade tree seedlings and trainings. Shade trees contribute to improved coffee yields and quality and strengthen coffee farms' resilience to climate change, ensuring future sustainable coffee production.

The AAA program also trains individual farmers in climate-smart agricultural practices, including stumping of coffee trees, a technique that increases the productivity of the trees over time. The AAA Program achieves a "triple win," delivering high-quality coffee, improved livelihood opportunities for farmers, and better management of forests and landscapes. The approach creates synergies between the public and private sectors, helping companies achieve profits while creating positive development outcomes and protecting the environment.

Fruit and horticulture value chain

There are about 20 private companies licensed between 2007 - 2017 by Ethiopian investment commission (most of them in Oromia) to invest in fruit farming and processing and related activities. For instance, Africa Juice Tibila Share Company (in Oromia) is a major new joint venture between Africa JUICE BV, a Netherlands based company, and the Ethiopian Government. The Africa JUICE Tibila Share Company has ambitious targets to become one of the largest Fair Trade accredited tropical juice exporters in Africa by processing fruit in a newly constructed processing facility for export to Europe and the Middle East. Some of the other fruit and vegetable processing plants include: Merti Fruits and Vegetable Processing plant,

[6] ORCU 2019 "Strategic Action Plan to Engage Private Sector in Oromia Forest Landscape Program

Frutopia Fruits PLC, Yeshrun Horticulture PLC and Raji Agro-industry plc is in a process to establish mango processing plant at *loko* mango farm.

Over 95% of the total flower production in Ethiopia comes from Oromia Regional State[7]. Many areas within the region are suitable for floriculture but the Great Rift Valley, South West Showa and Oromia Special Zone including areas in the West Shewa are most appropriate. These areas currently host several flower farms with leading companies such as Sher Ethiopia, Red Fox and Syngenta. The *Koka* area within the Rift Valley hosts some 15 such floriculture farms generating hundreds of million dollars income for the country and for the region.

Dairy/cattle, poultry and feed value chain

More than 95% of the milk produced in the region comes from smallholder farmers but there are also several private and cooperative commercial milk producing belts. The leading commercial milk producing zones within the region are North Showa, East Shewa, Arsi, West Shewa and Oromia Special Zone Surrounding Finfinnee (Addis Ababa). Though many corridors within the region are suitable for dairy investment, Adama-Bishoftu including the Arsi highland, Selale-Fitche and West Showa corridors stand-out. The Oromia region contributes about 50% of all national milk production[8]. The main milk-shed areas within Oromia region are: Adama-Asella, Addis Ababa, Ambo-Woliso, Hawassa, Dire Dawa and Jimma areas. Private milk producing and processing companies in Bishoftu -Adama -Asela belt among others, the Holland dairy, Alema, Genesis, and the Alfa Farms and Agro Industries are key players. Most of the export abattoirs (Modjo Modern, Helmix, Organic, Luna etc) in the country are located in Mojo area of Oromia. In addition, big international players, VERDE Beef from the USA and Allana Group from India, are establishing meat processing in Batu (Ziway) area. The main market for meat and mutton products is the Middle East countries but the domestic market is also of high potential.

Based on data obtained from Oromia Investment Commission some of the private companies engaged in animal feed production and processing include: Alema Koudijs Feed PLC, Ethio-Feeds plc, Feedco Animal Feeds PLC, Koket Dry Feed Complex PLC, European Food and Cattle PLC, Sorga Agro- Industrial Complex Plc, Verde Beef Processing PLC, Alfa Fodder & Dairy Farm PLC, Ethio Agriseft plc, Wonji sugarcane producers' cooperative union, Gibe-Dedesa Cooperative union, Eden Forage producers, Tibebu Lema Kenaf Farm PLC, and Anatoli Forage and Forest Seed Supply PLC.

There are about 20 private large-scale commercial poultry production farms in and around Addis Ababa and about 20 new poultry farms in implementation and pre-implementation stages. There are also SMEs working on poultry production, and others work on feed preparation and distribution while some others work on both poultry production and feed preparation. In general, inputs Day Old Chicks, and per-mix supply is monopolized by few large companies. Some of the private companies include: Ethio-feed Import and Feed Ingredient; Elfora Agro-Industries Private Limited Company; Alema engaged in broiler chickens and layer chickens; Friendship Agro-Industries; Akaki Feed Factory; Genesis; Good Shepherd PLC; Ethio-chicken; Astral Foods and Feed Co., Alema Koudijs Feed PLC;, SAFE Poultry PLC; Freisian Agro Processing and Farming PLC; Mubarak Dafalla Gabril; Luigi Monsellato, Sadot Agri Food PLC, Jacobs Integrated Farm OLC and Preconex East Africa PLC.

Wood and wood product processing, and honey value chains

There are growing numbers of private sectors investing in wood products processing, though not in plantation development. According to data obtained from Environment, Forest, and Climate Change Commission (EFCCC), some of the privately owned wood processing industries located in the regions and around Addis Ababa are: TY wood factory, Zhao Xinwang wood product manufacturing, Zamu Plc, FANGQIU JIANG wood products manufacturing, A.M Pine wood works enterprise, Gong Zhenrong wood products manufacturing, Min-Sen wood products manufacturing and 3F Manufacturing Industry. In recent

[7] Oromia Investment Commission: http://www.oromiainvest.gov.et/index.php/opportunities/agriculture/floriculture.html

[8] Feasibility Study for Climate Smart Livelihoods Through Improved Livestock Systems In Oromia, Ethiopia

years there has been growing interest to invest in bamboo industries. The number of private investors engaged in bamboo processing is growing. Some of these bamboo processing industries include: Adal, African Bamboo, and SA established to produce bamboo flooring, roofing panel, blinds or curtains, table mats, incense sticks, tooth picks, briquettes and pellets. Some of the private sectors engaged in honey sectors include Ano Agro-industry Plc, Beza Mar Agro Industry, Green Face Trading PLC, Alem Honey Processing Industry, Tesfa Beehives Private Limited Group Enterprise, Yirgu Food Packer, Nile Development and Services PLC and Susan Food and Beverage PLC.

Renewable Energy (Improved Stoves)

Various types of improved cooking stoves are produced and distributed in different parts of the Oromia region some by a group of women organized in micro and small enterprises and some by private producers. There are three briquette producers, and a cooking stove manufacturing and assembling company owned by a South African and by an Ethiopian.

The ISFL Private Sector Engagement Strategy

Through the ISFL additional support and based on grant financed strategic analysis for engaging the private sector, short term to medium term investment priority areas were narrowed down for the program to work on benefiting both program objective and the private sector. The three priority areas identified for short term intervention are: (i) Commercial Forest Plantations (with outgrowers scheme), (ii) Coffee stumping and income compensation, and (iii) Climate Smart Dairy Production. Private sector engagement in these supply chains that are key to the sustainable socio-economic development of the region is expected to trigger positive impacts in terms of emissions reduction, changes in land use, biodiversity, livelihoods and reduction of pressure on forest over the medium to long term. These predicted transformational changes and potential impact over time depends on the evolving opportunities of the private sector in the country and enabling conditions to operate during the transition of Ethiopia towards a more market-based economy. The support to this private sector entry points is meant to catalyze and trigger private investments in these key supply chains, and the transformational change towards more sustainable production systems that will effect change and impact over time. The ISFL support for the private sector engagement entry points in Oromia can take various modalities including technical assistance for the implementation of policy reforms, feasibility studies, direct grant support to smallholder farmers, design of financial and business models, and training. This strategy also allows for the possibilities of fund leveraging from private sector and/or co-funding from existing development projects[9]. Through this initiative, the ISFL will invest US$ 4.4 million with co-funding of US$ 3 million coming from the private sector.

[9] "Private Sector Engagement Strategy" document

Section 3: ISFL ER Program Design

3.1 Planned Actions and Interventions in the Program Area, Including Financing

3.1.1 Drivers of AFOLU emissions and removals

In the CRGE Strategy Plan, it is estimated that in Ethiopia in the year 2010, around 87% of GHG emission comes from AFOLU sector: agriculture with roughly 50% and forestry with approximately 37%. These sectors have also the highest potential for GHG emissions reduction: they contribute around 45% and 25% respectively to projected GHG emission levels under business-as-usual assumptions and together account for around 80% of the total abatement potential.

The drivers of AFOLU emissions and removals in Oromia National Regional State are multi sectoral and multi-dimensional. The main drivers are Agricultural land expansion, increase in production, synthetic fertilizer use, fuel wood demand, forest coffee plantation & management, unsustainable logging & overgrazing, high demand for forest products (construction materials including furniture), ecosystem restoration (removal), lack of livestock value chain improvement, poor livestock management and weak extension services. Other drivers are a complex combination of economic issues, ineffective land-use planning and enforcement and inadequate cross-sectoral policy and investment coordination, technological & climate change factors; cultural or socio-political concerns; and demographic factors.

At the regional scale, AFOLU sectors represent an important source of emissions, being forestland remaining forestland (forest degradation), enteric fermentation from cattle, forestland converted to grassland and forestland converted to cropland (deforestation); and grassland converted to cropland represents the main sources as illustrated in the following figure 4.

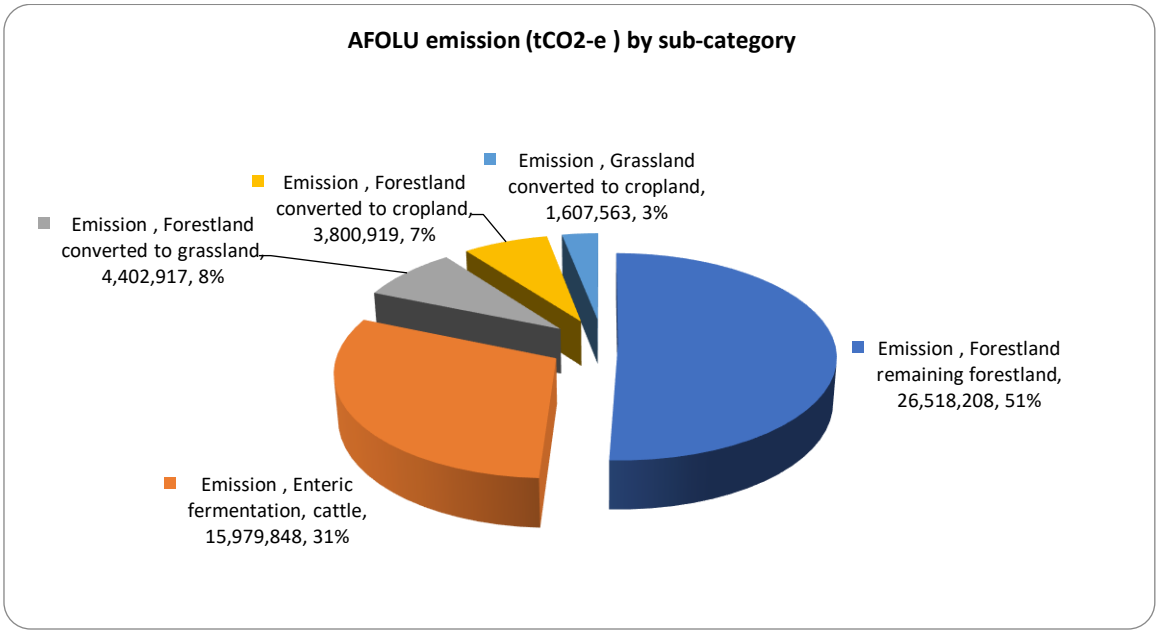


Figure 4. AFLOU emission & removal by category

The following paragraphs elaborate the summary of main drivers by sub-categories and detail descriptions are given in Annex 1: Drivers of AFOLU Emissions and Removals.

Forestland remaining forestland

Extensive extraction of fuel wood for commercial and subsistence purposes, forest coffee plantation & management, unsustainable logging and overgrazing are the major direct drivers in this sub-category. The underlining drivers being increase in population, socio-economic, ineffective policy implementation and enforcement, lack of effective land use plan & absence of clarity in forest tenure. With respect to drivers

for removal in this sub-category is mainly due to ecosystem restoration activities. In standing native natural forest, not only degradation occurs but also enhancement through ecosystem restoration. Interventions including participatory forest management (with enrichment planting and area enclosure), SLM initiatives and designation of forests as biosphere reserve could lead to enhancement and improved forest restoration (FARM Africa, EWNRA, OFWE, Yayu Biosphere Reserve, SLMP2, mass mobilization by the government, etc.). As a response to the decline of the natural forest area, a plantation program has been initiated on large scale to rehabilitate formerly forested areas, for construction and fuel wood production. Plantations are mainly of exotic tree species with few indigenous trees in few of the NFPAs (FAO, 1990, as sited in Forestry Outlook Studies in Africa, 2001[10]).

Enteric fermentation - cattle

Ethiopia has the largest livestock population in Africa and the fifth largest in the world. The Oromia Region has about 24.4 million cattle (CSA, 2018[11]), of which 45 percent is estimated to be dairy animals. The key driver in this sub-category is increase in cattle population. This is combined with low efficiency and relatively high emission intensity (i.e emissions per unit of product) specially in dairy cattle. Average GHG emissions estimation is 19 kg CO_2 eq/kg milk among mixed crop-livestock systems in Ethiopia against an average of ca. 9 kg CO_2 eq./kg milk in Sub-Saharan Africa (see Section 4: GHG Reporting and Accounting). Causes of the low efficiency include: Inadequate supply of quality feed, poor animal health due to disease prevalence, low livestock genetic make-up, poor manure management, low reproductive efficiency and weak herd management, limited adoption of improved livestock practices and poor provision of livestock support services and Low commercial market off-take due to inadequate processing and marketing infrastructure (FAO, 2017[12]).

Forestland converted to cropland and Forestland converted to grassland

The major direct drivers of forestland conversion to cropland and to grassland in Oromia are agricultural land expansion (small-scale subsistence, medium to large scale commercial) & increase in livestock population. The underlying drivers are a complex combination of socio-economic issues, ineffective land use planning, inadequate cross-sectoral policy and investment coordination, specifically changes in policies linked to land tenure and demographic factors (Unique 2014 and Climate Focus[13])

Grassland converted to forestland and Cropland converted to forestland (Removal)

The major causes of grassland & cropland conversion to forest land are; high demand for forest products (fuel wood & timber), high economic return from forest products and the need for restoration of degraded land. The other causes are increased emphases by policy makers for regreening andmultiple benefits of forests for ecosystem services including climate change mitigation & adaptation. In Ethiopia demand for wood is increasing owing to population and economic growth. However, domestic supply continues to decline due to deforestation and low level of investment in plantation forests. The state influences the actions of these agents through its institutions and legal framework. Accordingly, the state's policies are supportive of Afforestation/Reforestation undertakings for environmental restoration, including by NGOs, bilateral and multilateral agencies, while farmers' A/R activities are largely for economic gains (Mulugeta and Habtemariam, 2014[14]).

[10] Forestry Outlook Studies in Africa (2001)

[11] CSA (2018) Agricultural sample survey 2017/18, Volume II report on livestock & livestock Characteristics (Private peasant holding)

[12] FAO & New Zealand Agricultural Greenhouse Gas Research Centre (2017).

[13] Climate Focus. 2015. Legal and Institutional Framework for Oromia Forested Landscape Program. Final report, Addis Ababa.

[14] Mulugeta Lemenih and Habtemariam Kasa (2014), Re-Greening Ethiopia: History, Challenges and Lessons, forests ISSN 1999-4907

Grassland converted to cropland

Causes for grass land conversion to crop land in Oromia (also applies to the rest of rangelands/grass lands in Ethiopia) are many, having complex spatial and temporal patterns of LULC change varying across ecological zones of the region. The main direct drivers for emission from grass land to crop land conversion are farm land (cultivated land) expansion, increase in total crop production, growth in synthetic fertilizer use and increase in manure application in crop land (identical to abatement levers for soil as suggested in the CRGE). However, these direct drivers are highly factored by increase in demographics, unemployment/poverty, lack of proper land use planning and enforcement, government policy (commune system), climate change and others.

3.1.2 Description and justification of the ISFL ER Program's planned actions and interventions

Mitigation measures include creation of an enabling environment at regional (jurisdiction) level while addressing the drivers of AFOLU through targeted interventions. Major interventions to address the drivers of AFOLU include: i) agricultural intensification (CSA, irrigation, coffee plantation & management, etc.), ii) sustainable forest management (Participatory Forest Management, Afforestation/reforestation, Area enclosure, iii) sustainable livestock (cattle) production (improving rangeland management, improving quality and availability of feed resources, improving animal health extension services, improving cattle reproductive performance, improving breeds, enhancing and intensification of animal mix diversification) iv) energy efficient technology (cook stoves & biogas) and v) sound land use planning & tenure security, family planning service & increasing job opportunity, ensuring cross-sectoral coordination for improved outcomes, and effective coordination among investments (AFLOU mitigation measures, planned actions and interventions are described in detail in Annex 1: Drivers of AFOLU Emissions and Removals).

To achieve these broader interventions, OFLP follows a programmatic approach and provide a methodological framework to effectively coordinate all on-going and planned interventions to improve land-use management, livelihoods and to reduce land-use related emissions across Oromia Jurisdiction. To this end, the program implementation ensures multi-level and multi-actor coordination, not only of current interventions financed by the grant provided by the ISFL, but also other relevant interventions across the region for enhanced synergy, improved program outcomes and leveraging the financial gaps needed to achieve the ER program goals.

Table 4. Potential Emission Reductions per type of intervention[15]

Interventions	Type of intervention (sector)	Total ER (tCO_2)
OFLP - Forest management investment in deforestation hotspots	Forestry	1,168,869
Participatory Forest Management and Livelihoods	Forestry	211,044
Afforestation/Reforestation (total)	Forestry	957,825
REDD+ Investment in Ethiopia (2016 - 2020) Phase II	Forestry	28,908,654
Assisted Natural Regeneration	Forestry	26,760,000
Afforestation/Reforestation (A/R)	Forestry	1,827,500
PFM (Deforestation)	Forestry	321,154
Oromia Forest Sector	Forestry	4,784,344
Forest Resources Development, Conservation, and Sustainable Utilization of the OFWE - Afforestation (ha/year)	Forestry	2,741,250

[15] For a more detailed description of every intervention, please, refer to Annex 10 of the Project Appraisal Document on a Proposed Grant from the BioCarbon Fund Plus: https://www.biocarbonfund-isfl.org/sites/biocf/files/documents/Oromia-PAD-P156475-for-RVP-March-16-1-50pm-Clean.pdf

PFM	Forestry	1,988,094
Bale Eco-region REDD+ Pilot Project Phase II	Forestry	55,000
Enrichment planting	Forestry	55,000
National Biogas Program of Ethiopia (NBPE II and NBPE+)	Energy	270,000
Mass Mobilization for Natural Resource Management (NRM)	AFOLU[16]	102,200
Livestock and Fisheries Sector Support Project	Livestock	918,490
RLLP (Extension of SLMP 2 - Resilient Landscape and Livelihood Project)	AFOLU	2,164,898
REDD+ Joint Forest Management in Five Woredas in Illu Ababora Zone of Oromia Regional State Phase II Project	Forestry	123,874
Sustainable Land Management Project (SLMP 2)	AFOLU	6,552,000
Other interventions		
4B tree National Green Development Action Programme of Ethiopia	Forestry	
NICSP and Sustainable Rural Energy Technologies Project United Nations Development Programme (UNDP)/Global Environmental Facility (GEF)	Energy	NE
LIFT - Land Investment for Transformation (LIFT) Program	Land Tenure	NE
Certified Forest Coffee Production and Promotion Project	Agriculture	NE
PSNP 4 - Productive Safety Net Program	Livelihood	NE
AGP 2 - Agriculture Gross Program	Agriculture	NE
ILUP Study Project - Oromia Bureau of Rural Land Administration and Use (BoLAU)	Land tenure	NE
Nespresso-East Africa Coffee Project (Nespresso, IFC, and BioCF support)	Agriculture	NE
Lowlands Livelihood Resilience Project -LLRP (starting implementation)	Agriculture/Livestock	NE
PSIDP - Participatory Small-scale Irrigation Development Program II (PASIDP II)	Agriculture	NE
FEED II - Feed Enhancement for Ethiopian Development	Livestock	NE
Adaptation Fund Project (CRGE)	AFOLU	NE
PAID - Public Private Partnership in Artificial Insemination	Livestock	NE
Total		**45,048,329**

The table above is showing the emission reduction potential of activities that are under implementation or just starting projects with impact in the baseline emissions of the program. Some of these projects with unquantified ERs (last 13 initiatives listed in table above) could also generate some emission reductions (ERs), but it was not possible to quantify the exact magnitude of ERs given complex nature of project activities or lack of methodology to do estimation. As it can be seen, the list is not only including forestry-related activities but also other sectors: agriculture, livestock and energy, demonstrating the landscape scope of action of the Program.

On top of that and considering the risk of not having the expected results from the existing activities, Oromia Region has the intention to make sustainable use of the forest land under OFWE and OEFCCA jurisdiction. The current area under PFM is 1.3 million ha but the intention is to increase 270.000 ha with the support of OFLP and REDD+ Investment Project (RIP). In addition to that, there is an ambitious plan to include additional 163,000 ha per year of PFM (not yet funded) under the same management scheme, achieving additional 1,630,000 ha in the following 10 years and completing the total forest area under

[16] AFOLU: Agriculture, Forestry and Other Land Use

OFWE concession: i.e. 3,200,000ha. Beside this, there is also an intention to implement additional A/R activities (also not yet funded) in the region by adding 10,000 ha per year new plantation within the same time frame, achieving additional 100,000 ha at the end.

The already existing interventions and proposed actions are directly addressing Agriculture, Forestry and Other Land Uses´ drivers of emissions, not only during the Program´s lifetime but beyond. Moreover, the vision and the interventions are aligned with Ethiopia´s Climate-Resilient Green Economy, whose strategies focus to four pillars:

- Adoption of agricultural and land use efficiency measures[17]
- Increased GHG sequestration in forestry,
- Deployment of renewable and clean power generation
- Use of appropriate advanced technologies in industry, transport and buildings.

The OFLP is designed using grant resources, to leverage and attract new financing expanding the total envelope towards improved land use, forest retention, and forest gains. There is common understanding between the Government and development partners that a robust enabling environment is crucial to successfully implement a jurisdictional approach for ER payments and for leveraging and scaling up action, investments and initiatives on the ground. The OFLP will therefore serve as a "scale-up engine", as seen in Figure 2 and table above.

The successful implementation of the entire ER Program requires addressing the drivers of AFOLU across the regional state with the support of existing and planned interventions from other projects as described below per each category (Table 5).

Table 5. Sub-Category level drivers, mitigation/enhancement measures, and existing planned action & interventions

Sub-Category	Driver (emission & removal)	Proposed mitigation/enhancement measures	Existing & planned action & intervention

[17] The CRGE initiative has prioritized the following initiatives to limit the soil-based emissions from agriculture and limit the pressure on forests from the expansion of land under cultivation: 1) Intensify agriculture through usage of improved inputs and better residue management resulting in a decreased requirement for additional agricultural land that would primarily be taken from forests, 2) Create new agricultural land in degraded areas through small-, medium-, and large-scale irrigation to reduce the pressure on forests if expansion of the cultivated area becomes necessary, 3) Introduce lower-emission agricultural techniques, ranging from the use of carbon- and nitrogen-efficient crop cultivars to the promotion of organic fertilizers. These measures would reduce emissions from already cultivated areas.
To increase the productivity and resource efficiency of the Livestock sector, the following initiatives have been prioritized: 1) Increase animal value chain efficiency to improve productivity, i.e., output per head of cattle via higher production per animal and an increased off-take rate, led by better health and marketing, 2) Support consumption of lower-emitting sources of protein, e.g., poultry. An increase of the share of meat consumption from poultry to up to 30% appears realistic and will help to reduce emissions from domestic animals, 3) Mechanize draft power, i.e., introduce mechanical equipment for ploughing/tillage that could substitute around 50% of animal draft power, which – despite burning fuels – results in a net reduction of GHG emissions. 4) Manage rangeland to increase its carbon content and improve the productivity of the land.

Forestland remaining forestland	➢ Extraction of fuel wood for commercial and subsistence purposes ➢ Forest coffee plantation & management ➢ Unsustainable logging ➢ Overgrazing ➢ Ecosystem restoration; ➢ Ineffective land use planning & ➢ Forest tenure	➢ Small- & large-scale afforestation & reforestation (plantation); ➢ PFM; ➢ Cook stoves & biogas; ➢ Coffee intensification outside the forest area, coffee value chain improvement (processing - marketing), coffee certification; ➢ Improve value chain of non-timber forest products; ➢ Introduce wood industry & environmentally sound non-wood alternative technologies; ➢ Rangeland management, feed enhancement & improve livestock value chain ➢ Sound land use planning & law enforcement ➢ Clarity in forest tenure	➢ OFLP grant; ➢ OFWE regular interventions; ➢ BoANR (A/R & NRM mass mobilization); ➢ RIP; ➢ LLRP; ➢ SLMP 2/RLLP; ➢ PSNP IV; ➢ LIFT; ➢ NICP; ➢ NBPE(ORBP) ➢ NESPERSO ➢ REDD+ Joint Forest Management (EWNRA) ➢ Bale Eco-region REDD+ Pilot Project ➢ Coffee Forest Development Value Chain Project (FARM Africa)
Enteric fermentation	➢ Increase in cattle population; ➢ Inadequate supply of quality feed; ➢ Poor animal health & provision of livestock support services; ➢ Reproductive inefficiency & low livestock genetic make-up; ➢ Limited adoption of improved livestock practices; ➢ Poor manure management; ➢ weak herd management & low commercial market off-take	➢ Improving quality and availability of feed resources; ➢ Diversifying the animal mix; ➢ Improving animal health and husbandry; ➢ Manure management; ➢ Improving the genetic potential of local breeds & ➢ Cattle value chain improvement	➢ LFSDP; ➢ FEED III; ➢ LLRP; ➢ AGP; ➢ SLMP 2/RLLP & ➢ RIP

Forestland converted to cropland & grassland	➢ Agricultural land expansion (small-scale subsistence, medium to large scale commercial); ➢ Increase in livestock population; ➢ Socio-economic factors; ➢ Ineffective land use planning; ➢ Inadequate cross-sectoral policy and investment coordination; ➢ Land tenure and ➢ Demographic factors	➢ Aagricultural intensification; ➢ PFM; ➢ Sound land use planning & law enforcement; ➢ Afforestation/reforestation; ➢ Improving rangeland management; ➢ Feed enhancement; ➢ Family planning services & ➢ Multi-sectorial coordination	➢ OFLP grant; ➢ OFWE regular interventions; ➢ BoANR (A/R & NRM mass mobilization); ➢ RIP; ➢ LLRP; ➢ SLMP 2/RLLP; ➢ PSNP IV; ➢ LIFT; ➢ REDD+ Joint Forest Management (EWNRA) ➢ Bale Eco-region REDD+ Pilot Project & ➢ AGP
Grassland & cropland converted to forestland	➢ High demand for forest products (fuel wood & timber); ➢ High economic return from forest investment; ➢ Land degradation; ➢ Increased emphases by policy makers & ➢ Multiple benefits (ecosystem services)	➢ Small & large scale afforestation & reforestation (plantation) and ➢ Area enclosure (rehabilitation) ➢ Adopting sound land use planning & tenure	➢ OFLP grant; ➢ OFWE regular interventions; ➢ BoANR (A/R & NRM mass mobilization); ➢ RIP; ➢ SLMP 2/RLLP; ➢ PSNP IV; ➢ LIFT;
Grassland converted to cropland	➢ Farm land (cultivated land) expansion; ➢ Increase in total crop production; ➢ Growth in synthetic fertilizer use; ➢ Increase in manure application; ➢ Increase in demographics; ➢ Unemployment/poverty; ➢ Lack of proper land use planning and enforcement; ➢ Inappropriate government policy (commune system) and ➢ Climate change	➢ Agricultural (crop production) intensification (CSA & irrigation); ➢ Sound Land use planning policy and enforcement; ➢ Policy intervention in family planning, ➢ Women and youth development initiatives	➢ OFWE regular interventions; ➢ BoANR (NRM mass mobilization); ➢ RIP; ➢ LLRP; ➢ SLMP 2/RLLP; ➢ PSNP IV; ➢ LIFT; ➢ AGP & ➢ EWCA

3.1.3 Financing plan for implementing the planned actions and interventions of the ISFL ER Program

The following table is presenting the main activities that are under implementation in the region in coordination with the OFLP in order to address the AFOLU drivers as described in section 2.1.3.

The financing corresponds to the amount of budget that the OFLP needs to leverage in order to achieve the amount of ER by the end of the program period (2030). In most of the cases the funding for listed projects/initiatives is from development partner sources, and their implementation period is of short duration. However, there are some cases where some initiatives' funding duration cover the entire program period (through 2030); this is because such initiatives' budget comes from national or regional sources and is a continuous activity, e.g. Mass Mobilization under NRM program.

There is also a case where funding gaps is shown; this is particularly for more expansion of PFM (OFWE concessions & outside OFWE concession by OEFCCA) and A/R (by BoANR) activities.

Table 6. Financing plan for implementing the planned actions and interventions of the ISFL ER Program.

Planned action/intervention and timing or implementation	**Financing required (USD)**	**Financing identified/secured (USD)**	**Source of financing**	**gap (USD)**	**Proposed financing/measures to address gap**
1. Forestland remaining forestland					
Regional Improved Cook Stove Program (RICP)	2,000,000	0.00	N/A	2,000,000	Bi-lateral/multi-lateral funding agencies
Regional Biogas Program (RBPE II and RBPE+),	11,000,000	11,000,000	• European Union • The Netherland Ministry of Foreign Affairs • Netherlands Development Organization • Hivos International Organization-Netherlands • Other development partners to provide more resources for NBPE+		
Oromia Forest Coffee Value Chain Development Project – phase II (FCVCP-2)	400,000	400,000	• High water global		
Project for supporting Sustainable forest	4,000,000	4,000,000	• Government of Japan through JICA		

management through REDD+ and Certified Forest coffee production and promotion (CFCPP), JICA.					
Nespresso (Capacity building on coffee) & coffee value chain development	3,000,000	3,000,000	• Nespresso • IFC • BioCF		
2. Enteric fermentation					
Livestock and Fishery sector development project (LFSDP)	30,000,000	30,000,000	• World Bank IDA and BioCarbon Fund		
Feed Enhancement for Ethiopian Development - PHASE III (FEED III	1,300,000	1,300,000	• United States Department of Agriculture (USDA) under its Food for Progress program		
3. Forestland converted to cropland & grassland					
OFLP - Forest management investment in deforestation hotspots Participatory Forest Management and Livelihoods	2,137,785	2,137,785	• RETF grant (USDOS Child (47.5% and MoCE Child 52.5%)		

REDD+ Investment in Ethiopia (2016 - 2020) Phase II (Participatory Forest Management & livelihoods; Assisted Natural Regeneration)	12,600,000	12,600,000	• Royal Norwegian Embassy		
OFWE Forest Resources Development, Conservation, and Sustainable Utilization of the OFWE PFM Bale Eco-region REDD+ Pilot Project Phase II (see line 15) Enrichment planting	261,485,511	195,000,000	• Regional Government (OFWE)	66,485,511	Bi-lateral/multi-lateral funding agencies
REDD+ Joint Forest Management in Five woredas in IlluAbabora Zone of Oromia Regional State Phase II Project (Ethio Wetlands)	1,100,000	1,100,000	• Norwegian Agency for Development Cooperation		
RLLP (Extension of SLMP 2 - Resilient Landscape and Livelihood Project)	8,627,451	8,627,451	• International Development Association and Multi-donor Trust Fund		

Land Investment for Transformation Programme (LIFT)	26,462,532	26,462,532	• DFID • Bank-financed SLMP-1 and SLMP-2 have been financing the same activity since 2008		
Integrated Land Use Planning Study (ILUP)	20,000,000	10,000,000	• Government budget	10,000,000	Government budget
SLMP 2	16,000,000	16,000,000	• World Bank • GEF • Norway Ministry of Foreign Affairs • Global Environment Facility (GEF) • Least Developed Country Fund for Adaptation (of the GEF) • Kreditanstalt Für Wiederaufbau (KfW) • New EU support being prepared (2017) • New World Bank IDA support being prepared (2017-2018) • Other donors considering new support (2017-2018)		
4. Grassland & cropland converted to forestland					

A/R &Mass Mobilization for NRM (BoANR)	34,950,000	14,950,000	• Fully public government financing and community contributions. No external financing	20,000,000	Bi-lateral/multi-lateral funding agencies
OFLP - Forest management investment in deforestation hotspots (Afforestation/ Reforestation)	15,862,215	15,862,215	• RETF grant (USDOS Child (47.5% and MoCE Child 52.5%)		
REDD+ Investment in Ethiopia (2016 - 2020) Phase II (Afforestation/ Reforestation)	3,400,000	3,400,000	• Royal Norwegian Embassy		
5. Grassland converted to cropland					
Low Lands Resilience Project (2019 -2025)		55,800,000	• IFAD & IDA		
Agricultural Growth Project 2(AGP II)	100,000,000	100,000,000	• Swedish International Development Agency • Danish International Development Assistance • United Nations Children's Fund • World Food Program		
Participatory Small-Scale Irrigation Development Program II (PASIDPII)	46,496,000	46,496,000	• IFAD		

PSNP IV	500,000,000	500,000,000	• World Bank • United States Agency for International Development • DFID • European Commission • Government of Canada • Government of Ireland • Netherlands Development Association • Swedish International Development Agency		
Total	**1,156,621,494**	**1,058,335,983**		**98,485,511**	

See complete financing plan in Annex 2: Financing Plan for ISFL ER Program below. There are some differences between this table and Annex 2. For example, this table is only showing the actions to be implemented ant their direct cost, and the Annex 2 is listing all other costs and revenues.

3.1.4 Analysis of laws, statutes, and other regulatory frameworks

Ethiopia follows the federal system with highly devolved power to regional states. The regional states have the power to raise revenues, plan and implement their own development activities – including natural resources management – within the framework of the policies and proclamations issued by the federal government. The overall policy and legal framework are set in the federal constitution. Ethiopian Constitution (1995) vests the right to ownership of land and other natural resources, including forests, to the State and people of Ethiopia. The government administers land on behalf of the people. The constitution does not allow transfer of land rights through sales. However, it guarantees the right of Ethiopian 'peasants' and 'pastoralists 'to free allotment of land.

For sustainable management of land and forest resources, the federal government has issued proclamations, and the Oromia state has also issued regional proclamations and regulations. The Oromia Rural Land Use and Administration Proclamation (2007) provides framework for proper management and utilization of land and land resources. It entitles peasants and pastoralists with land use rights free of charge. It also provides private investors the rights to use rural land in accordance with the investment policies and laws at the Federal and State levels. The proclamation also provides framework for transferring land rights to individual users, communities, and private investors through issuance of land holding certificates and concessions; and the rights of individuals to transfer and lease land for which they have a certificate. However, it explicitly prohibits redistribution of rural land except for irrigated lands.

The Oromia Forestry Proclamation (2003) recognizes three types of ownership: state, private and community forests. The 2018 Federal Forest Proclamation has further expanded ownership types, adding Association forest. The Forest Proclamation gives priority to community if designation and demarcation of state forest results in eviction of the local community. It also emphasizes the participation of local communities in the management of state forests and sharing of the benefits. Forest use rights can be granted to communities or investors and are similar in substance to general land use rights.

On top of that, the 2018 Federal Forest Proclamation provides legal provisions that create enabling environment for the planned and on-going OFLP interventions. The proclamation recognizes participatory forest management for community engagement, participation in forest management and decision making; the right for fair and equitable benefit sharing (including benefits from carbon trading); and legal framework for engaging the private sector in forest development (through a form of concessions) and investment in forest carbon. In fact, there are gaps in the legal and institutional policy framework, particularly about land-use policy/planning which has significant implication on forests, forest lands and their management, carbon ownership, among others.

3.1.5 Risk for displacement

The OFLP is a jurisdictional and overarching program that intends to coordinate all land-use related programs in the region. The accounting area is the entire region (wall to wall), hence emission displacement and leakage estimation within the program area is impractical due to jurisdictional nature of the program. Within the program area there are numerous activities that are being implemented and will be implemented that will address the drivers of AFOLU emissions and removals (see section 3.1.2 above for more details). Moreover, the enabling policy, legal and institutional conditions put in place region wide as part of the program, will avoid displacement of emissions outside the region. In addition, to prevent cross-regional leakage, many of the initiatives listed in table 4 and 5 above are investing in regions bordering Oromia, such as Gambella, Benishangul and SNNPR, which together form the south western forest block. Given that there could be reduced risk of displacement, a brief risk analysis and practicality for estimation of leakage of emissions is presented as follows:

As constrained drivers of deforestation, for example, the conversion of forestland to small-scale agriculture ccould be displaced to areas "close" to the boundary of the OFLP. It is expected that a mobility analysis would suffice as the land selection criteria is usually not based on opportunity cost but accessibility. Monitoring leakage for the OFLP could be difficult in Woredas bordering with the SNNPR, Gambella and Benishangul Gumuz as these would require conducting analysis out of Oromia (with definition of baseline). Furthermore, considering that other initiatives have similar operations in the remaining moist forests of the South West bordering OFLP, there wouldn't be similar forests where to displace, so it is expected that leakage would be negligible.

Regarding unconstrained drivers, for example, wood extraction for commercial purpose (mainly fuelwood and charcoal production), could be displaced elsewhere so it would be difficult to know the area where these would be displaced and consequently it would be difficult to monitor and estimate leakage of emissions. In addition, unconstrained drivers are not expected to be predominant and that possible emission sources would be negligible.

Possibility of emission displacement from other AFOLU sectors (agriculture and livestock) to other regions is expected to be negligible too due to the same factors described above and social limitations. Overall, monitoring of leakage beyond OFLP's program area (past regional borders) would be impractical given the existing socio-political limitations mentioned above and its impracticality mainly because occurrence of displacement is expected to be negligible.

3.2 Description of stakeholder consultation process[18]

Stakeholders' consultation and participation is a basic requirement for successful implementation of the Program. ORCU has prepared a consultation and participation plan (CPP) for the OFLP which is being used for structured and consistent community and stakeholder consultations throughout the jurisdiction. As per the CPP, a range of relevant actors, including communities, government and non-government actors, at different administrative levels were engaged during the program design and being continually involved in the program implementation process. Issues discussed during the engagement included identification of the drivers of deforestation and forest degradation, the key interventions to address those drivers and the benefit sharing modalities, among others. ORCU will revise and amplify the CPP to serve for future consultation covering the entire AFOLU sectors (Ag and livestock). The revised CPP will be used during subsequent ERPA phases to ensure consistency in conveying message and documentation and the application of the benefit sharing plan (BSP) as per the AFOLU requirements.

The principles for a comprehensive stakeholders' consultation and participation of OFLP are laid on (i) support development of the more relevant, effective and coherent strategies by considering the views and interests of all stakeholders; (ii) enhance ownership of program strategies; (iii) increase accountability; (iv) reduce conflicts through improved relationships; (v) raise profile and greater support to ER the entire landscape (AFOLU); and (vi) share knowledge. In order to reach a larger number of stakeholders across Oromia, the OFLP information sharing and consultation to date were conducted at all levels of the government structure covering regional, zonal, woreda, kebele and village levels. At regional state level, a regional Task Force (TF) has been formed, composed of a team of four to five people, which were represented by core sectors and which are also members of the Oromia Regional Technical Working Group. The core sectors are: (1) agriculture and natural resources, (2) energy, (3) land administration and use (4) forest and (5) livestock. The Task Force also included one representative from CSO/NGOs, and it was chaired and facilitated by the Oromia REDD+ program

[18] The season and date of consultation is a factor in getting both women and men. Regarding the OFLP safeguards instruments preparation and subsequent consultations held so far at d/t administrative levels, there were no specific barriers identified which hindered participations/consultations of women. This will be further explored in the upcoming gender analysis.

coordination unit (social safeguard specialist). Similarly, at zone and woreda levels, task forces comprising representatives of similar sectors were established. The Consultation structure at different levels and their roles are shown in the figure below:

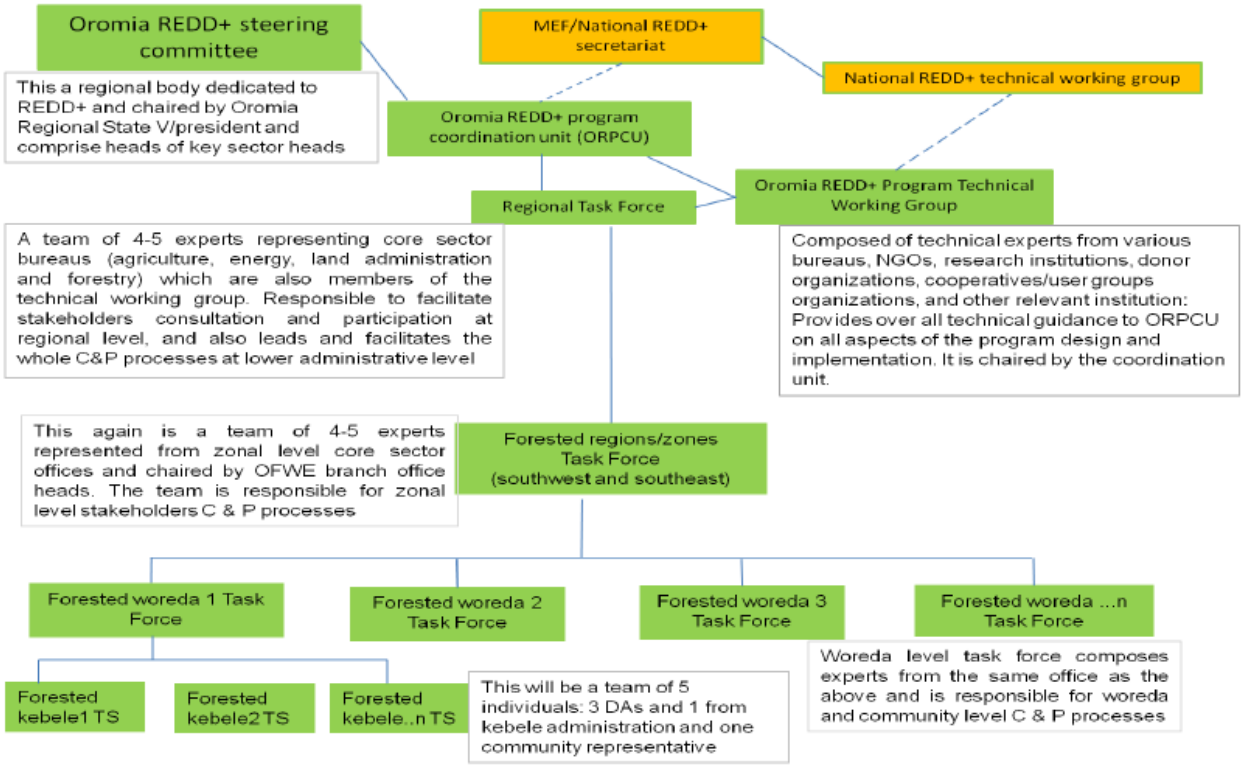


Figure 5. Structure of Consultation and Participation for the OFLP. Source: Oromia REDD+ Program Consultation and Participation Plan, final report 2015.

Initially, during the C&P design, stakeholders' analysis and mapping were conducted, and issues for consultation and participation were identified. The identified issues for C&P include, but are not limited to (a) Climate change: causes and impacts; (b) forests and climate change- roles in adaptation and mitigation (including ecosystem services; PES-REDD+ mechanism); (c) OFLP grievance redress structure; (d) Oromia forest sector (trends of forest resources, drivers of deforestation and forest degradation, and their respective agents); (e) institutional and governance arrangement for OFLP; (f) strategic options to address drivers of deforestation; (g) OFLP and national SESA (principles and practices in REDD+ implementation, role of stakeholders, benefits, risks, risk mitigation measures, carbon right/forest tenure, benefit and cost sharing); (h) Re-check and confirm if the institutional arrangement adopted is effective; (i) take a proactive discussion on gender roles; (j) reflect on effectiveness of conflicts management and grievance redressing procedure; (k) MRV- including the role and involvement of Community; (l) discuss on all relevant issues to be raised by stakeholders as well as issues identified by ORCU; (m) participatory monitoring (MRV) processes; and (n) monitoring of the effectiveness of the various structures including the C&P management structure, grievance structure and governance arrangement for implementing OFLP. As it can be seen, the focus has been put on forest and cropland sectors. ORCU will improve the C&P plan to include other categories or sectors as per AFOLU requirements.

The consultation materials including the FGRM operational procedures have been translated in to Afan Oromo language to ensure common understanding in the consultation using appropriate language.

Depending on the administrative for consultation and the educational status of the stakeholders for consultation, different participatory methods and tools were employed. These include, among others,

meetings, workshops, interactive media (talk shows) programs and publicity messages, printed materials (posters, leaflets), displays and exhibits, local drama and community and national/regional TV and radio programs.

ORCU and the Task Forces document and prepare minutes of all C&P meetings and panel discussions. The documents shall be made available on the project website, which is helping in collecting feedbacks by allowing interactive system for comments. Further, information shall be prepared, printed and distributed regularly as pamphlets, brochures, leaflets, posters and other essential media. ORCU also synthesizes and extracts lessons from the C&P process and communicates them to all stakeholders. All responses and views are analysed by the coordination unit and shared with national REDD+ secretariat, regional Task Forces, national Task Forces and working groups and Steering Committee for future consideration.

A total of 491,127 local community members (including men, women, and youth, forest dependent communities) were consulted across the regional state of Oromia to date (447,280 males and 43,847 females). In the same line, a total of 840 stakeholders (810 males and 30 females) drawn from government and non-government actors at zonal and regional level were consulted on similar issues. On top of these consultations, additional stakeholder engagements forums on the national REDD+ strategy with a focus on the region-specific issues were conducted at regional and local level. A total of 1,263 stakeholders (1,183 local community members and 80 government and non-government actors) were engaged (1130 males and 133 females). The season and date of consultation is a factor in getting both women and men for consultation. Regarding the ESMF, SESA, BSP, RPF instruments preparation and subsequent consultations held so far at different administrative levels, there were no specific barriers identified which hinder participation of women and forest dependent communities.

A detailed list of stakeholders engaged in different stages of the program design is available at https://ethiopiareddplus.gov.et/redd-readiness/redd-safeguards/consultation-participation/summary-report-of-consultation-and-participation/

3.3 Non-carbon benefits

Monitoring and Evaluation of the ISFL Emission Reductions Program will be undertaken through an Emission Reductions Monitoring Report., which will include the following indicators. These are taken from the ISFL MELF.

Table 7. Non-carbon benefits indicators

Indicator
T2.O2.2 Number of people involved in income generation activities due to ISFL support (% women)
T2.O3.1 Volume of for-profit private sector finance leveraged to contribute to ISFL objectives
T2.03.2 Volume of not-for-profit finance (public or private) leveraged to contribute to ISFL objectives
T2.O3.3 Number of people in private sector schemes adopting sustainable practices

Optional indicators are being discussed if included to the discretion of the M&E Specialists. The optional indicators are under the consideration of the GoE.

Table 8. Tier 2 Optional indicators: non-carbon benefits (to be included in non-carbon benefit annex)

Indicator

Outputs to achieve Outcome 1
T2.O1.a Total land area brought under sustainable management plans as a result of ISFL support, including where relevant: forest plans, biodiversity plans, land use plans, other
T2.O1.b Total land area under sustainable landscape management practices as a result of ISFL support, including where relevant: forestry, agriculture, other *(CRI, FAP)*
T2.O1.c Land users who have received training for improving land management (% women)
T2.O1.d Land users who have received training for agricultural productivity (% women)
T2.O1.e Reforms in forest and land use policy, legislation or other regulations as a result of ISFL support
T2.O1.f Government officials who have received technical training on ISFL interventions
T2.O1.g Number of government institutions provided with capacity building to improve land use management
Outputs to achieve Outcome 3
T2.O3.a Number of partnerships established with for-profit private sector organizations due to ISFL support
T2.O3.b Number of partnerships established with not-for-profit organizations/ initiatives (public or private) due to ISFL support
T2.O3.c Number of engagements established with for-profit private sector organizations due to ISFL support
T2.O3.d Number of engagements established with not-for-profit organizations/ initiatives (public or private) due to ISFL support
T2.O3.e Number of coordination platforms supported

3.4 Description of the Feedback and Grievance Redress Mechanism (FGRM)

As part of risk mitigation measures, the ERP would support citizen's complaints or grievances in a formalized, transparent, cost effective, and time bound manner. All program-affected people would be informed about how to register grievances or complaints, including specific concerns on any ER activities. As part of the OFLP grant (P156475), the enabling environment component is supporting the establishment and strengthening of a feedback and grievance redress mechanism (FGRM). The detail operational procedure for the FGRM was developed based on the principles outlined in the OFLP SESA, ESMF, RPF, PF and other safeguard instruments which will be used for the ERPA period as well.

OFLP's Grievance Redress Mechanism (GRM) is an integral element of Program management and national GRM that intends to seek feedback from beneficiaries and resolve complaints on program activities and performance. Grievances may arise from members of communities who are dissatisfied with (i) the eligibility criteria, (ii) community planning and resettlement measures, or (iii) actual implementation of program activities.

Grievances will be actively managed and tracked to ensure that appropriate resolution and actions are taken. OFLP grievance procedure does not replace existing legal processes. If the grievance

procedure fails to provide a result, complainants can still seek legal redress. OFLP grievance redress mechanisms are generally categorized into three broad classes as **traditional**, **religious** and **formal**.

A grievance mechanism may follow these steps: (1) receive and register a complaint; (2) screen and validate the complaint; (3) develop a proposed response; (4) communicate the proposed response to the complainant and seek agreement on the response; (5) implement the response to resolve the grievance; (6) close out or refer the grievance; and (7) disclose the feedbacks to the public.

Feedback and Grievance Redress Mechanism (FGRM): As part of safeguards risk mitigation measures, the OFLP instruments have incorporated mechanisms[19] for grievance redress into its design and implemented accordingly across the region to support citizen's complaints or grievances in a formalized, transparent, cost effective, and time bound manner. As part of the OFLP grant (P156475), the enabling environment component is supporting the establishment and strengthens of a FGRM, which will be used and strengthened during the ERPA period as well. The detail operational procedure for the FGRM developed based on the principles outlined in the OFLP SESA, ESMF, RPF and PF. ORCU has prepared communications materials, including brochures, for awareness creation and sensitization which explain about the FGRM value chain, focal points, the process and timeline. The FGRM being supported through the grant will be sustained during the ERPA period.

Traditional GRM- *The Oromo Gadaa System*- The *Luba* elders (aged 40-48) are responsible for redressing grievances within the community or among groups and individuals, and they shall apply the traditional laws dealing with the distribution of resources, criminal fines and punishment, protection of property, theft, etc. The indigenous/traditional mechanism is the best in redressing grievances both within the community and with the government and/or neighbourhood communities. The Gadaa system is one of the best indigenous tools used to harness grievances that arise over the management and use of natural resources.

Religious GRM- *Shari'a Court*- is a system that is run by local Muslim communities. When traditional GRM fails, the case is referred to the Shari'a court. Communities and individuals who are not satisfied by the traditional and/or religious GRM can take the case further to the formal GRM. In such cases, the traditional/religious grievance redress systems could refer the case to the next formal GRM by the community or individual.

Formal Grievance Redress Mechanism- consists of Arbitration by appropriate formal institutions at Kebele, Woreda, Zone and *Regional Public Grievance Hearin*g Offices (PGHO) in Oromia. Those include Social Courts, Courts, the Office of the Ombudsman, the Ethiopian Ethics, Anti-Corruption Commission (EACC) and the Ethiopian Human Rights Commission (EHRC).

Social Courts (Shengo) operate at Kebele administration all over Oromia region and redress grievances at grass root level. Social courts represent a fundamental and irreplaceable tool for quick and affordable dispute settlement at the kebele level. Social courts have jurisdiction over minor cases of up to 1000 ETB.

Courts are formal state judiciary system that may be viewed as external to the parties involved in the grievance. The modern court established at woreda level accomplishes the issues of grievances that arise in the community. This court handles both civil and criminal cases. The decision made at woreda court abides to the parties involved in grieves with their rights reserved to take to the case into the next higher-level court by appeal.

[19] The mechanisms for grievance redress include (i) Grievance Redress Service: This is a corporate-level service of the Bank available to communities and individuals who believe that they are adversely affected by a Bank-financed project; and (ii) This is an OFLP-specific mechanism for addressing complaints/ grievances arising from activities under the program. Both mechanisms are addressed in the OFLP PAD, safeguards instruments and detailed in the PIM.

The Office of the Ombudsman*:* is established to bring about good governance that is of high quality, efficient and transparent, and is based on the rule of law, by way of ensuring that citizens' rights and benefits provided for by law are respected by organs of the executive. The Institution has a jurisdiction over executive organs of the federal as well as regional governments. It is an organ that protects citizens from maladministration.

Ethiopian Ethics and Anti-Corruption Commission (EACC)*:* has no jurisdiction to entertain citizen complaints involving maladministration. The enforcement jurisdiction of the EACC is limited to prosecuting or causing the prosecution of serious ethical breaches and corruption that constitute violations of the penal code.

Ethiopian Human Rights Commission: The EHRC offers advisory services and has a decision-making power. It only investigates issues relating to violations of fundamental human rights which will exclude the great majority of complaints of maladministration.

World Bank Grievance Redress Service: Communities and individuals who believe that they are adversely affected by a Bank-supported project may submit complaints to existing project-level GRMs or the Bank's GRS. The GRS ensures that complaints received are promptly reviewed to address project-related concerns. Project-affected communities and individuals may submit their complaint to the Bank's independent Inspection Panel which determines whether harm occurred or could occur as a result of the Bank's non-compliance with its policies and procedures. Complaints may be submitted at any time after concerns have been brought directly to the Bank's attention and after the Bank management has been given an opportunity to respond. For information on how to submit complaints to the Bank's corporate GRS, visit http://www.worldbank.org/GRS. For information on how to submit complaints to the Bank's Inspection Panel, visit www.inspectionpanel.org.

3.5 Assessment of land and resource tenure in the Program Area

3.5.1 Description of land and resource tenure regimes in the Program Area

The importance of clarifying and addressing land and forest tenure issues for successful implementation of the program has well been recognized by the government of Ethiopia and the State of Oromia Region. Addressing tenure issues is pivotal for the program, since landholders must have the authority to make land use decisions and defend their forest land against outside claimants or other agents of land use change. Land and forest tenure determine who can use what resources, for how long and under what conditions. Thus, addressing tenure issues will not only assist to realize the OFLP initiatives but also contribute to sustainable forest management in general. Clarifying and addressing forest tenure issues are particularly important in the context where most of the forest resources are managed as a communal tenure. Communal tenure refers to situations where groups or communities have well defined, exclusive rights to jointly own and/or manage areas of natural resources such as land, forest, and water. For instance, in Oromia over one million hectares of forests are currently managed under Participatory Forest Management (PFM) arrangement, which is one form of communal tenure (FDRE, 2017). In communal tenure, both the boundaries of the resource owned in common and group membership are clearly defined. These are necessary conditions to exclude outsiders and to secure the rights of group members so that these rights cannot be taken away or changed unilaterally. Besides communal tenure, private and state are common typologies of property regimes in Ethiopia. Clear and secure forest tenure is critically important with the emergence new wave of incentive-based policy instruments such as PES (payment for ecosystem services) and REDD+.

Cognizant of this fact, ORCU and other institutions participating in the implementation of OFLP have decided to assess legal and policy framework governing rights to forest tenure, access and use, and its

application in the National Regional State of Oromia20. The report presents the assessment results of legal and policy framework on how land and forest tenure rights are recognized, supported, and protected by the existing legal system and implemented in practice in Oromia. This study employed four data collection approaches: (i) systematic and in-depth document review; (ii) interviews with key stakeholders/knowledgeable individuals; (iii) participatory consultations with selected CBOs and representatives of communities at grassroots level; and (iv) policy dialogue with key decision makers.

According to the federal constitution, land belongs to the people of Ethiopia and the State, and the State administers land on behalf of the people of Ethiopia. All land and natural resources in Oromia are administered by the State on behalf of the people. Both the federal and regional land administrations entitle rural farmers and pastoralists to land-use tenure rights. In Oromia, rural farmers and pastoralists residents are entitled to receive land use rights free of payment[21]. This right only applies to agricultural land and no equivalent right to receive forest land exists. However, land holders can develop forest on parts of their land that are not used for agriculture, for which they get forest tenure right. Land use rights cannot be sold or exchanged, though they may be bequeathed and up to half of the land may be leased.[22]

The Oromia forest proclamation recognizes three different types of forest land ownership: private, community and State forests. The new federal forest proclamation issued in 2018 recognizes an additional fourth category of ownership- association forest. Both federal and regional forest proclamations have provisions that allow community rights to state forests that are granted to community organizations, or on communal land. Community organizations have the right to use the forest sustainably (in accordance with agreed utilization schedules and use right certificates) and to protect it from encroachment. Besides such legal provisions, rangelands are traditionally owned by community members in pastoralist areas and administered by Gadaa institutions.

Both Federal and Oromia land proclamations provide for land use rights holders to be provided with holding certificates demonstrating proof of right. The land proclamation does not distinguish between different forms of land, such as forests, agricultural land and watershed land, though the regulation does provide some distinctions. The law provides for the provision of certificates to communities and organizations as well as individuals. In practice, however, certification focused on agricultural land. Most communal lands have not been issued with certificates. In recent years, there is increasing trend of issuing individual and communal certificates of managed forests. Over the past couple of years, individual land holding certificates were issued to small holder farmers managing parcels of forest for coffee production. Besides, certificates are also being issued to community organization.

Major gaps in clarity of tenure rights are:

- Lack of clearly defined guidelines for implementing land registration and certification process.
- Limited focus on land certification in forest areas- due to the absence of formally adopted guidelines and the reluctance of OFWE to consider certification in areas under its mandate.
- The possibility of redistributing land following irrigation infrastructure development.
- The inability to transfer ownership creates some insecurity for private investors.

For successful implementation of OFLP, it is recommended to adopt clear guidelines on the implementation of the communal land certification processes; to clarify that communal certificates can be granted for PFM; and to provide greater security to private investors in forest activities. This

[20] Assessment of legal and policy framework governing forest tenure in Oromia National Regional State, ORCU 2019, an assessment executed by ORCU by hiring individual consultant and using the Governance of Forests Initiative (GFI) framework, which is developed by the World Resources Institute. The draft report has been passed through appropriate consultations and validation workshops including government officials, communities, COBs and other pertinent stakeholders.

[21] Oromia Rural Land Use and Administration Proclamation (2007), Article 5.

[22] Ibid, Article 6.

will have a lasting impact by improving tenure security rights of individual farmers, community groups and private investors.

There are two main areas that are subject to significant conflicts:

1. Communal forest/grazing areas in pastoralist communities like Borana- they are communally used, but there is an increasing acquisition by individuals for farmlands and exclusive grazing enclosures[23].
2. Forest areas managed by individual coffee farmers. Such forests are used by individual farmers, but they are natural forest areas considered as State forests under OFWE concession. Most of such forests are mainly for coffee production, but they fall within natural forest blocks under OFWE concession.

These were identified as challenges in the program design and were addressed properly. Coffee forests managed by individuals are being given use right certificates with obligations of sustainable forest management practices. The program also proposed/planned to begin a group certification for communally owned/managed lands, giving due recognition to customary rights. Hence, the impact of the program on existing land and resource tenure- it is an improvement for the rights regime for individuals and groups/communities.

3.5.2 Implications of land and resource tenure assessment for program design

Please describe (roughly 300 words or less) how the outcomes of the land and resource tenure assessment have been incorporated in program design, including how the planned actions and interventions will address issues identified in the assessment. [Corresponds to ISFL ER Program Requirement 3.5.1]

The OFLP design has considered outcomes and recommendations of various preparatory studies, including land and tenure assessments. To address concerns related to weak land and forest tenure security, OFLP will complement the GoE's effort on rural land certification by coordinating with related projects to finance relevant activities outside the scope of the OFLP, and by including both individual land and communal forest land certification. OFLP has adopted PFM as one of the forest management investments in prioritized deforestation hotspot woredas in Oromia. Through promotion of PFM, the Program addresses perceived lack of tenure security by transferring or promoting joint forest management rights to communities by using defined contracts. PFM is used to describe systems in which communities and government institutions providing technical services in the forest sector work together by defining the rights of forest resource use, identifying and developing forest management responsibilities, and agreeing on how forest benefits will be shared. The PFM approach rests on the premise that people will conserve forest resources if they have secure user rights to the forests, if they gain more benefits by retaining forest resources and if these benefits are directly linked to the existence of the forest. The Program will support efforts to develop legal ground of PFM through adoption of PFM regulation at the regional state level. Besides, OFLP will also coordinate with other projects on PFM and watershed management.

Through implementation of PFM in forested areas and provision of land-use planning support across Oromia, the Program promotes improvements of forest and land tenure security for individuals, community groups and investors.

[23]John McPeak, Peter Little, Adi Greif, Kate Marple-Cantrell, Aleta Starosta, and Heather Huntington. 2016, Impact Evaluation of Ethiopia Land Administration to Nurture Development: Report on Baseline Findings. USAID

3.6 Benefit Sharing Arrangements

3.6.1 Summary of Benefit Sharing Arrangements

The 'Benefit Sharing Plan for Disbursing Result Based Payments from the proceeds of the ER Program has identified the following eligible stakeholders for sharing benefit from OFLP:

(i) the community that resides nearby and inside forests,
(ii) Federal and Regional governments, and
(iii) The private forest developers.

Private developers encompass those licensed as individual investors, private corporations, as well as business associations and cooperatives (e.g. *SMEs)* who have developed forests on own land or land received for this purpose in the form of lease or other arrangements within the landscape of Oromia. The Federal Forest Proclamation (Proc#1065/2018) defines Private Forest as "forest other than state and community and developed on private or institutions' holdings. However, very few such endeavors exist today in the region, as a result small proportion of the allocated benefit (5%) would be used to benefit them. The benefit allocated for private sector is meant to support establishment of new forest and forest management operations that enhance delivery of emission removal. For the private sector to benefit from the ER payment, requirements[24] such as allocation of a matching fund, proper application of the OFLP's safeguards instruments, size of job created, livelihood improvement option and, women and youth benefitted from the employment opportunity, and adoption of Corporate Social Responsibility (CSR) could be criteria for selection of proposals. Moreover, forest developed by a private sector should fulfil the definition of 'forest'[25] adopted nationally and adopted by OFLP. All other tree planting practices that don't fulfil the definition of forest will not be rewarded (more details on Annex 4: Current Version of the Benefit Sharing Plan for the ISFL ER Program below and section Description of coordination between entities involved in ISFL ER Programs2.2.4 above). However, as ER will be monitored and rewarded from other sector (AFOLU) in the second phase of ERPA, the BSP will be re-adjusted to reflect these changes in ER monitoring and hence the need to revise benefit distribution.

Communities refer to those who live within the boundaries of Kebele (government's smaller local administration unit) and engage in development and management of forests either legally or customarily. They are eligible because of:

- their customary and constitutional rights, and
- their responsibility for managing and developing forests.

Neither the Forest Law (Proc# 1065) nor the Rural Land Administration Proclamation (Proc# 456/2005) defines what constitute "community" in legal terms. FMC's are organized based on their interest and historical relationship with the forest; in Oromia, their boundaries coincide with the kebele's legal boundaries. Community(s) not organized as "PFM/FMC", their boundaries also be that of kebele boundaries. The difference between communities organized as FMCs and communities not organized as FMC/PFM is, the former are legal members of both the FMC and Kebele, while the latter are only legal member of Kebele. For benefits coming as ER proceeds, both are eligible.

However, the National forest law referred above legally recognizes communities' rights from the forest they developed and forest under their stewardship. It has legislated, forest developed by community belongs to them including the ER. In addition, it legislates among others: right to share

[24] Criteria should be developed for the matching fund by ORCU and/or the OFLP steering committee. The criteria may include but not limited to equitable access to ER (if many private sector applicants exist), size of job created and other community development plans, gender and age of the applicant(s) (e.g. group of youth applying for self-employment), etc.

[25] 'Land spanning at least 0.5 ha covered by trees and bamboo, attaining a height of at least 2m and a canopy cover of at least 20% or trees with the potential to reach these thresholds in situ in due course.

benefits from the natural forest including that owned by the government (through PFM arrangement); have a right to be given forest concession (originally belonging to government) also benefiting out of it.

On the other hand, the government is also eligible due to

- its responsibility to enact policies,
- technical and administrative supports,
- ownership of natural forests as defined in the constitution and relevant laws, and
- its role in facilitating bilateral agreements, mobilization of funds, responsibility for MRV, environment and social safeguards management and management of the ER payments.

Governments in the context of this BSP comprises Environment, Forest and Climate Change Commission (EFCCC) at Federal level and OEFCCA at regional level and other sectoral bureaus in the land use sector, both of which are coordinating OFLP activities at their respective governance hierarchy. Both are identified as government bodies eligible to lead formation of enabling environment and technical back-ups specifically to the success of OFLP.

The benefit to be shared is the net payment defined as gross ER payment minus operational costs incurred in the management process of the BSP plus 3% as performance buffer the recipient would set aside to manage potential risks. The operational cost to be covered from the ER payment includes specifically those expenses related to conducting MRV, safeguard, GRM, and audits (Table 2 in annex 4)[26], The operational cost up to 2022 will be covered from the program grant fund, and therefore no deduction for operational cost will be made from ER payment until this period. Moreover, the 3% deduction as indicated above shall also be set aside for 'Performance Buffer[27]". that will be used (i) to manage potential risks when there is under-performance or non-performance at state level while performance exist at zone(s) level; (ii) to manage risks that may occur due to natural factors (drought, fire, land slide, etc.) or other risks related to political instability and the like. The net payment will then be disbursed among the eligible beneficiaries as per the arrangement set in this BSP.

For vertical distribution of benefits, it has been proposed following consultations at different level that the share of community, the federal government, the regional state and the private forest developers be 75%, 5%, 15% and 5% of the net payment, respectively. Totally, the share of the government is 20%, with the higher share (15%) proposed for the regional state. The higher share for the regional government is based on the constitutional right which grants responsibility of administering natural resources to regional states (Article 52(2d) of the Constitution). The 20% allocation from the net ER proceeds to the government (national plus regional) is independent (separate) from that allocated as operation cost which will be deducted from the gross benefit. The 20% share of the benefit should be used to promote activities that will generate additional emission reduction and to coordinate activities and policies among sectors. Call for proposals will be issued and communicated by OEFCCA/ORCU and it will be communicated to regional sector offices. Successful proposals will be approved by the steering committee. Emission reduction potential and number of employment opportunity created could be among the criteria used to evaluate eligible proposals. Implementation of eligible projects from this proceed will eventually benefit communities, youth and government employees in the form of capacity building. Eligible private forest developers are those investing in new forest development and/or management of existing forest in the form of A/R or area enclosure, etc.

[26]The operational cost indicated in table 2 is estimated based on the current experience of Oromia REDD+ Coordination Unit (ORCU) and some adjustment for change in cost of living. This cost will be covered from grant money until 2022, so no reduction will be made from ER. However, after 2022 it will be deducted from ER payment.

[27] The buffer should be used mainly to reward zones/woredas/ kebeles in case of landscape non- performance, and local (zonal) performance. It would be kept separate at MoF.

Horizontally, the 75% community share will be dispensed among the communities across Oromia. The horizontal benefit share involves a three-step process: first, the share among administrative zones; second, the share among woredas in each zone and third, the share among kebeles in each woreda. This approach was chosen due to its suitability for forest governance and service provision to the forest managing communities. The zonal, woreda and kebele boundaries follow the official map used by the region (as given in OFLP PAD/PIM).

Based on the criteria developed during consultations, performance and forest area were selected as criteria to be used for sharing benefits among zones. Performance in this context refers to avoided deforestation and/or forest enhancement, while forest area refers to the forest coverage that exists in the zone at the time of performance evaluation. The weights given to the criteria are 60% for performance, and 40% for forest.

The type of benefits foreseen for communities is financial, but it is not a direct payment to individuals. The benefits will rather be invested on social development and activities that could generate more ERs (e.g., maintenance of school, clinics, water points, tree planting, improvement in coffee production, energy efficient cookstoves, etc). The beneficiary communities are those residing in and around the forests, including youth, women and vulnerable groups. Of the total ER payment that would be received at community level (kebele or FMC level), 45% would be invested on social development and livelihood improvement activities, while 50% will be invested on land-use and related activities that generate more ERs (see table below). The remaining 5% of the share received is dedicated to serve underserved social groups in the form of revolving fund.

Table 9. Activities used to generate ERs and social development/livelihood improvement

No	**Activities used to generate ERs**	**Social development/livelihood improvement**
1	Seedling production for income	Maintenance of school
2	Coffee outside forest	Maintenance of clinic
3	Tree planting for income and own consumption	Maintenance of road
4	Fuel saving stove	Bee keeping
5	Fruit tree planting	Fattening (intensive and through cutting and carry system)

The benefit disbursement option under consideration is the use of government structure for fiscal budget disbursement. Accordingly, the Ministry of Finance (MoF) receives the RBP in an independent account. Then, (i) it deducts the operation cost and performance buffer from the gross to determine the net benefit; (ii) from the net benefits, it transfers the share allocated to the EFCCC (5%); (iii) it transfers the remaining from the net benefit and the operational cost as determined above to the Oromia Bureau of Finance.

The MoF keeps the 3% performance buffer deducted from the gross proceeds for risk mitigation purposes. The rational for using this channel (MoF-BOFEC) is due to the fact that: (i) It is an established fund channelling system already in place used for government fiscal disbursement, (ii) no additional cost is required for fund channelling, and (iii) as proven and well-established system, would ensures speedy ER fund disbursement to beneficiaries at lower level

The Oromia BOFEC, being officially communicated on the amounts of shares to each entity in the region (by ORCU/OEFCCA), disburses operational cost and share of private forest developers (5% of the net) to OEFCCA's account. Moreover, Oromia BOFEC disburses share of FMCs to their respective account (subjected to the financial management capacity required by the World Bank) and the shares of kebeles without FMCs to the respective Woredas' Office of Finance (see figure below). BOFEC will release the share of Oromia regional state (15%) based on the decision of OFLP steering committee

which determines the specific activities and sectors that leads them (more details are given in annex 4).

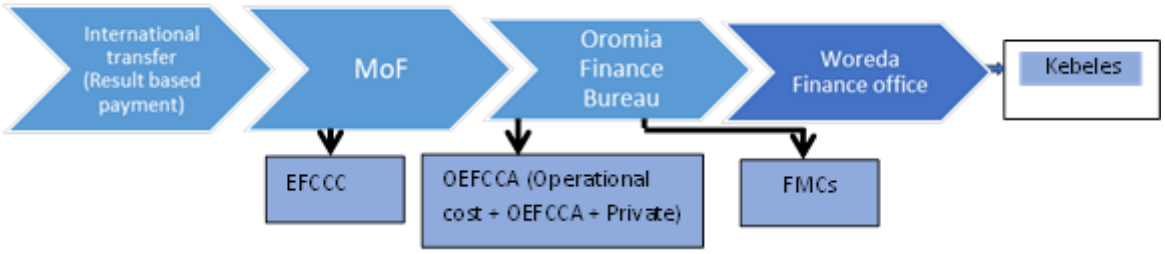


Figure 6.Flow of share of result-based payment (source OFLP draft Benefit Sharing Plan document)

3.6.2 Summary of the design process for Benefit Sharing Arrangements

The process of the design of the Benefit Sharing Arrangement involved: (a) desk review of various relevant documents; (b) stakeholders' consultation; (c) forest blocking; and (d) building on existing practices of PFM.

Desk review: was conducted to assess national and global experiences of BSP in the natural resources sector and REDD+. Specifically, the assessment focused on the eligibility of stakeholders for benefit sharing, the criteria for allocation of the shares of benefits, the methods to develop BSP and the structures for benefit disbursement. The review also assessed forest policies of Ethiopia and Oromia, and various REDD+ readiness and preparatory studies report. These include federal and Oromia Regional State forest proclamations, national REDD+ Readiness Proposal (R-PP) progress reports, study of drivers of deforestation and forest degradation in Oromia and the strategies to address those, the draft National REDD+ strategy, assessment of legal and policy framework governing forest tenure in Oromia and other related documents.

Stakeholders' consultation: three categories of stakeholders were consulted: i) Governments – both federal and regional; ii) CSOs and experts of NRM represented by various organizations including academia and research, and iii) the broader rural community in Oromia. In total, 111 consultations were conducted: two with policy makers (Federal and Oromia Regional State levels), one with Civil Society Organizations (CSOs) and Natural Resource Management (NRM) experts drawn from various organizations, and 108 with communities at various sites across Oromia Region State.

A total of 4647 community members, 3435 men and 1212 women, participated in the community consultations (please see Annex 4 for more details on this). It should be noted that community level consultations were designed and conducted considering inclusiveness as much as possible; no one is left out within those selected localities/kebeles (women, men, young, and those considered vulnerable without distinction). There were no attempts made to create social strata within selected communities for consultations, as such stratification would hardly reveal any difference in most places in Oromia and would entail lengthy if not costly process. All residents of selected Kebele/community participated and had full opportunity to give their opinions and give their suggestions, a base for final decision on issues such as vertical and horizontal benefit distribution, criteria for determine benefit, etc. (see summary of community consultation on BSP in the annex 4 for more details)

Zonal performing unit: the performance unit for ER is at zone level. Avoided Deforestation (AD) and/or forest development (A/R) delivered by each zone are taken as critical performance indicators for sharing benefit from the ER payment. Performance at zonal level will be measured against a Forest Reference Emission Level (FREL) for each zone which will be determined from the FREL developed for OFLP. In measuring the zonal level AD and A/R the same reference level and monitoring cycle should be applied to evaluate the regional performance. Determination of the zone level FREL and assessment of performance at all levels will be conducted by ORCU's MRV unit following national MRV protocol. The weight attached to the performance is 60% for overall assessment.

Monitoring and technical support: This part covers the following issues. (a) **Monitoring and evaluation (M&E) system for OFLP.** The M&E system is being established with the main purpose to enhance effectiveness, learning and accountability among the implementers and donors during both the grant and ERPA periods. Safeguards management is part and parcel of this system. (b) **Environmental and Social Audit (ESA) for OFLP.** The ESA for OFLP grant is undertaken (by independent environmental and social consultants) to assess and evaluate the environmental safeguards performance of the OFLP and identify gaps with corrective measures. This approach is also very useful to ensure safeguards compliance as per OFLP safeguards requirements and strengthens the M&E system of the program. It also lays foundation for the ERPA period. (c) **Independent safeguards monitoring for ERPA**. Like the grant period, in addition to self-reporting by the Program Entity and World Bank due diligence, independent third-party safeguards monitoring[28] will be carried out during the ERPA period. A portion of the ER payments will be allocated for this purpose. It should be noted that ER payments will only be made upon verification of the ER and payment requests will be subject to the confirmation that environmental and social safeguards due diligence was done.

Existing practices in PFM: The design of the BSP has also benefited from an extensive review of national and global experiences of BSP in REDD+ and other natural resources management interventions.

3.6.3 Description of the legal context of the Benefit Sharing Arrangements

OFLP is a jurisdictional REDD+ initiative implemented in the Oromia Regional State. There are some legal provisions and at national policy frameworks level that legalize forest ownership including emission reduction ownership (carbon ownership) by the state, community and private proprietors. The federal government (EFCCC), on the basis of recently revised forest law (Proc # 1065/2018) is developing a regulation aiming among others, to clarify further ER ownership and the ability to transfer the title (ownership right) to third party during possible ER transactions, also giving legal base for benefit sharing arrangement (BSM) for ER proceed coming from the forest sector.

Such regulation will complement existing government policies and regulations including the Constitution of the Federal Democratic Republic of Ethiopia that advocates for the right of citizens to participate in NRM in their vicinity. Issuance of this regulation is expected to be effective within few months of time. The Federal Forest Proclamation and the draft forest regulation encourages the participation of local communities in the development and conservation of State forests and in the sharing of benefits from their development. The Forest Proclamation of Oromia has also several provisions related to community participation and benefits:

- Article 4(6) - "The government shall sign agreements with non-governmental organizations, private companies, individuals, appropriate party and conclude bi-lateral agreements to strengthen forest protection, development and management";
- Article 9(5) - "The traditional user right of the local people to use the state forest resources such as fuel wood, construction wood, medicinal plants, grazing etc. shall be permitted according to the regulations and directives";
- Article 12(1) - "The government may permit the utilization of identified forest products to the local community from the protected forest".

Similarly, the Oromia Rural Land and Administration proclamation states that "The condition by which the local community may share the benefit from the protected areas shall be arranged".

[28] The main purposes of third-party monitoring are *to (a) provide timely information to the Program Entity on any problems with implementing the program safeguards instruments (SESA, ESMF, RPF and PF) so that the Program Entity can take corrective actions, if needed; and (b) provide information on systemic safeguards performance issues which may require changes in the management approach and/or additional financial or human resources.*

Further, building on the experiences of over two decades of PFM implementation in Oromia, the government and organized forest dependent communities (forest managing cooperatives – FMCs) were practicing co-management and benefit sharing as a result of such partnership.

3.7 ISFL ER Program Transactions

3.7.1 Ability to transfer title to ERs

In Ethiopia, land belongs to the state and people of Ethiopia. The Government/the state oversees administering land on behalf of the people. Within the program areas, the Oromia National Regional State automatically has the right over the natural forest and the forest developed by the state, and it also has the carbon right on natural forest and state plantations. For private forests owned by privates and association, the carbon right is vested on the respective developers. Based on article 5(1e) and 9(1a) of the Forest Development, Protection and Utilization Proclamation No 1065/2018, Private and Association forest developers have the right to transfer forest carbon ownership right to a third-party. But the law does not specify how individual forest developers or the state, would enter into such agreement to do the transfer; policy and regulatory frameworks that specifically stipulates title transfer rights to ER has been lacking so far.

From practical experiences and mandates given to government agencies at different levels, international negotiations, agreements (bilateral or multilateral) are the responsibilities of the federal government. Further, any agreement that involves finance and economic cooperation is the mandate of the Federal Ministry of Finance (MoF). Hence, MoF would be the Ethiopian government entity entitled to and capable of transferring ER title to ISFL, pending confirmation of the same through the under-development forest regulation which has evolved to an advanced stage now (see last para on this).

MoF has the mandate to oversee the planning and implementation of development programs, including those that address climate change. Its activities in climate-resilient development pathways, valued at over US$ 400 million, include mitigation and adaptation projects and programs in a variety of sectors, particularly agriculture, water, energy, forestry, buildings, industries and transport. Some of its key activities in these sectors include natural resources management through watershed management, afforestation and reforestation, energy generation and access, and low-carbon transport systems. MoF houses and has created, jointly with another public sector entity focused on the environment, a designated special purpose facility that will channel its climate investments into the country. MoF is also accredited to the Green Climate Fund (GCF) in order to continue developing a climate-resilient economy through the delivery of projects and programs by working with national and sub-national actors. While building its own capacity, MoF also intends to use its partnerships with regional organizations to share its experiences with other developing countries to prepare them to access climate finance.

The ownership rights, as well as institutional mandates, are clear in laws and practices in Ethiopia, and there are no associated risks with MoF being ER Program Entity. The Ministry has signed the grant agreement with the World Bank and RIP with the government of Norway. The Ministry is also in charge of funds disbursement from national treasure to other federal ministries and regional states, with a well-established, transparent and accountable system.

However, the ability to transfer titles to ERs has to be legally defined, as indicated above, for MoF to represent the program Entity or to be the Program Entity itself and enter agreement and transfer titles to ERs to a third party (ISFL). There are three options available: option1 -legal frameworks, option 2- enter into sub-agreements with right owners to represent them collectively, and option 3- use of a BSP backed by relevant legislation(s)). The Government option is to go for option 1, which to clarify the ability to transfer title to ERs using the country's legal frameworks.

Accordingly, the government right now is developing a regulation (yet to be approved by EFCCC Management and legislated by the Council of Ministers), capable of clarifying the ability to transfer to ERs considering that ERs are special property that the federal government should treat its transaction in a special way (meaning, the federal government as the main program entity would be able to enter agreement with a third part without a need to make sub-agreements with several and diverse right holders. It is also expected, a legal interpretation of such provisions in the regulation to be issued would be done by the Office of the Attorney General or by an accredited legal firm, and a legal opinion would need to be issued before entering any agreement or transaction.

Regarding other sectors (livestock), a discussion at EFCCC revealed that similar type of legislation like that of forest regulation is required to clarify ER ownership and title transfer to ERs. EFCCC has affirmed, it is mandated to prepare and enforce similar legislations to all ERs as it is a policy owner for climate change issues in the Country. Accordingly, the EFCCC is responsible to provide legal clarity on ER title and transfer coming from the livestock sector.

According to requirement 3.7.1, ISFL ER Programs will identify a Transaction Registry to register, track, and as appropriate retire or cancel ER units generated under the ISFL ER Program, to avoid double selling/use, or double claiming. The EFCCC is currently legislating a transaction registry for ER (coming from the forest sector) as part of the enactment of forest regulation, which is yet to be approved by the Council of the Ministers.

3.7.2 Participation under other greenhouse gas (GHG) initiatives

Two types of REDD+-relevant initiatives are distinguished: (a) existing REDD+ projects that seek to account for and sell ERs, such as the Bale Mountains Eco-regional REDD+ Project (BMERP) and REDD+ Joint Forest Management in the five districts of Illu-Ababora Zone South West Ethiopia phase II (REJFMA-SW Ethiopia II) Project; and (b) initiatives that contribute to REDD+ goals but are not seeking to account for and sell ERs, such as the Bank-financed SLMP. The former group will be nested into the OFLP, while the Oromia REDD+ Coordination Unit (ORCU), within the OEFCCA, and the Oromia vice presidency will together seek to further coordinate the second type of interventions across sectors toward the OFLP goals. The table lists relevant initiatives and institutions with which the OFLP aims to coordinate.

The Bale REDD+ completed its PDD in 2012 and got its first Verified ER (5 million tCO_2e) for the 2012-2015 period. The objectives of the BMERP are to prevent 84,150 hectares of Afromontane high forests from being cleared by 2031, to avoid the emission of 66.5 million tCO_2e in the atmosphere, to contribute to the continuation of the Bale Mountains area as a global hotspot of endemism and high conservation values while improving the quality of life of its rural citizens. The program was not able to sell the verified ER it has achieved so far.

The Nono-Sale REDD+ initiative focused mainly on implementing PFM and engaging community in participatory monitoring without going further to develop project level Project Description Document.

The OFLP will allow existing and potential REDD+ projects to directly account for ERs at the project level to attract new sources of financing and mobilize more technical partners in support of the program. However, these projects will not be able to sell ERs to third parties before the ERs contracted by the BioCF is fully delivered. These projects will be nested within the OFLP, which means that the Federal Democratic Republic of Ethiopia (FDRE) will put in place rules for coordinating all ongoing and planned REDD+ projects in Oromia including consistency in the approach to set the baseline [reference emissions level (REL)], the same benefit sharing rules, consistency in measuring and reporting on ERs, systems to avoid double counting of ERs, and consistency in how social and environmental sustainability approaches are applied following the Bank's safeguard policies and procedures. These rules are spelled out in the Program Implementation Manual (PIM) and its subsequent modules and updates.

There are also other initiatives that contribute to reduce pressure on forests and generate ERs. These include the National Improved Cook Stoves Program and Rural Electrification Program. The cook stoves program is an ambitious program for the deployment of more than 9 million Improved Cookstoves (ICS) in Ethiopia by January 2018. Deployment of cook stoves is expected to reduce emissions of up to 14 Mt of CO_2e over three years. One third of these emissions reductions will occur within the Oromia Regional State. Ethiopia is also promoting rural electrification, connecting to the national grid from hydro power, solar and wind energy. Although these are contributing to GHG emission reduction, none has attempted to register as CDM or any other GHG mitigation initiative separately.

Guidelines for the coordination of interventions across sectors toward the OFLP goals and for the nesting mechanism have not been elaborated. It has been agreed that all the emission reductions obtained in the Oromia Region will only be accounted for the OFLP. There will not be double counting.

3.7.3 Data management and registry systems to avoid multiple claims to ERs

Ethiopia has one national MRV system to which sub-national jurisdictions report to avoid double counting. That means that the OFLP's Measurement, Reporting and Verification (MRV) system is an integral part of the national MRV system. It is not envisaged to be independent to the national MRV to ensure consistency in the reported results for both the OFLP and the national level. A web-based registry system has been developed with technical support of the FAO and the Bale REDD+ information has been uploaded at this stage; however, the registry is not operational and will not be used for the OFLP.

The future National Registry, not yet approved (the draft forest regulation has articles on the establishment and operationalization of the registry -only for forest), is expected to provide all the information about projects and programs in the country, such as: entities who own the ERs Titles, geographic boundaries, Reference Level, monitoring report on activities, safeguards and non-carbon benefits, etc. The web-page registry platform is not operational.

Emission Reduction Credits will be issued exclusively through the National Registry when this is fully established. Registry accounts will be created for all government jurisdictional programs and authorized project holders. After any Emission Reductions are reported and verified, the respective ERCs will be issued directly into the relevant account(s). ERC issuance requires both carbon verification and verification of the relevant social and environmental thresholds defined under the domestic standard. Project holders may freely transfer ERCs issued to them, under a sales agreement, conversion (from domestic ERCs into e.g. Verified Carbon Units) or other. Only applicable for country not for Oromia.

Data captured through the MRV system and entering the national registry is collected and analysed at different levels. The lower levels collect important information and feed into the OFLP MRV system. The national level collects primary data and compiles primary and secondary data. Data from all sources is used to produce official AD, EFs, and revised RELs for the Oromia. These data and values are used to calculate the ERs in collaboration with ORCU. ORCU shall calculate the ERs that are assigned to each project/intervention area for the BSPs according to performance.

The calculated ERs in the jurisdiction will be registered in one registry system. Ethiopia will have one centralized national web-based registry system at EFCCC.

Section 4: GHG Reporting and Accounting

4.1 Program GHG Inventory

4.1.1 Short description of the Program GHG Inventory

Oromia National Regional State GHG Inventory is elaborated with the use of *2006 IPCC Guidelines for National Greenhouse Gas Inventories*[29]. Part of the calculations - emissions in agriculture - is done with the use of the IPCC Software (latest version available[30]) which is also based on the 2006 IPCC Guidelines. The IPCC software could be used given the information collected in agriculture sector. Emissions and removals in LULUCF are calculated on spreadsheets. The software, as well as the Guidelines, assisted in compiling a complete, sub-national Greenhouse Gas Inventory for Oromia for the Agriculture, Forestry and Other Land Use (AFOLU) sector.

The elaboration of the GHG Inventory includes good practices in inventory compilation so that the final estimates of the Oromia National Regional State GHG Inventory are neither over nor underestimated, and uncertainties are estimated and reported (reduced as far as possible).

The activity data used in the preparation of the GHG Inventory was obtained from national sources, and in some cases is considered country specific. In the case of Agriculture, the information was collected from the Central Statistical Agency as it was recommended by the Ministry of Agriculture. National data on all livestock species population (number of animals produced annually, NAPA), the amount of fertilizers, crop cultivation area and crop yield for the 2003-2017 period was collected from such Agency. In addition, some information was complemented with the data included in the National GHG Inventory (Ethiopia's Second National Communication), submitted to the United Nation Framework Convention on Climate Change (UNFCCC) in 2015. For example, data on manure management systems (share of different systems), since no region-specific information is available. Emission factors are default values obtained from 2006 IPCC Guidelines.

In the case of LULUCF, the activity data was prepared specifically for this Inventory. The National and regional MRV team elaborated the land-use and land-use change statistics, after realizing that the activity data from Ethiopia Geo-Spatial Information Agency resulted in inaccurate values when doing the wall-to-wall analysis. With the use of Collect Earth and supplementary tools it was possible to elaborate new activity data in Oromia for the 2000-2017 period.

In relation to emissions factors, most of the values are obtained from the National Forest Inventory.

- Aboveground biomass in all land-use classes is calculated with the *Chave et al.* model, using the raw data (diameter at breast height and height) from permanent sample plots in Oromia region provided by the Environment, Forestry and Climate Change Commission and basic wood density for species, included in the Forest Reference Level for Ethiopia (submitted to UNFCCC in March 2017). The Woody Biomass Inventory and strategic Planning Project (WBISPP, 2004) is also used to determine the annual increment in biomass in forest land remaining forest land and other non-forest areas. This source of information has been used to improve completeness of the inventory. However, it is considered, based on expert judgement, of very high uncertainty given the time it has passed since elaboration, the lack of knowledge of the methodology used and the extrapolation of data from its land-use classes and this inventory land-use classes.
- Belowground biomass is estimated with the use of root-to-shoot factors from the 2006 IPCC Guidelines.
- Deadwood is also obtained from the National Forestry Inventory. Data for litter is included in this study but considered insignificant and not included in this GHG Inventory.

[29] https://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html
[30] Version 2.54.6396.19217 from July 6th, 2017

- Soil organic carbon data in forest area is obtained from the document "Evaluation of the forest carbon content in soil and litter in Ethiopia" (implemented by Natural Resources Institute Finland - Luke). For other land uses, default soil organic carbon stocks are obtained from the 2006 IPCC Guidelines.

Greenhouse Gases considered in this Inventory are carbon dioxide (CO_2), nitrous oxide (N_2O) and methane (CH_4). CO_2 is the main Greenhouse Gas in LULUCF sector, while N_2O and CH_4 are present in the agriculture sector.

The categories and subcategories applied in the GHG Inventory are the same as the 2006 IPCC Guidelines. The table below shows the categories in the agriculture (livestock and other) and LULUCF sectors.

Table 10. Sector, categories and subcategories in GHG Inventory

Sector	Categories	Subcategories
Livestock	Enteric fermentation	Cattle
		Sheep
		Swine
		Other livestock
	Manure management	Cattle
		Sheep
		Swine
		Other livestock
		Indirect N_2O emissions
Other	Rice cultivation	Irrigated
		Rain-fed
		Deep water
		Other
	Agricultural soils	Direct N_2O emissions from managed soils
		Indirect N_2O emissions from managed soils
	Urea application	

Sector	Categories	Subcategories
LULUCF	Forest land	Forest land remaining forest land
		Grassland converted to forest land
		Cropland converted to forestland
	Cropland	Cropland remaining cropland
		Forestland converted to cropland
		Grassland converted to cropland
		Settlement converted to cropland
	Grassland	Grassland remaining grassland
		Forestland converted to grassland
		Cropland converted to grassland
	Wetlands	Wetlands remaining wetlands
		Land converted to wetlands
	Settlements	Settlements remaining Settlements
		Cropland converted to Settlements
		Grassland converted to settlements
	Other land	Other land remaining other land
		Grassland converted to other land

	Harvested wood products	

Enteric fermentation is a digestive process by herbivores by which carbohydrates are broken down by micro-organisms into simple molecules for absorption into the bloodstream. The process produces methane. Although ruminants are the largest source, both ruminant and non-ruminant animals produce CH_4.

Manure Management refers to the way animal manure is stored, managed and used. Animal manure is an important source of methane (CH_4) and nitrous oxide (N_2O). Methane (CH_4) emission in manure management is generated under the conditions of anaerobic decomposition of manure. The emission of N_2O can be either direct or indirect. **Direct N_2O emission**s via combined nitrification and denitrification of nitrogen contained in the manure.

Indirect N_2O emission from nitrogen used in agriculture is based on two pathways: (a) volatilization and subsequent atmospheric deposition of NH_3; and (b) leaching and runoff of the nitrogen that is applied to or deposited on soils.

Urea Application: adding urea during fertilization results in conversion of ($CO(NH_2)_2$) into ammonium (NH_4+), hydroxyl ion (OH-), and bicarbonate (HCO_3-), in the presence of water and urease enzymes.

Full description of each category is presented in chapter 0 and chapter 0 of the Agriculture, Forestry and Other Land Use Greenhouse Gas Inventory 2000-2017.

Although the category "rice cultivation" is included, it was not possible to quantify the emissions from the rice plantations due to the lack of information on the area under cultivation or crop management practices.

Land-use definitions are presented in the following paragraphs.

Forest land

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 (National Forest Reference Level Submission, 2017; Minutes of Forest sector management, MEFCC, Feb. 2015).

Forest subcategories

a. Natural forest
b. Plantation forest
c. Bamboo

Cropland

Land use category that includes areas used to produce adapted crops for harvest; this category includes both cultivated and non-cultivated lands. Cultivated crops include row crops or close-grown crops and hay or pasture in rotation with cultivated crops. On-cultivated cropland includes continuous hay, perennial crops and horticultural cropland. Cropland also includes land with alley cropping and windbreaks, as well as lands in temporary fallow or enrolled in conservation reserve programs. Roads through Cropland, including interstate highways, state highways, other paved roads, gravel roads, dirt roads, and railroads are excluded from Cropland area estimates and are, instead, classified as Settlements. It was advised that Ethiopia is a unique case in cropland mapping due to the vast production of teff that usually has the same reflectance as grasslands.

Cropland subcategories

a. Annual Cropland
b. Perennial Cropland

Grassland

Land use category on which the plant cover is composed principally of grasses, grass-like plants, forbs, or shrubs suitable for grazing and browsing, and includes both pastures and native rangelands. This includes areas where practices such as clearing, burning, chaining, and/or chemicals are applied to maintain the grass vegetation. Savannahs, waterlogged areas, low woody plant communities and shrubs, such as mesquite, mountain shrub, etc. are also classified as Grassland if they do not meet the criteria for Forest Land. Grassland includes land managed with agro-forestry practices such as silvi-pasture and windbreaks, assuming the stand or woodlot does not meet the criteria for Forest Land. Roads more than 5m wide through Grassland, including highways, other paved roads, gravel roads, dirt roads, and railroads are excluded from Grassland area estimates and are, instead, classified as Settlements.

Grassland subcategories

a) Shrubland

b) Grassland

Wetland

A land use category that includes land covered or saturated by water for all or part of the year. Managed Wetlands are those where the water level is artificially changed or those created by human activity. Certain areas that fall under the managed Wetlands definition are covered in other areas of the IPCC guidance and/or the inventory, including Cropland (e.g., rice cultivation), Grassland, and Forest Land (including drained or un-drained forested wetlands).

Settlement

Land use category representing developed areas consisting of units of 0.25 acres (0.1 ha) or more that includes residential, industrial, commercial, and institutional land; construction sites; public administrative sites; railroad yards; cemeteries; airports; golf courses; sanitary landfills; sewage treatment plants; water control structures and spillways; parks within urban and built-up areas; and highways, railroads, and other transportation facilities. Tracts of less than 10 acres (4.05 ha) that may meet the definitions for Forest Land, Cropland, Grassland, or Other Land but are surrounded by urban or built-up land are also included in the settlement category. Rural transportation corridors located within other land uses (e.g., Forest Land, Cropland) are also included in Settlements.

Other land

All land areas that do not fall into any of the other five land use categories.

There are other documents to which the Oromia GHG Inventory can be compared to detect consistent results: The Second National GHG Inventory of Ethiopia, “Ethiopia´s three years greenhouse gas inventory” (still being elaborated by the Environment, Forestry and Climate Change Commission), the National Forest Reference Level and the National State Regional (Oromia) Forest Reference Level.

The Second National GHG Inventory –which is included in the Second National Communication– is the country’s GHG emissions by sources and removals by sinks. The methodology and procedures used in preparing the Inventory were drawn from the IPCC’s 1996 Guidelines for National Greenhouse Gas Inventories, Good Practice Guidance (GPG) for 2000 and 2003, and 2006 Guidelines. The base year for this inventory is 1994 and the document includes emissions and removals up to 2013. The National GHG Inventory includes only some categories for Agriculture and LULUCF and does not correspond to IPCC categories, what made the comparison of results not possible.

Methodological consistency will be maintained with the National Regional Forest Reference Level with the national MRV team in the Environment, Forest and Climate Change Commission in charge of the National FREL and for obtaining AD and EF for LULUCF, used in Oromia ISFL project. MRV ORCU team, responsible for the Oromia GHG Inventory, is in close collaboration with Environment, Forestry and

Climate Change Commission (EFCCC). Activity data and emission factors are generated and kept by national MRV team which can be provided on demand. Consistency with the national GHG inventory is maintained with the existing MoU with the GHG team in the same EFCCC and other associated institutions (see 4.4.2 "organizational structure for monitoring and reporting").

Guidance was also used to find areas of the inventory where its improvement would most benefit the inventory overall. In chapter 3.4.1 (Agriculture) and 4.5.2 (LULUCF) of the "Agriculture, Forestry and Other Land Use Greenhouse Gas Inventory 2000-2017" (annex 6) there is a complete section with these areas for improvement. Hence, existing limited resources can be allocated to those areas in need of improvement to produce the best practical inventory.

4.1.2 Summary of the Program GHG Inventory

The following table shows the average net emissions and removals per subcategory (positive values mean emissions while negative values are removals) for the 2008-2017 period for agriculture and LULUCF sector. This is done in the sense that 10-year period shows more representative values, rather than one-year emissions or removals which would be a specific point in a period with fluctuations in emissions and removals. The relative contribution to the absolute level of the total GHG emissions and removals are also included in the Program GHG Inventory.

Table 11. Summary of the Program GHG Inventory

Subcategory	Net emissions and removals[1](t CO_2eq)	Relative contribution to the absolute level of the total GHG emissions and removals in the Program GHG Inventory (%)	Associated carbon pools and gases
Forestland remaining forestland	31.259.717	33.86%	CO_2 in aboveground biomass (AGB), belowground biomass (BGB), soil organic carbon (SOC) and deadwood (DW)
Enteric fermentation, cattle	15,979,848	17.31%	CH_4
Cropland remaining cropland	13,372,053	14.48%	CO_2 in AGB, BGB, SOC and DW
Agriculture soils – Direct emissions from managed soils	7,798,394	8.45%	N_2O
Forestland converted to cropland	4,407,034	4.77%	CO_2 in AGB, BGB, SOC and DW
Forestland converted to grassland	4,151,762	4.50%	CO_2 in AGB, BGB, SOC and DW
Manure management, cattle	4,113,562	4.46%	CH_4
Agriculture soils - Indirect emissions from managed soils	2,380,722	2.58%	N_2O
Enteric fermentation, other livestock	2,188,222	2.37%	CH_4
Grassland converted to cropland	1,154,184	1.25%	CO_2 in AGB, BGB, SOC and DW
Grassland remaining grassland	-1,001,930	1.09%	CO_2 in AGB, BGB, SOC and DW
Enteric fermentation, sheep	973,120	1.05%	CH_4

Manure management, other livestock	741,572	0.80%	CH_4
Settlement remaining settlement	-655,032	0.71%	CO_2 in AGB, BGB, SOC and DW
Manure management, Indirect N_2O emissions	628,497	0.68%	N_2O
Grassland converted to forestland	-550,119	0.60%	CO_2 in AGB, BGB, SOC and DW
Cropland converted to forestland	-280.517	0.30%	CO_2 in AGB, BGB, SOC and DW
HWP - Stock-change approach	-258,135	0.28%	CO_2 in AGB, BGB, SOC and DW
Manure management sheep	231,886	0.25%	CH_4
Cropland converted to settlement	64,126	0.07%	CO_2 in AGB, BGB, SOC and DW
Cropland converted to grassland	-44,292	0.05%	CO_2 in AGB, BGB, SOC and DW
Settlement converted to cropland	39,308	0.04%	CO_2 in AGB, BGB, SOC and DW
Urea application	26,658	0.03%	N_2O
Grassland converted to settlement	-13,708	0.01%	CO_2 in AGB, BGB, SOC and DW
Grassland converted to other land	-2,814	0.00%	CO_2 in AGB, BGB, SOC and DW
Rice cultivation	0,681	0.00%	CH_4
Manure management swine	0	0.00%	CH_4
Enteric fermentation swine	0.0	0.00%	CH_4
Otherland remaining otherland	0.0	0.00%	CO_2 in AGB, BGB, SOC and DW
Wetland remaining wetland	0.0	0.00%	CO_2 in AGB, BGB, SOC and DW
Total	86,576,549	100.00%	

4.2 Identification of subcategories that are eligible for ISFL Accounting

4.2.1 Step 1: Initial selection of subcategories

Analysis of subcategories involving conversions between land use categories

The following table shows the average net emissions and removals per subcategory (positive values mean emissions while negative values correspond to removals) for the 2008-2017 period. This is done in the sense that 10-year period shows more representative values, rather than one-year emissions or removals which would be a specific point in a period with fluctuations in emissions and removals

Table 12. Subcategories involving conversions between land-use categories

Subcategory involving conversions between land use categories	Net emissions and removals (t CO_2eq)[31]	Relative contribution to the total absolute GHG emissions and removals associated with all land-use conversions in the Program GHG Inventory	Cumulative contribution to the total absolute GHG emissions and removals associated with all land-use conversions in the Program GHG Inventory
Forestland converted to grassland	4,151.762	38.77%	38.77%

[31] When the subcategories have net emissions, please use a positive value. If the subcategory has net removals, use a negative value. However, please ensure that that relative contribution is based on the absolute value, meaning that the total of emissions is the sum of the absolute values of emissions and removals.

Forestland converted to cropland	4,407.034	41.16%	79.93%
Grassland converted to cropland	1,154.184	10.78%	90.71%
Grassland converted to forestland	-550.119	5.14%	95.85%
Cropland converted to forestland	-280.517	2.62%	98.47%
Cropland converted to settlement	-64.126	0.60%	99.06%
Grassland converted to other land	-2.814	0.03%	99.09%
Grassland converted to settlement	-13.708	0.13%	99.22%
Settlement converted to cropland	39.308	0.37%	99.59%
Cropland converted to grassland	-44.292	0.41%	100.00%
Total absolute GHG emissions and removals associated with all land-use conversions in the Program GHG Inventory	10,707.865		

List of subcategories included in the initial selection

The following table shows the average net emissions and removals per subcategory (positive values mean emissions while negative values correspond to removals) for the 2008-2017 for agriculture and LULUCF activities. The 10-year period shows more representative values, rather than a one-year emissions and removals period.

Table 13. Initial selection of subcategories

Subcategory involving conversions between land use categories and agriculture	Net emissions and removals (t CO_2eq)[32]
Forestland remaining forestland	31,259,717
Forestland converted to grassland	4,151, 762
Forestland converted to cropland	4,407,034
Grassland converted to forestland	-550.119
Cropland converted to forestland	-280.517

[32] When the subcategories have net emissions, please use a positive value. If the subcategory has net removals, use a negative value. However, please ensure that that relative contribution is based on the absolute value, meaning that the total of emissions is the sum of the absolute values of emissions and removals.

Enteric fermentation - cattle	15,979,848
Total absolute GHG emissions and removals associated with all land-use conversions in the Program GHG Inventory	**56,628,998**

Table 14. Non-forest related subcategories

Subcategory	Justification for initial selection
N/A	
N/A	
N/A	
N/A	
N/A	
N/A	

4.2.2 Step 2: Summary of the review of the available data and methods for the subcategories from the initial selection against the quality and baseline setting requirements for ISFL Accounting

Table 15. Summary of the review of the available data and methods for the subcategories from the initial selection against the quality and baseline setting requirements for ISFL Accounting

Subcategory	Forestland remaining forestland
Summary (150 words or less) of the historic time series (including start and end date) and data sources available for activity data needed to calculate the baseline	Emissions and removals in forestland remaining forestland were estimated for the 2000-2017 period. Activity data was generated for all land use classes for such period (land-use and land-use change) by using the subcategories mentioned in section 4.1.1 of this document. In the case of forest: natural forest, plantation forest and bamboo forest. The gain-loss method was applied to estimate carbon removals and emissions in this land use class. Data on emission factors was obtained from the combination of various sources: NFI (for carbon stock) and WBISPP (annual yields). Data from the annual harvest of round wood, branches, leaves, twigs and charcoal is obtained from the WBISPP.
Summary (150 words or less) of the main sources of data for determining emission or removal factors	In forestland remaining forestland the carbon stock change method could not be applied since carbon stocks are not available for two moments in time. The NFI was indirectly used, as the carbon stock in forest is the weighted average value from different forests in FREL (NFI data). The gain-loss method was considered. The information for the determination of the emission factor was obtained from the FREL and the Woody Biomass Inventory for

	Strategic Planning Project (WBISPP, 2004), where detailed information about yields (% of increment over carbon stocks) is presented. Deadwood and soil organic carbon pools were not considered following the "Guidance note on application of IPCC guidelines for subcategories and carbon pools where changes take place over a longer time period".
Summary (150 words or less) of assessment if the data used for the subcategory complies with IPCC tier 2 methods and data	Quality requirement set in ISFL Requirement 4.2.2 states that minimum IPCC Tier 2 methods and data must be used for significant[33] pools and gases for a subcategory- Exception is made for forest-remaining-forest, where activity data proxies can be used (ISFL Requirement 4.3.8). Data used for this subcategory does not comply with IPCC tier 2 or higher methods and data. Firstly, annual yields from the WBISPP (with a different land-use classification) are applied to FREL carbon stocks, thus different sources of information were combined to estimate removals and according to expert judgment the results are not reliable. The emissions are estimated based on the WBISPP data, which is from the year 2004. Therefore, the quality of data used for the estimation of emissions and removals in forestland remaining forestland needs to be updated and improved. Deadwood and soil organic carbon pools are in steady state following IPCC 2006 Guidelines (tier 1); thus, no emissions and removals are resulting from these pools.
Summary (150 words or less) of assessment if the data used for the subcategory allows for Approach 3 in land representation of land use categories and land use conversions	As a first approach, activity data was obtained with wall-to-wall mapping techniques, but it was improved with a sampling method (tier 3 approach). A full description of the methodology applied to obtain the activity data is presented in Annex 6. However, forestland remaining forestland area using this approach results in 6.4 million ha with an interval of confidence of around 0.5 million ha, while other documents report values that are close to 9 million ha (Oromia Forest Reference Level) using a different methodology. The MRV team will consider both methodologies in future estimations.

Subcategory	Forestland converted to grassland and forestland converted to cropland

[33] Significant refers to the individual pools or gases that make up at least 25% of the absolute level of the total GHG emissions and removals in the subcategory, and the pools and gases that, when listed in the relative magnitude of contribution to the emissions of the overall subcategory, contribute to 60% of the cumulative emissions.

Summary (150 words or less) of the historic time series (including start and end date) and data sources available for activity data needed to calculate the baseline	Emissions and removals in forestland converted to grassland and forestland converted to cropland are estimated for the 2000-2017 period. Activity data was generated for all land use classes for such period (land-use and land-use change) by using the subcategories mentioned in section 4.1.1 of this document. Activity data was generated specifically for this GHG Inventory. The source was Collect Earth tool with the use of satellite images. A grid of 3,600 samples was distributed across Oromia to target areas of change and assess the land-use. The samples were assessed by the national and regional (ORCU) MRV team. Each sample was labelled with the IPCC land-use subcategory and year of change, if a change occurred. The sample data has been used for statistics of land-use and land-use change with its confident interval estimation.
Summary (150 words or less) of the main sources of data for determining emission or removal factors	Ethiopia has implemented a National Forest Inventory with permanent sample plots in every land-use in the entire country. Data for aboveground biomass (diameter at breast height and height of trees), deadwood (transect method), litter and soil organic carbon (sample method) was collected during 2013-2017 period. Using the information from the NFI and applying the method described by Sarndal et al. (1992)., a net carbon stock approach was applied for the estimation of emissions and removals in these categories. Litter and soil organic carbon information was obtained from a the study "Evaluation of the forest carbon content in soil and litter in Ethiopia", which is based on the NFI and where litter is concluded to be insignificant and thus possible to be neglected. CO_2 removals in grasslands and croplands after conversion are accounted in this category. In this case, Woody Biomass Inventory and Strategic Planning Project (WBISPP, 2004) data (annual yield) was applied to carbon stocks from NFI.
Summary (150 words or less) of assessment if the data used for the subcategory complies with IPCC tier 2 methods and data	Data used for the subcategory follows IPCC tier 2 methods and data. Stock-difference method was applied based on the NFI data. Emissions and removals from aboveground, belowground, deadwood and soil organic carbon were estimated with a tier 2 method, using national or regional data.
Summary (150 words or less) of assessment if the data used for the subcategory allows for Approach 3 in land representation of land use categories and land use conversions	The activity data was obtained following tier 3 approach. A full description of the methodology applied to obtain the activity data is presented in Annex 6.

Subcategory	Grassland converted to forestland and cropland converted to forestland

Summary (150 words or less) of the historic time series (including start and end date) and data sources available for activity data needed to calculate the baseline	Emissions and removals in forestland converted to grassland and forestland converted to cropland are estimated for the 2000-2017 period. Activity data was generated for all land use classes for such period (land-use and land-use change) by using the subcategories mentioned in section 4.1.1 of this document. Activity data was generated specifically for this GHG Inventory. The source was Collect Earth tool with the use of satellite images. A grid of 3,600 samples is distributed across Oromia to target areas of change and assess the land-use. The samples were assessed by the national and regional (ORCU) MRV team. Each sample was labelled with the IPCC land-use subcategory and year of change, if a change occurred. The sample data has been used for statistics of land-use and land-use change with its confident interval estimation.
Summary (150 words or less) of the main sources of data for determining emission or removal factors	Ethiopia has implemented a National Forest Inventory with permanent sample plots in every land-use in the entire country. Data for aboveground biomass (diameter at breast height and height of trees), deadwood (transect method), litter and soil organic carbon (sample method) was collected during 2013-2017 period. Using the information from the NFI and applying the method described by Sarndal et al. (1992)., a net carbon stock approach was applied for the estimation of emissions and removals in these categories. Litter and soil organic carbon information was obtained from a the study "Evaluation of the forest carbon content in soil and litter in Ethiopia", which is based on the NFI and where litter is concluded to be insignificant and thus possible to be neglected. CO_2 removals in forestland after conversion are accounted in this category for the 20 subsequent years. In this case, Woody Biomass Inventory and Strategic Planning Project (WBISPP, 2004) data (annual yield) was applied to carbon stocks from NFI.
Summary (150 words or less) of assessment if the data used for the subcategory complies with the IPCC Tier 2 methods and data	Data used for the subcategory complies with IPCC tier 2 methods and data. The data used in the case of land-use conversion is from the NFI (stock-change method) which complies with the IPCC tier 2 method. After conversion, carbon removals in forest are accounted under this category ("land converted to forestland") with the gain-loss method. Losses are not accounted because it is assumed that biomass harvested is zero in young forests, and gains are derived from the WBISPP. Deadwood estimations follows tier 2. Litter is negligible and SOC is estimated with tier 2 method, which is a natural extension of the tier 1 method that incorporates country-specific data from NFI.
Summary (150 words or less) of assessment if the data used for the subcategory allow for Approach 3 in land representation of land use	Activity data is obtained following tier 3 method. A full description of the methodology applied to obtain the activity data is presented in Annex 6.

categories and land use conversions	

Subcategory	Enteric fermentation - cattle
Summary (150 words or less) of the historic time series (including start and end date) and data sources available for activity data needed to calculate the baseline	Emissions for enteric fermentation in cattle were estimated for the 2003-2017 period. This was the period for which emissions could be estimated using the published data from Ethiopia Central Statistical Agency (CSA). This source of information ensures consistency estimations over time. However, it is obtained with a sampling method and basic categories identified; in the future improved activity data needs to be generated.
Summary (150 words or less) of the main sources of data for determining emission or removal factors	The main source of data is from the Ethiopia Central Statistical Agency (CSA) which includes livestock number of animals produced annually (NAPA) for all species: cattle (dairy and non-dairy), poultry, camels, horses, etc., fertilizer application, area of crop cultivation and crop production. Emission factors are obtained from the 2006 IPCC Guidelines and from Ethiopia's Second National Communication submitted to the United Nation Framework Convention on Climate Change (UNFCCC).
Summary (150 words or less) of assessment if the data used for the subcategory complies with IPCC tier 2 methods and data	Data used for this subcategory does not follow IPCC tier 2 methods and data. According to the decision tree presented in chapter 10 of Volume 4, 2006 IPCC Guidelines, this category should be estimated with a tier 2 method given that it is a key category) represents a large portion of the region's total emissions). Tier 2 method for this category is a more complex approach that requires detailed country-specific data on gross energy intake and methane conversion factors for specific livestock categories.
Summary (150 words or less) of assessment if the data used for the subcategory allows for Approach 3 in land representation of land use categories and land use conversions	N/A

4.2.3 Step 3: Final selection of the subcategories eligible for ISFL Accounting

The table below list all subcategories from step 1 and identifies those subcategories for which step 2 has shown that the historic activity data, the emission factors available and the methods used to collect these activity data meet the quality and baseline setting requirements for ISFL Accounting.

Table 16. Final selection of the subcategories eligible for ISFL Accounting

Subcategory from step 1	Emissions Baseline setting requirement(s) met? (Yes/No)	Methods and data requirement(s) met? (Yes/No)	Spatial information requirement(s) met? (Yes/No)	Eligible for ISFL Accounting? (Yes/No)
Forestland remaining forestland	Y	N	Y	N
Forestland converted to grassland	Y	Y	Y	Y
Forestland converted to cropland	Y	Y	Y	Y
Grassland converted to forestland	Y	Y	Y	Y
Cropland converted to forestland	Y	Y	Y	Y
Enteric fermentation - cattle	Y	N	N/A	N

ISFL requirement also establish that, if a subcategory selected in step 1 has historic data available to construct an Emission Baseline over a Baseline Period of approximately 10 years but these data do not meet the other quality requirements of Section 4.2 (see **Error! Reference source not found.** above), it can only be included for accounting in the ERPA Phase if all the quality requirements can be met through the application of improved methods and data. OFLP intends to include those subcategories in following ERPA phases: forestland remaining forestland and enteric fermentation in cattle. OFLP will ensure that the quality requirements will be met at the latest at the end of the ERPA Phase.

4.3 Summary of time bound plan to increase the completeness of the scope of accounting and improve data and methods for the subsequent ERPA Phases during the ERPA Term

As can be seen from table 16 above, there are two subcategories that will not be part of the baseline during the first phase of the ERPA term: “forestland remaining forestland” and “enteric fermentation in cattle”. However, there is a time bound plan to improve the data and methods for these categories, in order to increase the level of estimation (from tier 1 to tier 2 or 3) and include these categories in the baseline estimation for the subsequent ERPA phases. The following paragraphs explains, in general terms, the plan to improve the estimations.

Forestland remaining forestland

The detailed time-bound plan to improve data and methods for this subcategory “forestland remaining forestland” is under construction. However, there is an agreed draft workplan that came out from the discussion of several institutions like FAO, FCPF, SilvaCarbon, FDRE National MRV team, Regional MRV team, USGS (US Geological Service). These entities have gathered and drafted a plan to harmonize and unite efforts to improve activity data and emission factors for several purposes including forestland remaining forestland.

The draft workplan foresees the use of advanced image analysis algorithms to be able to track changes between classes within the forestland-remaining-forestland subcategory. Algorithms that will be explored include BFast[34] and Continuous Degradation Detection (CODED)[35]. On the other hand, there

[34] http://bfast.r-forge.r-project.org/
[35] https://coded.readthedocs.io/en/latest/

are other activities that will need to be considered in that plan. There is a need to find the equivalences between the outcomes of the image analysis and NFI land use categories. It is known that all thirty-six land use classes, used in the NFI, cannot necessarily be obtained with the use of satellite images. The application of the remote sensing approach will coincide with the location of the NFI plots in Oromia. By this way, every sample plot from NFI will be classified with the activity data produced and it could be possible to infer a C Stock.

In addition, it will be necessary to eliminate the use of the WBISPP data source, since its inclusion increases uncertainty to the estimates. And therefore, it will be necessary to move from a gain-loss method to a stock-change method. This can be achieved with the implementation of a second national forest inventory. The first inventory was done between February 2014 and July 2016. An intensification of NFI sampling in the future can expand the use of NFI data to subnational levels and improve the accuracy of the estimates. And, as it is stated in the NFI final document, the current NFI is not an end; rather it is a beginning for future periodic monitoring and inventories.

At least another NFI measurement will be needed at national scale or in Oromia region. The frequency of NFI to update Emission Factor is every 5 years. As the second NFI has just finalized, the third NFI will be implemented approximately in 2023. If it is not possible to conduct an NFI with the national budget from EFCCC, then it should be implemented with Regional budget or international finance.

Enteric fermentation in cattle

Methane emission from Enteric Fermentation for cattle was estimated using tier 1 method and default emission factors from the 2006 IPCC Guidelines. This is due to the absence of national or regional detailed livestock population and country-specific data on methane conversion factor (Ym) and Gross Energy (GE), required to estimate emission under tier 2 method.

The Government of Ethiopia (Ministry of Agriculture) has already started work on a "Guideline on Data Collection and Estimation of GHG Emission from Livestock and Manure Management" as part of a GHG Emission Assessment Guideline. The report was produced by an independent consulting firm and has established a tier 2 approach for an enhanced characterization for livestock population and for the calculation of methane emission factor for enteric fermentation. However, based on the analysis of the report, the procedure used to estimate the emission factors is still based on literature review and expert judgement. Also, the enhanced emission factors are not correspondent with the livestock categories that could be obtained as activity data for GHG emission estimation. Despite all, this report is the starting point to improve estimations and move to a tier 2 method in the estimation of emissions in enteric fermentation in cattle. There are also other programs and projects that are also working in improving estimations in livestock sector.

Despite the text above is identifying variables needs to address the information gap, the OFLP is still in the process of defining the best strategy to collect this information in collaboration with the key actors. This includes the World Bank *Livestock and Fisheries Sector Development Project* (LFSDP). This project is being coordinated with the *Ethiopia - Oromia Forested Landscape Program* (OFLP) to build capacity on the quantification and reporting of GHG emissions in the livestock sector, and their reduction. The LFSDP has prepared an initial work plan for the development of nation-wide Tier 2 Emission Factors (T2EFs) for livestock; and guidance for the collection of baseline data on GHG emissions. The LFSDP organized a workshop and consultations with multiple stakeholders from Ministry of Agriculture, Project Implementation Units (PIUs) for both Livestock and Fisheries Sector Development Project and the Oromia Forested Landscape Program, Oromia Environment Forest and Climate Change Authority, Environment, Forest and Climate Change Commission (EFCCC), Food and Agriculture Organization (FAO), UNIQUE and CGIAR Research Program on Climate Change and Food Security (CCAFS) and International Livestock Research Institute (ILRI).

The workshop began with a discussion on the data availability, gaps, and modelling for estimation of GHG emissions in the livestock sector. The workshop helped build consensus around the way forward with a clear methodology for data collection and roles and responsibilities of each stakeholder. Specifically, the workshop concluded on the following:

(i) There is alignment between the needs of OFLP (i.e. the development of a baseline of direct emissions from the livestock sector) and the needs of the LSFDP (i.e. the development of T2EF for the livestock sector, that can be used by the Ministry of Agriculture and the Environment, Forest and Climate Change Commission to prepare national communication on GHG emissions). A joint plan can thus be developed for or tier2 GHG emission reporting in the livestock sector, including data collection and computation.

(ii) Activities planned in the context of OFLP and LSFDP also align well with ongoing complementary activities and technical assistance provide to the GoE by partners such as ILRI, FAO and UNIQUE-LANDUSE. This offers ample opportunity for collaboration.

(iii) A two-phased approach will be adopted to address the needs of OFLP and LSFDP going forward. Phase I will consist in the preparation of a plan for Tier 2 GHG emission reporting in the livestock sector, including data collection and computation. Phase II will see the implementation of plan and finalization of the national level T2EF as well as the livestock emission baseline for Oromia.
The conclusion of the phase II shall be achieved before the start of the second phase of the ERPD period.

Pivotal role of the Central Statistics Agency (CSA) in collecting time series on animal numbers (disaggregated as required) necessary for the Tier 2 reporting on a regular and sustainable basis.

It was agreed that the LFSDP will take the lead in implementation of Phase I developing the overall methodology for data collection and computation, the OFLP, will implement Phase II, piloting the approach in Oromia.

Finally, the working group elaborated the report: “Data/Inventory Improvement Plan for the Monitoring of Livestock Emission for Cattle Using Tier 2 Approach for Oromia Forest and landscape Program – OFLP”. Livestock and Fisheries Sector Development Project has planned for the development of Tier 2 emission factors (T2EF) for the livestock sector and monitoring of an emission indicator in the result framework of the LSFDP. The monitoring of emissions in the livestock sector using an IPCC Tier 2 approach was planned to be done in two phases:

a. Phase I: validated plan for data Improvement and computation; and
b. Phase II to implement Data Improvement Plan: collect data and compute Tier 2 emissions.

The two GHG inventory reports using IPCC Tier 2 approach done by UNIQUE at national (from cattle, sheep and goats) and Oromia (from cattle) level have identified a number of data gaps which contributes to high uncertainty in the T2EF computation. The inventory covers the period from 1994 to 2018. These reports have recommended improving the data for improved accuracy of the T2EF calculation and hence better emission inventory of the livestock sector (cattle, sheep and goat) using Tier 2 method. The data gaps are either missing data or poor quality data or both. The main data gaps identified by the reports are described under section 3 below.

The objective of the data improvement plan is to develop a detailed improvement plan for the monitoring of livestock emissions using IPCC Tier 2 approach. The plan should suit for the needs of OFLP (i.e. the development of a baseline of direct emissions from the livestock sector) that can be used OFLP to compute the baseline for the second phase of the program.

The scope of the data improvement plan and its subsequent work encompasses: (i) the cattle herd and (ii) direct GHG emissions from enteric fermentation and manure management in Oromia region.

The detailed plan that identifies the data gaps to be filled, data improvement plan, time frame to undertake the assignment and the budget estimated, can be consulted in the "Data/Inventory Improvement Plan for the Monitoring of Livestock Emission for Cattle Using Tier 2 Approach for Oromia Forest and landscape Program – OFLP" report.

Phasing on the new subcategories

Regarding phasing, the proposal is as follows: 1st phase, monitoring of ER from forest excluding forest degradation (up to 2 years from ERPA signing); 2nd phase: monitoring of ER from forest excluding forest degradation plus forest degradation and also livestock (enteric fermentation) (after 2 years from signing to the end of ERPA period including livestock. These are: 1st phase, beginning 2022 -end of 2023; 2nd phase, beginning 2024 onwards.

4.4 Emissions Baseline for ISFL Accounting

4.4.1 Approach for estimating Emissions Baseline

The construction of the Emissions Baseline in current ERPA phase follows the ISFL requirements. The first step is the preparation of the GHG Inventory for Agriculture, Forestry and Other Land Use (AFOLU) sector, applying the methodology, categories and subcategories from the 2006 IPCC Guidelines (short description in section 4.1.1). The best available data was used to provide the historical emissions and reductions of greenhouse gases in the sector. For the case of Land Use, Land Use Change and Forestry (LULUCF), emissions and removals were estimated with activity data generated specifically for this study, and basically two other sources of information: National Forest Inventory (2016) and Woody Biomass Inventory and Strategic Planning Project (2004).

ISFL requirements were applied to finally select the subcategories that are eligible for ISFL accounting at this first ERPA phase, meeting the quality and baseline setting requirements for ISFL accounting: historic data available, at minimum tier 2 method for estimation of emissions and removals and approach 2 or 3 for spatial information. Forestland remaining forestland and enteric fermentation in cattle are not complying with quality requirements at this ERPA phase and are not considered in the baseline. However, a time bound plan is prepared, to improve quality of estimations and introduce those categories in future ERPA phases. The activities considered at this ERPA phase are "grassland converted to forestland", "cropland converted to forestland" (similar to afforestation activity) and "forestland converted to cropland", "forestland converted to grassland" (similar to deforestation activity).

The baseline period considered is of 10 years, starting year is 2008 and ending year is 2017. Emissions in agriculture are estimated for the 2003-2017 period, and in LULUCF sector, emissions and removals are estimated for the 2000-2017 period.

Once the initial selection of categories is complete and the baseline period selected, the baseline is estimated with the sum of the average values of emissions and removals for the 2008-2017 period for the selected categories.

Identification and assessment of uncertainty in the determination of the Emissions Baseline are presented in the GHG Inventory report as part of the emissions and reductions calculations. In the agriculture sector the uncertainty analysis is conducted with the use of the IPCC software which uses approach 1. Enteric fermentation in dairy and non-dairy cows are one of the largest sources of emissions and the uncertainty is 30%. However, the overall uncertainty for all categories in agriculture sector is 22%, when using approach 1 "combining uncertainties" from the 2006 IPCC Guidelines.

In LULUCF sector, uncertainty is measured as the coefficient of variation, applying the Monte Carlo method, which resulted in 17% of the mean value for the year 2017. In addition, a sensitivity analysis

was performed, and the result is the detection of the main variable contributing to the overall estimation of emissions and removals: C stock in natural forest.

In future ERPA phases, the Emissions Baseline can change with the inclusion of more detailed information. The current baseline is applying certain carbon stock for every land use. As it was explained in section 4.2 “Summary of time bound plan to increase the completeness of the scope of accounting and improve data and methods for the subsequent ERPA phases during the ERPA term” and previous sections, there is one source of information from Collect Earth (activity data) that determines certain land-use classes and another source of information that defines the carbon stocks in every land-use (national forest inventory), with a different land use classification. If the time bound plan to improve data is applied, the extrapolation of carbon stock data will not depend on expert judgement, as it is done for this Inventory, but the definition of carbon stock to Collect Earth land use classes will have a more accurate base.

4.4.2 Emissions Baseline estimate

According to the ISFL Program requirement, the following table shows the emissions baseline for the final selection of the subcategories eligible for ISFL Accounting. The emissions correspond to the average value of the categories for the period 2008-2017. It is noted that the numbers for the subsequent phases are preliminary estimates based on the current historic emissions. In accordance with the ISFL Program requirements, the baseline will be updated with each new phase. This table using best available data for “forestland remaining forestland” (starting in year 4) and “enteric fermentation in cattle” (starting in year 6), to be able to provide ex-ante estimations of the Emission Reductions.

Table 17. Emissions Baseline estimate

Baseline year	Emissions Baseline (tCO_2e)
1	7,728,161
2	7,728,161
3	7,728,161
4	54,967,725
5	54,967,725
6	54,967,725
7	54,967,725
8	54,967,725
9	54,967,725
10	54,967,725

4.5 Monitoring and determination of emission reductions for ISFL Accounting

4.5.1 Description of the monitoring approach

REDD+ is part of a national strategy, referred to as Climate Resilient Green Economy (CRGE) strategy that aims, at the main sectors of the economy, to develop an environmentally sustainable and climate resilient economy. In line with this, EFCCC is coordinating, among other development programs, the implementation of the CRGE strategy, and overall environmental and forest management (including the REDD+ national program) in the country. As part of the national REDD+ program, the Oromia National Regional State has been given priority and selected to implement the first pilot jurisdictional REDD+ program in the country, as it accounts for most of Ethiopia's forest resources.

On the other hand, the EFCCC is also responsible for the elaboration of the national GHG Inventory. There is a MOU signed between EFCCC and all the Line Ministries and Agencies as well as the intensive capacity building programs on MRV provided by the Commission. This represents a significant improvement in Government's commitment to addressing the issue of monitoring and reporting on climate change to support CRGE and the Growth and Transformation Plan II.

EFCCC is Ethiopia's Coordinating Entity for climate MRV through its recently created MRV Directorate. The MRV Directorate collects and reports GHG inventory data and undertakes official MRV by working in collaboration with a range of federal ministries and agencies.

The ISFL ER Program is implemented at a Regional scale, Oromia National Regional State, which has a REDD+ Coordination Unit (ORCU). The monitoring approach that will be followed for the estimation of emission reductions for ISFL accounting will be aligned with the national monitoring plan since it is embedded in it.

In May 2017, EFCCC published the "Ethiopia´s Framework for the MRV under the REDD+ Program". This document is exhaustive in the consideration of the activities and institutions that are needed to monitor, verify and report REDD+ programs. The ISFL ER Program is similar to a REDD+ program, but it considers other activities such as agriculture. Thus, the MRV presented here uses the same structure as the existing MRV system in the Ethiopia´s Framework for the MRV under the REDD+ Program. The ISFL Program is not creating new structures of activities to the current activities in MEFCC and other institutions; the monitoring of the program is done with the actual proven capacities.

The document "Ethiopia´s Framework for the MRV under the REDD+ Program" is redacted to help the country respect commitments on the threshold in CO_2 emissions and removals in order to access the results- based payments (RBPs).

The EFCCC with all its institutions supports each strategic action for the calculation of carbon stocks. Specifically, this function addresses the following:

- Support of the Forest Inventory (FI) at federal and regional scale;
- support of the FI logistic operations;
- Verification of the field data by applying the Quality Assessment/Quality Control (QA/QC) protocols;
- analysis, and if necessary, improvement of the Forest Inventory (FI) data precision;
- cleansing, analysis and verification of the FI data;
- production of statistical reports on the FI;
- EFs calculation;
- evaluation of the new techniques on the biomass and EF calculation and estimations;
- evaluation and comparative analysis of third-party relevant data for the EF; and
- storage and management of all relevant data or documentation and retrieval, when required.

In relation to AD, function supports each strategic action to elaborate the area estimates and area changes. It undertakes:

- Multi-temporal analysis on Forest/Non-Forest cover and change;
- LULC map preparation and improvement (with special focus on forest and forest-related strata);
- Land Use and Land use change statistics
- quality assessment of products;
- production of relevant cartography including thematic maps, templates and metadata;
- production of statistical reports at different scales;
- evaluation, support and adoption of new Remote Sensing techniques applied to Forest Cover and LULC detection and evaluation;
- evaluation and comparative analysis of third-party data sources; and
- storage and management of all relevant data or document.

The Emission Reduction function produces reports related to afforestation and deforestation activities through:

- Evaluation of the data sources;
- estimation of the Ethiopia Emission/Reduction statistics using LULC data, EF data and relevant third-party data (e.g. other Ministries);
- production of statistical reports;
- ensuring consistency in the data sources; and
- ensuring the quality of the output.

The agriculture sector is also represented in the MRV of the EFCCC because this Commission is Ethiopia's Coordinating Entity for climate MRV through its MRV Directorate. The MRV Directorate collects and reports GHG inventory data and undertakes official MRV by working in collaboration with a range of federal ministries and agencies.

Under the CRGE framework, several key ministries have established in-house CRGE units. In terms of GHG inventory data and other MRV, the primary interaction between the MRV Directorate and other ministries is via CRGE units:

- Ministry of Agriculture and Natural Resources (MANR);
- Ministry of Livestock and Fisheries (MoL&F);
- Ministry of Water, Irrigation and Electricity (MoWIE);
- Ministry of Mines, Petroleum and Natural Gas (MoMPNG);
- Ministry of Industry (MoI);
- Ministry of Urban Development and Housing (MUDHo);
- Ministry of Transport (MoT);
- Central Statistical Agency (CSA); and
- Ethiopian Geospatial Information Agency.

There is another agency that is a key actor in the monitoring: Central Statistical Agency. The agency has been reporting information that is used as activity data for this Inventory. Since its establishment in 1960, CSA has been and is involved in socio-economic and demographic data collection, processing, evaluation and dissemination that are used for the country's socio-economic development and planning, monitoring and policy formulation. This is the institution that collects cross-sectoral data on a variety of sectors and sub-sectors throughout the country, including agriculture (e.g. crop production, livestock population, etc.), industry (e.g. industrial statistics), transport and energy, at the regional level. The CSA undertakes extensive surveys and other data collection on behalf of key federal ministries (agriculture, industry, transport, etc.).

CSA is not an outsider of the GHG estimations. They have worked in the report of "Compendium of Environment Statistics, 2016" where they report the GHG Inventory of Ethiopia.

Despite the existing institutional agreements for the elaboration of the National GHG Inventory, they can be significantly improved if the arrangements for data collection are formalized and mainstreamed within the key institutions in the sectors. Further, the process for data collection needs to be integrated into the annual statistical data collection and updates, specifically for the agriculture sector. Capacity building needs to be addressed to harmonize and/or standardize formats and units of measurement to reduce time of data processing and improve quality. Frequent updates of the National Inventory will enable the country to obtain information within short-term changes and medium-term trends for each inventory sector and emission or removal category

4.5.2 Organizational structure for monitoring and reporting

The following diagram is extracted from the "Ethiopia´s Framework for the MRV under the REDD+ Program". It graphically illustrates the relation among institutions for the MRV under REDD+ program. Climate Resilient Green Economy (CRGE) units are the primary interaction between the MRV Directorate and other ministries, and they are becoming operational during 2018.

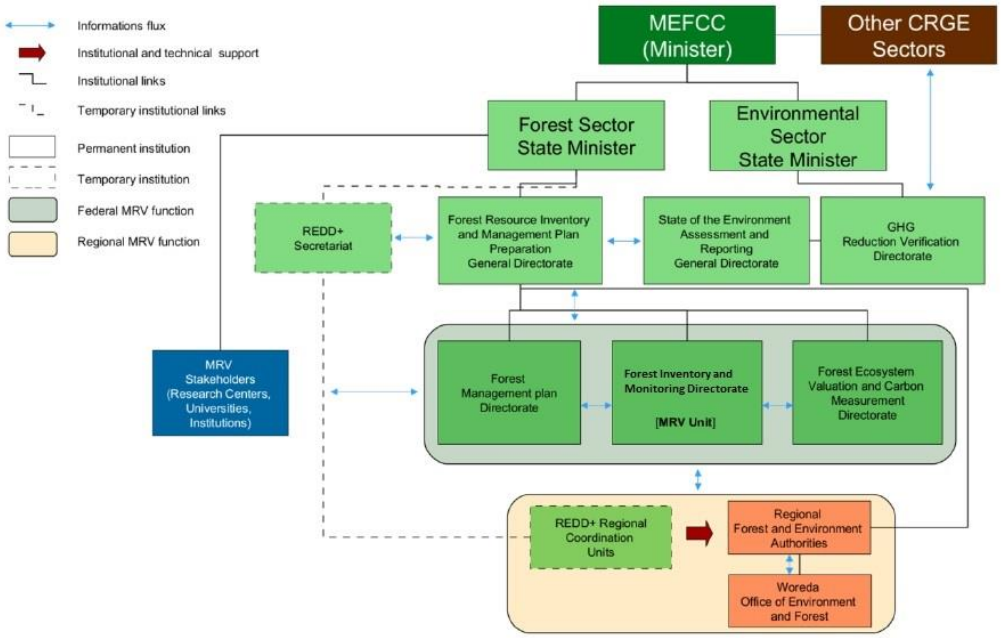


Figure 7. Institutional arrangement for monitoring and reporting36

The diagram includes several components described in the legend. There are federal and regional MRV functions, temporary and permanent institutions, institutional links and temporary institutional links, institutional and technical support and information fluxes.

As it was previously explained in the report, the Ethiopian MRV system has three functions: estimation of emission factors, activity data, and emissions and removals. The Forest Resource Inventory and Management Plan Directorate within the Forest Sector State Minister in the EFCCC is the main responsible for these activities. It is composed by three Directorates: Forest Management, Forest Inventory and Monitoring, and Forest Ecosystem Valuation. The following paragraphs describe their responsibilities.

Forest Resource Inventory and Monitoring Directorate: This Directorate is currently composed of seven experts and one Director. It is responsible for national and unique forest ecosystem inventories, analysis of forest data and forest monitoring of national forest resources (National Forest Monitoring System) using Ground Inventory and Remote Sensing techniques. It prepares forest maps, generates information on forest changes at regular time intervals, it estimates Emission Factor (EF) and Activity

[36] EFCCC. 2017. Ethiopia's Institutional Framework for the MRV under the REDD+ Program. Addis Ababa

Data (AD) related to LULUCF sector. This Directorate is tasked with major part of the MRV activities for REDD+.

Forest Management Plan Directorate: This Directorate is currently composed of three experts and one Director and is responsible for preparing forest management plans based on the information obtained from the above-mentioned Directorate.

Forest Ecosystem Valuation and Carbon Measurement Directorate: This Directorate is also currently composed of three experts and one Director and is mandated for evaluating the forest ecosystem services, measuring carbon from forest pools and estimating emissions/removals statistics. In close supervision with the national REDD+ secretariat, it also updates the national FREL/ FRL and supervises/supports the regions in the preparation of regional FRELs/FRLs.

The agriculture sector considered in the ISFL program is also part of the MRV system through the MEFCC, Environment Sector State Minister. The State of the Environment Assessment and Reporting General Directorate is the institution that merges all the GHG Inventory sectors (Energy, IPPU, Waste, Agriculture and LULUCF).

The Commission, therefore, supports, oversees and coordinates the collection, analysis and archiving of information, and activity data for the GHG emission and removal estimates. The Director of the Greenhouse Gas Emission Reduction Measuring, Reporting and Verification Directorate, EFCCC, is the national coordinator for the GHG Inventory development process, and it provides the necessary administrative and logistical support to ensure an efficient and sustainable GHG Inventory Management System and National Communication processes. MEFCC prepared a comprehensive Memorandum of Understanding (MOU) with seven Ministries and two Agencies to collect the activity data and compilation of the report. Based on this, all Ministries send the data (with gaps) and the EFCCC compiles the data by IPCC 2006 Guidelines and calculate by IPCC Software. The national coordinator is responsible for initiating and coordinating the processes of data collection, developing a national schedule of activities, and communicating with the Line Ministries during the activity data collection and compilation. Further, the technical and scientific issues related to the different thematic areas of the National Communication, including the compilation of the GHG inventory, are rested with the National Coordinator and the assistant Technical coordinator.

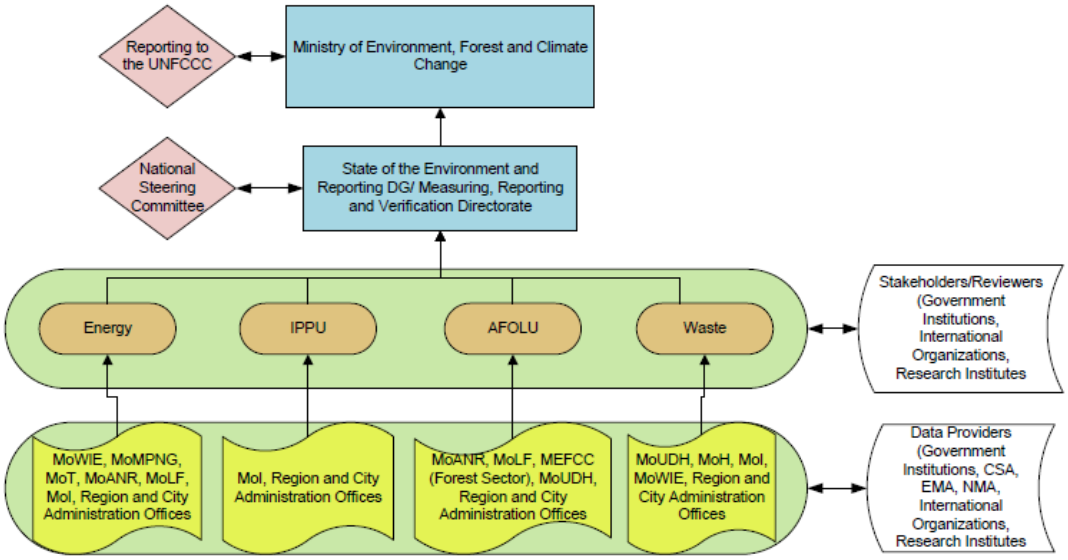


Figure 8. GHG Inventory Management System and National Communication processes

For the forest sector, the institutional arrangements and workflow for the REDD+ MRV system consist of the three different levels defined in the overall framework (see the figure below).

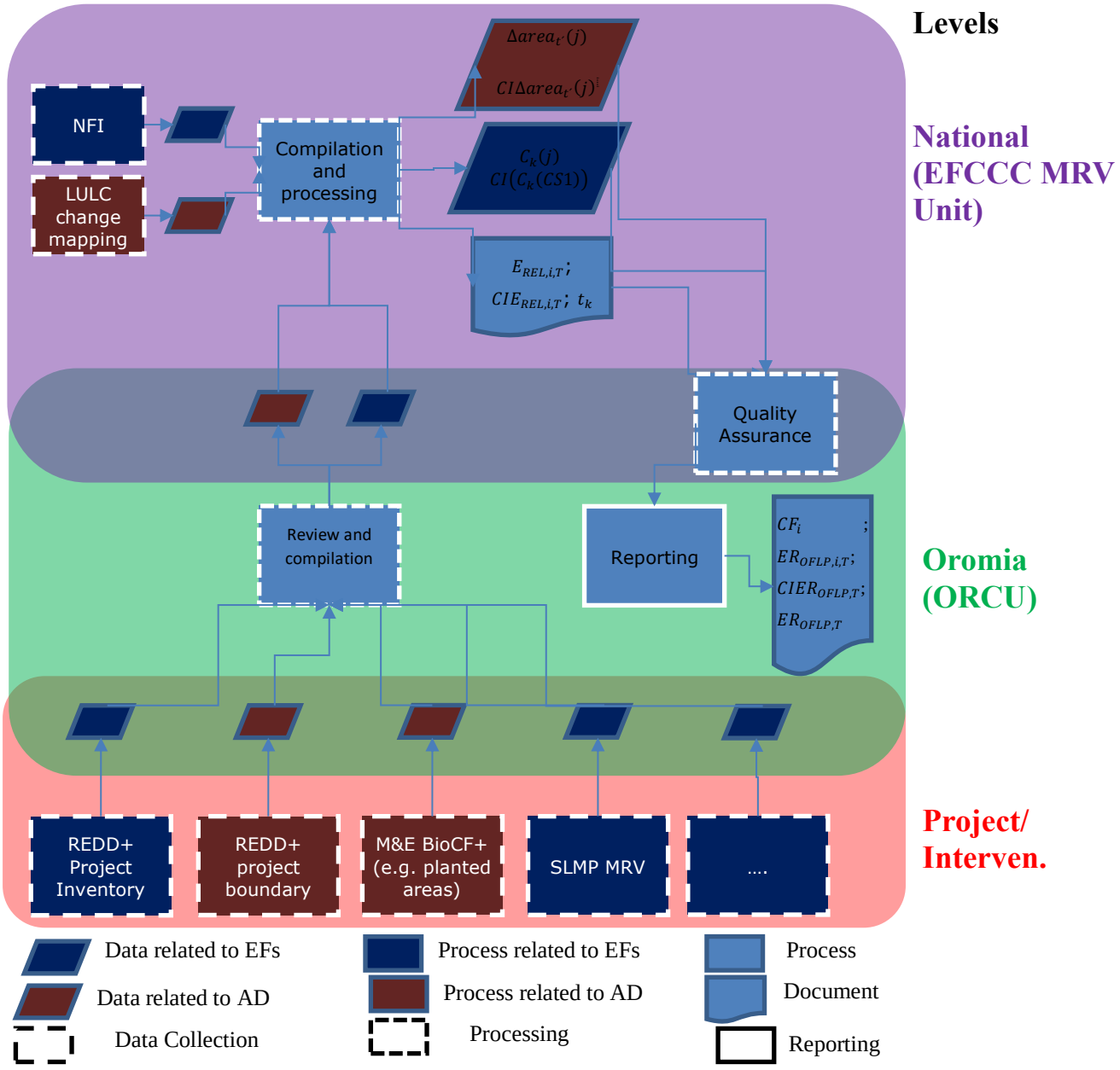


Figure 9. Institutional arrangement for MRV (source National REDD+ strategy and OFLP PIM)

The lower level will collect important information for feeding the OFLP REDD+ MRV system. This will include, for instance, data reported by REDD+ activities (i.e. forest inventories, project areas, detailed mapping of land-use and land cover (LULC classes)), data reported by M&E systems (e.g. planted areas by OEFCCA, etc.) or other data (e.g. biomass surveys conducted by the SLMP MRV).

The national level will collect primary data and compile primary and secondary data. Additionally, specific LULC mapping will be made by the MRV Unit in cooperation with the Geo-Spatial Information Agency (GSIA, former EMA). Moreover, the NFI will feed data regarding carbon densities into the system. All these data will serve to produce official AD, EFs, revised RELs, and related uncertainties for the Oromia region. These data and values will then be used to calculate the ERs, which will be done in collaboration with ORCU. The ORCU will then include these calculations in their program monitoring report. Moreover, it will be the ORCU which will calculate the ERs that are assigned to each project or intervention area, in case the BSPs are performance based.

Data generation and recording will be done at the national level, and at the lower level by following the specific standards or guidelines for data collection and reporting, consistent with the national-level procedures.

The proposed institutional arrangements for monitoring are detailed in the table below.

Table 18. Role of MRV units at the National and Oromia State level

Function	National	Oromia
Measurement	The GSIA collects LULC data. The EFCCC MRV Unit produces the map. The MRV Unit regularly collects, analyses, and aggregates primary data.	The ORCU MRV team collects primary and secondary data on program interventions (that is, geographical information on A/R activities, program-level biomass survey data, and so on).
Reporting	MRV Unit - The EFCCC calculates GHG emissions at the regional level in both FRL and MRV (as defined in the draft National REDD+ Strategy), including GHG emissions estimate for REDD projects. EFCCC MRV Unit– The EFCCC MRV Unit delivers official GHG emissions estimates.	The ORCU will compile results of the EFCCC MRV Unit for the region and submit a report in the form of a Program Document (for example, BioCF ISFL and Verified Carbon Standard).
Verification	It is conducted by national or international entities. The MRV Unit provides support in verification.	The ORCU will be the focal point and lead verification.
Registry	National web portal.	The OEFCCA/ORCU is responsible for reporting relevant information to the EFCCC.
High-level oversight and coordination	The Federal Steering Committee oversees the process and ensures a link to decision making. The Federal MRV Task Force monitors the process and reports to the Federal Steering Committee. The MRV Unit manages workflows and day-to-day coordination.	The OEFCCA/ORCU, supported by the Technical Working Group, monitors implementation of MRV within the region. The OEFCCA and OFWE is a member of the Federal MRV Task Force.

Function	National	Oromia
Support and technical advice	The MRV expert group provides support and technical advice. Universities and research institutes will be engaged by the MRV Unit on a continuous basis for research and capacity building. The MRV Unit opens call for research proposal, in close coordination with the ORCU, on any research needs and to liaise with research institutions in Oromia.	The Oromia REDD Technical Working Group provides technical advice.
International reporting	The EFCCC (appropriate directorate) reports to the UNFCCC.	n.a.

4.5.3 Uncertainty

This chapter presents the proposal to manage and reduce the uncertainty in the monitoring of emissions and removals.

Uncertainties arise in baseline setting and Measurement, Monitoring and Reporting. Uncertainty (the lack of knowledge of the true value) is due to both random and systematic errors. Uncertainties can be addressed in a number of ways. Systematic errors (bias) should be avoided by good Measurement practices. Random errors tend to cancel each other out and can be managed by sampling.

ER Program will follow a 3-step process to ensure accuracy:

1. Identify and assess sources of uncertainty.
2. Minimize uncertainty where feasible and cost-effective.
3. Quantify remaining uncertainty.

The identification and assessment of sources of uncertainties have already been implemented with the estimation of the first GHG Inventory. The sources of uncertainty are related to activity data collection and emission factors.

Uncertainty in activity data in the agriculture sector is given by the sampling method performed by CSA, which estimates the Standard Errors and Coefficient of Variations of the data collected. In general terms, the coefficient of variation in CSA to Oromia is relatively reduced, since CSA dedicated extra resources to this region. The overall uncertainty (coefficient of variability) is 1.93%. The following table is an example of the level of uncertainty for other categories.

Table 19. Activity data´ uncertainty in agriculture sector

2011	Number	SE	CV
Cattle, <6 months	968,889	29,021	3%

Cattle, 6 months < 1 year	1,107,417	31,400	3.09%
Cattle, 1-3 years	1,610,162	42,500	2.64%
Cattle, 3-10 years	6,592,895	122,090	1.85%
Cattle, 10 years and older	267,405	22,985	8.6%

Uncertainty in activity data in LULUCF is the result of the statistical analysis applied to the sampling method to detect land-use and land-use change with Collect Earth. The second step towards achieving accuracy will be the minimization of uncertainty. In the agriculture sector, the minimization of uncertainty will not be cost - effective. The survey will have to increase the number of samples to a level that will not be efficient, given the low level of uncertainty. However, there is an improvement plan detailed in "Annex 8: Time bound plan to increase the completeness of the scope of accounting and to improve data and methods for the subsequent ERPA Phases during the ERPA Term" that establishes a plan to improve the quality of data and estimate emissions with a tier 2 approach. That plan will also reduce the uncertainty of data.

In the case of LULUCF, the error is low in land use categories with large areas, for example forestland remaining forestland, cropland remaining cropland and grassland remaining grassland. Other land use and land use change classes have higher error levels. The uncertainty should be reduced in those areas. The method could be the preparation of a land-use map and stratification in land-use classes. Then, instead of installing samples systematically, a stratified sampling method should be applied, installing proportionally samples in land use and land use classes with reduced area or in area of land-use change.

Emission factors in the agriculture sector are obtained from the 2006 IPCC Guidelines. The uncertainty in this case is known as it is provided in the guidelines. And there is nothing that can be done to reduce that uncertainty. The plan, in this case, will be to estimate national emission factors from data that will be collected as part of the time bound plan to increase the completeness of the scope of accounting and improving data and methods for the subsequent ERPA phases during ERPA term. Once the emission factor is determined, there will be an identification and assessment of the uncertainty sources, followed by the minimization of uncertainty where feasible and cost-effective. Finally, the remaining uncertainty will be quantified.

The Emission factor for LULUCF is mainly provided by the National Forest Inventory and the uncertainty is from the field work and process of data collected on field. Systematic errors (bias) are avoided by good measurement practices. The National Forest Inventory has a "Field manual" prepared in July 2013. The document is prepared as a Standard Operational Procedure to summarize the work done and establish guidance for future inventories. It has a description of the sampling design, land use/cover classification and organizational structure and responsibilities. Another section is dedicated to fieldwork procedure with the overview of data collection process, preparation for the fieldwork, introduction of the project to local people, field data collection and end of work in the sampling unit.

When estimating the overall emissions, a Monte Carlo analysis was performed to assess the uncertainty. The sensitivity analysis that arises from the analysis shows that the carbon stock from natural forest is the main source of uncertainty for the estimation of emissions and removals in the sector. This value is estimated as the weighted average value from the NFI for the four biomes present in Oromia. When the second NFI is implemented together with the time bound plan to increase accuracy, the uncertainty of the LULUCF sector will be substantially reduced. There are other sources

of uncertainty, such as basic wood density of species, that are contributing to the overall uncertainty, but it would not be cost-effective to consider them.

4.6 Estimation of the Emission Reductions

With a timeframe of 15 years, the National Redd+ Strategy (NRS) will be implemented in three phases. Also, although the NRS is implemented at national scale, Ethiopia will initially prioritize addressing deforestation in hotspot areas and restoration along natural forest areas. Accordingly, the strategic period for implementation of the planned activities is divided into short-term, medium-term and long-term phases.

Short-term implementation goals. In the short-term (Phase I) , the NRS focuses on preparing the national REDD+ action plan by improving enabling conditions (forest legislation, land allocation, MRV, financing, forest extension, inter-sectoral coordination and institutional capacity) for the REDD+ implementation; operationalizing the national forest monitoring system; mobilizing non-results based (upfront) investments; and designing and implementing prioritized REDD+ policies, actions and measures in order to achieve a 25% reduction in national deforestation rate, while consolidating experiences for forest restoration.

Medium-term implementation goals. In the medium-term, NRS will focus on increased investments and scaling up REDD+ PAMs at national scale and starts operationalizing Results Based Payment (RBP) at sub-national levels. The main target in this period is to bring net deforestation to zero (i.e., rates of deforestation and afforestation will be equal).

Long-term implementation goals. This phase rolls out REDD+ at full national scale and operationalizes national Result Based Payments. In this period, Ethiopia's forests and land areas will become a net carbon sink and address 50% of national emission reduction target by 2030.

Considering the NRS mentioned before, the approach followed to estimate emissions under ISFL ER is a conservative approach. The estimation will only consider the short-term goal. The ex-ante emission reduction calculation is also considering activities and projects that will be implemented in Oromia (see 2.1.3), assuming a 10% reduction in emissions.

Emissions baseline in the table below is considering the future ERPA phases, where “forestland remaining forestland” and “enteric fermentation” will be included once they comply with the ISFL quality requirements, in the year 4 tentatively.

Considering an average uncertainty set aside factor equals 4% (aggregate uncertainty of emission reductions between 15% and 30%).

Table 20. Estimation of Emission Reductions

ERPA year t	Emissions Baseline (tCO_2-e/yr.)	Estimation of expected emissions under the ISFL ER Program (tCO_2-e/yr.)	Estimation of expected set-aside to reflect the level of uncertainty associated with the estimation of ERs during the Term of the ERPA (tCO_2-e/yr.) (4%)	Estimated Emission Reductions (tCO_2-e/yr.)
1	7,728,161	6,955,345	30,913	741,903
2	7,728,161	6,955,345	30,913	741,903
3	7,728,161	6,955,345	30,913	741,903

4	54,967,725	49,470,953	219,871	5,276,902
5	54,967,725	49,470,953	219,871	5,276,902
6	54,967,725	49,470,953	219,871	5,276,902
7	54,967,725	49,470,953	219,871	5,276,902
8	54,967,725	49,470,953	219,871	5,276,902
9	54,967,725	49,470,953	219,871	5,276,902
10	54,967,725	49,470,953	219,871	5,276,902
Total	375,998,864	367,162,704	1,631,834	39,164,022

4.7 Reversals

4.7.1 Assessment of the anthropogenic and natural risk of Reversals

The program design has involved many stakeholders at different levels through series of consultation and awareness raising events. The program is quite across the Oromia region, especially in forested areas at a landscape level. Communities at grassroots level are also aware of the direct and indirect benefits of the program and are familiar with the intended program interventions and outcomes from experiences of implementation of other programs with similar activities on sustainable forest, land management and climate smart agriculture (e.g. PFM, SLMP, AGP).

With the establishment of OEFCCA and clarification of institutional arrangement among relevant sector offices at all levels, there is strong and resilient public sector capacity to implement the program. Traditionally, there is a problem of coordination among public sector institutions. For effective coordination both vertically and horizontal among key sectors, the OFLP has a coordination unit, ORCU, hosted by OEFCCA. In addition to the main coordination at OEFCCA HQ, ORCU has coordinators at different levels, down to woreda coordinators. There are also different sector policies and laws like forest and land related proclamations and regulations that have created conducive environment for the program. Hence, there is a conducive policy and institutional environment that enables success of the program.

However, Ethiopia in general and Oromia in particular, has experienced political changes over the recent years, with violent protests. There is also high youth unemployment in rural areas, with high demand for land or other alternative means of livelihood. This may lead to conflict over land and forest resources.

The program area does not experience significant risks due to pests, extreme weather events and other natural risks, except possible medium risk of forest fire in the dry lowland forests like *Acacia-Commiphora* and *Combretum-Terminnalia* woodlands. Some studies in lowland woodlands have shown increasing incidence of fire with human activities (settlement and roads). It is evident that there is a growing population in those areas and increasing road density. Fire severity, on the other hand, is associated with grass biomass. In many lowland areas, fire has led to declines in the extent of dry forests. Fire has accelerated (along with population pressure and agricultural investment) the process of changes from dry forest and dense woodland to open woodland and wooded grassland, and, eventually to agriculture.

4.7.2 Assessment of the level of risk of Reversals

"Reversals" occur if one or more disturbance event(s) result in the aggregate number of ERs measured and verified within the ISFL ER Program Accounting Area for one Reporting Period, it is less than the aggregate amount of ERs measured and verified within the ISFL ER Program Accounting Area for the previous Reporting Period.

Reversals can be caused both by natural disturbances and by human activities, which may be driven by a range of factors both internal and external to an ISFL ER Program.

The assessment of the level of risk of Reversals has been elaborated with the use the most updated version of the Reversals Risk Assessment in the "ISFL Buffer requirements". The assessment is done with no distinction of subcategories, covering forest-related and non-forest-related categories. The following table presents the assessment result.

Table 21. ISFL risk of reversals assessment

Risk factors	Risk indicators	Level of risk	Reversal set-aside percentage
Lack of long-term effectiveness in addressing the key drivers of AFOLU emissions and removals	<u>Lack of broad and sustained stakeholder support</u> (applicable to all eligible sub-categories) Key drivers of AFOLU emissions and removals are related to forestland remaining forestland, conversion from forestland to grassland and cropland (deforestation) conversion from grassland and cropland to forestland (afforestation), conversion from grassland to cropland and enteric fermentation in cattle. Anthropogenic direct drivers of deforestation are agriculture, charcoal production, livestock grazing, and forest coffee planting, among others. However, the underlying causes are economic, social, political, demographic, cultural or governance and institutional, as it is stated in the OFLP Social Assessment. Lack of broad and sustained stakeholder support is a key element that defines the risk of reversals. The OFLP Program is one-of-its-kind project in the sense that it incorporates other sector: agriculture. So, this is not a REDD+ project, which is a more known concept. The principal stakeholders are the people living on the project area, and they are not aware of the comprehensiveness of the program. Literature review ("The context of REDD+ in Ethiopia: drivers, agents and institutions") shows that surveys in eight regional states completed by REDD+ focal persons showed a lack of awareness of existing international conventions and national legal frameworks in REDD+. Knowledge or awareness about the comprehensiveness of the program can be even lower. A general concern in the Social Assessment is the level of awareness on REDD+. It is said that it is generally low in the regions.	High	15% Reversal Risk is considered high for some indicators and or medium /low for others

	Conducting awareness creation workshops, distributing promotional materials, in appropriate languages and culturally sensitive manner, and expanding support for local capacity building on forest sector development and law enforcement should be part of the preparedness process. Despite all, OFLP community consultations has been going on since the design of the program that reached thousands of people.		
	<u>Significant occurrences of conflicts over land and resources in the program area</u> (applicable to all eligible sub-categories) There has not been detected any conflict over land. However, communities and landholders still face a perception of land tenure insecurity in Ethiopia. According to the Social Assessment of the OFLP, this is particularly important in forested areas, since individual land certificates are not issued. Although PFM goes some way in addressing this perceived lack of security by transferring forest management rights to communities through contracts, this could be strengthened through communal land certification in forest areas and this also applies to communal grazing lands. Meanwhile, the GoE is aiming to allow community tenure of forests if anticipated legal reforms of 2018 are realized. The GoE's effort to improve individual land tenure is being supported in the program area through activities to improve land certification financed by the WBG's SLM Program and the UK-financed LIFT program.	Medium	
	<u>Lack of institutional capacities and/or ineffective vertical/cross sectoral coordination.</u> One of the potential risks and challenges found in the social assessment of the OFLP program is the weak institutional capacity, such as in traditional grievance redress and resource management institutions. The Ethiopian government functions are carried out by various Institutions with a very good understanding of their roles and responsibilities. Every institution is aware of its function and there are no overlapping areas of work. Even though these institutions cooperate with each other, there must always be a formal protocol defined beforehand in order to share information, for example. Information means power in certain cases, and	Medium	

	institutions are reluctant of sharing it if no clear explanation is provided. At the end, the Ethiopian government has a weak track record of cross-sectoral cooperation, showing a weak institutional capacity towards this multi-sectoral project. . For instance, EFCCC is responsible for forest areas and MoA is responsible for agriculture; landscape level coordination among these two institutions is weak Moreover, the forest sector governance has gone through frequent structuring and restructuring causing poor institutional memory. Although the new EFCCC is formed, its structure is limited at the top level. Forestry in regional structures is treated differently. In some cases, the representation is at expert level while some have formed enterprises to harness conservation and utilization. Such structural adjustments have also created mandate overlaps and gaps, leaving the resources exposed to further destruction.		
	<u>Lack of long-term incentives beyond climate finance to decouple deforestation and degradation from increases in agricultural production and other economic activities</u>. Agriculture in Ethiopia is market driven and deforestation for agriculture is profitable. As it is also described in the social assessment of the OFLP, Commodity prices for major cash crops such as coffee, khat and oil seeds affect local production systems, which often lead to policy adjustments at the national level and trigger land-use changes at the local level, encouraging deforestation and forest degradation. In terms of investment, favourable policies for agricultural and industrial investments are attracting foreign direct investments and boosting domestic investments increasing the demand for large tracts of land. This trigger clearing of forests in high forest and woodland areas. Economic development in urban centres and industrial expansion in the peripheral areas of urban centres push urban limits to forest landscapes and initiate deforestation. Extreme fragmentation of land in rural areas is causing increasing rate of unemployment. The rural unemployed youth in forest resource areas will either migrate to urban centres or resort to forest resource extraction for living or conduct deforestation to claim land.	High	

Exposure and vulnerability to natural disturbances	OFLP accounting area is vulnerable to natural disturbances. Ethiopia Readiness document established that human induced and natural fires are direct drivers of deforestation. The other natural drivers of deforestation are climate change, droughts, pests and diseases, and floods. However, there exists Programs in Ethiopia with a direct or indirect objective of managing disaster risks: • Productive Safety Net Program, Sustainable Land Management Program, RLLP, LLRP, etc. • Climate Resilient Strategy for Agriculture and Forestry. • Ethiopian Biodiversity Strategy and Action Plan (revised in 2014). On the other hand, enteric fermentation in cattle is also prone to natural disasters. For example, when droughts, the availability, palatability and digestibility of feed for animals dramatically drops. This has a direct impact in emissions from enteric fermentation.	High	15% Reversal Risk is considered high for all eligible subcategories
	Capacity and experience in effectively responding to natural disturbances. There is no evidence of a trained and well-equipped team to control and manage natural disasters. Forest fires are common in the region.	High	
Actual reversal risk set-aside percentage			30%

Furthermore, there is a more complete and deep risk analysis with their own mitigation measures in the OFLP Project Appraisal Document (this is before the ISFL requirement is considered). It is included in this section because the indicators are similar and comparable to the evidence of the overall "high" reversal risk given in the table above.

Table 22. OFLP PAD risk assessment

Risk categories	**Rating**
1. Political and governance	High
2. Macroeconomic	Moderate
3. Sector strategies and policies	Substantial
4. Technical design of program	Substantial
5. Institutional capacity for implementation and sustainability	High
6. Fiduciary	Substantial
7. Environment and social	High
8. Stakeholders	Substantial
9. Other	N/A
Overall	**High**

The OFLP's overall risk is rated high. The individual risks rated substantial or high are listed below along with the main mitigation actions.

Political and Governance (High risk).

Risk to achieve ERs under the ERPA. Exogenous governance factors such as the following can prevent achievement of ERs: (a) pressure on forests from sectors other than the forest sector; and (b) related land-use initiatives that are underperforming or not delivering. The mitigation action designed into the OFLP is that a robust multisector implementation setup is (i) defined within government structures, (ii) strengthened by the grant financing, and (iii) the Regional State's executive level decision makers are directly involved in OFLP implementation. There are added risks from a potential re-emergence of the civil disturbances in Oromia.

Sector Strategies and Policies (Substantial risk)

Risk of not reducing deforestation trends and associated emissions due to a variety of exogenous factors: The OFLP may not reduce deforestation trends as expected due to exogenous events outside the control of the OFLP, such as development of roads or other infrastructure and major population shifts, among others. The fact that the proposed program is a national landscape program helps mitigate this risk by ensuring that the OFLP is embedded into national and regional state priorities, institutions, and structures, which in turn may influence national and regional state policies and programs. Another mitigating factor is that the jurisdictional approach assumes that statewide coverage is accompanied by statewide improvements in the enabling environment (policy, regulations, law, institutions, information, and safeguards) that are supported by the grant.

Technical design of OFLP (Substantial risk)

While OFLP is innovative and potentially transformative, it faces a number of challenges to achieve the Program Development Objectives. The substantial risk is partly because of the fact that deforestation is driven primarily by the land use behavior of millions of smallholders, various sectors and stakeholders, and variables (such as other land use related projects) outside the direct influence of OFLP financing. The risk mitigation strategy includes the establishment of a government coordination platform (which is in place now) that involves all AFOLU sectors, supported by the grant, for convening and leveraging other investments and projects to contribute to achievement of the ERs that are accounted under the ERPA at the level of the state-wide jurisdiction. This coordination will occur at all administrative levels of government and will be led by the Regional State executive and relevant sector heads.

Institutional capacity for implementation and sustainability (High risk)

Weak cross-sectoral coordination and complexity of the institutional and implementation arrangements for verifying, receiving, and disbursing ER payments at a statewide jurisdictional scale of this size is a high risk to ERPA success. The risk is rated high because coordinating across AFOLU sectors and projects (environment/forest, agriculture, water, energy and livestock) at the local, regional state, and national levels, combined with the complexity of monitoring requirements for performance-based carbon finance, and the complexity to act toward common goals. Risk mitigation includes activities financed by the grant to strengthen the capacity of participating institutions to coordinate and implement OFLP, carry out work planning and budgeting across sectors, enhance safeguards implementation, build MRV capacity, and ensure the timely performance and delivery of operational requirements.

Given that the Oromia National Regional State government established the OEFCCA at regional, zone, and woreda levels with the same mandate as EFCCC, there is a need to build considerable capacity at the regional, zone, woreda and kebele levels, while also continuing strengthening capacity at the federal level.

Fiduciary (Substantial risk)

Financial management risk is rated substantial due to a shortage of qualified accountants and auditors particularly at the OEFCCA (regional), woreda finance and PFM cooperative levels. This risk will be

mitigated through the on-going FM capacity building activities supported by the grant and by strictly implementing the benefit sharing arrangement in the BSP.

Environment and social (High risk)

The OFLP will face a changing and fragile environment with complex social relationships and will likely face social concerns related to the existence of underserved and vulnerable groups in its intervention areas. This is compounded by: (a) inadequate understanding of relevant social issues, and (b) weak capacity and expertise within the government structures to deal with both social and environmental risks to properly implement and document safeguards instruments. The risk mitigation measures rely on carefully designed safeguards management plans and capacity-building measures to strengthen the implementation capacity of the implementing agency and has been reinforced by a dedicated Safeguards Management system. The program has the following safeguards instruments: (a) an Environmental and Social Management Framework (ESMF), (b) a Resettlement Policy Framework (RPF) and Process Framework (PF), and (c) a Social Assessment (SA) and Social Development Plan (SDP) as part of the Strategic Environmental and Social Assessment (SESA).

Stakeholders (Substantial risk)

Stakeholder risk is rated substantial for the program, because of (i) potential for re-emergence of civil disturbances, (ii) weak multi-sectoral coordination, and (iii) inadequate benefits sharing and funds flow associated with the ERPA. For a variety of reasons, benefits associated with ER payments may not reach the stakeholders whose behavior needs to be changed to deliver reduction in deforestation. There may also be elite capture of the benefits and exclusion of some stakeholders, particularly underserved members of the communities. These risks are mitigated by implementing; i) the BSP developed through consultative process, ii) the Consultation and Participation Plan, iii) Communication Strategy, and iv) enhance transparency in project-supported activities and safeguards operational instruments.

Annex 1: Drivers of AFOLU Emissions and Removals

In the CRGE Strategy Plan, it is estimated that in Ethiopia in the year 2010, around 87% of GHG emission comes from AFOLU sector: agriculture with roughly 50% and forestry with approximately 37%. These sectors have also the highest potential for GHG emissions reduction: they contribute around 45% and 25% respectively to projected GHG emission levels under business-as-usual assumptions and together account for around 80% of the total abatement potential.

The drivers of AFOLU emissions and removals in Oromia National Regional State are multi sectoral and multi-dimensional. The main drivers are Agriculture land expansion, increase in production, use of synthetic fertilized use, Fuel wood, forest coffee plantation & management, unsustainable logging & overgrazing, high demand for forest products (construction materials, including furniture), ecosystem restoration, lack of livestock value chain improvement, poor livestock management and weak extension services. Other drivers are a complex combination of economic issues, ineffective land-use planning and enforcement at the micro-level and inadequate cross-sectoral policy and investment coordination, technological factors; cultural or socio-political concerns; and demographic factors.

At the regional scale AFOLU sector represents an important source of emissions, being forestland remaining forestland (forest degradation), and enteric fermentation from cattle, Forestland converted to grassland and Forestland converted to cropland (deforestation) represents the main sources.

1. Forestland remaining forestland

Extensive extraction of fuel wood for commercial and subsistence purposes, forest coffee plantation & management, unsustainable logging and overgrazing are the major driver of emissions from forestland remaining forestland throughout Ethiopia. With respect to drivers for removal in forestland remaining forestland is mainly due to ecosystem restoration activities.

Demand and supply: Wood product demand is growing fast in Ethiopia due to population and economic growth. The construction sector boom, growth in urbanization and urban population, and growing middle class is driving a rapid increase in demand for wood and other forest products (FSR 2015). The total wood product demand in 2015, measured by the volume of wood consumed in the country (production +import-export) is approximately 130.3 million m3 Round wood Equivalent (RWE). Approximately 92.3% of this is in the form of wood fuel and the rest is in the form of industrial wood (MEFCCA, 2018[37]).

The demand for fuel wood in 2009 was 77 million m3 against 9.3 million m^3 of sustainable supply (Unique, 2015). The extent of biomass scarcity is exemplified by the long travel distances currently required for wood collection.

More than 40 percent of the annual charcoal supply to Addis Ababa is from the Central Rift Valley areas (Unique, 2015). The activity is aggravated by traditional inefficient charcoal production technologies. Fuel wood extraction is most prominent in the surrounding urban areas, as these areas have a high demand for fuel wood. The extent of biomass scarcity is exemplified by the long travel distances currently required for wood collection. Most charcoal and fuel wood production are conducted informally without any license. Charcoal trade is characterized by weak law enforcement as the capacity to enforce regulations and effectively collect revenue is low (Beleke 2011). The vast majority of households depend on wood or charcoal for domestic energy consumption, using wood for cooking, heating, and lighting. Traditional biomass (wood, charcoal, and dung) accounts for roughly 90 percent of total primary energy use in Ethiopia, and about 84 percent and 99 percent of urban and rural households, respectively, rely on biomass as their primary cooking fuel (UNIQUE 2015). Charcoal is made using traditional earth mound kilns which incur considerable losses, entailing four or five times as much energy input as would be required for burning wood directly. Many account the loss of the

[37] MEFCCA (2018). National Forest Sector Development Program, Ethiopia, volume I situation analysis

acacia woodland in the Central Rift Valley area mainly to charcoal production and firewood extraction. According to Ethiopia's Biomass Energy Strategy developed by the MoWIE, there is a massive increase in charcoal consumption in the last years due to the significant increase in rural incomes, proliferation of rural markets, improved road system and reduced transportation costs, and the limited land for growing trees surrounding urban areas.

The intensification of forest coffee cultivation to maximize coffee production negatively affects diversity, composition and structure of forests resources. Intensification of coffee productivity starts with the conversion of forest coffee to semi-forest coffee, which has significant negative effects on tree seedling abundance and leads to forest degradations. Further intensification leads to the conversion of semi forest to semi plantation coffee, causing significant diversity losses and the collapse of forest structure (decrease of stem density, basal area, crown closure, crown cover, and dominant tree height (Kitessa Hundera et al., 2012).

The forest resource of southwest Ethiopia (Friis 1992) are the center of origin and diversity of *Coffea arabica L.* and hold the wild gene pool of all cultivated arabica coffee (Anthony and others 2002). These forests are traditionally managed by local people for coffee production because coffee forms the livelihood basis for many rural communities, where the forest management typically removes canopy trees to increase coffee yield in the natural forest (Gole 2003; Senbeta and Denich 2006; Aerts and others 2011). Moreover, according to Senbeta and Denich, (2006) showed that coffee in the forest affects natural forest through: i) farmers harvest coffee from essentially wild coffee shrubs with little or no intervention in the canopy and sub-canopy layers which herbs, shrubs other than coffee, and emerging tree seedlings in the understory are removed annually; ii) through semi plantation coffee system, the upper canopy is selectively thinned and coffee saplings are locally planted which results modification of the forest significantly.

Demand for timber and furniture are other causes of forest degradation. This demand leads people to illegal logging and cutting down of trees in the forest areas. Selective logging is described as a harvesting system practiced mainly in native forests and in hardwood plantations where a few desired and commercially valuable trees species are harvested. Selective harvesting is said to remove some portion of the standing trees leaving a viable forest for natural regeneration and growth (Shiferaw, Dinku, and K. V. Suryabhagavan, 2019). According, Ethiopian Forest Sector Review MEFCCA, 2017), Illegal harvesting of industrial round wood may take place in natural forests. It is highly likely that a certain share of the round wood in the Ethiopian market originates from illegal activities. Expert estimates suggest that between 30% and 50% of Ethiopian construction and furniture timber production is based on illegal harvesting, amounting to 2 - 3 million m^3.

In standing native natural forest not only degradation occurs but also enhancement through ecosystem restoration. Interventions including participatory forest management (with enrichment planting and area enclosure) and designation of forests as biosphere reserve could lead to enhancement and improved forest restoration. As a response to the decline of the natural forest area, a plantation program has been initiated on large scale to rehabilitate formerly forested areas, for construction and fuel wood production. Plantations are mainly of exotic tree species with few indigenous trees in few of the NFPAs (FAO, 1990, as sited in Forestry Outlook Studies in Africa, 2001[38]) (forestland converted to crop land or grassland).

Forest grazing and browsing is the major source of feed for the vast population of livestock in Ethiopia. Some 17,5000km^2 or nearly 35 percent of Ethiopia rangelands are found under forest cover of bush and shrub, and fodder deriving from forest lands provides 10 percent and 60 percent of livestock feed in the wet and dry seasonal respectively. In pastoral areas, forest grazing and browsing constitute the sole land-use system (Shiferaw, Dinku, and K. V. Suryabhagavan, 2019). The natural regeneration of

[38] Forestry Outlook Studies in Africa (2001)

the forest resources is impacted due to high livestock populations which results in to overgrazing and over browsing within the forests (Reusing, 2000). Overgrazing reduces the species composition of important plants, undergrowth and reducing stand biomass which leads to excessive degradation of vegetation in the natural forest (Kassahun *et al.,* 2008, Mekuria and Aynekulu, 2011).

2. Enteric fermentation - cattle

Ethiopia has the largest livestock population in Africa and the fifth largest in the world. The Oromia Region has about 24.4 million cattle (CSA, 2018[39]), of which 45 percent is estimated to be dairy animals. Key drivers that influence emission intensity (i.e emissions per unit of product) from dairy production include: Inadequate supply of quality feed, poor animal health due to disease prevalence, low livestock genetic make-up, poor manure management, low reproductive efficiency and weak herd management, limited adoption of improved livestock practices and poor provision of livestock support services and Low commercial market off-take due to inadequate processing and marketing infrastructure[40] . As a result of low productivity levels, the livestock sector in Oromia and Ethiopia in general is characterized by relatively high greenhouse gas (GHG) emissions per unit of product. Average GHG emissions are 19 kg CO_2 eq/kg milk among mixed crop-livestock systems in Ethiopia, against an average of ca. 9 kg CO_2 eq./kg milk in Sub-Saharan Africa.

Ethiopia has economically important livestock sectors, where Oromia accounts 24.4 million out of 60 million cattle population. In Ethiopia, although the dairy sector is not well developed, livestock production contributes between 25 and 45% of agricultural GDP (Behnke 2011). However, the livestock sectors in Ethiopia face feed shortages, and a lack of investment in improved genetics, animal health services and farm inputs, inefficient production systems which lead to high GHG emissions intensity. Under the BAU scenario, emissions from livestock will increase from 65 Mt CO2e in 2010 to 124 Mt CO2e in 2030 (CRGE). Accordingly, driven primarily by a growing cattle population (84% of emissions in livestock category), emissions from enteric fermentation and decomposition of manure in storage will grow from 57 Mt CO2e in 2010 to 112 Mt CO2e in 2030. Although there is substantial variation of GHG emissions by type, Nitrous oxide and methane emissions from feed production and processing (including land use change) produce 45% of total GHG emissions, and nitrous oxide and methane from manure management and processing contribute another 10% (Herrero et al. 2016) in Ethiopia.

Manure from livestock is a source of nitrous oxide and methane emissions as a result of storage and processing. Methane is released from anaerobic decomposition, while nitrogen is released as ammonia or nitrous oxide (Gerber et al. 2013). On the positive side, manure is a valuable resource containing many essential micro and macro nutrients required for plant growth, and its application to cropland also increases soil quality (Hristov et al. 2013).
The above FAO study elaborates a number of factors influence emissions and emission intensities from dairy production in Ethiopia:

Inadequate and poor-quality feed: Inadequate supply of quality feed is the major factor limiting dairy production in Ethiopia. Feeds are either not available in sufficient quantities due to fluctuating weather conditions or even when available are of poor nutritional quality. The diet is largely made up of low-quality feed products such as crop residues and native pastures of poor nutritive value. Consequently, the digestibility of average feed ration in all 4 systems (medium & small-scale commercial, rural mixed crop-livestock dairy system and pastoral/agro-pastoral) is very low. These constraints explain the low milk yields and short lactations, high mortality of young stock, longer

[39] CSA (2018) Agricultural sample survey 2017/18, Volume II report on livestock & livestock Characteristics (Private peasant holding)
[40] FAO & New Zealand Agricultural Greenhouse Gas Research Centre (2017).

parturition intervals, low animal weights and high enteric methane emissions per unit of metabolizable energy.

Animal health: The prevalence of various animal diseases, tick-borne diseases, internal and external parasites affects the performance of dairy cattle. Animal health affects emission intensity through the "unproductive emissions" related to mortality and morbidity. Calf mortality is high in all systems and particularly in the pastoral and mixed crop-livestock systems where mortality ranges between 12%-16%. Many of the health problems result from poor animal condition as a result of inadequate nutrition, but also from the limited access to animal health services. Morbidity has an indirect effect on emission intensities through slow growth rate, reduced mature weight, poor reproductive performance and decreased milk production. This is particularly true for improved exotic dairy cattle breeds which are often inherently more susceptible to diseases compared to the indigenous cattle.

Reproductive efficiency: Reproductive efficiency affects emission intensity by influencing the portion of the herd that is in production (e.g. milked cows and young stock fattened for meat). It is also key parameters to the economic performance of dairy systems. Improvements in reproductive performance are a major efficiency goal of the dairy industry. However, achieving this goal is currently hampered by a number of factors, particularly feed availability and quality. Poor reproductive performance in the Ethiopian dairy herd is manifested in a number of parameters such as low fertility rates (50%), delayed time to reach puberty and age at first calving (2.8 and 3.6 years in rural mixed crop-livestock and pastoral systems, respectively). The proportion of lactating cows ranges from 26%-28% which implies a large proportion of the dairy herd comprises of non-productive stock (bulls, replacements and dry cows).
Genetic limitation and a low number of improved genotypes: About 97% of the cattle populations in Ethiopia are indigenous. While adapted to feed and water shortages, disease challenges, and harsh climates, the productivity of these breeds is generally low. Milk production is as low as 0.5 to 2 liters per cow per day over a lactation period of 160-200 days

3. Forestland converted to cropland and Forestland converted to grassland

The major drivers of *forestland conversion to grassland and cropland* in Oromia are expansion of agriculture (small-scale subsistence, medium to large scale commercial), fuel wood and grazing (ranching). The other drivers are a complex combination of socio-economic issues, weak policy implementation on land use, low capacity of forest institutions & inter-sectoral coordination, land use conflict and policy discrepancy and demographic factors.

Irrigated agricultural practice in lowland areas, Medium-large scale commercial agriculture investors (sugar cane plantation for instance Didhessa, Wonji Shoa, Mata Hara and Fincha); tea plantation (illu Aba Bor). In Ethiopia, many factors contribute to the forest degradation and deforestation problem. Harvesting fuel wood and logging, for agricultural land and grazing, expansion of rural areas and villages into forest regions and lack of clear forest and land tenure policies are believed to be the major factors of forest degradation and deforestation in Ethiopia (Mulugeta and Melaku, 2008). High population growth which results in increase demand for agricultural land, fuel, and other forest products, and poverty also contribute to the current problem of the forestry sector in Ethiopia. In addition, policy failure due to implementation problem may lead to more deforestation and forest degradation problem as this may, among other things, create a property right regime closer to open access (Mekonnen and Bluffstone, 2008).

Expansion of small-scale cultivation systems has been identified as a major driver of deforestation and forest degradation. Subsistence agriculture is the main economic activity throughout Oromia, with farmers cultivating a diversity of crops depending on the local livelihood systems.

Main crops include barley, wheat, beans, potatoes, and cabbage in the highlands and bananas, maize, and teff in the lowlands. The choice of crops in smallholder agricultural production systems results in

different impacts on forest cover as farming techniques vary with different crop combinations. Some crops result in more forest conversion or forest degradation, such as khat (Unique 2014). Farmers' decision of which crops to plant is influenced by a range of factors, including agro-ecological characteristics of the land, proximity to markets, consumption preferences, and price fluctuations. For example, enset—a type of banana found in southern Oromia near the border with SNNPR—provides a higher amount of foodstuffs per unit area as compared to many other crop choices, especially cereals and maize; enset has helped to support a dense population in the southern region in general. The shift in consumption patterns from tubers to cereal crops in both rural and urban areas (often conceived as modernization) demands larger plots and is less likely to be integrated with other land uses such as forest or crops (UNIQUE 2015). Many poor farming households respond to declining land productivity by abandoning existing degraded cropland and moving to new lands for cultivation. Therefore, one of the main reasons for the destruction of natural forests are unsustainable agricultural practices which transform forested landscapes into mosaics of managed and unmanaged ecosystems, resulting in habitat loss and fragmentation for many species of flora and fauna. The majority of small-scale farmers operating in Oromia's forest are engaged in coffee production. The response of small-scale coffee farmers to global coffee price increases has been systematically analyzed by a number of studies, with mixed results. In the case of Alemu and Worako (2009)[41], coffee growers were found to benefit little from positive changes in the global coffee price, as this price fluctuation is mainly absorbed in the coffee auction markets. These authors attribute the lack of producer price response to world price fluctuations to the use of the domestic market as a major coffee outlet at times of lower world prices.

4. Grassland converted to forestland and Cropland converted to forestland

The major drivers of grassland & cropland converted to forest land are; High demand & dwindling supplies of forest products & high economic return from forest products (fuel wood, construction materials), land degradation, and multiple benefits (ecosystem services, climate change mitigation & adaptation). The other driver is increased recognition by policy makers of the importance of expanding forest cover to increase the supply of forest products, conserve biodiversity and reduce the decline in forest-based ecosystem services.

In Ethiopia demand for wood is increasing owing to population and economic growth. However, domestic supply continues to decline due to deforestation and low level of investment in plantation forests. Consequently, the gap between supply and demand is expanding. This has been perceived for many years and led to government-initiated Afforestation/Reforestation efforts onwards. The state influences the actions of these agents through its institutions and legal framework. In some cases, the state's policies are supportive of Afforestation/Reforestation undertakings, while in other cases they are obstructive, e.g., rules constraining transportation of wood products from selected indigenous trees. Afforestation/Reforestation practices driven by NGOs and bilateral and United Nations (UN) agencies primarily emphasize environmental rehabilitation, while farmers undertake Afforestation/Reforestation activities largely for economic gains (Mulugeta and Habtemariam, 2014[42]).

To meet the needs of Ethiopia's growing economy, a supply gap of 4.4 million cubic meters industrial round wood will need to be closed over the next 20 years, as demonstrated by the 2033 "unspecified challenge provides a considerable investment opportunity, as Ethiopia can close this gap through plantation establishment, and expansion of the forestry sector's industry base. Smallholder woodlots are currently the main source of round wood mainly poles and these are expected to continue to

[41] Alemu & Worako 2009. Price Transmission and Adjustment in the Ethiopian Coffee Market. Paper prepared for presentation at the international association of agricultural economist's conference in Beijing, China, August 2009

[42] Mulugeta Lemenih and Habtemariam Kasa (2014), Re-Greening Ethiopia: History, Challenges and Lessons, forests ISSN 1999-4907

supply an important amount of round wood. Opportunities for downstream processing, including through small and medium forest enterprises, to supply the growing construction and furniture demand (MEFCC, 2017[43]).

A study showed that market value of forest production and its contribution to GDP of Oromia is increasing. Forest products are used as a source of fuel, production of timber and source of construction materials. On an average, forest production contributed about 6.10% to GDP and became the second least contributor to the GDP of Oromia (Hundessa, 2017[44]).

The extent and severity of land degradation in Ethiopia is unprecedented. Major land-cover changes resulting from improper practices are taking place on the rugged topography that characterizes most of the Ethiopian highlands, which have accelerated land degradation and soil erosion. This has left vast areas severely degraded, while the loss of fertile topsoil, estimated at 1 billion cubic meters (m^3) per year, significantly reduces agricultural productivity and continues to threaten food security at household and national levels (FAO 1984, as sited in Mulugeta and Habtemariam, 2014]. An estimate by (FAO 1984, as sited in Mulugeta and Habtemariam, 2014] put the degraded area on the highlands at 27 million ha, of which 14 million ha are very seriously eroded and 2 million ha of the seriously eroded lands have reached a point of no return. This large-scale land degradation and its impact are led initiatives for soil and water conservation as well as for forest land rehabilitation. Some of these rehabilitation projects later became national programs run by the government with financial assistance from donors.

Empirical evidence on forms of land degradation in Oromia region is scanty. However, a review of available information reveals that soil erosion is the most widespread form of land degradation in the region. The average erosion rate for agricultural land has been estimated at about 40 t/ha but there is wide variation between different parts of the region and between production systems. Several factors contributing to erosion include: rugged topography with steep slopes and a thin soil layer accelerated by increased agricultural activities (for example, in one community, the length of gullies increased 14 times over a 40-year period following expansion of crop production on medium and steep slopes by replacing pasture and woodland); .high amount of rainfall concentrated in a limited period during the year, which also contributes to erosion as rainfall intensity is a more important factor which has been exacerbated by traditional cultivation practices in which land is tilled before, and left bare and loose during the main rainy season. Loss of forest and other vegetation cover over time due to population pressure and expansion of farmland has also contributed greatly to enhance erosion rates over a large part of the region (Bezuayehu *et al.,* 2002[45]).

The Oromia Forest Reference Level, which uses information from the National Forest Reference Level (submitted to UNFCCC in March 2017), estimates the annual forest gain (bias corrected area) in 5,238 ha/year with in 734.916 tCO_2 $year^{-1}$ in removals by Afforestation/reforestation category.

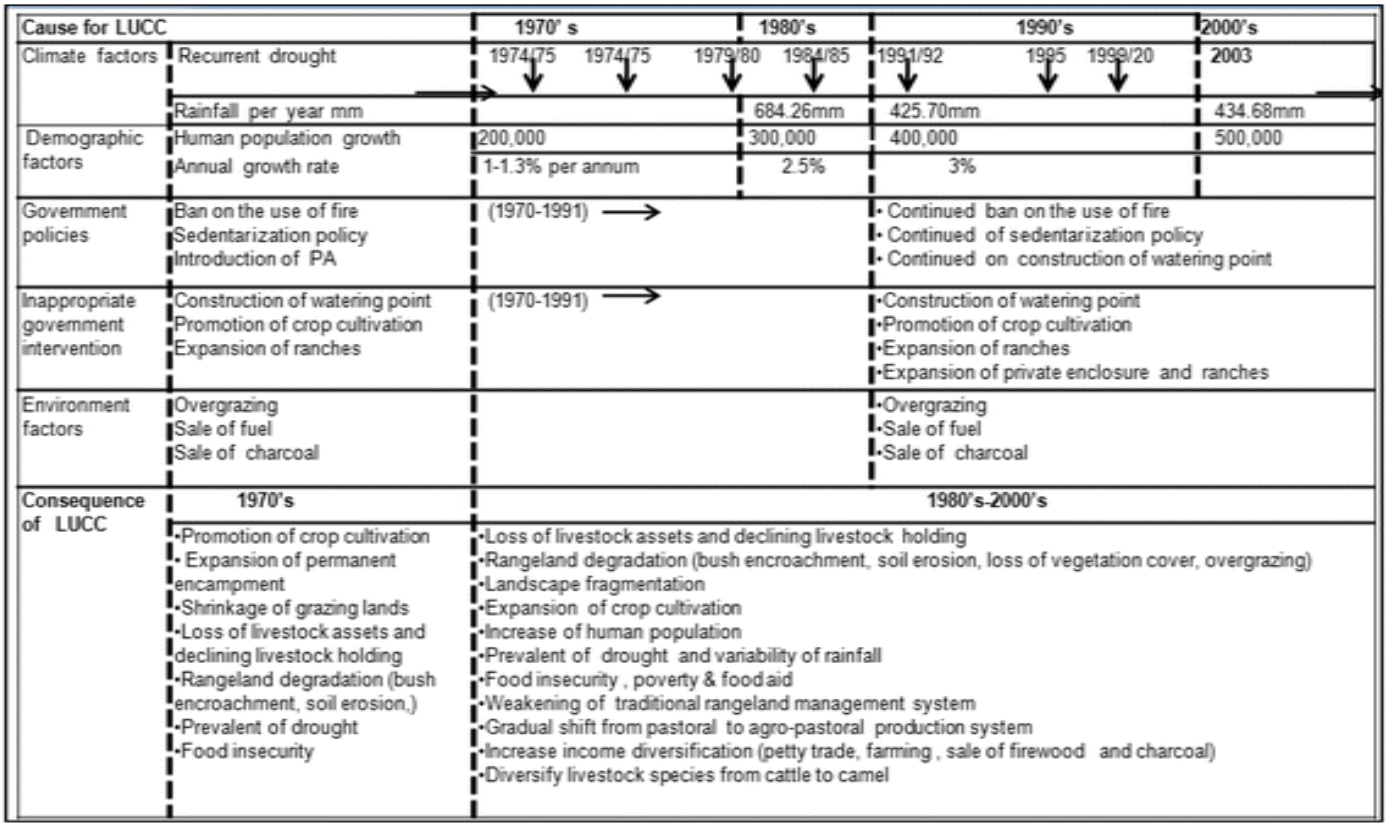
In the Oromia GHG Inventory, these categories resulted in average value of -714,401tCO_2 $year^{-1}$ and -258,305 tCO_2 $year^{-1}$ for grassland converted to forestland and cropland converted to forestland, respectively. These values equal to 8.7% of total net emissions and removals.

[43] Environment, Forest & Climate Change Commission (2017). Ethiopia forest sector review Focus on commercial forestry and industrialization, Technical Report.
[44] Hundessa Adugna (2017). Contribution of Forest Production to GDP and Its Challenges in Oromia National Regional State, Ethiopia. Jurnal Ekonomi dan Studi Pembangunan, 9 (1),
[45] Bezuayehu Tefera, Gezahegn Ayele, Yigezu Atinafe, M.A. Jabbar & Paulos Dubale (2002). Nature & Cause of Land Degradation in the Oromia Region: review, Socio-economic & policy Research Working Paper page 36

5. Grassland Converted to Cropland

Main causes for grass land conversion to cultivated land in Oromia (also could apply to the rest of rangelands/grass lands in Ethiopia) are many, having complex LULC change spatial and temporal patterns and varying across ecological zones of the region.

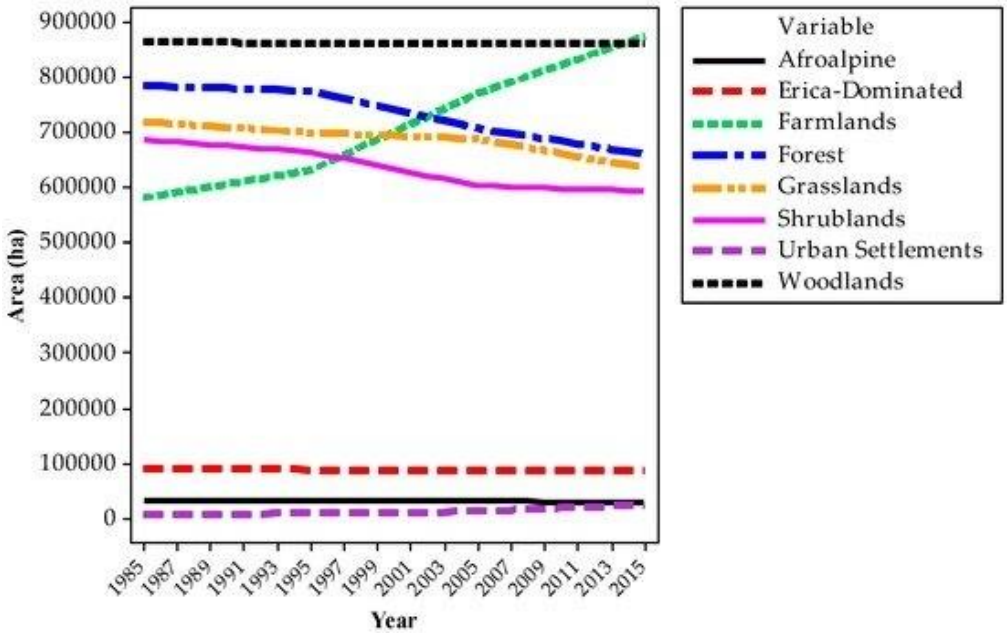
According to Abate and Angassa (2016)46 in a study conducted in Borana Zone, Yabello Woreda of Oromia lowlands, showed that the Borana rangelands had undergone substantial changes during the last couple of decades. Between 1987 and 2003, a considerable increase in woodland cover (11.7 %), bushland cover (17 %), cultivated land (72.5 %), and settlements (79.8 %) were witnessed. The results showed a rapid decline in grassland cover (7.7 %), shrubby grassland cover (86 %), and bare land (0.7 %). The spatial pattern analysis indicate that the Borana rangeland was fragmented and characterized by the proliferation of large numbers of patches with a decline in patch index, increased patch density, and irregular shape of patches within a landscape. Local communities' perceptions indicate that recurrent drought, increased human population size, and expansion of cultivation were largely responsible for the observed LULC changes in this area. The cause-effects (underlying causes) and impacts in line with the above are summarized by the authors in figure below.



46 Abate, T. and Angassa, A, 2016 "Conversion of Savanna Rangelands to Bush Dominated Landscape in Borana, Southern Ethiopia", Journal of Ecological Processes, SP 6, VL 5

As a result, the conversion of grassland and livelihood diversification from a livestock dominated production system to crop cultivation is an emerging land use change in the region.

Similar trends were observed in Bale Mountain Eco-region by Nune et al, 2016[47]. Out of the eight LULC types identified in the study area, only two, namely farmland and urban settlements, showed growth over the 31-year study period while the rest declined in their cover, grasslands loosing substantial area between 2005 and 2015. Between 2005 and 2015, the gain of farmland was estimated at 103,320 ha; however, the average area added to farmland annually was estimated at about 10,575 ha (much of the addition being from forest land), see fig. below



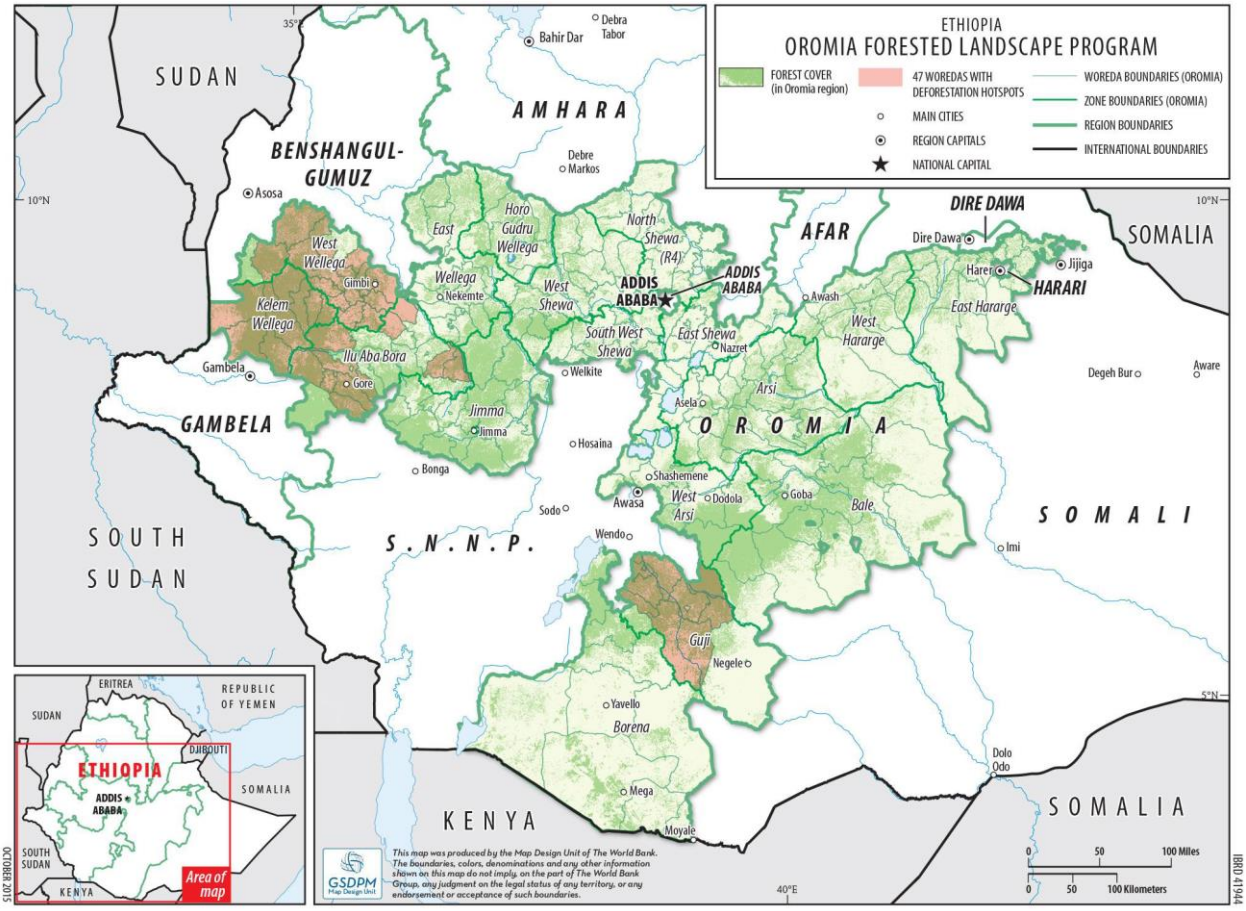
In line with this, a study by Muleta Ebisa Feyissa (2015[48]) in Jima Arjo Woreda of West Wollega (Western Oromia) showed a rather transitional LULC change patterns occurring through the years; changes from dense forest to degraded forest, open wood land and grass land first, and subsequently to farmland/crop lands and bare lands. From 1973 to 1986, changes were largely forest to cultivated land (deforestation), open woodlands (degradation) and grass lands. Between 1986 - 2001 however, the period clearly showed the massive land transformation and magnified the state of human intervention in an ecosystem. With more or less equal time interval with that of 1973 to 1986 period, the amount of farm land during 1986 to 2001, has increased extremely (increased with 151.715 km2 as compared to 1.55 km2 in the previous period) with 10.11km2/yr. average rate of change. Large patches of native vegetations have been removed, degraded and either converted or transformed in to farm land. The original grass lands, open wood lands and wet lands were drastically diminished. Bare lands showed expansion over the period. Farmland has expanded throughout the period due to largely the conversion of the initial open wood land followed by grass land. Between 2001 -2006, farmlands continued expanding at the expense of open wood lands and grass lands (though overall, grass land covered increased between 1973 – 2006, its vulnerability to conversion is very high).

[47] Nune, S. H.; Sormessa, T. and Teketay, D., 2016 "Land Use and Land Cover Change in the Bale Mountain Eco-Region of Ethiopia during 1985 to 2015" Land 2016, 5(4), 41; https://doi.org/10.3390/land5040041

[48] Feyissa, E.F., 2015 "Remote Sensing GIS Based Western Ethiopian Highlands – A case of Jima Arjo District" Dept. Of Earth Sciences, Wollega University, Journal of Science, Technology and Arts, https://www.ajol.info/index.php/star/article/view/118627

In a nutshell, the main direct driver for emission from grass land to crop land conversion is farm land (cultivated land) expansion, increase in total crop production, growth in synthetic fertilizer use and increase in manure application in crop land (identical to abatement levers for soil as suggested in the CRGE). However, these direct drivers are highly factored by increase in demographics, unemployment/poverty, lack of proper land use planning and enforcement, government policy (villagization), climate change and others (as well described fig. above)

Oromia National Regional State Map



Annex 2: Financing Plan for ISFL ER Program

Annex 2 is attached separately as Excel table to this document.

Annex 3: Assessment of Land and Resource Tenure in the Program Area

Assessment of legal and policy framework governing forest tenure in Oromia National Regional State

Assessment of legal and policy framework governing forest tenure rights in Oromia National Regional State

1. Introduction

1.1 Background

Globally forests contribute to the livelihoods of more than 1.6 billion people, with 60 million wholly dependent and 350 million dependent to a high degree (CIFOR, 2016; Olavand El-Mikawy, 2009). According to a recent study by UN-REDD program, more than 11.6 million rural households in Ethiopia are relying on some aspect of timber and NTFPs for their livelihoods (UNDP, 2017).The same study estimated that about 57 million economically active rural populations are engaged part time or full time in the collection of one or more of the forest products. The various goods and services provided by forest resources in Ethiopia include food, medicine, energy, shelter, clean water, land stabilization, erosion control, maintaining invaluable biodiversity by providing critical habitat for flora and fauna, and regulation of climate change.

In terms of contribution to national economy, Ethiopian forests generated economic benefits in the form of cash and in-kind income equivalent to 111.2 billion Ethiopian Birr (ETB) (USD16.7 billion) or 12.86% of Gross Domestic Product (GDP) in 2012/2013 (UNEP, 2016). This study indicated that the major benefits obtained from Ethiopian forests were associated with flows of wood fuel (firewood and charcoal), forest based livestock fodder, round wood, forest coffee, control of cropland erosion, pollination of crops by forest insects, forest honey/ beeswax, and collection of wild medicinal plants.

Despite its significant role, the forest resources in Ethiopia have experienced multiple challenges for quite a long time. These challenges are associated with poor legal and institutional framework, which resulted in considerable loss of the country's forest cover, topsoil, bio-diversity resources, and emission of GHG (Green House Gas). Currently, Ethiopia has about 17.35 million hectares of forests (15.7% of the country area), which include bamboo, dense woodland, natural forests, and planted forests. This estimation is the result of new forest definition - land spanning more than 0.5 ha covered by trees 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). Forest resources in Ethiopia are under threat with net annual loss of 72,000 ha or deforestation rate of 0.54% from 2000 to 2013 (Ethiopia's FRL-revised submission to UNFCCC, 2016).

Several studies show that this alarming rate of deforestation will not only damage valuable ecological services but also impair the rural development efforts and livelihoods of forest dependent communities. Factors that contributed for deforestation and forest degradation include absence of comprehensive land use planning; institutional instability and low capacity of forestry institutions; poor inter-sectorial coordination and lack of synergy between sectors, inadequacy of the forestry legal framework and weak law enforcement, and unclear tenure and forest user rights. Particularly the latter factor is identified by a number of studies as a major cause of deforestation given that insecurity of land and forest tenure provides little incentive for sustainable management and conservation of forested land (Tamire and Bekele, 2014; Anonymous, 2015; Bekele *et al*., 2015). Insecure forest tenure creates uncertainty, mistrust, and conflict that reduce the interest of key actors such as local communities in proper forest management.

The Government of Ethiopia (GoE) has been involved in the REDD$^+$ (Reducing Emissions from Deforestation and Forest Degradation) process since 2008 and is a participant country of the World Bank Forest Carbon Partnership Facility (FCPF). REDD$^+$ is a novel strategy introduced by UNFCCC as a

measure to reduce greenhouse gas emissions and support developing countries in their efforts to reduce deforestation and forest degradation. It is a set of policy model that include an incentive mechanism where rewards are provided to parties which take progressive action to reduce emissions from forest lands. The REDD$^+$ strategy has become very relevant for a low-income country like Ethiopia because of their vulnerability to climate change effects and low adaptive capacity. Ethiopia recognized the potential roles of the REDD$^+$ initiative to harness the growing challenges of deforestation and strengthen the contribution of the forest sector to achieve economic growth. Thus, REDD$^+$ is promoted as an integral part of Ethiopia's long-term Climate Resilient Green Economy (CRGE) strategy and considered as a key vehicle to achieve the goals of Growth and Transformation Plan (GTP II) (FDRE, 2015). The CRGE baseline scenario showed that agriculture and forestry together contribute 85% of the country's total GHG emissions, out of which emissions from the forestry sector account for approximately 37% (FDRE, 2011). Thus, one of the four pillars of the CRGE strategy emphasizes protecting and re-establishing forests for their economic, social and ecosystem services. The CRGE sets the target to afforest/reforest 3 million hectares and improve management of 4 million hectares of forests and woodlands.

The OFLP is a sub-national REDD$^+$ program implemented as pilot within the nation REDD$^+$ readiness activities with the aim to reduce deforestation and net greenhouse gas emissions from land use in all forested areas in the Oromia National Regional State. OFLP seeks to contribute to sustainable management of forested landscapes in Oromia in order to deliver multiple benefits such as poverty reduction and building resilient livelihoods, mitigate climate change, and enhance ecosystem services. It aims to foster equitable and sustainable low carbon development through: (i) on-the ground activities that address deforestation, reduce land-use based emissions, and enhance forest carbon stocks; and (ii) state-wide and local enhancements to institutions, incentives, information, and safeguards management to upscale investment, including coordinating multiple REDD-relevant interventions across the regional state of Oromia. In fulfilling these objectives, OFLP has a potential to promote integrated low carbon landscape management interventions and contribute to the GTP-II and the CRGE goals in forestry, agriculture and energy sectors.

1.2 Why forest tenure rights important to implement OFLP initiative

Successful implementation of OFLP initiatives hinges on clarifying and strengthening land and forest tenure and property rights issues, which is believed to be a fundamental requirement for sustainable forest management. Forest tenure determines who can use what resources, for how long and under what conditions (FAO, 2014). Thus, addressing tenure issues will not only assist to realize the OFLP initiatives but also contribute to sustainable forest management in general. Clarifying and addressing forest tenure issues are particularly important in the context where most of the forest resources are managed as a *communal tenure*. Communal tenure refers to situations where groups or communities have well defined, exclusive rights to jointly own and/or manage particular areas of natural resources such as land, forest, and water. For instance, in Oromia over one million hectares of forests are currently managed under Participatory Forest Management (PFM) arrangement, which is one form of communal tenure (FDRE, 2017). In communal tenure, both the boundaries of the resource owned in common and group membership are clearly defined. These are necessary conditions to exclude outsiders and to secure the rights of group members so that these rights cannot be taken away or changed unilaterally. Besides communal tenure, private and state are common typologies of property regimes in Ethiopia. Clear and secure forest tenure is critically important with the emergence new wave of incentive-based policy instruments such as PES (payment for ecosystem services) and REDD+. Within this policy context, clear property rights over forests directly determine who is eligible to

receive protection incentives and who is responsible for meeting programs' contractual obligations (Robinson *et al*., 2017).

In practice, tenure arrangements are quite complex and, in most cases, constitute overlapping hierarchy of rights. For instance, there is a situation when a government formally owns forest as a state tenure, but at the village level the customary tenure clearly defines which part of the state forest belongs to a specific group or individuals. Another example is when one village has rights only to minor forest products for subsistence use in a particular forest, while another village may have rights in timber and other higher value non timber forest products (NTFP) in the very same area of forest. Given the potential complexity of these overlapping rights, it is highly important that externally implemented forestry projects and programs understand the configuration of rights.

Natural resource tenure scholars distinguish between the *form* and the *security* of tenure (see Robinson *et al*., 2017). *Form* of tenure determines who can use what resources, for how long, and under what conditions. The common categories of tenure forms are private, communal, public or state, and customary. *Tenure security*, on the other hand, concerns the assurance a property holder feels that those rights will be upheld by society (Robinson *et al*., 2017). It reflects a property holder's confidence or belief (real or perceived) that agreed-upon rights, i.e., the form of tenure, will be enforced and upheld by society more broadly. Each single category of tenure forms significantly varies in the depth, breadth, and quality of the bundle of rights. Common bundle of rights in the case of natural resources like forest tenure are *right to access, the right to use or withdrawal, the right to manage, exclusion, alienation, due process and compensation, the right to security, and the absence of term* (Schlager and Ostrom, 1992; Johnson, 2007)[49].

Table 1: Bundle of rights and their characteristics

Bundles of rights	**Common characteristics**
The right to access	The right to enter a defined physical area and enjoy non-subtractive benefits (e.g. to camp or rest in the area
The right to use or Withdrawal	The right to benefit from resource units, for subsistence or commercial purposes (for example, cut trees and collect NTFPs)
The right to manage	The right to regulate internal use patterns and transform the resource by making improvements. Individuals who hold rights of management have the authority to determine how, when, and by whom the resource shall be used.
Exclusion	The right to determine who has access and withdrawal rights, and how those rights may be transferred. It is the right to refuse others access to and use of a resource.
Alienation	Concerns the right to subdivide, lease or sell one's property
Due process and compensation	The right that allow for adjudication of grievances and fair (usually monetary) compensation in cases of eminent domain
The right to security	Immunity from expropriation, that is, the resource cannot be taken from the right holder
The absence of term	The indeterminate length of one's ownership rights, that is, that ownership is not for a term of years, but forever.

[49] "Bundle of rights" implies rules specifying, proscribing, or authorizing actions on the part of the owner

Source: Schlager and Ostrom (1992) and Johnson (2007)

Local conditions determine which of these bundles of rights are relevant for forest management. Even in the most complete private land markets, the state always retains some "takings" rights and restricts prohibited uses. The state or governing body is almost always implicated as a *duty holder* as the entity that has the power to arrest and adjudicate. It is often assumed that the right to possession is one of the most important bundles of rights. However, the right to possession is not necessarily more important than the right to alienation, which is the right to subdivide, lease or sell one's property (Johnson, 2007). Because of these complexities and overlapping bundle of rights, it is crucial for forestry interventions like REDD+/OFLP to carefully understand and clarify more efficient tenure arrangement and property right regimes.

The importance of clarifying and addressing tenure issues for successfully implementation of the new incentive-based approaches such as payments for ecosystem services (PES) or $REDD^{+}$ program has also been internationally recognized (See: FAO, 2011; Atela *et al*. 2015; Robinson *et al*., 2017). Addressing tenure issues is pivotal for the success PES or $REDD^{+}$ programs, since landholders must have the authority to make land use decisions and defend their forest land against outside claimants or other agents of land use change.

Cognizant of this fact, ORCU and other institutions participating in the implementation of OFLP have decided to assess legal and policy framework governing rights to forest tenure, access and use, and its application in the National Regional State of Oromia. This report presents the assessment results of legal and policy framework on how forest tenure rights are recognized, supported, and protected by the existing legal system and implemented in practice in Oromia.

2. Objectives of the study

2.1 General objective

The general objective of this assignment is to assess existing policies and legal frameworks on forest tenure rights in order to better understand how a broader spectrum of these rights are allocated, recognized, supported, and protected by the existing legal system and implemented in practice. The assignment also aims to facilitate policy dialogue to further transform the current PFM/JPFM practices to the next level of forest management and use regime through regulatory incentive such as communal forest land certification.

2.2 Specific objective

The specific objectives of the assignment:

- Review the existing policy and legal framework pertinent to communal land and forest tenure, access and use rights in the Oromia national regional state;
- Assess to what extent does the legal framework define a fair and effective process for the adjudication, demarcation, registration and certifications of forest tenure right;
- Assess the management of forest tenure information in terms the extent to which the government maintains and provides access to high-quality information about forest tenure, access and use rights;

- Assess the level of empowerment of forest rights-holders: to what extents is forest tenure, access and use rights-holders (such as local communities) empowered and supported to exercise their forest rights;
- Review the legal basis for designating state forests and assess how the existing legal framework provides adequate checks and balances on government powers to designate lands as state forests, including the extent to which decisions to designate and re-designate state forests are transparent and accountable;
- Review the legal basis for allocating concessions in state forests and assess to what extent concessions are allocated in an accountable and transparent manner;
- Review the extent to which forest concessions contracts comprehensively describe all rights and obligations of the concession holder, and provide suggestions for improvement;
- Assess the legal basis for forest tenure dispute resolution bodies (judicial, administrative and traditional, such as village/kebele level elder's committees) and their capacities in terms of accessibility to all rights-holders, effectiveness, legitimacy, and fairness of resolutions;
- Review to what extent concession contracts include requirements to ensure social and environmental sustainability and assess to what extent concession-holders comply with social and environmental sustainability requirements in their contracts;
- Identify gaps in the ongoing landholding certification programs and provide options for improvement pertinent to forest tenure right;
- Facilitate high level inter-agency dialogue on how to improve forest tenure, access and use rights for better management of forest and land resources; and
- Prepare a policy brief to inform government policymakers and development partners.

3. Methodology and assessment framework

3.1 Methods of data collection

This study employed four data collection approaches: (i) systematic and in-depth document review; (ii) interviews with key stakeholders/knowledgeable individuals; (iii) participatory consultations with selected CBOs and representatives of communities at grassroots level; and (iv) Policy dialogue with key decision makers.

3.1.1 Systematic and in-depth document review

In-depth desk study/literature review was conducted on systematically selected documents relevant to forest landscape management and climate change and carbon emission reduction efforts such as REDD$^+$/OFLP initiatives. The document review was specifically focus on synthesizing and collating lessons relevant to the achievement of OFLP objectives from the recent international, regional, and national assessments of forest tenure forms and level of security. The review also focused on exploring and understanding various policies and legal frameworks on forest tenure rights to assist the implementation of REDD$^+$ and OFLP objectives. Thus, different regional, national, and international legal and policy instruments, which are relevant for forest landscape management, climate change and carbon emission reduction efforts were thoroughly examined. The review was conducted on relevant legal and policy documents as well as recent analytical work on Ethiopian forestry sector, see detail in the annex 1.

The review identified the synergy, integration, and inconstancies that exist between different strategies, programs and other legal instruments focusing on forest tenure issues. It also systematically captured and benchmarked other countries' experience on REDD$^+$ and other emission reduction efforts to inform the OFLP initiatives.

3.1.2 Interviews with key stakeholders

In addition to the systematic document review, in-depth interviews were conducted with key stakeholders and knowledgeable individuals to critically examine the *de jure* and *de facto* practices of forest tenure arrangements and institutional settings of forest governance in Oromia. The interviewees were selected on the basis of their roles and experiences in the forest and related environmental governance issues in Ethiopia, including REDD^{+}, PFM, OFLP, OFWE, and related programs at national, regional and project levels. These interviewees included politicians/policymakers and bureaucrats working at different administrative levels (from national to woreda level), NGO and donor officials, consultants, academicians, research scientists, and representatives of CBOs.

3.1.3 Participatory consultations with CBOs and other community representatives

Participatory consultations were conducted with selected CBOs and other community representatives engaged in various forms of participatory forest management in Oromia. In selecting study sites for community consultation, emphasis were given to the zones that represent dominant forest biomes in Oromia (Moist and Dry Afromontane, Combretum-Terminalia, and Acacia-Commiphora woodlands), deforestation hotspots identified in the PIM document, and areas where PFM has been implemented for relatively long and short period of time for comparison and to draw institutional lessons for the achievement of OFLP objectives. The compositions of community consultation participants in each woreda include:

- 15 PFM cooperative members, which include 5 committee members, 5 non-committee members (men) and 5 non-committee members (women);
- 10 non-PFM members in the kebele involved in various forms of forest management such as private forest owners (individual farmers who own greater than 1 ha of forest), other communal land/forest owners, e.g. community watershed or rehabilitation site or group managing patch of forest outside state forest, and about 5 landless youth in the community. Table 2 presents CBOs and PFO, number of participants, zones and woredas where community consultation conducted.

Table 2: List of study sites, CBOs and PFO consulted

Zone	**Woreda**	**CBOs/PFO**	**Number of participants**
Jimma	Gera	Sadi Cawura (CBO), Sadi Loya (PFO)	24
Illu Ababor	Alle	Abdi Bori (CBO) and Sagi Baqi (PFO)	38
Kelleme Wollega	Anfilo	Hawi Jirenga (CBO), Shebel (PFO)	18
West Wollega	Nolle Kaba	Siba Daalo and Harbu (CBOs), Siba Silase (PFO)	21
West Showa	Dandi	Chilimo and Mesalema (CBOs)	24
Guji	Adola Rede	Sakaro, Maleka and Dooba (CBOs), Anferara (PFO)	45
	Wadara	Magarisa (CBO) Sokora Jide (PFO)	39
West Arsi	Dodola	Danaba, Barisa, Bura Chale and Addelle (CBOs)	38
Total			**247**

CBO – Community Based Organization (PFM); PFO – Private forest owners and other forest management group

3.1.4 Policy dialogue

Policy dialogue was conducted with selected stakeholders and key decision makers to discuss how to improve forest tenure, access and use rights for better management of forest and land resources in Oromia National Regional States. The participants of the policy dialogue forum are federal and regional level decision-makers including members of parliament (MPs) and Oromia region president office, federal and regional state land administrators, forest and environment bureau head and experts, different NGO officials, academic and research scholars working on forest and land tenure and property right issues.

The main objectives of the policy dialogue forum were to discuss with key decision makers and stakeholders on how to improve forest tenure, access and use rights; and gather valuable inputs that can be integrated into a policy brief summarizing practical measures to be taken by GOs and other development partners to improve OFLP implementation. The forum enabled different stakeholders to see problems from each different perspective, which can improve the implementation of the OFLP/REDD^{+} program.

Some of the critical issues discussed during the policy dialogue forum, among others, were:

1. How to improve rights-holders access to understandable information about the administrative channels available to formalize and defend their forest tenure rights;
2. How to build the capacity of the rights-holders to get services such as certificate of forest title deed, which can ensure tenure security;
3. How to address the challenges such as lack of clear forest boundary and criteria to enroll PFM members;
4. How to harmonize PFM and traditional forest tenure rights held by local community or with customary forest tenure systems;
5. How to devise mechanisms for non-PFM members, particularly unemployed and landless youth and those who have lost their customary access due to the establishment of the new PFM system;
6. How to address the challenges related to weak forest law enforcement such as lack of clarity in the legal framework to provide how the severity of a penalty for a forest crime is determined;
7. How to address the challenges related to allocating forest concessions, such as:

a. lack of comprehensive legal framework that defines transparent and competitive process for allocating forest concessions including public disclosure of information relating to the allocation process;
b. technical requirements and minimum qualifications for application;
c. anticorruption measures and public consultation process.

The participants of the policy dialogue forum have provided their inputs and recommendations with regards to the critical issues identified by researcher and the inputs were thoroughly analyzed and included into the final draft report. The discussion during the policy duologue forum also helped to prioritize and fine-tune the recommendations for policy reform and ultimately enhance sustainable management of forest resources.

3.2 Governance of Forests Initiative (GFI) framework

3.2.1 The scope of the analytical framework

Governance of Forests Initiative (GFI) framework, which is developed by World Resources Institute (see Davis *et al*., 2013), is adopted to assess the legal and policy framework governing forest tenure in Oromia with particular emphasis to understand how broader spectrum of forest tenure rights are allocated, recognized, supported, and protected by the existing legal system and implemented in practice. The GFI framework is one of the comprehensive tools used to diagnose and assess strengths and weaknesses of legal and policy arrangement governing forest tenure. The GFI framework is practically applied in several countries like Cameroon, Brazil, and Indonesia and yielded useful results and practical lessons on how to design and collect forest governance data. The GFI framework was primarily designed to support civil society-led, evidence-based advocacy for forest governance reforms at national and sub-national levels. However, the GFI indicators are proved to be useful for many different types of applications at various scales. According to Davis *et al*. (2013) the scope of GFI application may include:

- Government agencies wishing to assess the effectiveness of policy implementation;
- Legislators seeking to identify priorities for legal reforms;
- Multi-stakeholder bodies aiming to build consensus about governance challenges;
- NGO watchdogs or oversight bodies seeking to monitor government performance;
- International organizations or donor agencies seeking to verify compliance with safeguards;

The GFI framework has been designed to be flexible and adaptable to support a customized assessment for multiple applications. Accordingly, by customizing the framework to the objectives of the study, the main theme of forest tenure governance was assessed under three key dimensions:

i. **Forest tenure rights**,

ii. **Tenure dispute resolution**, and

iii. **Concession allocation**.

Each key dimension was assessed at multiple sub-dimensions and using several indictors; and in total 20 sub-dimensions and 102 indictors (50 for forest tenure rights, 19 for tenure dispute resolution, and 33 for concession allocation) were evaluated.

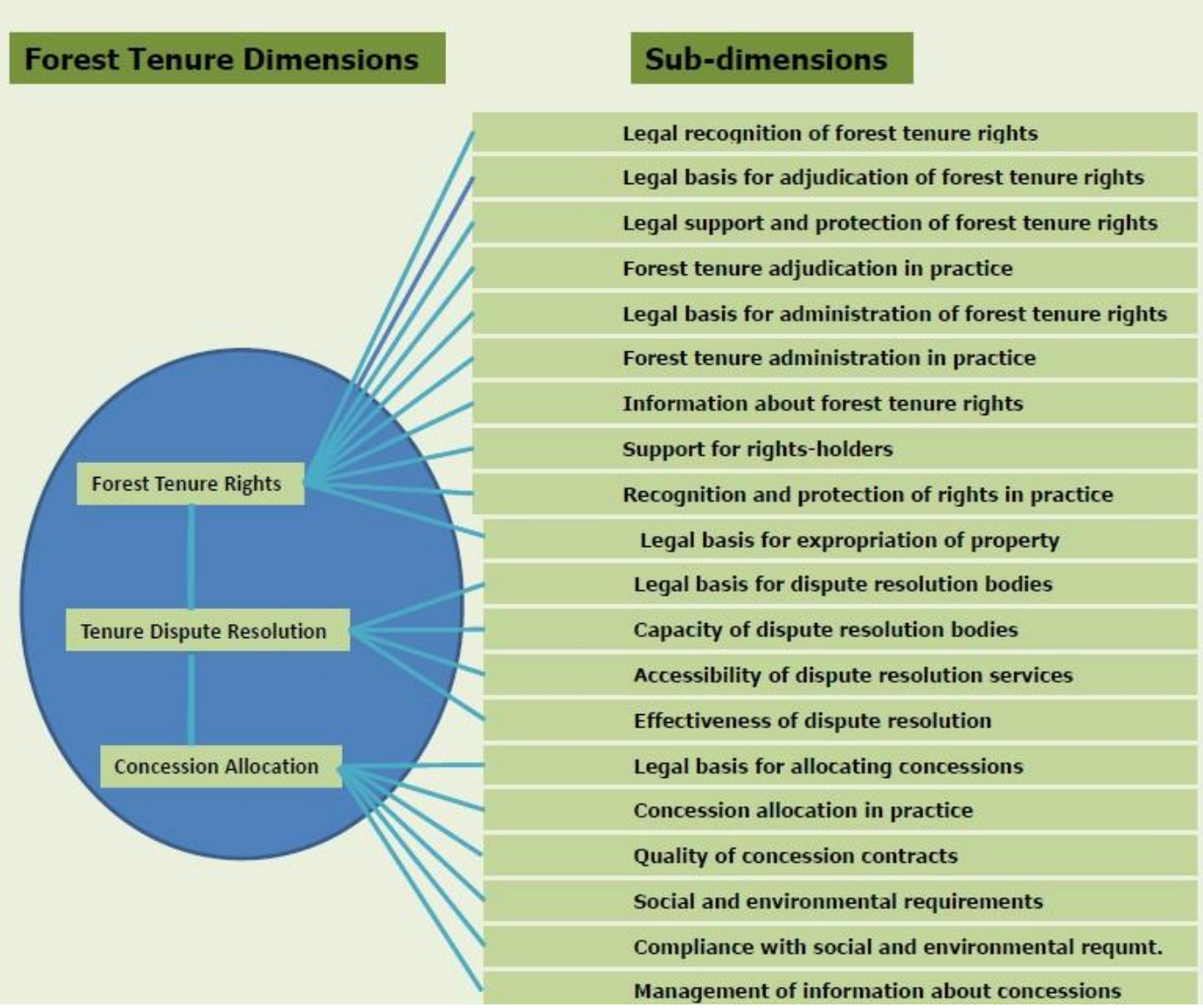


Figure. Forest Tenure Governance Assessment Framework

Under each sub-dimension, a short description was included to summarizes the scope of the assessment, diagnostic question or objective, elements of quality or indictors that are the focus of data collection and help the user answer the diagnostic question in a structured manner. Indicator is used to describe a quantitative, qualitative, or descriptive attribute that, if assessed periodically, could indicate direction of change (e.g., positive or negative) in that attribute (Davis *et al*., 2013).

3.2.2 Scoring method and data analysis

Scoring is the process of assigning quantitative values to indictors based on the data collected in order to concisely summarize assessment results or quickly identify strengths and weaknesses. At the design stage of this study, the indicators that describe the quantitative and qualitative, attributes of each sub-dimension were included in the semi-structured questionnaire prepared for community consultations and checklist designed for key informant interviews. Various stakeholders participated to answer the diagnostic questions designed to address each element of quality or indictor. These stakeholders include PFM members and other community members involved in various forms of forest management, private forest owners, experts and decision-makers working on forest and land administrations, law enforcement agencies from woreda to federal levels, and NGO officials and

researchers working on land and forest related projects. Accordingly, a detailed and comprehensive data about forest tenure rights, tenure dispute resolution, and forest concession allocation were generated through community consultation, key informant interviews, and document review. Based on the evidence extracted from field notes, interview transcripts, document review and other relevant sources, researcher critically assigned score for each element of quality or indictor. In assigning the score, researcher specifically focused on critically evaluating how well a specific element of quality has been met compared to the description or diagnostic question stipulated under each indictor. In doing so, the researcher double-checks the assessment data before drawing conclusions about the quality of a specific indicator. Moreover, the researcher carefully employed the detailed guidance provided on WRI manual (see Davis et al. 2013), in translating assessment data into scores and drawing conclusions about elements of quality and indicators. Several strategies were also applied to minimize subjectivity and researcher's bias. First, study employed four data collection tools to triangulate and enrich information collected through different data collection techniques. Second, multiple stakeholders were involved ranging from different group of local communities, bureaucrats and decision-makers working at different levels and capacities, and independent experts from NGO and research organization. Third, instead of using the binary response (yes or no), which is commonly used in most WRI assessment, we adopted the four-tiered scoring system (1= never, 2= sometimes, 3= often, 4=always) developed in Brazil to capture the three key forest tenure dimensions and adequately assign an accurate value to each indictor. Fourth, the three key forest tenure dimensions were assessed at 20 sub-dimensions and 102 indictors to minimize bias and enhance the precision of the score values. A short qualitative description is presented to justify the assigned score for each indictor and briefly describe the assumption behind the sore. Finally, multi-stakeholder forum will be carefully organized to review and validate the assessment results, which enhance the credibility and legitimacy of the report.

Therefore, following the experience of GFI assessment in Brazil, this study consistently assigned quantitative values ranging from 1 to 4 denoting: 1= never, 2= sometimes, 3= often, 4=always. After calculating average score or cumulative performance, the quality of each sub-dimension is determined as: 1 - 1.5= very weak, 1.6 - 2.5= weak, 2.6 - 3.5= moderate, 3.6 - 4 = strong. The consistency in assigning values is very important for ensuring the comparability of results across different indicators and through time. Through this structured and comprehensive evaluation, we identified which forest tenure issues scored weak and very weak that requires serious corrective measures to improve forest tenure governance in Oromia national regional state.

4. Results

4.1 Basic information on studied CBOs

About two hundred forty-seven (247) community members selected from seven zones and eight Woredas in Oromia were participated in this study. These participants represent forest cooperative members, individuals in the kebele involved in various forms of forest management such as private forest owners, and community group managing patch of forest outside state forest. Table 2 presents community groups involved in this study and their forest size and year of establishment.

Table 3: Studied CBOs

Studied CBOs	Year established	Forest size (ha)			CBO members		
		Natural Forest	Plantation	Total	Male	Female	Total
Sadi Cawura	2008	961.54		961.54	491	38	529
Abdi Bori	2012	2681		2681	103	59	162
Abdi Gudina	2012	962		962	111	18	129
Awi Jeregna	2014	3202		3202	263	16	279
Siba Daalo	2015	1134.06	468.41	1602.47	159	6	165
Siba Silase/Harbu	2015	1130.76	473.02	1603.78	86	5	91
Harbu Aba Gada	2016	76		76			25
Chilimo	1997	596.21	99	695.21			128
Masalema	1997	664	246	910			119
Sakaro	2015	4230.87		4230.87	138	9	147
Maleka	2015	4375.93		4375.93	73	33	106
Anferara/Dooba	2015	2992.82		2992.82	687	63	750
Sokora Jide	2013	2174.63		2174.63	591	203	794
Danaba	2001	4141		4141	238	65	303
Barisa	2000	2645		2645	137	21	158
Bura Chale	2002	3419		3419	223	81	304
Addelle	2002	9578		9578	424	132	556
Total				**46251.25**			**4745**

4.2 Assessment results of forest tenure governance

Forest tenure shapes the relationship between people with respect to forests by defining who can use what resources, for how long, and under what conditions. Clear and secure forest tenure is widely believed to be a key enabling condition for sustainable forest management. The following section presents the results of the analysis using the three forest tenure governance dimensions identified in the framework section.

- **forest tenure rights,**
- **tenure dispute resolution, and Concession allocation.**

Each of this key dimension is analyzed at multiple sub-dimensions and using a number of indictors.

4.2.1 Forest tenure rights

Forest tenure rights refers to the entire bundle of forest-related property rights that may be held individually, communally, or by state, including right to access, right to use or withdrawal, right to manage, exclusion, alienation, right to compensation, and the right to security (Johnson, 2007). Stable tenure rights and the assurance that those rights will be protected, or disputed through due process, are essential for sustainable forest management. Local communities who depend on forests for daily subsistence and livelihood and have a connection to forests over long periods of time, will take responsibility for better long-term care of the land and forest if they have control over most of the bundles of rights. Tenure rights govern the ability of forest owners and other landowners to acquire, manage, use, and dispose of their land and its products and services. These rights are exclusive, but not absolute because landowners' tenure rights are generally bounded by limits on externalities, such as preventing soil and water pollution, or other relevant requirements to leave land in good condition

for future generations, such as seed tree or tree planting requirements. Clear property rights are arguably the fundamental requirement for sustainable forest management, and a process to assign those rights, determine who controls and determines those rights, and a means to resolve disputes must be clear and accessible to all owners. The following section presents ten sub-dimensions of forest tenure rights, which are assessed using several indictors under each subdimension.

Legal recognition of forest tenure rights

This sub-dimension examines the extent to which the legal framework for forest tenure recognizes a broad spectrum of existing forest tenure rights and rights-holders. As indicated above, forest tenure involves a bundle of rights that includes *right to access*, *right to use or withdrawal*, *right to manage*, *exclusion, alienation, right to compensation, right to security*, and *absence of term*. Ideally, full right holder over a particular resource typically bestowed those entire bundles of rights. Those rights can be individually or communally held or may derive from customary systems of resource management. Under this subdimension, this study evaluated the spectrum of tenure rights granted by the law by reviewing all relevant national policies and legislations on land rights and forest tenure. These documents include federal and regional constitutions, land tenure laws, forest laws, and implementing regulations related to land registration and titling. The cumulative performance of this sub-dimension is scored moderate mainly because of the following attributes in the existing legal framework:

- The forest tenure rights held by individuals are recognized in the legal framework, e.g. Proc. No. 456/2005, Art 2/11; Proc. No. 1065/2018, Art 2/6.
- Communal forest tenure rights are recognized in the legal framework, e.g. Proc. No. 456/2005, Art 2/12; Proc. No. 1065/2018, Art 2/7.
- The customary tenure system is not recognized in the new forest Proc. No. 1065/2018. Customary held rights to forest lands and resources are not clearly recognized in the other legal document.
- The legal framework does not directly discriminate against the forest tenure rights of women. Although the rights of women are not explicitly defined in the new forest Proc. No. 1065/2018, article 35 this proclamation states that expressions in the masculine will apply to the feminine.

Detail assessment results on the extent to which the existing legal framework recognizes individual, communal, customary rights, and a right of women to forest resources is presented in the appendix section.

Legal support and protection of forest tenure rights

This sub-dimension seeks to evaluate the clarity and comprehensiveness of the legal framework for forest tenure, particularly in terms of protecting and supporting rights. The assessment was conducted on multiple types of rights (e.g., individual, communal, and state) to evaluate whether a given type of right or rightsholder is adequately supported and protected under the law. The assessment was conducted by reviewing federal and regional state legislation regarding land rights and forest tenure including constitution, land tenure laws, forest law, and implementing regulations for land registration and titling. The cumulative performance of this sub-dimension is moderate mainly because of the following attributes:

- The existing legal framework defines private, community, association and state forest rights clearly and consistently.
- The legal framework defines forest rights that are of adequate duration and scope.

- The legal framework provides the right to transfer possession rights (Proc No. 1065/2018, Art 5/1e); however, the land holding cannot be sold and can be transferred only through inheritance to family members and can be leased, subject to restrictions on the extent and duration of leases (Rural Land Use and Administration Proc. No. 456/2005, Art 5/4 & Art 8).
- The FDRE constitution, proclamation on Land Expropriation for Public Purposes and Payment of Compensation (proc. No. 455/2005), regulation 137/2007, and Oromia Region proc 130/2007 assure the protection of land holders against forced evictions and denial of access to essential natural resources.
- The legal framework provides the right to get compensation in case of expropriation of possession for public interest (Proc No. 1065/2018, Art 5/1g and Art 7/1h).

Legal basis for adjudication of forest tenure rights

This sub-dimension evaluates the extent to which the legal framework defines a fair and effective process for the adjudication of forest tenure rights. Adjudication concerns the process of final and authoritative determination of existing rights and claims of people to land and/or resources. Adjudication may occur during the first-time registration of rights, or during the process of resolving doubt or dispute after registration. All relevant legislation pertinent to the process of adjudicating tenure claims such as land tenure laws, forest law, implementing regulations related to land administration, and procedural manuals or guidelines for registering land rights were reviewed. The cumulative performance of this sub-dimension is moderate mainly because of the following attributes:

- The legal framework defines a clear process for adjudication of forest tenure rights. For example, the Oromia rural land administration and use proc. No. 130/2007, Art 16/1a-j provides clear process for adjudication of land tenure rights, where forestland tenure adjudication process can also be considered within the land administration and this process is also broadly specified in new forest proclamation.
- Clear process required for tenure claims is broadly prescribed in Oromia rural land administration and use proc. No. 130/2007 and specifically in regulation No. 151/2013, Art 3.
- The Oromia rural land administration and use proc. No. 130/2007, Art 16 and regulation No. 151/2013, Art 18 prescribe the criteria to resolve overlapping claims. Locally elected land administration committees are mandated to resolve overlapping claims according to the specified law.

Forest tenure adjudication in practice

This sub-dimension evaluates the process of adjudication on the ground or in practice to ensure that it involves fair and transparent consultation of all claimants including vulnerable and marginalized peoples. Adjudication may occur in the context of first-time registration of rights, or it may occur to resolve a doubt or dispute after registration. The study evaluated this indictor by collecting primary data from eight woredas in Oromia through participatory community consultations and key informant interviews with those responsible for administering the adjudication process. It assessed the transparency, inclusiveness, and fairness of the process, including whether relevant legislation on adjudication was respected in practice. The cumulative performance of this sub-dimension is weak mainly because of the following attributes:

- Claimants are not provided with adequate information about how to conduct fair and effective adjudication of forest tenure rights, particularly in communal forest cases.
- Full and effective consultation of claimants was observed only in few cases.

- Weak support for vulnerable claimants such widow, orphanage and poor community members were observed. For example, in terms of understanding their rights, understanding the adjudication process, or documenting claims.
- The adjudication process is fair
- The studied community believes that the final decisions of the adjudication process are not fair and mostly resulted in displacements and reductions of their rights without fair compensation.
- Weak access to effective redress mechanisms such as help desk, phone and local office. Claimants have limited access to file complaints and appeals. Complaints and appeals are not timely addressed, particularly with written response, and detailing resolutions.

Legal basis for administration of forest tenure rights

This sub-dimension evaluates to what extent the legal framework ensures fair and effective administration of forest tenure rights. Administration of forest tenure rights focuses on activities such as titling, registering, surveying, demarcating, transferring rights, allocating permits, licenses, or other types of forest use contracts. For this assessment the study focused on registration of land titles and the process of sharing forest management and use rights between local community and government institution in the case of PFM and other joint forest management arrangement. The study reviewed and evaluated all relevant legislations including federal and regional land tenure laws, forest laws, and implementing regulations related to land and forest administration. The cumulative performance of this sub-dimension is moderate because of the following attributes:

- There are comprehensive legal rules both in the proclamation and regulation that provide clear guidance for how the administrative procedures including those that define how rights can be transferred, how lands are surveyed, and boundaries demarcated.
- The existing legal framework provides clear guidance to minimize complexity and discretion in administrative procedures. However, there were cases where administrative discretion such professional judgment rather than strict adherence to regulations led to abuse of authority and inconsistency in administrative actions.
- The costs of the administrative procedures are reasonable and affordable for the majority of applicants. These were assessed against the cost of living and average wage rate in the area. However, some requirements create a burden for the applicants like demanding frequent travel to administrative offices.
- The legal framework outlines specific procedures for petitioning land and forest agencies to reconsider administrative decisions, for example, by specifying how long after a decision customer have to make requests. However, there is lack of clarity on the type of information that must accompany the request.

Forest tenure administration in practice

This sub-dimension assesses to what extent forest tenure rights are fairly and effectively implemented in practice. Tenure administration services include processes such as titling, registering, surveying, demarcating, and transferring rights, as well as allocating permits, licenses, or other types of forest use contracts. The study assessed how registration of land certification and transfer of forest management and use rights were implemented in practice by gathering documentation related to tenure administration such as service records and conducting interview with staff of land administration, forestry agency, and NGOs implementing or supporting forest tenure issues. The cumulative performance of this sub-dimension scored weak because of the following attributes:

- Tenure administration services are rarely provided within the timeframe set out in the legal framework. This was verified from the documentation and signatures present in the tenure administration documents.
- No discrimination is recorded during service provision to different social groups.
- The accessibility of tenure administration services is weak in terms of convenience of its locations and hours to customers. For example, remote community members have limited time and resources to travel to woreda office to access tenure related services and sometimes involve opportunity costs for leaving their farm activities during the travel.
- Relatively longer times are spent to process tenure administration related services compared to what is stipulated in the legal framework.
- The procedures for complaints or appeal of administrative decisions is poorly accessible in terms of providing the service at a reasonable cost, location, and without overly burdensome procedures.

Information about forest tenure rights

This sub-dimension assesses whether a comprehensive system exists to store information about the nature and spatial extent of tenure rights in forests. An information system may refer to a database or website that can be stored digitally or in hard copy in government offices. Legal records of forest tenure rights may include holding titles, certificates, licenses, permits, or other contractual agreements defining the ownership or use rights possessed an individual, community, or the state. Informal records may also include community maps or other documents produced by individuals or communities to document their tenure claims. Such records are often stored or managed by different organizations responsible for land or forest administration, or sometimes maintained by NGOs through partnerships with mandated government institutions. Staff responsible for managing information on forest and land tenure rights selected from Ministry of Agriculture and Natural Resources/Rural Land Administration and Use Directorate, Oromia Rural Land Administration and Use, OEFCCA, OFWE, and NGOs such as Farm Africa, GIZ, and Water and Land Resource Center of Addis Ababa University were interviewed. The cumulative performance of this sub-dimension scored as very weak because of the following reasons:

- There is no centralized system in place that integrate all relevant information on forest tenure rights such as a mapping system or database that lists records for all relevant tenure types.
- No comprehensive records or database of legally recognized rights, particularly on forest tenure that is documented in the information system. For example, there is no comprehensive information system on forest land title, boundaries of protected areas and reserves.
- Although there are some informal records such as community maps to document their tenure claims, there is no strong information system on the documentation of informal rights.
- No centralized information system on forest tenure that include digital records and dedicated staff to manage and update the system regularly. There is no clear mechanism to control quality and ensure that information is current and accurate.
- No mechanism to access or share information on forest tenure. Responsible institutions such as EFCCC or OFECA are not practicing the duty to keep the record and ensure that other agencies can obtain hard and soft copies in a timely manner.

Support for rights-holders

This sub-dimension evaluates to what extent forest tenure rights-holders are empowered and what mechanisms exist to provide support to exercise their forest tenure rights. It assesses awareness of their rights, access to information, and assistance for socially vulnerable rights-holders. Social

vulnerability refers to the social, economic, and demographic characteristics that influence a community's ability to respond to, cope with, recover from, and adapt to environmental hazards. Besides conducting interviews with rightsholders in seven zones and eight Woredas of Oromia to understand their knowledge on forest tenure rights, we also collected and analyzed relevant documentation such as brochures, posters, minutes of workshops provided by government agencies or NGOs to support rights awareness. The cumulative performance of this sub-dimension scored as weak because of the following reasons:

- Inadequate effort to raise the awareness of rights-holders about their forest tenure rights and duties under the law by the government, NGOs, and CBOs.
- Limitations in facilitating awareness creation, for example, by disseminating informative materials such as brochures and posters, and capacity building workshops that inform stakeholders of their rights under the law.
- There is weak capacity building services and technical support such as legal representation, assistance during documentation of community lands, development of resource management plans, and delineation of boundaries.
- Inadequate legal, technical and financial assistance for vulnerable social groups such as women, ethnic minority and poor community group in exercising their tenure rights.

Recognition and protection of forest tenure rights in practice

This sub-dimension assesses how well forest tenure rights are recognized and protected in practice. This, for example, includes the *de facto* recognition of gender equity and demarcation and enforcement of forest boundaries. Demarcation is a process of setting boundaries to an area, often to clarify land ownership and other tenure arrangements. This indicator is evaluated by interviewing government staff responsible for tenure administration and individual rights holders as well as by reviewing relevant documentation on forest tenure rights. The cumulative performance of this sub-dimension scored weak because of the following reasons:

- Although approved Forest Management Agreement (FMA) agreement exist in most forested areas, most interviewed community members require more formal legal recognition such as title document to proof their forest rights.
- There are no clearly defined forest boundaries. Particularly most communal and state forest boundaries are not digitized and are highly contested.
- The law enforcement agencies inadequately monitor and take enforcement action against illegal encroachment and infringement of rights including trespassing and illegal extraction of resources. As a result, infringements of rights are not quickly and fairly addressed.
- Although federal and regional land laws boldly recognize women's land rights equally with that of men. However, in areas where polygamy is allowed, the right written in the legal document is not respected because only one of the partners is allowed for registration.
- The customary land tenure system has been recognized under the 1995 Constitution and proclamation 456/2005, particularly applicable in the pastoralist areas. However, in practice there is no harmonization of statutory and customary forest tenure systems.

Legal basis for expropriation of property

This sub-dimension assesses whether the legal framework describes clear rules, procedures, and provide adequate checks and balances on government powers to expropriate private or communal property for public purposes. Expropriation occurs when the state compulsorily acquires private or communal property for a purpose deemed to be in the public interest. Analysis was made on relevant legislations that set out terms and procedures for expropriation such as the constitution, proclamation

No. 455/2005 on expropriation of landholdings for public purposes and payment of compensation, and council of ministers regulation No 135/2007 on payment of compensation for property situated on landholding expropriated for public purposes. The cumulative performance of this sub-dimension is weak because of the following reasons:

- Conditions and procedures of expropriation are stated in proclamation No. 455/2005, Art 3/1 and Art 2/5 that expropriation should only occur when rights to land or forests are required for a public purpose. However, the concept of public purpose is not clearly defined.
- The legal framework defines clear procedures for expropriation, for example, in proclamation No. 455/2005. However, conditions such as requirements to consider alternatives before decision of expropriation are inadequately defined.
- The legal framework requires public disclosure of information about the expropriation process, for example, in proclamation No. 455/2005, Art 4, sub-article 1-5. However, public disclosure of information about final decision on expropriation is limited.
- The 1995 constitution, Art 43/2 and other relevant legislations including the new forest proclamation describes the right to participate and consultation of affected people or community in any development initiatives. However, the need for public consultation in the development initiatives is not translated into implementation tools such as directives. Particularly there is not guideline on the procedure and requirements of public consultation.
- The council of minister's regulation No 135/2007 elaborates on payment of compensation for property situated on landholding expropriated for public purposes, including assistance to displaced persons to restore their livelihoods. However, the emphasis is on compensation for property situated
  on landholding expropriated for public purposes not for land as such and fairness and promptness of compensation is unsatisfactory.

4.2.2 Tenure dispute resolution

Tenure dispute resolution refers to the efforts made by judicial, administrative, and/or community-based entities to resolve conflicts arising between individuals or groups with respect to forest tenure rights.

Legal basis for dispute resolution bodies

This sub-dimension evaluates whether the legal framework establishes clear rules and institutions such as judicial, administrative, or community-based entities for resolution of tenure disputes. Reviewed relevant legislations including the constitution, land tenure laws, implementing regulations for tenure administration, and forest laws. We also assessed different mechanisms for resolving disputes defined in the legal framework were reviewed. The cumulative performance of this sub-dimension is strong mainly because of the following attributes:

- Clear institutional mandates for tenure dispute resolution bodies at different administrative levels are provided in Oromia rural land administration and use proc. No. 130/2007, Art 16/ 1.
- Proc. No. 456/2005 and Oromia rural land administration and use proc. No. 130/2007 provide clear legal authority to hear cases, deliver rulings, and enforce final tenure dispute resolution.
- The legal framework defines requirements and procedures to ensure the independence and impartiality of dispute resolution bodies. For example, proc. No. 130/2007, Art 16/ 1 (a-j) provide clear measures to promote impartial dispute resolution mechanism that include multi-stakeholder dispute resolution bodies and clear rules and procedures to guide the selection or appointment of decision-makers.

- The legitimacy of community-based dispute resolution systems is recognized in the proc. No. 130/2007, for example, by demanding dispute case to pass through arbitration elders. However, there is no harmonization between customary and statutory forms of dispute resolution in the legal framework.

Capacity of dispute resolution bodies

This sub-dimension assesses the capacity of dispute resolution bodies in order to determine whether they have adequate resources and expertise to carry out their mandate effectively. This include the capacity to apply alternative dispute resolution (ADR), which refers to processes and techniques for resolving disputes that do not include litigation. They are often overseen by a neutral third-party, and may include negotiation, mediation, and arbitration. For this assessment judicial mechanism of resolving dispute were selected and interviews were conducted with staff of the dispute resolution body to assess questions related to expertise and resources. The cumulative performance of this sub-dimension is weak mainly because of the following attributes:

- This study identified weak capacity of expertise that execute formal forest tenure procedures such as registering rights, demarcating boundaries. These capacities were assessed in terms of staff education, experience, and completion of trainings with respect to effectively executing forest tenure procedures.
- There were limited applications of alternative dispute resolution techniques partly because of shortage of formally trained expertise in alternative means of resolving disputes.
- The dispute resolution bodies have limited access to official data sources and other relevant legal evidence to inform rulings.
- There is critical shortage of financial resources for dispute resolution bodies to pay operational and facility costs and maintain regular hours for hearing disputes compared to the volume of cases to be handled on land and forest tenure issues.
- The number of staffs required to operate dispute resolution were one of the critical constraints in those cases studied.

Accessibility of dispute resolution services

This sub-dimension assesses whether tenure dispute resolution procedures are easily accessible to citizens. It evaluates dispute resolution services in terms of legal standing, accessibility, language, affordability, and legal aid. Legal standing refers to the right to bring a lawsuit, and often requires the plaintiff to demonstrate a specific or other interest. Focusing on judicial mechanism of resolving dispute, interviews were conducted with staff of the dispute resolution body and community members who have used or tried to access dispute resolution services, and other persons with knowledge of dispute resolution services. The cumulative performance of this sub-dimension is weak mainly because of the following attributes:

- All citizens including local communities have legal standing to bring tenure-related cases before a dispute resolution body. However, the legal standing requires formal recognition of tenure rights, and this criterion makes difficult for informal claimants to bring tenure disputes before the formal law.
- Dispute resolution services are hardly provided in locations that are accessible for the majority of citizens. In most cases they need to travel to woreda court the services, which is far from their village.
- Dispute resolution services are provided in relevant local languages both during hearing causes and providing documentation. Accommodations are made to have translators for those who do not speak local languages.

- Most respondents claim that dispute resolution services are costly or not within their financial means. However, it was difficult to verify this claim.
- The practice of legal support for vulnerable or marginalized group such as poor community group, orphan and widow is very weak.

Effectiveness of dispute resolution

This sub-dimension evaluates to what extent the dispute resolution bodies provide timely, effective, and transparent rulings. We analyzed the interviews conducted during the community consultation and conducted key informant interview to evaluate the dispute resolution process with regards to forest tenure governance. The cumulative performance of this sub-dimension is weak because of the following reasons:

- Respondents in study areas claim serious limitations on the process of presenting their arguments and evidence before getting final rulings. They have also reservation on formal court settings, particularly on how the evidence was considered and what conclusions were drawn.
- Respondents also believe that rulings on land and forest related disputes generally take longer time compared to other similar litigations.
- Most respondents are hesitant on the fairness and effectiveness of dispute resolution decisions. They generally perceive that the final decision may not be based on the evidence presented and justified in the final ruling.
- Respondents perceive that the final decisions are not properly upheld or enforced in a timely manner.
- Huge limitation reported in terms of documenting and publicly disclosing the final rulings of tenure disputes.

4.2.3 Concession allocation

Concession allocation refers to the process whereby the government confers significant use rights in state forests to a private entity or to enterprise through a contractual agreement (Davis *et al*., 2013). The agreement may be referred to as a concession, license, permit, or other contract type and often relates to commercial utilization of forest products and include conservation activities like carbon sequestration. The new forest proclamation of Ethiopia defines concession as a contract given to a person with the legal standing to develop, conserve, or utilize a given state forest for a defined period of time (FDRE, 2018).

Legal basis for allocating concessions in state forests

This sub-dimension assesses the laws governing how concessions are allocated in state forests, including concessions allocated for extraction of timber and non-timber forest products or other activities such as conservation projects like carbon sequestration (e.g., CDM or REDD+ projects). It evaluates whether the legal framework define a transparent and accountable process for allocating those concessions. We analyzed the case of Oromia Forest and Wildlife Enterprise (OFWE) as concession holder of most the forest resources in the region. OFWE is a public enterprise established with regulation number 122/2009 issued in July 2009 to achieve three interrelated objectives: i) ensure conservation, sustainable development and the use of forest and wildlife resources in its concessions through community participation; ii) ensure supply of forest products to domestic and international markets by enhancing the forest industry; iii) and subsequently contribute to regional and national socio-economic development goals. The size of OFWE concession in Oromia is about 3.2 million hectares of forestland, which includes 3.2 million hectares of natural forests, 62,000 hectares of forest plantations, and 470,000 hectares of other land types. The cumulative performance of this sub-dimension is weak because of the following reasons:

- The OFWE concession was directly assigned by Oromia State Council through regulation number 122/2009. There was no open and competitive process for allocating concessions such as auctions and competitive negotiation.
- No direct article concerning anticorruption measures in forest concession allocation other than the fact that all public enterprise is subject to screening for corruption.
- The technical requirements for applying for concession such as feasibility studies, impact assessments, and management plans are not explicitly defined in the legal framework.
- The legal framework is not explicit on the requirements of the existing tenure claims and claimants such as forest dependent communities to be identified before concession allocation.
- No legal requirements for transparency and information disclosure during the application process of concession allocation.
- Although public consultation is a requirement in most legal documents including constitution prior to implementing any development project that have significant social or environmental impacts, there is no specific legal clause that requires public notice or consultation during the concession allocation process.

Concession allocation in practice

This sub-dimension evaluates the transparency and accountability of concession allocations in practice. The concession allocation process was examined by conducting interviews with OFWE staff as a concession holder of Oromia forest and comparing this information with the allocation procedures stipulated within the legal framework. This information is triangulated or verified through additional interviews with OEFCCA staff who is supposed to administer concession allocation processes regarding the respect of existing rights, public disclosure of the process, and consultation. The cumulative performance of this subdimension is very weak because of the following reasons:

- Forest concession was allocated to OFWE by Regulation No. 122/2009. However, there is no clarity weather the concession allocation was consistent with Oromia forest proclamation No. 72/2003 and other relevant laws and regulations regarding compliance with the rules and other procedural requirements.
- Local communities who have existing rights over forest areas in Oromia were not adequately consulted before allocating and during operation of forest concession. Consequently, local community has negative attitude about OFWE.
- There are no clear rules in the forest legal framework that restrict administrative discretion and effectively curtail corruption during concession operation.
- No practice of reporting information and publicly disclosing about the allocation process, applicants, and final decision on forest concession.

Quality of concession contracts

This sub-dimension evaluates to what extent the concession contracts comprehensively describes all rights and obligations of the concession holder. Review was made on the contents of concession contracts to assess how they deal with legal, technical, administrative, financial, environmental, and social aspects. Key informants who have knowledge of concession terms or contracts were interviewed. The cumulative performance of this sub-dimension is weak because of the following reasons:

- There is no contract that directly concern forest concession. Regulation No 122/2009 serves as a quasi-contract; however, this regulation is not very clear on the duration of the contract, the specific property rights granted, any restrictions on rights within the concession boundary, and conditions related to termination, transfer of the contract.

- Regulation No 122/2009, which serves as quasi concession contract is not very clear on technical requirements that describe methods and procedures to carry out the activities of the contract. Although some articles in this regulation specify the need for conducting surveys activities and feasibility studies, there is no detail about technical requirements such as annual allowable cuts.
- Regulation No 122/2009 has articles that address administrative procedures and obligations. However, there is limitation on contract terms that clearly spell out types of reporting required and how often they should be carried out.
- This regulation is not clear on financial terms and obligation about pricing arrangements, fees, warranties, liabilities, required deposits, and taxes.
- Regulation No. 122/2009 emphasizes three interrelated objectives one of which is environmental conservation besides social and economic objectives. Moreover, OFWE mentioned that they are practicing selective cutting, restoration and reforestation, and preservation of existing vegetation. However, it is not clear on how they fulfill mitigation obligations, abatement measures, and compensation.
- Social obligations are also underlined in the Regulation No. 122/2009. These obligations include the provision of benefits to groups living within or near forest boundaries such as employment, provision of public goods such as the construction of schools or clinics. However, the actual performance is not up to the expectation of the beneficiaries.

Social and environmental requirements of concessions

This sub-dimension assesses to what extent concession contracts include requirements to ensure social and environmental sustainability. To evaluate this indictor key informant interview were conducted to understand how OFWE deals with and maintain quality of concession contracts in terms of impact assessment requirements, community engagement, mitigation and monitoring of social and environmental impacts, and whether the contracts require corrective measures if negative social or environmental impacts are detected. The cumulative performance of this sub-dimension is weak because of the following reasons:

- Although OFWE claims that social and environmental impacts are considered before staring operation, the researcher couldn't find supporting documents or social and environmental impact study report that show whether the impact assessments are conducted prior to beginning new operation.
- Regulation number 122/2009, article 7/10 require engagement and benefit sharing with local communities. New directive was also issued in 01/2017, which details forest utilization and benefit sharing by local community. However, local communities are not convinced with the proportion of the benefit sharing, e.g. 5% to be shared to local community in non-PFM areas.
- Although measures such as reforestation and rehabilitation of degraded areas are commonly implemented in the OFWE concession areas, strict mitigation measures are not specified in the contract or regulation. The practice of compensating local communities living in the concession area for the lost livelihoods is weak.
- There is no provision in the contract or regulation that require monitoring of social and environmental impacts whether by the contract-holder or a third party.
- No provision in contract or regulation that clearly state any obligations of the contract-holder to address negative social or environmental impacts. Nor does specific clause for the consequences of noncompliance, such as penalties.

Compliance with social and environmental requirements in concession contracts

This sub-dimension assesses how contract-holders comply with environmental and social sustainability regulations in practice to identify the gap between contract requirements and actual implementation on the ground. We evaluated the case of OFWE by interviewing key informants and local stakeholders impacted by the operations of concession contracts. The cumulative performance of this sub-dimension is very weak because of the following reasons:

- No document that reveals the implementation of environmental and social impact assessment (ESIA) in relation to OFWE operation. Nor does such assessment report publicly disclosed.
- There were practices of providing services for local communities like schools, healthcare, and employment opportunities, particularly towards the beginning of OFWE operation. However, there are no mandatory social agreements in the contract or in the regulation that oblige the agreements should be implemented.
- No provision in the contract or regulation that specifies impact and its mitigation actions.
- Key informant interviews and consultation with local stakeholders confirmed that no corrective measures, for example, to stop or modify project activities that are causing negative social or environmental impacts.

Management of information about concessions

This sub-dimension assesses to what extent responsible government agencies effectively and transparently manage information about concessions and their operations. We interviewed responsible staff or managing information about concessions or have knowledge about how concession contracts operate. The cumulative performance of this sub-dimension is very weak because of the following reasons:

- There is no centralized public registry of concessions that effectively and transparently manages information about concessions. The new forest proclamation (Proc No. 1065/2018, article 19/7) states that “government may identify forests under its possession and given through concession agreement”.
- No digital record by OFWE that store comprehensive information on the current concession records. Although at very early stage, the new digital land registry system is attempting to bring together all land use information including forest tenure from different geographic scales.
- There is no comprehensive record system that details information on contract terms, rights, and related conditions.
- OFWE has some spatial information, which includes concession boundaries and forest cover. However, the accuracy of the boundary data is highly contested, particularly from the perspective of local community living in and around the forest, i.e. some areas that OFWE claim as its concession areas are currently utilized by community as farmland.
- Records of forest concession are not freely accessible by the public either online or by request in the office.

5. Summary analysis and discussions

5.1 Forest tenure rights

The forest tenure rights dimension is analyzed from the perspectives of ten (10) sub-dimensions and fifty (50) indictors with the score ranging from moderate to very weak. The cumulative performances of this dimension scored weak. The sub-dimensions such as forest tenure implementation in practice, forest tenure adjudication in practice, support for rights-holders, recognition and protection of forest tenure rights in practice, and legal base for expropriation of property scored as weak. Particularly, information about forest tenure rights was evaluated as very weak and requires greater attention to improve the overall forest tenure system. This indicator evaluated whether the existing system comprehensively store information about the nature and spatial extent of tenure rights in forests in the form of database or website digitally or in hard copy. Such forest tenure records include holding titles, certificates, licenses, permits, or other contractual agreements defining the ownership or use rights of private individual, community, or the state. It also includes informal records such as community maps or other documents produced by individuals or communities to document their tenure claims.

Table 4: Summary scores of forest tenure rights sub-dimensions

Sub-dimensions	**Average score**	**Score quality**
Legal recognition of forest tenure rights	2.75	Moderate
Legal support and protection of forest tenure rights	2.66	Moderate
Legal basis for adjudication of forest tenure rights	2.75	Moderate
Forest tenure implementation in practice	2.33	Weak
Legal basis for administration of forest tenure rights	2.75	Moderate
Forest tenure adjudication in practice	2.16	Weak
Information about forest tenure rights	1.4	Very weak
Support for rights-holders	1.8	Weak
Recognition and protection of forest tenure rights in practice	2.4	Weak
Legal basis for expropriation of property	2.16	Weak
Cumulative performance	*2.32*	*Weak*

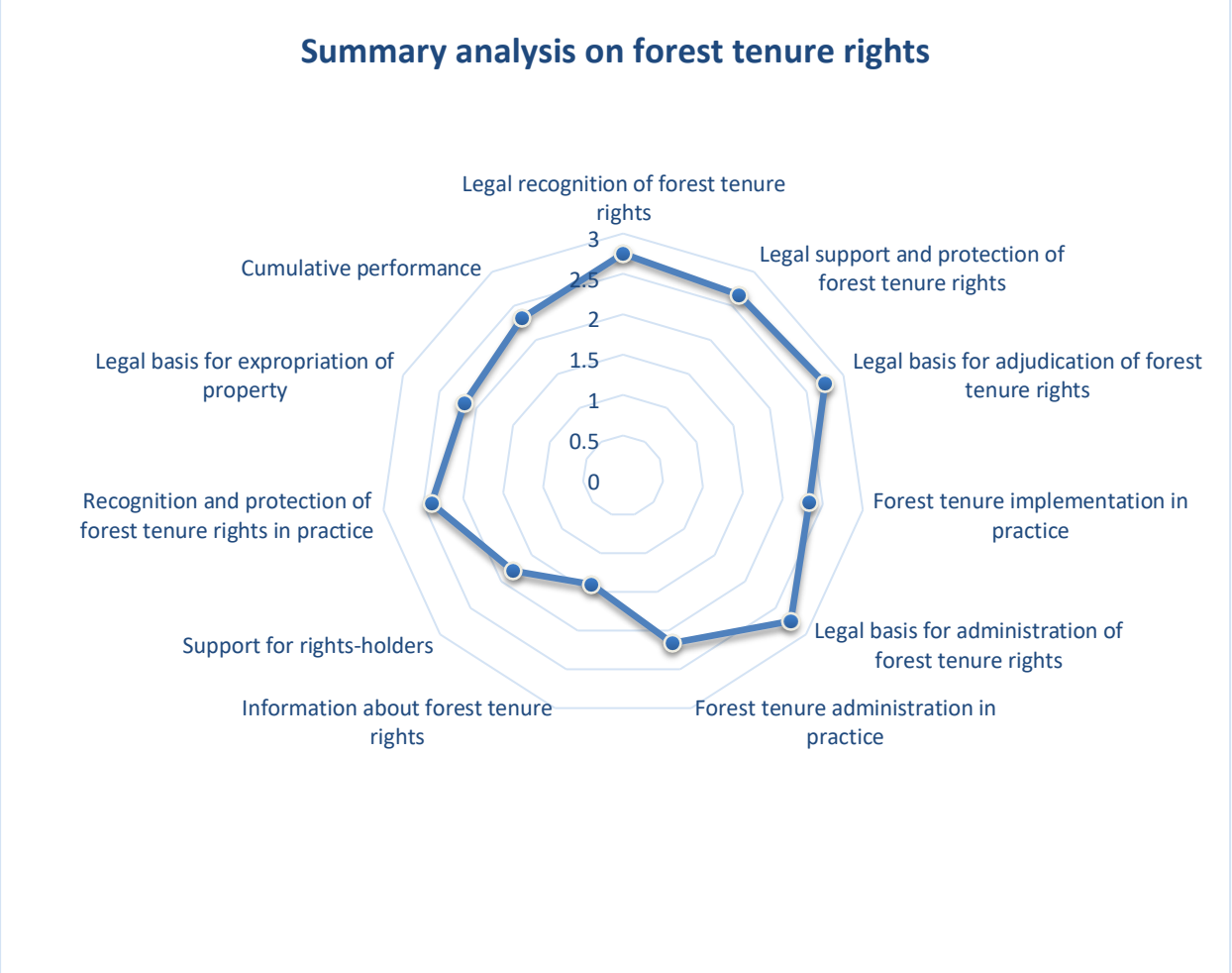


Figure. Analysis of forest tenure rights sub-dimensions

The current forest development, conservation and utilization proclamation No.1065/2018recognizes four forest tenure categories, namely, private, community forest, association, and state forests (Article 4). Recognition of four types of tenure categories is a significant step forward compared to the recently repealed forest proclamation (proc. No. 542/2007), which categorized forest ownership into state and private. Besides expanding forest tenure categories, the new forest proclamation further elaborated legally recognized buddle of rights for each tenure type. For example, the legally recognized buddle of rights for private forest (forest other than community or state forest, and developed on private or institutions' holding) according to the new forest development, conservation and utilization proclamation No. 1065/2018, Art 5 are:

- obtain certificate of title deed
- utilize or sell the forest products and ecosystem services including carbon to local or foreign markets
- transfer possession rights, however, the land holding cannot be sold and can be transferred only through inheritance to family members and can be leased, subject to restrictions on the extent and duration of leases (Rural Land Use and Administration Proc. No. 456/2005, Art 5/4 & Art 8)
- get compensation in case of expropriation of possession for public interest
- conduct business by providing services as well as adding value to forest products

- free from land lease and any kind of tax for the first production period
- Access to loan upon fulfilling appropriate requirements, however, no clear indication about the right to use the holding as a collateral.

The legally recognized buddle of rights for community forest (forest developed, conserved, utilized, and administrated by the community on its private or communal possession based on by laws and plans developed by the community, according to proc No. 1065/2018, Art 7are:

- voluntarily engage in participatory forest management;
- obtain certificate of title deed;
- share benefits obtained from the forest;
- get priority to benefit from forest concession;
- get professional, technical, inputs, and legal services;
- utilize, sell, and add value to forest products;
- get compensation in case of expropriation of possession for public interest;
- exemption from any forest development income tax for two consecutive production period;
- access to loan upon fulfilling appropriate requirements; however, no clear indication about the right to use the holding as a collateral;
- no clear article on the right to transfer possession rights

Communal land holding including forest land is also recognized by the 1995 constitution, rural land use and administration proc. No. 456/2005. Proclamation 456/2005, Article 2/12 defines the communal holding as rural land which is given by the government to local residents for common grazing, forestry and other social services. The constitutional articles that support communal land forest holding include: 1) freedom of association which could allow people to organize into forest use groups; 2) direct participation of the local people in all matters (which include forest management and sustainable utilization issues); and (3) joint ownership of land and other natural resources (which shall apply to forest resources).

The legally recognized buddle of rights for association forest (forest developed, conserved, utilized, and administrated by the associations established to develop forest), according to proc No. 1065/2018, Art 9, are:

- all rights and incentives bestowed for private forest developers are also granted for associations of forest developers upon registration with the appropriate government body;
- free from any kind of tax for the first production year;
- access to a loan upon fulfilling the appropriate requirements; however, phrase ‘appropriate requirements’ is specified in the current proclamation;

The key steps to establish community or association forest involve: a) screening forest users who want to voluntarily engage in participatory forest management, b) delineating the forest boundary to be managed and developing a forest management plan (FMP), and c) preparing a forest management agreement (FMA) that details roles and responsibilities of parties involved in forest management. The roles and responsibilities to be detailed in the FMA include forest development, forest protection, forest harvesting, and forest monitoring. FMA also includes internal rules (bylaws) that define the day-

to-day decision-making process of the participating parties. The FMA is considered as a legally binding contract when it is signed between a community organization and a relevant government agency.

Although the approved FMA is considered as a legally binding contract, majority of local communities consulted in the course of this study claim additional paper documentation such as certificate holding to proof their ownership and reduce the likelihood of losing the forest. Currently, the government of Ethiopia is implementing certification of common land in the name of groups using the common resources. The land certification process is advancing in the highland areas while in the pastoral areas, where vast communal range wooded lands exists, the registration and certification process is at piloting stage due to technical difficulties to identify and demarcate boundaries according to the customary use rights in the area. However, there are several initiatives by government and NGOs to implement communal land certification in pastoral areas like Borana lowlands using the customary range land management approach (interview with director of Rural Land Administration and Use Directorate in the MoA, July 2018).The Ethiopian constitution recognizes the right of pastoralists (article 40/5) and states: 'Ethiopian pastoralists have the right to free land for grazing and cultivation as well as the right not to be displaced from their own lands'. The rural land administration and use proclamation (456/2005) confirms constitutional rights of pastoralists. The

Oromia rural land administration and use proc. No. 130/2007, Art 6 stipulates that "any peasant or pastoralist, or semi pastoralists who has the right to use rural land shall have the right to use and lease on his holdings, transfer it to his family member and dispose property produced there on, and to sell, exchange and transfer the same without any time bound". Likewise, the Oromia forest proclamation No. 72/2003,
Article 6/1, states: "the state-owned forest, patches of forests outside the boundary of the state forest may be handed over to organized local community based on the recommendation of study that suggest better forest management under community ownership". According to regulation No 122/2009, article 16, sub article 3&4, besides the registered concession areas, OFWE shall administer "demarcated and non-demarcated woodlands, highlands and lowland bamboo, incense and gum resources in the region"; as well as " open lands designated by the government for forest development purpose in accordance with the land use studies".

In spite of the various laws that support communal resource management and access of local people to forest resources, there are huge gaps in the implementation of these rules in practice, particularly in accommodating the customary rights of local people to access the very resources they have been managing for ages. These created a feeling of hostility by the local people toward the forests. To overcome this long-standing sense of insecurity, it is important to issue certificate of forest title deed to organized beneficiaries, which is believed to develop sense of ownership and ensure tenure security. It is also imperative to strengthen the legal and administrative protection for organized community or associations by limiting the powers of government organs not to interfere with the day to day activities of community and clearly define the legal base for expropriation of possession for public interest. The scope of the phrase of 'public interest' shall be clearly defined to avoid ambiguities while interpreting and implement land expropriation.

As it exists now the valid legal contract in the case of organized forest management group is Forest Management Agreement (FMA), which is classified in the Civil Code as administrative contracts. According to legal analysts, the government party has a special prerogative or an overriding power to modify or revoke the administrative contracts such as the forest management agreement even without consulting the other contacting party, in this case, organized local community (Melese, 2016). Different scholars explain that in a number of settings, the security of local forest management

arrangements may be weakened by apparently wider powers on the part of the government to terminate the arrangement, or when the grounds for termination are poorly defined or vaguely spelled out (Lindsay, 2004; Ayana *et al*., 2015).Local communities are either reluctant to invest in such development activities or harvest rapidly from the common when they are not sure whether they can reap benefits from the final harvest. Gregersen (1988) indicates that local community responses to forestry related intervention is determined by strength of the institution to assure to all parties involved that they will reap the benefit, for instance, through provisions of reliable legal documents like certificate of title deed. Thus, for any forestry related interventions like OFLP effort to be successful it must not only provide a realistic hope of significant benefits, it must install confidence that the rights to those benefits are secure and cannot be taken away arbitrarily. Because such confidence and positive sense of security will enhance community's compliance to the common rule, their commitment to the common goal and long-term plan and investment in the common recourses. Building confidence and sense of security particularly important for local community in the context of Ethiopia where the same government which denied their accesses to resources in the past, vested only usufruct rights but still maintained the ownership rights. Therefore, although building trust is not a one-time effort, all decisions taken with regards to joint forest management must be legitimate, transparent and accountable, so that community members should develop confidence overtime that relevant laws are being upheld and their interest is being protected.

Another challenge in the context of communal tenure like PFM arrangement is the issue of boundary between users and non-users. The usual procedure during the establishment process of PFM is to assess the forest utilization pattern in order to identify primary and secondary users who would be allowed to become members of the new arrangement. However, membership selection criterion and delineating clear boundary between members and non-members is found to be problematic and prone to conflicts. Although in most cases households residing close to the forest resources are recruited as a PFM member, such approach creates disadvantage to the distant communities who also depend on the forest for several products. We observed strong objection and concern from non-members for being excluded from their customary use rights like getting forest-based fodder for their livestock, especially during dry periods in most PFM areas. Observation during community consultation in the study areas like Adaba Dodola and Chilimo show a critical shortage of animal feed, which confirms the same problem. Conflicts between members and nonmembers that led to violence and destruction of property were reported in most study areas, which will threaten the sustainability of the communal regime. The PFM members are also aware of the fact that large groups of the community, particularly the youth are excluded from membership. Such conflicts can aggravate and endure over long periods if those who are excluded cannot find alternative livelihoods or other job opportunities. Moreover, in some areas the official principles that all members have equal rights and responsibilities is facing practical challenge on the ground where the already existing traditional arrangement allows some individual holdings in which a few family members own adjacent forest plots that constitute the entire forest block under the PFM arrangement. This is particularly evidenced in the coffee growing areas like Jimma, Illubabor, Kelem Wollega, and Guji zones. In those areas, members who have no traditional use rights are not allowed to harvest economically important forest products, such honey, coffee, and spices, and in general they are not perceived as legitimate 'owners' of forest plots. They are only allowed to use some forest products, such as firewood and farming materials, and other products for subsistence use. Moreover, in certain areas like Anferara and Wodara forests in Guji zone we observed unmanageably large members (more than sex hundred) in a user group. The PFM members complained that there are some members who are not residing in or around forest, including urban dwellers, unfairly included in absentia. This issue should be further clarified and resolved to sustain the communal tenure system in the area.

Fig 3: Coffee expansion inside the PFM forest area

It is important to clearly and fairly defined membership criteria and bundles of right for all members to minimize grievances build sense of ownership. In this regard the traditional forest tenure rights held by local community and other groups as customary tenure systems need to be officially recognized and clearly aligned with the statutory framework. It is necessary to develop a comprehensive guideline that supports multiple rights to co-exist on the same plot of forest land. As a communal tenure arrangement, PFM shall limit the access or may even exclude non-members from accessing the forests under PFM regime. The regional and local government should devise mechanisms for non-PFM members such as unemployed youth and those who have lost their customary access due to the establishment of the new system. The mechanisms to consider include encouraging value addition and value chain development where members and non-members are effectively linked in the commodity chains of legally harvested forest products. This will not only ensure equity but also enhance the productivity and benefits derived from forests the PFM regime.

5.2 Tenure dispute resolution

The forest tenure dispute resolution dimension is assessed under four sub-dimensions and 19 indictors with the score ranging from strong to weak. The cumulative performances of this dimension scored weak. The sub-dimensions of the legal basis for dispute resolution bodies is evaluated strong mainly because a number of legislations exist both at federal and regional state level that provide legal ground for dispute resolution process.

Table 5: Summary of scores on tenure dispute resolution sub-dimensions

Sub-dimensions	Average score	Score quality
Legal basis for dispute resolution	3.75	Strong
Capacity of dispute resolution bodies	1.8	Weak

Accessibility of dispute resolution services	2.4	Weak
Effectiveness of dispute resolution	1.8	Weak
Cumulative performance	***2.44***	***Weak***

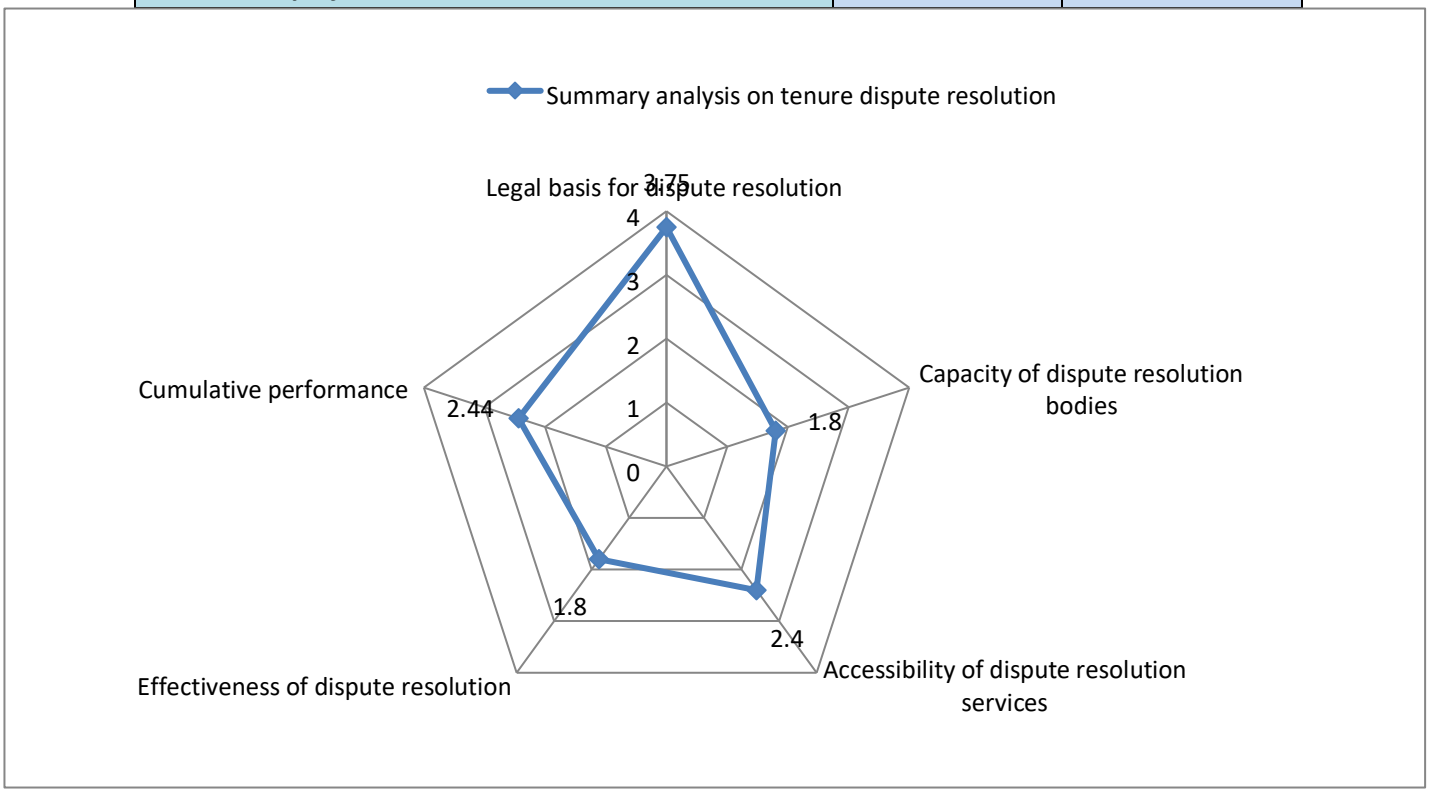


Figure. Analysis of forest tenure resolution sub-dimensions

For example, the federal rural land use and administration proc. No. 456/2005provides a guiding principle on dispute settlement mechanism. Article 12 of this proclamation stipulates that "where dispute arises over rural landholding right, effort shall be made to resolve the dispute through discussion and agreement of the concerned parties. Where the dispute could not be resolved by agreement, it shall be decided by an arbitral body to be elected by the parties or decided in accordance with the rural land administration laws of the region". The Oromia rural land administration and use proc. No. 130/2007 and regulation No. 151/2013 also detail clear procedure and institutional mandates for tenure dispute resolution bodies at different administrative levels and for different types of disputes. The latter proclamation also grants dispute resolution bodies adequate powers to deliver and enforce rulings and defines requirements and procedures to ensure the independence and impartiality of dispute resolution bodies (proc. No. 130/2007, Art 16/ 1 (a-

j)). This proclamation also recognizes the legitimacy of community-based and customary dispute resolution systems by demanding dispute case to pass through arbitration elders. On the country, the new forest proclamation No. 1065/2018 paid inadequate attention to dispute resolution in forest tenure rights. However, the provisions of rural land administration and use proclamation also encompass forest tenure.

As indicated in table 5, indictors like capacity of dispute resolution bodies, accessibility of dispute resolution services, and effectiveness of dispute resolution are evaluated as a weak and requires careful attention to improve the overall performances of forest tenure dispute resolution. For

example, the capacity of dispute resolution bodies was assessed whether they have expertise in relevant tenure laws and practice alternative means of resolving disputes, such as mediation; and have access to sufficient financial and human resources to handle their case volume. The staff of law enforcement agencies that we interviewed in the various study wored as evaluated the judicial mechanism of resolving dispute as weak in terms of the availability of expertise and resources. The dispute resolution services through judicial mechanism are also evaluated as weak in terms of its accessibility, affordability and legal aid for citizens who cannot afford the litigation. The experts also pointed out that a lot of emphasis was given to resolve disputes through the courts of law in the current legal system of Ethiopia. However, in most cases court litigations spoor enmity between the contending parties and have severe adverse effects. Thus, legal experts recommend prioritizing resolving disputes through arbitration before resorting to the courts and to include such legal provisions in the administrative contracts and bylaws.

In most cases violation of forest tenure rights may lead to conflict and violence, in particular when the rights in question are limited in breadth and scope, too short in duration, sustain unresolved conflicts between formal state law versus informal/customary claims, and lead to overlapping and inadequate rights, etc. People with insecure rights are often removed from their land by force. And whenever forced evictions take place, violence is generally used both for enforcement and defense of the eviction. More than 80% of respondents participated in the community consultation in the study areas replied negatively on the questions that inquire about the effectiveness of the legal system, particularly the court litigation. The respondents highly criticized the judicial procedures as inaccessible, long procedural, and often costly. Both participants of community consultation and key informants bitterly criticized, especially when presenting forest related offenses to district or woreda level court. They pointed out some reasons: first, the district woreda court is very far from average villagers and they have to pay their traveling and other associated costs for deliberating their legal cases at district level. Second, it takes a very long time until one case is decided. As a result, villagers often prefer to reconcile the matter at local level, regardless of the level of the offense. ‘Rule breakers’, villagers said, are cognizant of this costly and length judicial procedure and as a result they ignore the rules and undermine the mandate of forest management committee. The major offenses presented to district level court were storing and transporting forest product without holding evidence from the authority, performing illegal activities in the forest like making charcoal, permanently settling in the forest, clearing forest for agriculture, keeping domestic animal in the forest.

Fig 5: New expansion of coffee plantation by gradually thinning tree covers in Adola Rede

Key informants from forestry department added that even those cases which received decisions were not fair and compatible with the magnitudes of offense. They added that most of the penalties are trivial to offenders and it is much more profitable for them to keep on committing the same offenses even after covering the penalties. They pointed to situations in which several offenders were repeatedly presented to the district court for similar offenses. They further explained that this encourages free-riders and rent seekers while discouraging rule followers. This is partly attributed to the absence of specialized jurisdictions dedicated for communal resource management and weak local level arbitration mechanism outside the formal lawsuit. According to the design principle (DP), which informed much of the process and structure of PFM in Ethiopia, rapid access to low-cost, local level legal arenas to resolve conflict among users and eternal claimants are a basic prerequisite for successful communal resource management system (see Ostrom *et al*., 1999, Ayana *et al*., 2015). The practical experience in the study areas, however, cannot fulfill this basic requirement. The empirical study by Kohler and Schmithüsen (2004) from comparative analysis of forest laws in 12 sub-Saharan African countries including Ethiopia also confirmed similar problem in the region. It is recommended that for successful communal resources management institutions to emerge in the region, the judicial systems should be easily accessed and effective enough to change the image of the wider public. This can be attained by encouraging community level dispute resolutions through arbitration that reduce costs and enable community members to use their time for other productive purpose. This requires revision of legal framework that recognizes and enforces decisions and agreements made through community level arbitration. The revised legal framework should also establish clear procedures to

build the capacity of community-based tenure dispute resolution bodies by providing training, legal materials working space. For example, the capacity building efforts for the community-based dispute resolution bodies can be strengthened by linking with the legal aid centers established by various universities in the country to provide legal support for poor and vulnerable groups.

5.3 Concession allocation

The forest concession allocation dimension is assessed under six sub-dimensions and 33 indictors. As indicated in table 6, the scores of these indictors range from weak to very weak with cumulative performances scored as weak.

Table 6: Summary scores of concession allocation sub-dimensions

Indictors	Average score	Score quality
Legal basis for allocating concessions in state forests	1.8	Weak
Concession allocation in practice	1.2	Very weak
Quality of concession contracts	2.3	Weak
Social and environmental requirements of concessions	1.8	Weak
Compliance with social and environmental requirements in concession contracts	1.2	Very weak
Management of information about concessions	1.5	Very weak
Cumulative performance	***1.6***	***Weak***

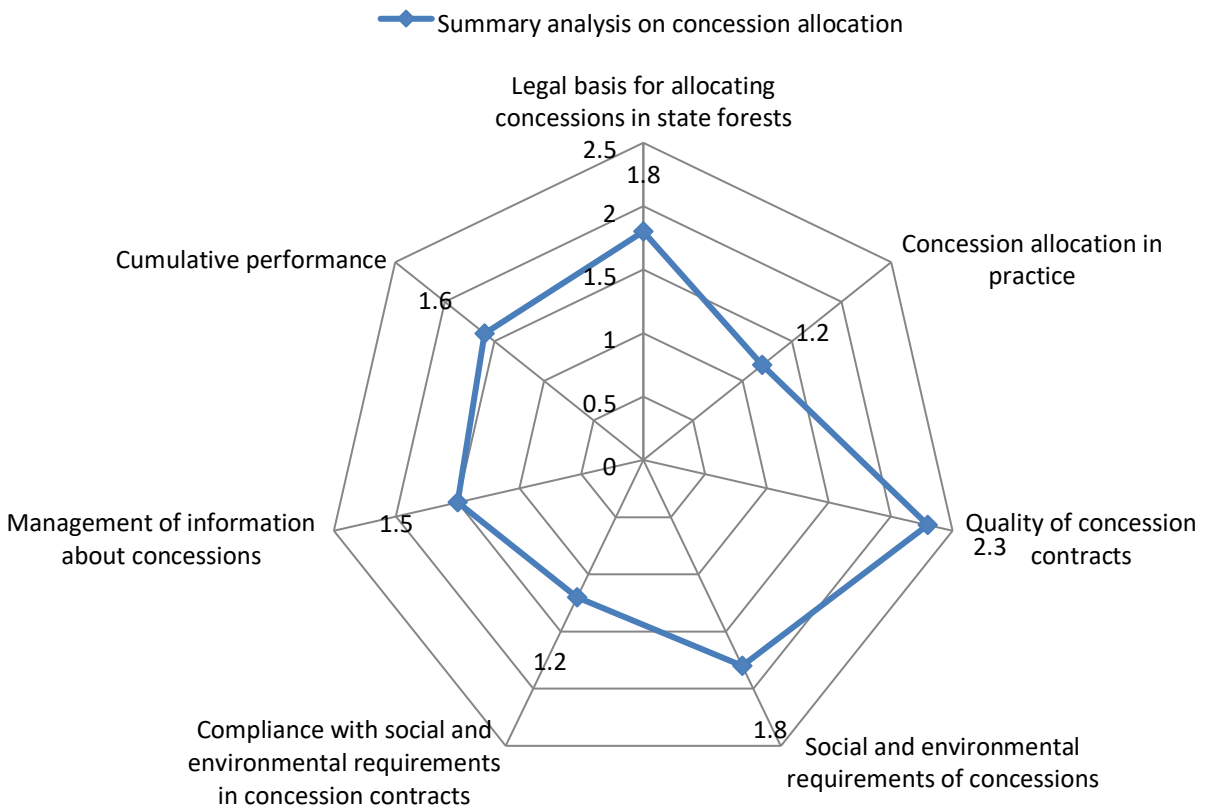


Figure. Analysis on concession sub-dimensions

The new forest proclamation No. 1065/2018, article 2/10 defines forest concession as "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". According to this definition, concessions are usually intended for business enterprise and it is not clear if this applicable for community-based forest management groups like PFM. The same proclamation article 7/1/d guarantee community forest developers the right to get priority to benefit from the forests concession given by the government. Therefore, detail regulation and directives are required to clarify whether community forest management is considered as concession contract and make clear the duration of the contract considering the long gestation period of harvesting forest products. Although concession allocation for agricultural investment is very common, private investment in forest sector is limited Ethiopia. This analysis focused on the case of Oromia Forest and Wildlife Enterprise (OFWE) that administer and manage most Oromia's forest resources through concession. The legal basis for allocating forest concessions in is evaluated as weak. A number of reasons were identified during the analysis: 1) there is no comprehensive legal framework that defines transparent and competitive process for allocating forest concessions including public disclosure of information relating to the allocation process; 2) technical requirements and minimum qualifications for application is not clearly defined; 3) existing tenure claims and claimants were not properly identified and addressed prior to allocating concession, for example, organized local community were managing several forest areas in Oromia under PFM arrangement prior to its allocation to OFWE and the rights and duties of these two claimants were not properly addressed. The evaluation concerning the transparency and accountability of forest concession allocations in practice is even very weak mainly because indictors such as legal compliance, respect of existing rights, anticorruption measures, public disclosure of information about the allocation process, and public consultation are very weak in practice. For example, although the legal framework including the constitution (article 43/2) requires public consultation prior to implementing any development initiatives, in practice local community have minimum opportunities to participate and influence the concession allocation process even when the interventions have significant social or environmental impacts. The mechanisms and practice to conduct proactive impact assessment, mitigation and monitoring of social and environmental impacts due to concession contracts is very weak. Particularly, there is huge gap concerning monitoring of concession holder's compliance with contractual provisions and taking corrective measures when negative social or environmental impacts are detected. The information management system concerning concession allocation and their operations is also very weak. Accurate and up-to-date information and records that contain comprehensive legal and spatial information about forest concession are expected to be maintained centrally both at regional state and federal level and freely accessible by the public. However, in practice, availability and accessing well-organized information on forest concession is challenging.

6. Conclusions and recommendations

6.1 Conclusions

This study assessed the legal and policy framework governing forest tenure in Oromia in order to understand how broader spectrum of forest tenure rights are allocated, recognized, supported, and protected by the existing legal system and implemented in practice. We adopted the GFI (Governance of Forests Initiative) framework developed by World Resources Institute that works to promote policies and practices that strengthen forest governance to support sustainable forest management and improve local livelihoods (Davis *et al*., 2013).The GFI framework provides a comprehensive menu of indicators that can be used to diagnose and assess strengths and weaknesses of legal and policy framework governing forest tenure. Forest tenure issues were analyzed under three key dimensions: forest tenure rights, tenure dispute resolution, and concession allocation. Each forest tenure dimension was assessed at multiple sub-dimensions and indictors level; and in total 20 sub-dimensions and 102 indictors (50 for forest tenure rights, 19 for tenure dispute resolution, and 33 for concession

allocation) were evaluated. Through this detail and comprehensive evaluation, the study identified which forest tenure issues scored weak and very weak that requires serious corrective measures to improve forest tenure governance in Oromia national regional state. Table 7 presents forest tenure sub-dimensions that scored (very) weak and issues that require policy measures to improve forest tenure governance in Oromia.

Table7: Forest tenure sub-dimensions and issues for policy actions

Sub-(dimensions)	Score	Issues for policy actions
Forest tenure rights		
Forest tenure implementation in practice	Weak	Consultation of claimants, support for vulnerable claimants, fairness of outcomes, and access to effective redress mechanisms if rights are not respected
Information about forest tenure rights	Very weak	How information about forest tenure rights is maintained, comprehensiveness, accuracy, accessibility of information and inclusion of informal rights
Support for rights-holders	Weak	Rights holders' access to capacity building services and technical support and additional legal, technical, and financial assistance for vulnerable rights-holders
Recognition and protection of forest tenure rights in practice	Weak	Demarcation of forest of boundaries, law enforcement to quickly and fairly address infringements of rights, the inconsistency and conflict between customary and statutory forest tenure systems on the ground
Legal basis for expropriation of property		The concept of public purpose is not clearly defined. Conditions such as requirements to consider alternatives before decision of expropriation are inadequately defined. Public disclosure of information about final decision on expropriation is limited. The need for public consultation in the development initiatives is not translated into implementation tools such as directives.
Tenure dispute resolution		
Capacity of dispute resolution bodies	Weak	Availability of tenure expertise in relevant tenure laws and practices, expertise in alternative dispute resolution such as mediation, access to range of evidence, financial and human resources to handle tenure dispute cases
Accessibility of dispute resolution services	Weak	Accessibility and affordability of dispute resolution services, availability of legal aid or free legal services for peoples who cannot afford court litigation
Effectiveness of dispute resolution	Weak	Evidence base for rulings, timeliness, fairness, enforcement, and disclosure of rulings
Concession allocation		
Legal basis for allocating concessions in state forests	Weak	Defining open and competitive process for allocating concessions, anticorruption measures, clearly defining the minimum qualifications and technical requirements for application

Concession allocation in practice	Very weak	Compliance with relevant laws and regulations, identifying and addressing issues related of existing tenure claims, public consultation and disclosure of information, minimizing administrative discretion and opportunities for corruption during concession allocation
Quality of concession contracts	Weak	Comprehensive legal contracts and agreement including all technical requirements, administrative procedures and obligations of contract-holder in terms of financial, environmental protection and social aspects
Social and environmental requirements of concessions	Weak	Comprehensive concession contracts that require environmental and social impact assessment, community engagement, mitigation, monitoring and corrective measures if negative social and/or environmental impacts are detected
Compliance with social and environmental requirements in concession contracts	Very weak	Conducting and publicly disclosing social and environmental impact assessments, establishing equitable social agreements with local communities, putting in place appropriate avoidance and mitigation measures, regular monitoring, reporting, and taking corrective measures when negative social or environmental impacts are detected
Management of information about concessions	Very weak	Establishing central database to store and managing accurate and up-to-date information that contain comprehensive legal and spatial information about forest concession

6.2 Recommendations

- ❖ It is important to issue certificate of forest title deed to organized forest beneficiaries to overcome the long-standing sense of insecurity by communal resource management group. Certificate of forest title deed and forest management plan is, particularly required for patches of forest outside forest priority areas. Improving the overall information system about forest tenure rights is crucial to enhance the overall forest tenure governance system in Oromia. This includes:
    - Improving the support for all rights-holders by enhancing their access to understandable information about the administrative channels available to formalize and defend their rights.
    - Strengthening the legal and administrative protection for organized community by limiting the powers of government organs not to interfere with the day to day activities of community and clearly define the legal base for expropriation of possession for public interest. The scope of the phrase of 'public interest' shall be clearly defined to avoid ambiguities while interpreting and implement forest land expropriation.
- ❖ Address the critical challenges related to lack of clear forest boundary and criteria to enroll PFM members.

Some of the steps to be taken to address these challenges include:

- Translate policy and legal provisions regarding forest designation and demarcation into implementation instruments such as regulations, directives, and guidelines;
- Strengthen the capacity of expertise that execute forest tenure procedures such as registering rights and demarcating boundaries;
- Encourage community participatory mapping, database management and updating; o Clearly and fairly define membership criteria and bundles of right for all communal forest management arrangement to minimize grievances and build sense of ownership;
- Formulate clear criteria for recruiting members, getting community consent on the criteria and implementing participatory member selection.

❖ The following concrete actions should be taken to address the critical challenges related to weak law enforcement:

- The law enforcement agencies should regularly monitor and take enforcement action against infringement of rights and other non-compliance to ensure that forest tenure rights are widely recognized and protected in practice;
- Harmonize the penalties and other articles in the Oromia and federal forest laws according to the constitutional provisions;
- Increase awareness and provide continuous capacity building for the judiciary and law enforcement bodies;
- Forest penalties should include compensation for the lost property, for example in case of forest destruction, and should be effectively enforced.

❖ The traditional forest tenure rights held by local community and other groups as customary tenure systems need to be officially recognized and clearly aligned with the statutory framework. This include amending the existing legal framework to recognize customary use rights and traditional institutions like Gedda system as entity to be involved in natural resource management.

❖ It is necessary to develop a comprehensive guideline that supports multiple rights to co-exist on the same plot of forest land.

❖ Government should devise alternative mechanisms for non-PFM members such as unemployed youth and those who have lost their customary access due to the establishment of the new system. Alternative mechanisms to consider include encouraging value addition and value chain development where members and non-members are effectively linked in the commodity chains of legally harvested forest products. Further comprehensive study is also recommended to identify feasible alternative livelihood strategies for landless and unemployed youth living in and around forested areas in Oromia.

❖ Encourage and strengthen community level alternative dispute resolutions through arbitration that reduce costs and enable community members to use their time for other productive purpose. It also requires revision of legal framework that recognizes and enforces decisions and agreements made through community level arbitration.

❖ When revising the legal framework, it should establish clear procedures to build the capacity of community-based tenure dispute resolution bodies by training expertise in alternative dispute resolution, providing legal materials and working space. For example, the capacity building efforts for the community-based dispute resolution bodies can be strengthened by linking with the legal aid centers established by various universities in the country to provide legal support for poor and vulnerable groups.

❖ During forest concession allocation and operation, it is crucial to conduct and publicly disclose social and environmental impact assessments, establish equitable social agreements with local communities, put in place appropriate avoidance and mitigation measures, regular monitoring, reporting, and take corrective measures when negative social or environmental impacts are detected.

❖ Initiate new legal framework that addresses social and environmental safeguard issues when designing and implementing forestry related projects, particularly for those with potential social and environmental impacts.

❖ Accurate and up-to-date information and records that contain comprehensive legal and spatial information about forest concession and their operations should be maintained centrally both at regional state and federal level and should be freely accessible by the public.

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8. Appendix

8.1 Appendix 1: List of legal and policy/strategy documents reviewed

- The CRGE Strategy (2011), which identified forestry as one of the four key pillars;

- The National REDD+ strategy (Draft), outlines the inter-sectorial actions that should be undertaken to reduce deforestation and forest degradation;
- The legal and institutional framework for the Ethiopian REDD+ Program (2015);
- Legal and institutional framework for the OFLP (2015);
- Environment Policy of Ethiopia;
- Forest development, conservation and utilization proclamation No. 1065/2018
- Rural Land Use and Administration Proc. No. 456/2005
- Proclamation on Land Expropriation for Public Purposes and Payment of Compensation (455/2005)
- Rural Development Policy and Strategies;
- Ethiopian Biodiversity Strategy and Action Plan;
- Forest Conservation and Utilization Policy and Strategy;
- The Ethiopian Strategic Investment Framework for Sustainable Land Management(ESIF–SLM);
- Forest Sector Review (FSR) (2017), a comprehensive sector diagnostics study;
- MEFCC Growth and Transformation Plan (GTP) II (2015), which lays out the broadly accepted and ambitious goals for forest sector to achieve its growth objectives;
- National Forest Sector Development Program (NFSDP) (2017), which provides the master plan and roadmap for future forestry actions at the federal and regional levels;
- The contribution of forests to national income in Ethiopia and linkages with REDD+ (2016);
- Monitoring, Reporting, Verification (MRV) of emissions and reductions from REDD+ and Forest Reference Level (FRL).
- The 19195 constitution,
- Oromia rural land administration and use proc. No. 130/2007 and regulation No. 151/2013
- Oromia forest proclamation No. 72/2003

8.2 Appendix 2: Detail assessment results on forest tenure governance dimensions

I. Forest tenure rights

1. Legal recognition of forest tenure rights

Objective	Indictor	Description	Value(1= Never, 2= Sometimes, 3= Often, 4=Always)	Description of Score

To evaluate the spectrum of tenure rights granted by the law	**Individual rights**	The forest tenure rights held by individuals are recognized in the legal framework	4	- Proc. No. 456/2005, Art 2/11defines private holding as rural land in the holding of peasants, semi-pastoralists and pastoralists and other bodies entitled by law to use rural land. - Proc. No. 1065/2018, Art 2/6, recognized private forest as forest other than community or state forest, and developed on private or institutions 'holding
	Communal rights	The forest tenure rights collectively held by local communities and other relevant groups are recognized in the legal framework	3	- Proc. No. 456/2005, Art 2/12 defines communal holding as rural land which is given by the government to local residents for common grazing, forestry and other social services. - Proc. No. 1065/2018, Art 2/7 recognized community forest as forest developed, conserved, utilized, and administrated by the community on its private or communal possession based on by laws and plans developed by the community; communal land holding is also recognized by constitution (1995). However, compared to private holdings, there are limitations in the bundles of rights legally recognized for communally owned property, e.g. the right to transfer possession.
	Customary rights	The customary forest tenure systems held by local community are recognized in the legal framework	1	- The customary tenure system is not recognized in the new forest Proc. No. 1065/2018. Customary held rights to forest lands and resources are not clearly recognized by another legal document.
	Rights of women	The legal framework does not discriminate against the forest tenure rights of women	3	- Article 35 of the Ethiopian Constitution (1995) reaffirms principles of equality of access to economic opportunities, including the right to land rights. All federal and regional land laws boldly recognize women's

				land rights equally with that of men. E.g. Oromia land administration proc. No. 130/2007, art 5/2 stipulates women have equal rights
				with men to possess, use and administer the rural land. Although rights of women are not directly defined in the new forest Proc. No. 1065/2018, article 35 this proclamation states that expressions in the masculine will apply to the feminine.
Average Score/ Cumulative performance			2.75	1–1.5=Very weak, 1.6–2.5=Weak, **2.6 – 3.5=Moderate,** 3.6–4=Strong

2. Legal support and protection of forest tenure rights

Objective	Indictor	Description	Value (1= Never, 2= Sometimes, 3= Often, 4=Always)	Description of Score
To evaluate to what extent the legal framework promote and protect the exercise of forest tenure rights	**Clarity**	The legal framework defines rights clearly and consistently.	3	- Private and community group have clearly defined use rights and to conduct business by providing services as well as adding value to forest products (Proc No. 1065/2018, Art 5/1h). However, customary land and forest tenure rights are not clearly and consistently defined in the relevant proclamation.

	Duration	The legal framework defines rights that are of adequate duration	3	- Private and community right holders have the right to obtain a lifetime certificate of holding (Proc. No. 130/2007, Art 15/6). However, the duration of forest tenure holder is not clearly defined in the Proc. No. 1065/2018. For example, Art 5/1b states: 'obtain a certificate of title deed for developing forests in the identified forest land.
	Scope	The legal framework defines rights that are of adequate scope	2	- The forest proclamation bestows the right to utilize or sell the forest products and ecosystem services including carbon to local or foreign markets (Proc. No. 1065/2018, Art 5/1c&f). However, there are bundles of rights not adequately defined such as the right to transfer possession by communal property-holders.
	Restrictions	The legal framework does not place unreasonable restrictions on how rights can be exercised	2	- The legal framework provides the right to transfer possession rights (Proc No. 1065/2018, Art 5/1e); however, the land holding cannot be sold and can be transferred only through inheritance to family members and can be leased, subject
				to restrictions on the extent and duration of leases (Rural Land Use and Administration Proc. No. 456/2005, Art 5/4 & Art 8)

	Protections	The legal framework assures that rights cannot be taken away or changed unilaterally and unfairly, and it protects all citizens against forced evictions and denial of access to essential natural resources	3	- The 1995 constitution, proclamation on Land Expropriation for Public Purposes and Payment of Compensation (proc. No. 455/2005), regulation 137/2007, and Oromia Region proc 130/2007 assure the protection of land holders against forced evictions and denial of access to essential natural resources.
	Enforcement mechanisms	The legal framework establishes mechanisms to enforce rights and seek redress when rights are not respected	3	- The law provides the right to get compensation in case of expropriation of possession for public interest (Proc No. 1065/2018, Art 5/1g and Art 7/1h).
Average Score/Cumulative performance			2.66	1–1.5=Very weak, 1.6–2.5=Weak, **2.6–3.5=Moderate**, 3.6–4=Strong

3. Legal basis for adjudication of forest tenure rights

Objective	Indictor	Description	Value (1= Never, 2= Sometimes, 3= Often, 4=Always)	Description of Score
To evaluate the extent to which the legal framework define a fair and effective process for the adjudication of forest tenure rights	**Clarity of process**	The legal framework defines a clear and streamlined process for adjudication.	3	- The Oromia rural land administration and use proc. No. 130/2007, Art 16/1a-j provides clear and streamlined process for adjudication of land tenure rights. - Forestland tenure adjudication process can also be considered within the land administration and

				this process is also crudely specified in new forest proclamation.
	Requirements to identify claimants	The legally prescribed process requires that all existing tenure claims and claimants be identified and documented at the outset	3	- Clear process required for tenure claims is broadly prescribed in Oromia rural land administration and use proc. No. 130/2007 and specifically in regulation No. 151/2013, Art 3
	Requirements to consult claimants	The legally prescribed process requires that all identified claimants be fully informed and consulted	2	- Partly prescribed in Oromia rural land administration and use regulation No. 151/2013, Art 13&15 -
	Criteria to resolve overlapping claims	The legally prescribed process includes fair procedures and criteria for resolving overlapping claims	3	- Prescribed in Oromia rural land administration and use proc. No. 130/2007, Art 16 and in the regulation No. 151/2013, Art 18
				The locally elected land administration committees are mandated to resolve overlapping claims according to the specified law.
Average Score/ Cumulative performance			2.75	1–1.5=Very weak, 1.6–2.5=Weak, **2.6–3.5=Moderate**, 3.6–4=Strong

4. Forest tenure adjudication in practice

Objective	Indictor	Description	Value (1= Never, 2= Sometimes, 3= Often, 4=Always)	Description of Score
To assess to what extent forest tenure rights fairly and effectively adjudicated in practice	**Identification of claimants**	Existing tenure claims and claimants are identified and documented at the outset	3	- Identification and documentation of claimants are transparently implemented in most areas except pastoral areas
	Provision of information	Claimants are provided with understandable information about the adjudication process	3	- Clear information for individual holdings but ambiguous for communal lands and forest
	Consultation of claimants	Claimants are fully and effectively consulted	2	- Full and effective consultation were observed in few cases
	Support for vulnerable claimants	Vulnerable claimants have access to legal and other relevant support as needed	2	- Weak support for vulnerable claimants such widow, orphanage and forest dependent community, for example, understanding their rights, understanding the adjudication process, or documenting claims.
	Fairness of outcomes	The adjudication process does not result in any forced evictions or uncompensated loss of legitimate rights	2	- Less than 25% of the participants believe the adjudication process is fair - Interview participants believe that the final decisions of the adjudication process resulted in

				displacements and reductions of their rights without fair compensation
	Access to redress	Claimants have access to effective redress mechanisms if their rights are not respected	2	- Very weak access to effective redress mechanisms such as help desk, phone and local office. - Claimants have limited access to file complaints and appeals. - Complaints and appeals are not timely addressed, particularly with written response, and detailing resolutions.
Average performance	Score/Cumulative		2.33	1–1.5=Very weak, **1.6–2.5=Weak**, 2.6–3.5=Moderate, 3.6–4=Strong

5. **Legal basis for administration of forest tenure rights**

Objective	Indictor	Description	Value (1= Never, 2= Sometimes, 3= Often, 4=Always)	Description of Score

To assess to what extent the legal framework provides for fair and effective administration of forest tenure rights	**Comprehensiveness**	The legal framework comprehensively regulates all types of administrative services necessary to recognize and support existing forest tenure rights	3	- There are comprehensive legal rules both in the proclamation and regulation that provide clear guidance for how the administrative procedures including those that define how rights can be transferred, how lands are surveyed, and boundaries demarcated.
	Simplicity	Legally prescribed administrative procedures avoid unnecessary complexity and minimize opportunities for administrative discretion	3	- Most of the respondents believe that the existing legal framework provide clear guidance to minimize complexity and discretion in administrative procedures. - However, there were cases where administrative discretion such professional judgment rather than strict adherence to regulations led to abuse of authority and inconsistency in administrative actions.

	Fairness	Fees and other legally prescribed requirements are reasonable and affordable for the majority of customers	3	- The costs of the administrative procedures are reasonable and affordable for the majority of customers. - These were assessed against the cost of living and average wage rate in the area. - However, some requirements create a burden for the applicants like demanding frequent travel to administrative offices.
	Accountability	Customers have the legal right to challenge administrative decisions	2	- The legal framework outlines specific procedures for petitioning land and forest agencies to reconsider administrative decisions, for example, by specifying how long after a decision customer must make requests. - However, there is lack of clarity on the type of information that must accompany the request.
Average Score/ Cumulative performance			2.75	1–1.5=Very weak, 1.6–2.5=Weak, **2.6–3.5=Moderate**, 3.6–4=Strong

6. Forest tenure administration in practice

Objective	Indictor	Description	Value (1= Never, 2= Sometimes, 3= Often, 4=Always)	Description of Score
Evaluate the extent to which forest tenure rights fairly and effectively administered in practice	**Legal compliance**	Service providers adhere to relevant laws and regulations	2	- The services are rarely provided within the timeframe set out in the legal framework. This was verified from the documentation and signatures present in the tenure administration documents
	Service standards	Service providers advertise and adhere to clear service standards	2	- Service standards such as the types and levels of fees for different services, hours of operation are advertised through brochures and guidance documents.
	Nondiscrimination	Service providers serve all customers without discrimination	3	- The results obtained by reviewing service records and conducting interviews with customers who accessed the services of land registration show no discrimination in providing the services to

				different social groups.
	Accessibility	Service providers offer services at times and locations that are convenient to customers	2	- The accessibility of tenure administration services is weak in terms of convenience of its locations and hours to customers. For example, farmers have limited time and resources to travel to woreda office to access and related services and sometimes involve opportunity costs for leaving their farm activities during the travel.
	Timeliness	Service providers provide services in a reasonable amount of time	2	- Relatively longer times are spent to process land related services compared to what is
				identified in the legal framework.
	Accountability	Customers can easily file complaints and challenge administrative decisions	2	- The procedures for complaints or appeal of administrative decisions is poorly accessible in terms of providing the service at a reasonable cost,

				location, and without overly burdensome procedures.
Average Score/ Cumulative performance			2.16	1–1.5=Very weak, **1.6– 2.5=Weak**, 2.6– 3.5=Moderate, 3.6–4=Strong

7. Information about forest tenure rights

Objective	Indictor	Description	Value (1= Never, 2= Sometimes, 3= Often, 4=Always)	Description of Score
Evaluate to what extent the information about forest tenure rights effectively and transparently managed	**Centralized system**	Information about forest tenure rights is maintained in a centralized system	2	- Weak digital data on land certification and boundary demarcation of forest areas. - There is no centralized system in place that integrate all relevant information on forest tenure rights such as a mapping system or database that lists records for all relevant tenure types.
	Comprehensiveness	The information system contains comprehensive records of legally recognized rights (private and public)	1	- No comprehensive records or database of legally recognized rights, particularly on forest tenure that is documented in the information system. - For example, there is no comprehensive information system on forest land title lands, boundaries of protected areas and reserves.
	Inclusion of informal rights	The information system contains or links to available information about informal rights	2	- There is no strong information system on the documentation of informal rights. - However, there are some informal records such as

				community maps to document their tenure claims.
	Accuracy	The information system is up-to date and accurate	1	- No centralized information system on forest tenure that include digital records and dedicated staff to manage and update the system regularly.
				- There is no clear mechanism to control quality and ensure that information is current and accurate.
	Government accessibility	Information within the system can be easily accessed by relevant government users	1	- No mechanism to access or share information on forest tenure - Responsible institution is not in charge to keep the record and ensure that other agencies can obtain hard and soft copies in a timely manner.
Average Score/ Cumulative performance			1.4	**1–1.5=Very weak**, 1.6–2.5=Weak, 2.6–3.5=Moderate, 3.6–4=Strong

8. Support for rights-holders

Objective	Indictor	Description	Value (1= Never, 2= Sometimes, 3= Often, 4=Always)	Description of Score
Evaluate to what extent forest tenure rights-holders empowered and supported to exercise their forest tenure rights	**Awareness of rights**	Efforts are made to raise the awareness of rights-holders about their forest tenure rights and duties under the law	3	- There are mechanisms to facilitate awareness of forest tenure rights by the government, NGOs, and CBOs. - The existing mechanisms include disseminating informative materials such as brochures and posters, and capacity building workshops that inform stakeholders of their rights under the law.

	Access to information	Rights-holders have access to understandable information about the administrative channels available to formalize and defend their rights	2	- Information is provided to rights-holders in a way that is understandable to them, e.g., provided with local languages.
	Access to support	Rights holders have access to capacity building services and technical support if needed to fully exercise their rights	2	- There is weak capacity building services and technical support such as legal representation, assistance during documentation of community lands, development of resource management plans, and delineation of boundaries.
	Assistance for vulnerable rights-holders	Vulnerable rights-holders have access to additional legal, technical, and financial assistance as needed	2	- There is weak legal, technical and financial assistance for vulnerable groups such as women or minority ethnic group in exercising their tenure rights.
Average Score/ Cumulative performance			1.8	1–1.5=Very weak, **1.6–2.5=Weak**, 2.6–3.5=Moderate, 3.6–4=Strong

9. Recognition and protection of forest tenure rights in practice

Objective	**Indictor**	**Description**	**Value** (1= Never, 2= Sometimes, 3= Often, 4=Always)	**Description of Score**
Evaluate to what extent forest tenure rights widely recognized and protected in practice	**Recognition**	Most rights holders have had their rights formally recognized and recorded	3	- Although approved PFM agreement exist in most forested areas, majority of community interviewed require more formal document to proof that they own the forest
	Demarcation	Most individual and communal forest lands have boundaries demarcated and surveyed	2	- Most forest boundaries are not digitized and are highly contested. There are no clearly defined boundaries.

	Enforcement	Infringements of rights are quickly and fairly addressed	2	- The law enforcement agencies inadequately monitor and take enforcement action against illegal encroachment and infringement of rights including trespassing and illegal extraction resources.
	Gender equity	Rights registered to individuals or households are often registered in the names of women, either jointly or individually	3	- All federal and regional land laws boldly recognize women's land rights equally with that of men. However, in areas where polygamy is allowed, the right written in the legal document is not respected because only one of the partners is allowed for registration.
	Customary tenure	Minimal conflict exists between customary forest tenure systems and statutory systems on the ground	2	- The customary land tenure system has been recognized under the 1995 Constitution and proclamation 456/2005, particularly applicable in the pastoralist areas. However, in practice there is no harmonization of statutory and customary forest tenure systems
Average Score/ Cumulative performance			2.4	1–1.5=Very weak, **1.6–2.5=Weak,** 2.6–3.5=Moderate, 3.6–4=Strong

10. Legal basis for expropriation of property

Objective	**Indictor**	**Description**	Value (1= Never, 2= Sometimes, 3= Often, 4=Always)	**Description of Score**
To evaluate whether the legal	**Public purpose requirement**	The legal framework states that expropriation should only occur when rights to land or forests	3	- Conditions and procedures of expropriation are stated in

framework provide adequate checks and balances on government powers to expropriate private property for public purposes		are required for a public purpose		proclamation No. 455/2005, Art 3/1
	Public purpose definition	The legal framework clearly defines the concept of public purpose	2	- The concept of public purpose is not clearly defined in the proclamation No. 455/2005, Art 2/5
	Clarity of procedures	The legal framework defines clear procedures for expropriation, including requirements to consider alternatives	2	- Proclamation No. 455/2005clearly defines procedures for expropriation. However, conditions such as requirements to consider alternatives are inadequately defined.
	Transparency requirements	The legal framework requires public disclosure of information about the expropriation process and final decision	2	- The legal framework requires public disclosure of information about the expropriation process, for example, in proclamation No. 455/2005, Art 4, sub-article 15. However, public disclosure of information about final decision on expropriation is limited.
	Consultation requirements	The legal framework requires that potentially affected people be fully informed and consulted prior to making a decision	3	- The 1995 constitution, Art 43/2 and other relevant legislations including the new forest proclamation describes the right to participate and consultation of affected people or community in any development initiatives. However, the need for public consultation in the development initiatives is not translated into implementation tools such as directives. Particularly there is not guideline on the procedure and requirements of public consultation.

	Compensation requirements	The legal framework requires fair and prompt compensation for expropriated rights	1	- The council of minister's regulation No 135/2007 elaborates on payment of compensation for property situated on landholding expropriated for public purposes, including assistance to displaced persons to restore their livelihoods. However, the emphasis is on compensation for property situated on landholding expropriated for public purposes not for land as such and fairness and promptness of compensation is unsatisfactory.
Average Score/Cumulative performance			2.16	1–1.5=Very weak, **1.6–2.5=Weak**, 2.6–3.5=Moderate, 3.6–4=Strong

II. Tenure dispute resolution

1. Legal basis for dispute resolution bodies

Objective	Indictor	Description	Value (1= Never, 2= Sometimes, 3= Often, 4=Always)	Description of Score
Evaluate to what extent the legal framework define a clear institutional framework for resolving disputes over forest tenure	**Jurisdiction**	The legal framework assigns clear institutional mandates for tenure dispute resolution bodies at different administrative levels and for different types of disputes.	4	- Oromia rural land administration and use proc. No. 130/2007, Art 16/ 1 provided clear institutional mandates for tenure dispute resolution bodies at different administrative levels and for different types of disputes.
	Authority	The legal framework grants dispute resolution bodies adequate powers to deliver and enforce rulings	4	- Proc. No. 456/2005 and Oromia rural land administration and use proc. No. 130/2007provide clear legal authority to hear cases, deliver rulings, and enforce final tenure dispute resolution

	Impartiality	The legal framework defines requirements and procedures to ensure the independence and impartiality of dispute resolution bodies	4	- Oromia rural land administration and use proc. No. 130/2007, Art 16/ 1 (a-j) provide clear measures to promote impartial dispute resolution mechanism that include multistakeholder dispute resolution bodies and clear rules and procedures to guide the selection or appointment of decision-makers based on clear criteria.
	Recognition of community-based systems.	The legal framework recognizes the legitimacy of community based and customary dispute resolution systems	3	- Oromia rural land administration and use proc. No. 130/2007 recognizes the legitimacy of community-based and customary dispute resolution systems by demanding dispute case to pass through arbitration elders - However, the relationship between customary and other statutory forms of dispute resolution is not clear in the legal framework.
Average Score/Cumulative performance			3.75	1–1.5=Very weak, 1.6–2.5=Weak, 2.6–3.5=Moderate, **3.6–4=Strong**

2. Capacity of dispute resolution bodies

Objective	**Indictor**	**Description**	Value (1= Never, 2= Sometimes, 3= Often, 4=Always)	**Description of Score**
Evaluate to what extent dispute resolution bodies have adequate capacity to resolve tenure disputes in a timely and fair manner	**Tenure expertise**	Dispute resolution bodies have expertise in relevant tenure laws, systems, and practices, including customary systems	2	- In the study cases there were weak capacity of expertise that execute formal forest tenure procedures such as registering rights, demarcating boundaries; and that deal with customary or have knowledge of traditional or customary systems. - These capacities were assessed in terms of staff education, experience, and completion of trainings.

	Expertise in alternative dispute resolution	Dispute resolution bodies have expertise in alternative means of resolving disputes, such as mediation	2	- There were limited applications of alternative dispute resolution techniques
	Access to evidence	Dispute resolution bodies have access to a range of evidence to inform rulings	2	- The dispute resolution bodies have limited access to official data sources such land titles and other relevant legal documentation; and to unofficial evidences
	Financial resources	Dispute resolution bodies have sufficient financial resources to handle their case volume	1	- There is critical shortage of financial resources for dispute resolution bodies to pay personnel, operational and facility costs, and maintain regular hours for hearing disputes.
	Human resources	Dispute resolution bodies have sufficient human resources to handle their case volume	2	- The number of staff required to operate dispute resolution were one of the critical constraints in those cases studied.
Average Score/Cumulative performance			1.8	1–1.5=Very weak, **1.6–2.5=Weak**, 2.6–3.5=Moderate, 3.6–4=Strong

3. Accessibility of dispute resolution services

Objective	**Indictor**	**Description**	Value (1= Never, 2= Sometimes, 3= Often, 4=Always)	**Description of Score**
To assess whether tenure dispute resolution services are broadly accessible to citizens	**Legal standing**	All citizens and communities have legal standing to bring tenure related complaints before a dispute resolution body	3	-All citizens including local communities have legal standing to bring tenure related cases before a dispute resolution body. - However, the legal standing requires formal recognition of tenure rights. Thus, difficult for informal claimants to bring tenure disputes before the formal law.

	Accessibility	Dispute resolution services are provided in locations that are accessible for the majority of citizens	2	- Respondents generally criticized the accessibility of dispute resolution services. In most cases they need to travel to district court the services, which is far from their village.
	Language	Dispute resolution services are provided in relevant local languages	3	- Respondents generally agreed that dispute resolution services are provided in relevant local languages both during hearing causes and providing documentation. - For those who do not speak local languages accommodations are made to have translators.
	Affordability	Dispute resolution services are affordable for the majority of citizens	2	- Most respondents claim that dispute resolution services are not within their financial means. However, it was difficult to verify this claim.
	Legal aid	Free legal services are available for citizens who cannot afford them	2	- The practice of legal support for vulnerable or marginalized group such as ethnic minorities and women is very weak.
Average Score/Cumulative performance			2.4	1–1.5=Very weak, **1.6–2.5=Weak**, 2.6–3.5=Moderate, 3.6–4=Strong

4. Effectiveness of dispute resolution

Objective	**Indictor**	**Description**	Value (1= Never, 2= Sometimes, 3= Often, 4=Always)	**Description of Score**
To assess whether the dispute resolution bodies provide timely, effective, and transparent rulings	**Evidence base**	Rulings are made after all parties have presented their arguments and evidence	2	- In most study areas respondents claim serious limitations in presenting their arguments and evidence before getting final rulings. They have also reservation on formal court settings, particularly on how the evidence was considered and what conclusions were drawn.

	Timeliness	Rulings are made in a timely manner	2	- Most respondents believe that rulings on land and forest related disputes generally take longer time compared to other similar legal cases.
	Fairness	Rulings provide a fair and effective remedy to the dispute	2	- Most respondents are hesitant on the fairness and effectiveness of dispute resolution decisions. They generally perceive that the final decision may not be based on the evidence presented and justified in the final ruling.
	Enforcement	Rulings are enforced in a timely manner	2	- Most respondents perceive that the final decisions are not properly upheld or implemented.
	Disclosure	Rulings are documented and publicly disclosed	1	- Huge limitation reported in terms of documenting and publicly disclosing the final rulings of tenure disputes.
Average Score/Cumulative performance			1.8	1–1.5=Very weak, **1.6–2.5=Weak**, 2.6–3.5=Moderate, 3.6–4=Strong

III. Concession allocation

1. Legal basis for allocating concessions in state forests

Objective	**Indictor**	**Description**	Value (1= Never, 2= Sometimes, 3= Often, 4=Always)	**Description of Score**
Evaluate whether the legal framework define a	**Quality of process**	The legal framework defines an open and competitive process for allocating concessions	2	- The concession was directly assigned by Oromia State Council through regulation number 122/2009. - There was no open and competitive process for allocating concessions such as auctions and competitive negotiation.

transparent and accountable process for allocating concessions in state forests	**Anticorruption measures**	The legal framework prohibits applications from people or companies who have been convicted of corruption or who have failed to pay taxes	2	- No direct article concerning anticorruption measures in forest concession allocation but all public enterprise is subject to screening for corruption.
	Application requirements	The legal framework clearly defines the minimum qualifications and technical requirements for applying	2	- The technical requirements for applying for concession such as feasibility studies, impact assessments, and management plans are not explicitly defined in the legal framework.
	Requirements to identify rightsholders	The legal framework requires that existing tenure claims and claimants be identified and documented prior to allocating a concession	2	- The legal framework is not explicit on the requirements of the existing tenure claims and claimants to be identified before concession allocation.
	Transparency requirements	The legal framework requires public disclosure of information relating to the allocation process, applicants, and final decision	1	- No legal requirements for transparency and information disclosure during the application process of concession allocation.
	Consultation requirements	The legal framework requires public consultation prior to allocating a concession that may have significant social or environmental impacts	2	- Public consultation is requirement in most legal documents including constitution prior to implementing any development project that have significant social or environmental impacts, but huge challenge in the implementation - However, there is no specific legal framework that requires public notice or consultation during the concession allocation process.
Average Score/Cumulative performance			1.8	1–1.5=Very weak, **1.6–2.5=Weak**, 2.6–3.5=Moderate, 3.6–4=Strong

2. Concession allocation in practice

Objective	**Indictor**	**Description**	Value (1= Never, 2= Sometimes, 3= Often, 4=Always)	**Description of Score**
Evaluate to what extent concessions	**Legal compliance**	Concessions are allocated through a process consistent with relevant laws and regulations	2	- Forest concession was allocated to OFWE

allocated in an accountable and transparent manner in practice				following Regulation No. 122/2009. - However, it is not clear how the concession allocation was consistent with Oromia forest proclamation No. 72/2003 and other relevant laws and regulations regarding compliance with the rules and other procedural requirements.
	Respect of existing rights	Concessions are not allocated in ways that create conflicts with existing rights and rights holders	1	- The existing rights of local communities over forest areas in Oromia were not respected when forest concession was allocated to OFWE. Nor did local communities adequately consulted before allocating forest concession
	Anticorruption measures	Measures are in place to minimize administrative discretion and opportunities for corruption during concession allocation	1	- No rules that restrict administrative discretion and effectively curtail corruption. Lack of good governance reported during community consultation in a relation to concession operation in most areas.
	Public disclosure	Information about the allocation process, applicants, and final decision is publicly disclosed	1	- No practice of reporting information and publicly disclosing about the allocation process, applicants, and final decision on forest concession
	Public consultation	There are opportunities for public comment regarding the allocation of concessions that may have significant social or environmental impacts	1	- Very weak community consultation regarding concession allocation, local community has negative attitude about OFWE.
Average Score/Cumulative performance			1.2	**1–1.5=Very weak**, 1.6–2.5=Weak, 2.6–3.5=Moderate, 3.6–4=Strong

3. Quality of concession contracts

Objective	Indictor	Description	Value (1= Never, 2= Sometimes, 3= Often, 4=Always)	Description of Score
Evaluate to what extent concession contracts comprehensively describe all rights and obligations of the concession holder	**Legal**	Contracts include clear legal provisions setting out the terms, rights, and conditions of the agreement	2	- There is no contract that directly concern forest concession. These conditions are indirectly addressed on Regulation No 122/2009. However, this regulation is not very clear on the duration of the contract, the specific property rights granted, any restrictions on rights within the concession boundary, and conditions related to termination, transfer of the contract.
	Technical	Contracts include all technical requirements related to forest management, exploitation, or conversion	2	- Regulation No 122/2009 is not very clear on technical requirements that describe methods and procedures to carry out the activities of the contract. However, some articles in this regulation specify the need for conducting surveys activities and feasibility studies. The regulation is not clear on technical requirements such as annual allowable cuts.
	Administrative	Contracts include all administrative procedures and obligations with which the contract-holder must comply	3	- Regulation No 122/2009 has articles that address administrative procedures and obligations. However, there is limitation on contract terms that clearly spell out types of reporting required and how often they should be carried out.

	Financial	Contracts include all financial obligations of the agreement	1	- The regulation is not clear on financial terms and obligation about pricing arrangements, fees, warranties, liabilities, required deposits, and all taxes.
	Environmental	Contracts include all environmental protection, impact assessment, or mitigation obligations of the agreement.	3	- Regulation No. 122/2009 emphasizes three interrelated objectives one of which is environmental conservation besides social and economic objectives. Moreover, OFWE mentioned that they are practicing selective cutting, restoration and reforestation,
				and preservation of existing vegetation. However, it is not clear on how they fulfill mitigation obligations, abatement measures, and compensation.
	Social	Contracts include all social obligations of the agreement	3	- Social obligations are also underlined in the Regulation No. 122/2009. These obligations include the provision of benefits to groups living within or near forest boundaries such as employment, provision of public goods such as the construction of schools or clinics. However, the actual performance is not up to the expectation.
Average Score/Cumulative performance			2.3	1–1.5=Very weak, **1.6–2.5=Weak**, 2.6–3.5=Moderate, 3.6–4=Strong

4. Social and environmental requirements of concessions

Objective	**Indictor**	**Description**	Value (1= Never, 2= Sometimes, 3= Often, 4=Always)	**Description of Score**

Evaluate to what extent concession contracts include requirements to ensure social and environmental sustainability	**Impact assessment requirements**	Contracts require social and environmental impact assessment prior to beginning exploitation or conversion activities	2	- According to key informants from OFWE social and environmental impacts are commonly considered before staring operation. However, the researcher couldn't find supporting documents that show whether social and environmental impact assessments are conducted prior to beginning implementation.
	Community engagement	Contracts require engagement and benefit sharing with local communities	3	- Regulation number 122/2009, article 7/10 require engagement and benefit sharing with local communities - New directive was also issued in 01/2017, which details forest utilization and benefit sharing by local community. However, local communities are not convinced with the proportion
				of benefit (e.g. 5% for non-PFM areas)
	Mitigation	Contracts require the development and implementation of measures to avoid or mitigate identified social and environmental risks	2	- Although measures such as reforestation and rehabilitation of degraded areas are commonly implemented in the OFWE concession areas, strict mitigation measures are not specified in the contract or regulation. The practice of compensating local communities living in the concession area for the lost livelihoods is weak.
	Monitoring	Contracts require monitoring of social and environmental impacts	1	- There is no provision in the contract or regulation that require monitoring of social and environmental impacts whether by the contract-holder or a third party.

	Response	Contracts require corrective measures if negative social or environmental impacts are detected	1	-No provision in contract or regulation that clearly state any obligations of the contract-holder to address negative social or environmental impacts. Nor does specific clause for the consequence's noncompliance, such as penalties.
Average Score/Cumulative performance			1.8	1–1.5=Very weak, **1.6–2.5=Weak**, 2.6–3.5=Moderate, 3.6–4=Strong

5. Compliance with social and environmental requirements in concession contracts

Objective	**Indictor**	**Description**	Value (1= Never, 2= Sometimes, 3= Often, 4=Always)	**Description of Score**
To what extent do concession holders comply with social and environmental sustainability	**Impact assessment**	Social and environmental impact assessments are completed and publicly disclosed	1	- No document that reveals the implementation of environmental and social impact assessment (ESIA) in relation to OFWE operation. Nor does such assessment report publicly disclosed.
	Community engagement	Equitable social agreements are established with local communities	2	- There were practices of providing services for local communities like schools, healthcare, and employment opportunities,
requirements in their contracts				particularly towards the beginning of OFWE operation. However, there are no strict social agreements in the contract or in the regulation that oblige the agreements should be implemented.

	Mitigation	Appropriate avoidance and mitigation measures are implemented	1	- No provision in the contract or regulation that specifies mitigation actions.
	Monitoring	Social and environmental impacts are regularly monitored and reported on	1	- No provision in the contract or regulation that specifies impact.
	Response	Corrective measures are taken when negative social or environmental impacts are detected	1	- Interviews with OFWE staff and local stakeholders reveal no corrective measures, for example, to stop or modify project activities that are causing negative social or environmental impacts.
Average Score/Cumulative performance			1.2	**1–1.5=Very weak**, 1.6–2.5=Weak, 2.6–3.5=Moderate, 3.6–4=Strong

6. Management of information about concessions

Objective	**Indictor**	**Description**	Value (1= Never, 2= Sometimes, 3= Often, 4=Always)	**Description of Score**
Evaluates to what extent information about concessions managed in an effective and transparent manner	**Legal basis**	The legal framework requires a public registry of concessions	2	- Hitherto there was no system that effectively and transparently manages information about concessions. However, the new forest proclamation (Proc No. 1065/2018, article 19/7) states that "government may identify forests under its possession and given through concession agreement for forest".
	Centralized system	Records of concessions are maintained in a central public registry	2	- There is no centralized public registry system that brings together all forest concession information across geographic scales. Although at very early stage, the new digital land

				registry system is attempting to bring together information
				from sub-national levels into a central system.
	Digitized system	Records are available in digital formats	1	- No digital record is observed in the case of OFWE that store comprehensive information on the current concession records.
	Completeness	Records contain comprehensive legal and spatial information about the concession	1	- Comprehensive record system that details information on contract terms, rights, and related conditions is missing.
	Accuracy	Records are accurate and up-to date	2	- OFWE has some relevant spatial information, which includes concession boundaries and forest cover. However, the accuracy of the boundary data is highly contested, particularly from the perspective of local stakeholder, i.e. some areas that OFWE claim as its concession are community's farmland.
	Accessibility	Records are freely accessible by the public	1	- Records of forest concession is not freely accessible by the public either online or by request in the office.
Average Score/Cumulative performance			1.5	**1–1.5=Very weak**, 1.6–2.5=Weak, 2.6–3.5=Moderate, 3.6–4=Strong

Annex 4: Current Version of the Benefit Sharing Plan for the ISFL ER Program

THE NATIONAL REGIONAL GOVERNMENT OF OROMIA

OROMIA ENVIRONMENT, FOREST AND CLIMATE CHANGE AUTHORITY

Oromia REDD+ Coordination Unit

Oromia National Regional State Forested Landscape Program

(Project ID P151294)

Benefit Sharing Plan for Disbursing Result Based Payments from BioCF ISFL Program

Finfine, Ethiopia

August 5th, 2019

Acronyms/Abbreviations

A/R	Afforestation/Reforestation
BioCF	Bio-Carbon Fund
BoANR	Bureau of Agriculture and Natural Resources
NoLAU	Bureau of Land Administration and Use
BoWERD	Bureau of Water and Energy Resources Development
BSP	Benefit Sharing Plan
CO_2e	Carbon dioxide equivalent
CRGE	Climate Resilient Green Economy
CSO	Civil Service Organization
ER	Emission Reduction
FREL	Forest Reference Emission Level
FRL	Forest Reference Level
GoE	Government of Ethiopia
GRM	Grievance Redress Mechanism
EFCCC	Environment, Forest and Climate Change Commission
MoF	Ministry of Finance
MRV	Measuring, Reporting and Verification
NRM	Natural Resource Management
OEFCCA	Oromia Environment, Forest and Climate Change Authority
ORCU	Oromia REDD+ Coordination Unit
OFLP	Oromia National Regional State Forested Landscape Program
OFWE	Oromia Forest and Wildlife Enterprise
PFM	Participatory Forest Management
REDD+	Reducing Emissions from Deforestation and Forest Degradation (REDD), Conservation, Sustainable Management of Forests and Enhancement of Forest Carbon Stocks
RBP	Result Based Payment

Introduction

1. The Government of Ethiopia (GoE) has embraced Reducing Emissions from Deforestation and Forest Degradation, as well as conservation, sustainable management of forests and enhancement of forest carbon stocks (REDD+) as part of its strategy to achieve a Climate Resilient Green Economy (CRGE)[50]. The CRGE strategy has identified the forest sector as one of the four priority sectors for fast tracking and establishing a policy framework for implementing REDD+ in the country. Forestry is expected to generate over 50% of the expected 255 Mt CO_2e Emission Reduction (ER) by 2030 in the country through the CRGE strategy (CRGE, 2011). The Oromia National Regional State Forested Landscape Program (OFLP), the first pilot sub-national ER program under implementation, was designed as part of Ethiopia's REDD+ Readiness Process. The result generated from the program will contribute to the achievements of Ethiopia's CRGE Strategy.

2. The OFLP has two financial instruments, a US$ 18 million mobilization grant from BioCarbon Fund (BioCF)-plus support and a US$ 50 million Result Based Payment (RBP) from BioCF-ISFL. The mobilization grant finances program establishment, enhancing state-wide enabling environment for scaling up actions and implementation of selected on-the-ground investment activities over a period of 5-years. The program would receive RBP for a net ER verified against the program's reference level in a period of up to 2029 (OFLP grant became effective in May 2017). The OFLP accounts the ER from Agriculture, Forestry and other land uses coming from the entire jurisdiction of Oromia National Regional State. The ERPA period is expected to comprise of two phases: (i) the first phase of the ERPA where ER is accounted from forest sector except forest land remaining forest land (degradation), ii) the second phase from LULUCF and agriculture, forestry and other land uses (AFOLU). Livestock generate GHG gases in the form of methane emissions arising from digestion processes and nitrous oxide emissions from excretions. The cultivation of crops also emits GHG due to the use of fertilizer and emissions of N_2O from crop residues reintroduced into the ground. In forestry, the sources of GHG emission are human activities like deforestation for agricultural expansion and degradation for wood extraction, livestock grazing and forest coffee production. Potentially, emission coming from only enteric fermentation would be considered eligible in the second phase of the ERPA period. OFLP is expected to generate financial and non-financial benefits. This document outlines the Benefit Sharing Plan (BSP) for ER payment from the program focusing on the financial benefit for the first phase of the ERPA (ERs coming from the forest sector). The BSP will be updated after completion of the first phase of the ERPA to consider ER benefits coming from all eligible AFOLU sectors and sources. Updating the BSP may involve in defining eligible beneficiaries, set criteria for benefit allocation, benefit sharing arrangements and conduct needed consultations for the sub-category to be added in the second phase.

II Approach

Figure 1 summarizes the approach followed in the preparation of the BSP for OFLP.

[50]Climate Resilient Green Economy (CRGE) is a long term (2010-2030) development strategy of Ethiopia. Its goal is to ensure fast and Carbon neutral economy growth to help Ethiopia achieve a middle-income country status by 2025. There are four priority pillars of the CRGE. These are agriculture, forestry, energy and industry. Among the key strategies selected for fast tracking are avoidance of deforestation and forest degradation, improved forest management and forest enhancement through reforestation/afforestation collectively known as REDD+. The national REDD+ initiative is therefore an initiative to support implementation of CRGE.

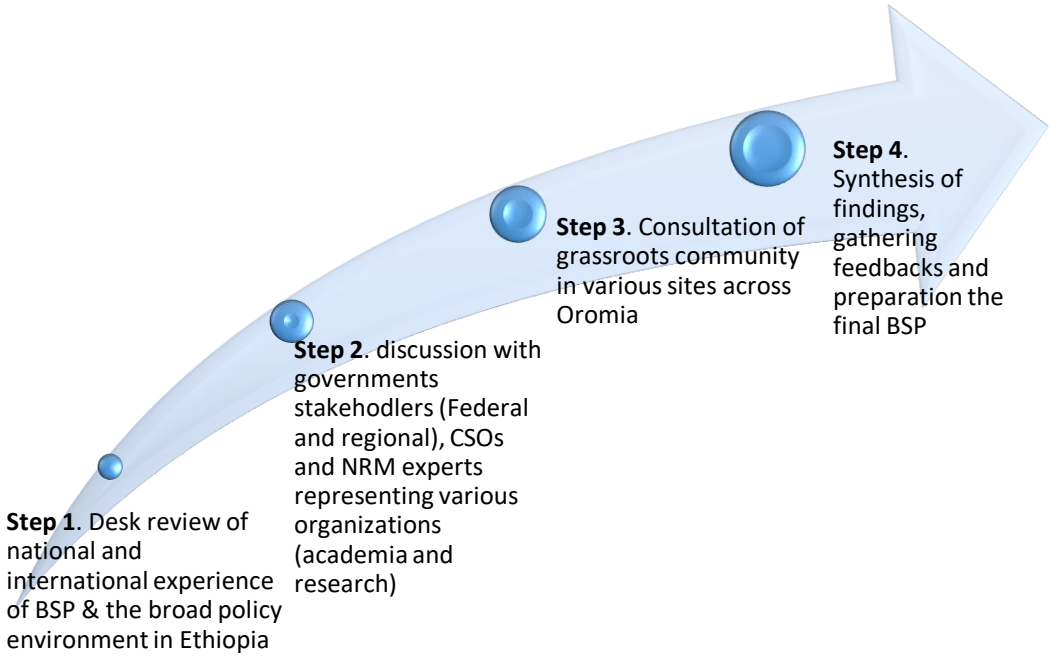


Figure. A stepwise process followed to develop the BSP for OFLP

3. A total of 111 consultation meetings on this BSP were held with a wide range of stakeholders in October 2016 (please see annex A). Two of the consultations were with policy makers, one at Federal and the second at regional (Oromia National Regional State) levels; one consultation with Civil Society Organizations (CSOs) and experts in the field of natural resources management (NRM), and the remaining 108 meetings were with communities across Oromia Regional State. A total of 4647 community members, 3435 men and 1212 women, participated in the community consultations (Table 1). The consultations focused on eligible stakeholders and their roles and responsibilities, vertical and horizontal shares and criteria to employ for benefit sharing, benefit disbursement mechanism and grievance redress mechanism. In each consultation meetings, introduction to the programme, its objectives, goal and the need for community participation was made. This has facilitated informed and active participation of the community in the BSP discussion and accordingly participants of the consultation meetings proposed a mechanism that was felt fair, equitable and effective. Extensive review of literature on national and international experiences on BSP in REDD+ and NRM in general was also conducted and presented and discussed during the consultations.

Table 1. List of administrative zones, woredas and kebeles[51] where community consultations were conducted and with number of participants in each consultation.

No	Zone	Woreda	Kebeles	Number of participants		
				Male	Female	Total
1	West Shewa	Dandi	Gare Arera,	105	49	154
			Dano ejersa Gibe	66	15	81
		Jibat	Tuta-Jibat,	41	8	49
			Abeyi-Reji	112	91	203
2	Guji	Adola	Maleka,	81	74	155
			Anferara	253	85	338

[51] Kebele is the formal and legally recognized administrative unit below the woreda (district) level.

No	Zone	Woreda	Kebeles	Number of participants		
				Male	Female	Total
		Wadera	Danisa Worasti,	119	31	150
			Borema	165	66	231
3	West Haraghe	Gemechis	Sororo,	96	33	129
			Maderia	75	20	95
		Chiro	Chiro Qala,	64	41	105
			Najabas	53	45	98
4	Buno Bedelle	Dhidhessa	Esiya,	89	29	118
			Jamiya	81	11	92
5	Illu Ababor	Bacho	Tulu-Sona,	51	36	87
			Walgahi-Kubsa	150	68	218
6	Jimma	Sigimo	Aterkeda,	110	40	150
			Yadesso	73	31	104
		Gera	Sadi-Loya,	110	30	140
			Kecho-Anderacha	128	59	187
7	East Wollega	Gudeya Bila	Hena Jawo Ja,	325	129	454
			Bilo Ejere	133	42	175
		Diga	Arjo Konana Bula,	107	40	147
			Bikila	200	65	265
8	Kelem Wollega	Anfilo	Duli	235	21	256
		Sayo	Alako Kusaye	137	13	150
		Yamalagi Walal	Gurati Walal,	138	0	138
			Burka Lomicha	138	40	178
				3435	1212	4647

Benefits

4. Up on successful implementation, OFLP will generate multiple benefits: monetary, non-monetary and non-carbon benefits. The non-carbon benefits comprise all other benefits other than the payment for the emission reduction (ER) and this includes institutional and human capacity building, increased income from new and improved land-use practices, more secure flow of ecosystem services and natural-resources-based small enterprise development and the like. The socio-economic impact from the non-carbon benefit likely outweighs the direct monetary benefit to be received in the form of ER payment. OFLP also generates monetary and non-monetary benefit in the form of ER payment through avoided of deforestation and forest degradation and/or enhancement of forest carbon through A/R. This will be used as a financial incentive mechanism to reward good forest management and conservation practices for the eligible stakeholders that deliver the ER results. The term benefit and, benefit sharing in this document, therefore, refers specifically to the monetary (cash) and non-monetary (in-kind) benefit received in the form of results-based payment (also called ER payment) from OFLP.

5. The benefit to be shared is the net payment defined as gross ER payment minus operational costs incurred in the management process of the BSP plus 3% as performance buffer the recipient would set aside to manage potential risks. The operational cost to be covered from the ER payment includes specifically those expenses related to conducting MRV, safeguard,

GRM, and audits (Table 2)[52], The operational cost up to 2022 will be covered from the programme grant fund, and therefore no deduction for operational cost will be made from ER payment until this period. Moreover, the 3% deduction as indicated above shall also be set aside for 'Performance Buffer[53]". that will be used (i) to manage potential risks when there is under-performance or non-performance at state level while performance exist at zone(s) level; (ii) to manage risks that may occur due to natural factors (drought, fire, land slide, etc.) or other risks related to political instability and the like. The net payment will then be disbursed among the eligible beneficiaries as per the arrangement set in this BSP.

6. As part of the overall risk management (risk minimization) for those risks described above, potential mitigation measures such as integrated watershed management, fire break, area closure to enhance natural regeneration will be implemented through engagement, continuous consultation and participation of forest communities and with the involvement of concerned local actors. Furthermore, multi-sector implementation coordination to enhance performance and minimize risks shall also be employed. The resource needed for such risk mitigation shall be sourced from (i) the 3% set aside as performance buffer as indicated above; (ii) as deemed necessary, from the share of ER benefits allocated to the government (15%) and part of community's ER benefits allocated for community development projects; and (iii) additional resources from existing projects implemented by other partners in the region. In the case where potential risks as described above are negligible or absent, the performance buffer fund shall be transferred to eligible beneficiaries as per the arrangement of this BSP. It should be noted though, a different buffer reserve valued as ER credit would be set aside by the ISFL on behalf of ER buyers through negotiation with the Program Entity (ER seller). This form of buffer reserve is meant to address potential risks due to uncertainties during ER assessment, risks associated to natural factors and reversals. The exact amount of this buffer reserve would be determined based on associated risks using international best practices to calculate the so called "Buffer Reserve".

Table 2. *Estimate of ORCU's operational cost that will be covered from ER payment (These costs may change over time, and the estimate provided in this table is based on current price estimation for similar operation in ORCU. Note also that the cost for period up to 2022 will be covered from the program grant*

Items/tasks	**Estimated cost/year (USD)**	**Remark**
MRV (5 specialist)	78,000	Specialist =1300 USD/month, (working on measuring performance and other related tasks in the unit). The payment per month is estimated from current salary of most ORCU technical staff and with some adjustment for change in cost of living.
MRV (Equipment e.g. computers)	5,000	This includes maintenance costs every year

[52]The operational cost indicated in table 2 is estimated based on the current experience of Oromia REDD+ Coordination Unit (ORCU) and some adjustment for change in cost of living. This cost will be covered from grant money until 2022, so no reduction will be made from ER. However, after 2022 it will be deducted from ER payment.

[53] The buffer should be used mainly to reward zones/woredas/ kebeles in case of landscape non-performance, and local (zonal) performance. It would be kept separate at MoF.

Items/tasks	Estimated cost/year (USD)	Remark
2 Safeguards specialists (1 env't & 1 social)	31,200	The same rate as above
Environmental and Social Audit	20,000	
GRM (a lump sum estimated by experts)	10,000	The assumption here is OLFP will be implemented in a participatory and transparent manner causing little grievance. However, as some grievances are unavoidable, allocation of some cost is mandatory, hence a lump sum of 10,000 USD/annum. With experience the amount can be adjusted.
Drivers (one driver)	4,200	1. driver @ 350 USD/month
Car maintenance including insurance, fuel and lubricants	6000	Estimated based on current use @6000 USD/car/year
Other operational costs (allowance, stationary, etc.)	6000	
Sub total	160,400	
Contingency	8,020	5% of total
Total	**168,420**	

Eligible stakeholders

7. The benefits received from RBP will be shared among stakeholders eligible for sharing. The BSP involves a two-tier process: vertical and horizontal sharing. Vertical share refers to the sharing of the benefit between the community and private forest developers on one side and governments (Federal and Regional) on the other side. Horizontal share refers to the distribution of community's allotted share among the communities across the forested landscapes in Oromia.

8. The major eligible stakeholders identified for sharing the benefit from OFLP are (i) the community that resides nearby and inside forests, and (ii) Federal and Regional governments (Table 3), (iii) private forest developers are also eligible in sharing of the benefit. Private developers encompass those licensed as individual investors, private corporations, as well as business associations and cooperatives (e.g. *SMEs)* who have developed forests on own land or land received for this purpose in the form of lease or other arrangements within the landscape of Oromia. The Federal Forest Proclamation (Proc#1065/2018) defines Private Forest as "forest other than state and community and developed on private or institutions' holdings. However, very few such endeavors exist today in the region, as a result small proportion of the allocated benefit (5%) would be used to benefit them. The benefit allocated for private sector is meant to support establishment of new forest and forest management operations that enhance delivery of emission removal. For the private sector to benefit from the ER payment, requirements[54] such as allocation of a matching fund, proper application of

[54] Criteria should be developed for the matching fund by ORCU and/or the OFLP steering committee. The criteria may include but not limited to equitable access to ER (if many private sector applicants exist), size of job created and other community development plans, gender and age of the applicant(s) (e.g. group of youth applying for self-employment), etc.

the OFLP's safeguards instruments, size of job created, livelihood improvement option and, women and youth benefitted from the employment opportunity, and adoption of Corporate Social Responsibility (CSR) could be criteria for selection of proposals. Moreover, forest developed by a private sector should fulfil the definition of 'forest'[55] adopted nationally and adopted by OFLP. All other tree planting practices that don't fulfil the definition of forest will not be rewarded. Call for proposal for private sector forest development will be announced by ORCU/OEFCCA annually by using popular media (either electronic, printing materials or both). In order to access from the 5% allocated benefit, the proposals submitted by the private sector will be assessed by OEFCCA/ORCU's experts mainly in the lights of contribution to generating additional ERs and whether it is aligned with OFLP safeguards instruments, among others. The experts forward their recommendations on the proposals to OFLP steering committee which will ultimately select and approve the winning proposals. Whenever private sector developers are absent the share goes back to the community's share. The share of each PS investors from the total 5% will be determined based on the total forest area developed by each and calculated relative to the overall zonal performance. OEFCCA/ORCU will be responsible to conduct and document potential list of eligible PS projects in forest sector.

Vertical share

9. This is a sharing of the ER payment between government, communities, and the private forest entities. Government in this context refers to the federal republic of Ethiopia and the Oromia National Regional State, whereas communities refer to those who live within the boundaries of Kebele (government's smaller local administration unit) and engage in development and management of forests either legally or customarily, and private forest developers as defined above that fulfil the benefit sharing criteria. Neither the Forest Law (Proc# 1065) nor the Rural Land Administration Proclamation (Proc# 456/2005) defines what constitute "community" in legal terms. FMC's are organized based on their interest and historical relationship with the forest; in Oromia, their boundaries coincide with the kebele's legal boundaries. Community(s) not organized as "PFM/FMC", their boundaries also be that of kebele boundaries. FMCs as PFM operators could be organized by government agencies, NGOs or government projects dedicated to this objective and are organized according to the "Cooperative Development and Promotion Law", with regular oversight by local level Cooperative Office. The difference between communities organized as FMCs and communities not organized as FMC/PFM is, the former are legal members of both the FMC and Kebele, while the latter are only legal member of Kebele. For benefits coming as ER proceeds, both are eligible. NGOs or DP projects who operate within communities are not expected to be eligible for benefits. The share is set based on perceived rights, roles and responsibilities of the eligible parties (Table 3). The major responsibility of the eligible beneficiaries is mainly related to their contribution in relation to ER and removal expected at Oromia level. This vertical share is set at 20:75:5% (government: community: private forest developers).

Table 3. Eligible stakeholders, proposed share, and their rights, roles and responsibilities

Main categories of eligible stakeholders (current and future)	**Percent share of the stakeholders**	**Rights, roles and responsibilities**
Communities refer to those who live within the boundaries of Kebele and	75%	Customary and constitutional right of ownership, cultural and social responsibility of managing, protecting and developing the

[55] 'Land spanning at least 0.5 ha covered by trees and bamboo, attaining a height of at least 2m and a canopy cover of at least 20% or trees with the potential to reach these thresholds in situ in due course.

Main categories of eligible stakeholders (current and future)	Percent share of the stakeholders	Rights, roles and responsibilities
engage in development and management of forests either legally or customarily		forest, and customary right of use and/or legally granted user right through PFM along with responsibility of managing and developing forests. Community will be represented by kebele which is the lowest unit of government's administration.
Federal government (Represented by EFCCC)	5%	Constitutional right to own forests; responsibility to enact policies, regulations, develop national strategies; representation in international negotiations and giving technical back-up to OFLP.
Regional government (sectoral bureaus in the land use sector)	15%	Constitutional responsibility to administer forests; responsible for developing regional policies (forest, land use, etc.), provide technical support on forest management including MRV process, budget (carbon fund) management, law enforcement, organizing and supporting communities and private forest developers,
Private forest developers (these could be individuals, or other stakeholders – e.g. private investors)	5%	Investing in new forest development and/or management of existing forest in the form of A/R or area enclosure.

10. Governments in the context of this BSP comprises Environment, Forest and Climate Change Commission (EFCCC) at Federal level and Oromia Environment, Forest and Climate Change Authority (OEFCCA) at regional level and other sectoral bureaus in the land use sector, both of which are coordinating OFLP activities at their respective governance hierarchy. Both are identified as government bodies eligible to lead formation of enabling environment and technical back-ups specifically to the success of OFLP. The 20% government share will be further shared between these federal and regional bodies according to the proportion of 5%:15% (Federal: Regional). This arrangement was set on the basis of roles and responsibilities played by both parties in the OFLP implementation (table 3). Funds should be used to promote activities that will generate additional emission reduction and to coordinate activities and policies among sectors. Next ER payment will be made when eligible beneficiaries present a technical and financial report of the use of the funds to OEFFCA who will be responsible for consolidating and reporting to all concerned parties.

11. The 15% share of Oromia regional state will be housed in Oromia Bureau of Finance and Economic Cooperation (BoFEC) and managed by OEFCCA which will be responsible in identifying activities and actions in other sectors that reduce deforestation, forest degradation and promote forest development. It will be mobilizing implementing sectors and coordinating activities at regional level involving institutions such as, BoANR, BoLAU, BoWERD, OFWE and Livestock and Fishery Resource Development Agency. Investment

options[56] mainly focus on addressing drivers of deforestation and forest degradation and will be identified and prioritized at regional level. Call for proposals will be issued by OEFCCA/ORCU and it will be communicated to regional implementing sectors. The proposals submitted by implementing sectors will be evaluated by OFLP TWG and selected proposals will be approved by the OFLP steering committee. Emission reduction potential and number of employment opportunity created; livelihood improvement option could be among the criteria used to evaluate eligible proposals. To ensure representation of other sectors, the OFLP steering committee is composed of heads of sector offices such as OEFCCA, Bureau of Agriculture and Natural Resources (BoANR), Bureau of Water, and Energy Resources Development (BoWERD), Oromia Forest and Wildlife Enterprise (OFWE), Bureau of Land Administration and Use, Bureau of Finance and Economic Cooperation (BoFEC), Bureau of Women and Youth Affairs, among others. The steering committee is chaired by the Vice President of the region. The Steering Committee meets biannually to review progress and give direction to facilitate implementation of OFLP. Likewise, the utilization of share of EFCCC will be decided by the National REDD+ Steering Committee based on proposal prepared by EFCCC with in the general framework of OFLP support that the commission will be providing. The underlying issue in utilization of the government share at both governance hierarchy (Federal and Regional) is to ensure that it is used for activities that reduce GHG emission.

Horizontal share

12. The 75% community share will be dispensed among the communities across Oromia. The horizontal benefit share involves a three-step process: first is the share among administrative zones; second is share among woredas in each zone and the third is share among kebeles in each woreda. This approach was chosen due to its suitability for forest governance and service provision to the forest managing communities. The zonal, woreda and kebele boundaries follow official map used in the PAD/PIM.

13. Based on suggestions from stakeholders' consultations: performance and forest area (Table 4) were selected as criteria to determine sharing of benefits among zones. Performance in this context refers to avoided deforestation (AD) and/or forest enhancement (A/R), while forest area refers to the forest coverage that exists in the zone at the time of performance monitoring. Delivering performance requires commitment, time, energy and effective collective action to manage and restore forests. This should be rewarded with proportional positive incentive. Similarly, historical forest stewardship that contributed to preservation of forest for current and future generation should be valued and rewarded with positive incentive, which makes existing forest area an important criterion to consider.

Performance

14. Oromia has an estimated 9 million hectares of forest distributed in different parts of the region. The contribution to the ER that generate payment from zones, woredas and kebeles

[56] Investment option here refers to all possible interventions from all relevant sectors i.e. forest, crop, livestock, energy and the like that is recognized to generate additional emission reduction and/or removal.

in the region will vary depending on level of effort put to address the drivers of deforestation and other social, ecological and economic factors. Assessing the contribution of each administration levels to the regional performance enables to incentive efforts put at each level in changing human forest interaction, i.e. result based incentive. Therefore, avoided deforestation (AD) (in hectares) and/or forest development (A/R, also in hectares) delivered by each zone should be considered as a critical performance[57] indicator for sharing benefit from the ER payment. Performance at zonal level will be measured against a Forest Reference Level/Forest Reference Emission Level (FRL/FREL) for each zone which will be determined separately using the same approach used in the FRL/FREL developed for OFLP. In measuring the zonal level AD and A/R, same reference level and monitoring cycle used to evaluate the regional performance should be applied. Determination of the zone level FRL/FREL and assessment of performance at all levels will be conducted by ORCU's MRV unit following national MRV protocol.

15. The weights attached to the above two criteria are 60% for performance and 40% for existing forest area (see table 5 for hypothetical example).

Table 4. Summary of criteria, rank and weight attached to each criterion for the horizontal share among zones as agreed during stakeholders' consultations

Criteria	**Justification**	**Rank**	**Weight**
Performance[58]	Communities in different zones are expected to differ in their performances as a result of their internal strengths, experiences, and support services by government and non-government bodies and other socio-economic and political factors. Therefore, the benefit shared should reflect performance delivered aggregated at zone level.	1	60
Forest area	Communities in different zones manage different size of forest that reflects their historic forest stewardship; therefore, benefit share should reward communities according to the size of forest they manage.	2	40

16. Based on the criteria and weight attached to each criterion, the following equation (Eq. 1) will be used to estimate share of monetary benefit at zone level.

*Share of Benefit/Zone = (Total community share *((0.6* performance of the zone/total performance across Oromia) + (0.4*Forest area of the zone/forest area in Oromia)) Eq. 1.*

Table 5. Hypothetical example to demonstrate how the equation works to calculate horizontal share

Variable	**Unit**	**Quantity**	**Remark**
Forest area of Oromia	Ha	9,000,000	
Forest area of zone n	Ha	400,000	
Performance at Oromia level	Ha	5,000,000	
Performance of zone n	Ha	10,000	

[57] Performance in this specific context refers the net reduction of deforestation (avoided deforestation) and forest development.
[58] For performance measurement at zonal level see section VII below.

ERP*	USD	25,000,000	based on performance @ regional level done independent of this BSP
ORCU operational cost	USD	842,100	Table 2. If performance is done every five year, hence, 168,420*5 = 842,100
Net payment	USD	24,157,900	ERP – ORCU operational cost
Community share of ERP (75%)	USD	18,118,425	0.75*24,157,900
Share for zone n	= 18,118,425 * ((0.6*100,000/5,000,000) +(0.4*400,000/9,000,000)) = 539,526 USD		

17. There could be a condition where performance at Oromia scale doesn't exist, while some zones still showing positive performance. Since OFLP is designed as jurisdictional level ER program, no benefits shall be expected even for the performing zones under such a circumstance. However, an arrangement could be made to use funds set aside as buffer to reward the zones that performed well, in case of landscape non-performance (however, for this buffer to be created, ERs need to be generated first). Conversely, when performance is achieved at regional level, zones that did not perform (zero performance[59]) should still benefit from the overall payment based on their forest area criterion alone (see equation above and table 6). This is essential to motivate zones to work hard to deliver performance in the future and reward their stewardship. Zones with negative performance will not be rewarded[60].

Table 6. Hypothetical example to demonstrate how the equation works if there is jurisdiction level achievement but zone fail to perform (zero performance).

Variable	**Unit**	**Quantity**	**Remark**
Forest area of Oromia	Ha	9,000,000	
Forest area of zone n	Ha	100,000	
Performance at Oromia level	Ha	5,000.000	
Performance of zone n	Ha	0	
ERP	USD	25,000,000	based on performance @ regional level done independent of this BSP
ORCU operational cost	USD	842,100	Table 2. If performance is done every five year, hence, 168,420*5 = 842,100
Net payment	USD	24,157,900	ERP – ORCU operational cost
Community share of ERP (75%)	USD	18,118,425	0.75*24,157,900
Share for zone n	= ((0.6*0/5,000,000) * 18,118,425) +(0.4*100,000/9,000,000) * 18,118,425)) = 80,526 USD		

Sharing within zones

[59] Zero performance will happen under the condition where the net gain in avoided deforestation (forest loss in ha) and/or forest development (forest gain in ha) equals the reference level during a given monitoring cycle, hence zero net gain over the reference level.

18. As indicated above, performance is measured, and reward is provided at zonal level. However, the forest is managed at community level, which demands for a mechanism to distribute the zonal level share further among woredas in each zone and kebeles in each woreda. For this, objective criteria should be applied to minimize MRV related costs. Hence, area of existing forest (50%), forest development[61] (30%) and number of Forest Management Cooperatives (FMCs) (20%) are proposed to serve as criteria for sharing benefit among woredas in each zone[62]. These criteria were suggested because they show effort of community in forest management. For instance, number of FMCs was suggested to be a criterion since it shows the level of effort put by the community in the woreda to actively engage in ER activities. The use of such criterion will motivate the others to organize in that line to manage forests. For benefit distribution among woredas and kebeles using quality data considering total forest area and forest development (A/R, enrichment planting and rehabilitation) as proxy indicators, ORCU/OEFFCA will rely on the critical mass of MRV specialists (proposed to be 5 in total). The MRV Specialist will be deployed using ER proceeds set aside from the gross ER payment as operational cost, to collect data and analyze (GIS/remote sensing, on ground measurement using GPS particularly from new forest development area, data from forest management information system (FMIS) repository, and data collected by various implementing entities including OFWE, OEFCCA, BoANR, NGOs, CBOs, etc.) and produce quality maps with acceptable error margins to be used to determine performance in each woreda and Kebele. The MRV team has been receiving regular capacity building training and are equipped with required technologies from resources of the REDD+ Readiness and OFLP grants to be able to undertake measurement of performance. To enhance their capacity further, continuous capacity building training shall be provided in the remaining grant period and beyond using ER proceeds as stated above. The national MRV unit and the National Geospatial Information Agency will assist in this capacity building exercises particularly on forest inventory and quality map production.

19. The proxy for forest development is the number of planted seedlings in the form of enrichment planting, A/R and/or gain in forest area through rehabilitation activities. Area of each forest enrichment and A/R activities will be measured using GPS and clear demarcation of these sites will be determined and submitted to Zonal and Regional OEFFCA offices for continuous monitoring. In support of this, online data submission system would be developed and aggregated upwards to the central data base using mobile data submission mode such as ODK or ArcGIS. Survival of the seedlings is a key factor to consider as any planting activities should not be considered a success. Therefore, the criterion considers the seedlings that survived for at least two years after planted. Forest area refers to the size of natural forest in each woreda following the definition of "forest" in Ethiopia. Forest monitoring and mapping for reporting is conducted every two years at Jurisdictional level. Whereas there will be continuous monitoring and mapping of A/R and PFM activities on yearly basis. To avoid double counting, forest area does not include newly developed and rehabilitated forest within the monitoring period. The total area of A/R (ha) is determined: multiplying number of seedlings planted with spacing between seedlings (m^2) divided by 10,000. The spacing between tree

[61] Forest development in this case refers to area of forest gain in evaluation period as compared to the reference period. The gain may be achieved from A/R or rehabilitation of degraded site and it is expressed in hectares.

[62] It is acknowledged that the accuracy level of forest cover assessment may be questionable as of now, but, in 3 years from now, is expected to improve considerably.

species depends on many factors, including species, objective, weed competition, soil moisture etc.[63]. The data on those criteria is always updated by OEFCCA/ORCU field staff.

20. Based on the criteria and weight attached to each criterion, the following equation (Eq. 2) can be used to determine share of each woreda in zones (see also table 7).

*Share of benefit/woreda x = total community share of zone n * ((0.5 * forest area of woreda x/total forest area of zone n) + (0.3 * area of forest developed of woreda x / total area of forest developed in zone n) + (0.2 * number of FMCs in Woreda x / number of FMCs in zone n))…….Eq. 2.*

Table 7. Hypothetical example to demonstrate how the equation works to calculate share of woredas.

Variable	**Unit**	**Quantity**	**Remark**
Forest area of zone n	Ha	100,000	
Afforested/reforested and rehabilitated area of zone n	Ha	100	
Number of FMCs in zone n	Number	50	
Community share for zone n	USD	539,526	Table 5
Forest area of Woreda x	Ha	5000	
Afforested/reforested and rehabilitated area of woreda x	Ha	20	
Number of FMCs in woreda x	Number	10	
Share for Woreda x	((0.5 * 5000/100000) + (0.3 * 20/100) + (0.2*10/50)) * 539,526 = 67,440 USD		

21. For the benefit to reach the community, the woreda level share needs a further sharing among kebeles within each woreda. Forest area (60%) and forest development (40%) are the criteria and weights assigned to share benefit among kebeles within woreda. The share per kebele is calculated using the equation below (Eq. 3). Most benefit may likely go to the FMCs or kebeles with larger area of forest. However, non-forested kebeles may receive benefit if they engage in forest development during the monitoring period.

*Share of benefit/kebele = total community share of woreda n * ((0.6 * forest area of kebele x/total forest area of woreda n) + (0.4 * area of forest developed of kebele x / total area of forest developed in woreda n)). Eq. 3.*

Disbursement mechanism

22. Out of the estimated 9 million ha of forest that exists in Oromia only around 1.3 million ha is put under PFM so far. Although the use of PFM cooperatives as agent of benefit disbursement was suggested during stakeholders' consultations, the fact that most forests have not been put under PFM means other disbursement mechanism should be sought. The second option identified to serve this purpose was to employ the government structure used for fiscal budget disbursement. Under this preposition, the Ministry of Finance (MoF) receives the RBP in an independent account and keeps the 3% performance buffer for risk management and deducts the operational cost as described above. ORCU/OEFCCA officially communicates the

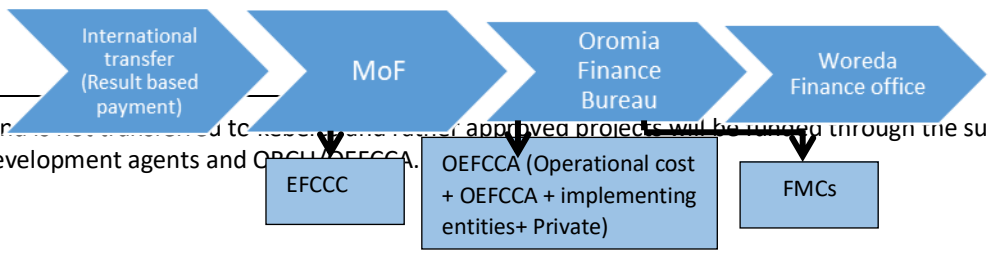
[63] Spacing is 2m for fuel wood, maximize yield, short rotation, no small size limit and 4.5 m for Sawn timber, large log size 30 cm+ in DBH, long rotation, regular thinning

BOFEC detailing share of all eligible stakeholders from the net payment as per the OFLP monitoring result. Accordingly, BOFEC transmits this disbursement request to MoF. Then MoF transfers the share of federal government to the account of EFCCC and the remaining net benefit and the operational cost to Oromia BOFEC. The rational for using this channel (MoF-BOFEC) is due to the fact that: (i) It is an established fund channeling system already in place used for government fiscal disbursement, (ii) no additional cost is required for fund channeling, and (iii) as proven and well-established system, would ensures speedy ER fund disbursement to beneficiaries at lower level. The Oromia BOFEC, being officially communicated on the amounts of shares to each entity in the region (by ORCU/OEFCCA), disburses operational cost and share of private forest developers (5% of the net) to OEFCCA's account. Moreover, Oromia BOFEC disburses share of FMCs to their respective account (subjected to the financial management capacity required by the World Bank) and the shares of kebeles without FMCs to the respective Woredas' Office of Finance (Figure 2). BOFEC will release the share of Oromia regional state (15%) based on the decision of OFLP steering committee which determines the specific activities and sectors that leads them. OEFCCA's lower administrative level units will oversee the proper disbursement and utilization of the shares at the respective sector administrative level.

23. The Woreda Office of Finance funds community action plans in accordance of the instruction provided by ORCU/OEFCCA for the respective kebele[64]. Sector offices related the approved action plans (as decided by the Woreda Steering Committee) will oversee the implementations of the community action plans. The Woreda Cooperative Promotion and Development Office is responsible to manage the utilization of the FMC money through evaluating FMCs' business plan jointly with relevant sectors. The Woreda Cooperative Promotion and Development Office has mandated to examine and audit expenditure of FMC against their business plan and report the findings to concerned authorities. Furthermore, it provides required financial management trainings such as, bookkeeping and other skills to FMC and kebele offices as needed.

24. Concerning the share allocated to the private forest developers, ORCU/OEFCCA experts evaluate project proposal based on set criteria and approved by OFLP steering committee and then the OEFCCA finance unit transfers funds for the winning investment projects/proposals based on private sectors' action plans. The schedule of payment will be based on performance status indicated in their technical and financial reports. ORCU/OEFCCA will oversee the implementations against the action plans and receive technical and financial reports.

25. ORCU steering committee will oversee the entire use of the ER payment at all levels, while OEFCCA/ORCU will provide annual update to EFCCC and World Bank on the overall use of the ER benefit. Next transfer of benefit to eligible users of the benefit depends on acceptable technical and financial report of beneficiaries of the preceding share of benefits. ORCU/OEFCCA will follow up and receive physical and financial reports on the utilization of the share of benefits and report the same to all concerned entities.



[64] Fun[illegible] to [illegible] approved projects will be [illegible] through the supervision of development agents and O[illegible]CA.

Figure. Flow of share of result-based payment

Potential uses of the benefit

26. In Oromia, there are more than 300 woredas. Each woreda on average consist of 20 kebeles, of which about 35% are forest-dependent community. Based on the 2013 Central Statistics Authority population projection, the population of Oromia reached 33,691,991 in 2015. The demographic figures show almost a 50:50 ratio of men and women dominated by more than 50% young and dynamic population group (CSA, 2013, BoFEC, 2013). Oromia is home for more than 88% of the ethnic Oromo. Whereas, twelve percent of the population of Oromia belongs to the different ethnic groups (Amhara, Hadiya, Sidama, etc.). More than 87% of the people of Oromia live in rural areas while 13% reside in urban areas (CSA, 2007). But it is difficult to compartmentalize these layers of the community into simple arithmetic numbers at the Kebele and village levels. Socio-economic situation of majority communities/beneficiaries depends on forests to support their livelihoods through agriculture, agro-pastoralists and pastoralists.

27. During consultations dedicated to this BSP preparation, communities have identified investment options (proposals) for use of the ER payment. The consensus was also that the benefit will not be shared among individual households and rather it will be invested on activities/projects that will ensure communal or collective benefits as well as generate further additional ERs. The long list of investment options identified during the community consultations were sorted into the two categories as presented in Table 8. The categorization is based on environmental and social safeguard principles of OFLP. Of the total ER payment (75%) that would be received at community level (kebele or FMC level), 45% would be invested on social development and livelihood improvement activities, while 50% will be invested on land use and related activities that generate more ERs. The remaining 5% of the share received is dedicated to underserved social groups in the form of revolving fund. This will serve poor households or individuals and youths in the communities. In parts of Oromia National Regional State, the pastoral, agro-pastoral and forest-dependent communities meet the World Bank OP 4.10 policy requirement. In addition, orphans, pregnant and lactating mothers, elderly households, and other labor-poor, high-risk households with sick individuals, such as people living with HIV and AIDS, and the majority of female-headed households with young children, Polygamous households, Unemployed Rural Youth, and Occupational Minorities ((some of the excluded in Oromia encompass, the Idig (smiths), fuga (wood workers), kallu (tanners) and potters (who produce basic day to day implements to farm production and home use)) are categorized as a vulnerable groups. As per the Benefit-sharing Plan, 5% of the ER earnings (assuming the total ER proceeds minus operational cost and buffer is US$ 46 million, the share that goes to communities would be US$ 34.5M; the 5% that goes to vulnerable groups would be approximately US$1.72 M), which will be dedicated to serve the underserved communities in the form of revolving fund. These investments should be

designed carefully not to result in negative impacts, i.e. emission increase rather than reduction. The revolving fund will be hosted at woreda finance office and coordinated by woreda OEFCCA office and managed by micro finance institution (MFI) operating in the woreda. Eligible projects to be financed by this fund are already identified through forest dependent community consultations and will further updated as deemed necessary.

28. In kebeles with FMC, all households may be members of the FMCs since membership is open. However, under a situation where there are some non-FMC community members, they could benefit mostly from the 45% share meant for social development that serves all communities in the kebele.

Table 8. Proposed list of potential uses of the benefit at community level. This list is screened from the long list of activities suggested during the community consultation.

No	**Activities used to generate ERs**	**Social development/livelihood improvement**
1	Seedling production for income	Maintenance of school
2	Coffee outside forest	Maintenance of clinic
3	Tree planting for income and own consumption	Maintenance of road
4	Fuel saving stove	Bee keeping
5	Fruit tree planting	Fattening (intensive and through cutting and carry system)

29. Once the share of the community is known, detailed action plan on the potential uses needs to be prepared by the community with the facilitation of woreda level OEFCCA office and development agents with technical support from the regional OEFFCA/ORCU. The action plan will be evaluated and approved by Woreda OFLP Steering Committee. This also applies to FMCs' action plan oversight and approval process. Financial records of the FMC are documented at FMC office level and audited by the woreda Cooperative Promotion and Development Office. Whereas, the financial records of non-FMC community projects will be documented at woreda OEFFCA Office and audited by the government auditor, like other government managed development activities. The potential of the action plans in ER (e.g. measured in area of A/R), number of beneficiaries and sustainability of the planned actions can be possible criteria to compare among different action plans presented. Evidently, the amount of benefit received may not match the development need of the community. Community, with the support of concerned offices and partners, need to prioritize where and how to invest based on needs and amount of share received. The community could also think of investing in projects that serve the wider community, including communities beyond a single kebele. Under such circumstances, shares of multiple communities can be pooled together for the investment but through a participatory dialogue and negotiation. Such investments need to be facilitated and assisted by woreda level experts and NGOs working in those areas.

Grievance Redress Mechanism

30. As part of risk mitigation measures, the OFLP should allow citizens present any complaint or grievance they have in a formalized, transparent, cost-effective, and time bound manner. All

program affiliated people across Oromia should be informed about how to register grievances or complaints, including concerns on any specific activities of OFLP. According to the program's SESA (2015) document, arbitration by appropriate local institutions such as Local Authorities or community leaders is encouraged as grievance redress mechanism (GRM). It also states that the Program would make use of the existing kebele, woreda, zonal and Regional Public Grievance Hearing Offices (PGHO). Where satisfactory solutions cannot be achieved at such levels, the aggrieved party may escalate the matter to the existing court system.

31. Regarding grievance related to BSP the recommendation from the consultations held was to resolve issues first at community level using elders, Gada and religious leaders. If not resolved at these levels, the case can be escalated to formal court system (Figure 3). It was suggested that grievances should be actively managed and tracked to ensure that appropriate resolutions and actions are taken effectively and timely. There should also be proper documentation at every stage of the arbitration. Proper follow up on the implementation of the proposed corrective actions needs to be made and the complaint should be informed of the outcome. Any compliant arising from BSP should be lodged to OEFCCA/ORCU at woreda level and it is also the responsibility of the same office to follow up on the process and give necessary feedback to all involved.

Figure. Grievances redress mechanism for BSP of OFLP

Legalizing Benefit Sharing Plan

32. The Federal Forest Development, Conservation and Utilization Proclamation (no. 1065/2018) defines forest carbon as a non-timber forest product (Article 2(18)). In its article 5 (1c, 1e, and 1f) and article 9 (1a) the same proclamation states that forest developers have the right to sell forest products, benefit from carbon sales and transfer of carbon possession rights. However, policy frameworks that specifically stipulates title transfer rights to ER and the development and operationalization of the BSP has been lacking so far.

33. At the regional level, the establishment of OEFCCA (Article 37 of Proclamation No. 213/2018) has mandated it to facilitate community benefit from ER payment (Article 37(6)). The regulation to establish Oromia Forest and Wildlife Enterprise (OFWE) (No. 122/2009) also states that the utilization of the revenue obtained from ER shall be in accordance with the regulation to be issued by the regional government of Oromia. But such regulation is yet to be issued.

34. However, the National Government, based on provisions of the new federal forest law (Proc# 1065/2018) is preparing a forest regulation expected to clarify better ER ownership coming from the forest sector including on the right of transferring of titles to ER through transactions. The forest regulation is expected to come into effect within short period of time and is also to include articles on Benefit Sharing Plan (arrangement) for ER coming from the forest sector. For ER coming from the other sectors (livestock and crop), a separate legislation

(regulation) would need to be prepared and issued within 1-2 years period by the Government. With these, the OFLP BSP would have full backing from government's policy and legal frameworks.

Annex A - Summary of community consultation conducted for developing Benefit Sharing Plan of Oromia forested landscape program

Approach

Consultations with grassroots community

A total of 108 consultation meetings on this BSP were held with communities across Oromia Regional State. A total of 4647 community members, 3435 men and 1212 women, participated in the community consultations (Table 1). The consultations focused on eligible stakeholders and their roles and responsibilities, vertical and horizontal shares and criteria to employ for benefit sharing, benefit disbursement mechanism and grievance redress mechanism. In each consultation meetings, introduction to the programme and objectives, goal and the need for community consultation were discussed first. This has facilitated informed and active participation of the community in the BSP discussion and accordingly participants of the consultation meetings proposed a mechanism that was felt fair, equitable and effective. Extensive review of literature on National and international experiences on BSP in REDD+ and NRM in general was also conducted and presented and discussed during the consultations.

Table 1. List of administrative zones, woredas and kebeles where community consultations were conducted and number of participants in each consultation.

No	**Zone**	**Woreda**	**Kebeles**	**Number of participants**		
				Male	**Female**	**Total**
1	W.Shewa	Dandi	Gare Arera,	105	49	154
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		Yamalagi Walal	Gurati Walal,	138	0	138
			Burka Lomicha	138	40	178
Total				3435	1212	4647

Results of the stakeholders' consultations

Beneficiaries of OFLP carbon payment

The result from the consultations held with communities unanimously identified government and community as the two eligible stakeholders to share the financial benefit obtainable from the Emission Reduction Payment (ERP). For instance, in 86% of the community consultation meetings held with communities across Oromia, community and government were identified as the stakeholders eligible for sharing the benefit (Table 2). The eligibility of the community depended on the basis of customary and constitutional rights as well as because of their responsibility of managing and developing the forest as part of the earlier engagement through PFM including the forest management agreement signed. This prior engagement, according to the community is already contributing to deforestation reduction and improved forest management which will continue under the OFLP as well. The beneficiaries will also comprise private forest developers in Oromia if they contribute a measurable and verifiable quantity of emissions reduction or removal. These private forest developers can be individuals, groups, share companies or communities outside PFM areas.

On the other hand, government's eligibility is defined on the basis of its responsibility to enact policies, give technical and administrative supports and also ownership of natural forests as defined in the country's constitution. Its role as facilitator of bi-lateral agreements, mobilization of funds for the program implementation, MRV and managing processes related to the ERP were all acknowledged to qualify government to share the benefit. Eligible government entities are identified to exist at several administrative hierarchies: national (Federal) and sub-national (regional) including their structures at zonal, woreda and kebele levels.

Private sector was suggested as an eligible stakeholder for benefit sharing during the expert consultation. It was mentioned that there is only one[65] private investor involved in developing large forest area in Oromia at the moment. Looking into the very early stage of engagement into private forest development across Oromia, it was suggested that the private sector be considered as a FMC and included under the community share. With development of the sector and presence of enough stakeholders involved in the sector for consultation, the share can be re-negotiated. Similar approach of gradual involvement of private sector into BSP is also suggested in PAD[66].

Table 2. Eligible stakeholders and basis for their eligibility for benefit sharing from OFLP

Main categories of eligible stakeholders (current and future)	Rights and Role
Community	Customary and constitutional right of ownership, cultural and citizenship responsibility of managing, protecting and

[65] This investment is located in Kellem Wollega Zone, Anfilo Woreda. It is developed and owned by Ato Dagne G/Meskel and covers about 220 ha.

[66] In the PAD it is stated that other stakeholders such as communities outside forests and/or smallholders engaged in reforestation will be included in the future.

(these are either already organized local communities into FMCs or those to be organized in the future with the help of OFLP program activity)	developing the forest and cultural/customary right of use and through PFM granted legal right and responsibility of managing and developing forests.
Government (Federal and regional)	Constitutionally ownership, and responsibility to manage; legally responsible for developing policies (forest, land use, etc.), provide technical support on forest management including MRV process, budget (carbon fund) management, soliciting additional funding from donors for forest management conservation/protection and broader rural development
Private forest developers (these could be individuals, community or other shareholders – e.g. private investors)	Those that have already developed forests are eligible for ERP or those to invest and develop new forests in the future

Vertical benefit share

This refers to the sharing of net emission reduction payment between government on one hand and collectively the community at the other hand. Based on the perceived rights, roles and responsibilities of these two eligible stakeholders, consultation made at the different levels including community proposed various proportion of the vertical share.

The community consultation proposed different options on the proportional share between government and FMCs. In each group discussion, participants proposed several options but through discussion a consensus is reached to provide one common proposal. In few cases a majority vote was required. Communities discussed thoroughly on the rights, roles and responsibilities of each party (government and themselves) before reaching a consensus on what they think is a fair share between the two parties. Yet, the proposals by the community from different sites varied widely as shown in the figure 2 below. The range was from 100/0% to 50/50% for community and government share. The two most frequent proposals, however, were 90/10% and 80/20%.

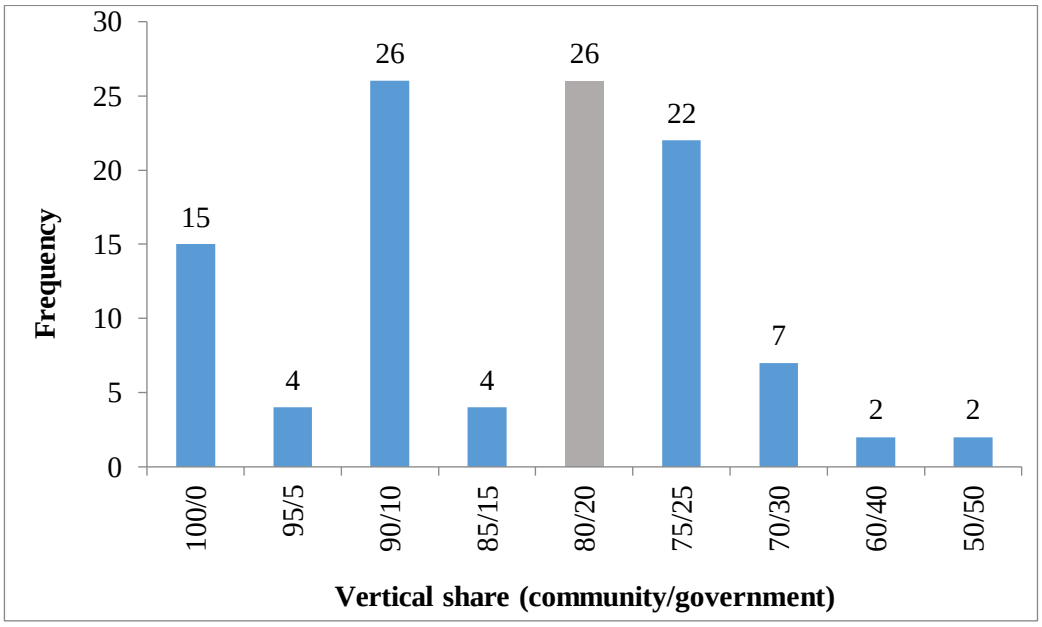


Figure. Frequency of vertical share of eligible stakeholders from group discussions during community consultation across Oromia.

The weighted average of all the community proposals resulted in 80/20% (i.e. 80% for community and 20% governments. This proposal matches the ones suggested by government stakeholders at federal and regional levels.

The 20% share of the government represents what federal and regional governments should share between themselves. The 20% is agreed to be shared among federal and regional governments in the proportion of 5:15% respectively. The higher share to regional government is based on constitutional right which grants responsibility of administering natural resources to regional states (Article 52(2d)). Institutional capacity building includes training of its human resources, development of facilities and infrastructure needs (e.g. offices, office equipment and forestry equipment), all of which will be better coordinated with the regional body. EFCCC will also invest its share in strengthening its institutions to provide the required backstopping to regional states for their forest management endeavors. Such investments can ensure sustainability of OFLP initiatives and make forestry relevant for rural development.

Net vs gross benefit sharing: a contentious topic for vertical share?

While it has been clearly stated in the PAD that the benefit to be shared is a net monetary benefit, which is a gross carbon payment received minus OFLP's operational cost, it became an important point of discussion during the community consultations. The question was 'why government should involve in benefit sharing once the cost of running the program is covered?' The argument was that the government share was supposed to cover program running cost, which otherwise could have been extra cost to the government. In 14% of the consultation held with community, strong suggestion was made to channel all the net benefit to the community. These groups argued this on the basis of two reasons. First, they argued that sharing benefit after all the operational costs is deducted is illogical. For them there is no rationality for government to further compete with community once it recovered all its costs. Second, they argued that the government has the ethical obligation to invest in protecting, managing and developing forests, and for these it has been allocating budget and supporting institutions accomplishing such a task. With the involvement of the community in forest management, this cost has been reduced and this should also be considered as benefit to the government. This similar issue was also raised during the expert consultation. However, in the remaining 86% of the community consultation group as well as the consultation with government stakeholders at federal and regional level, share from the net carbon payment was agreed. Consequently, the vertical share of 80/20% was suggested.

Horizontal benefit share

Share of Benefits among Forest Blocks

Horizontal benefit share refers to the sharing of carbon payment among forest blocks[67] of OFLP as well as among communities within each forest blocks. In all the consultations held, it was suggested and agreed that benefit distribution should not be uniform across all forest blocks and communities in Oromia but should vary according to certain criteria. Accordingly, a number of criteria were proposed to guide the horizontal benefit share among forest blocks during the consultation process namely:

a. Forest area per block,

[67] Forest blocks in the context of OFLP are a top-down sub-dividing of Oromia into sub-landscapes or administrative units in a way that assists effective implementation of benefit sharing.

b. Performance achieved in terms of ER due to avoidance of deforestation and/or areas afforested and reforested,
c. Opportunity cost of land use, and
d. Population size (Figure 3).

Performance and well managed forest area were the two most frequent criteria, mentioned in 102 out of the total 108 community consultations (Figure 3), and these two were finally approved to guide the horizontal share (see also Table 3). Performance in deforestation avoidance requires commitment of time, energy, effective collective action to manage existing forest, and plant and tend new forests. This should be rewarded with proportional incentive. Similarly, historical forest stewardship that managed and saved forest for current and future generation should be valued and rewarded also with positive incentive, which makes existing forest area an important criterion to consider.

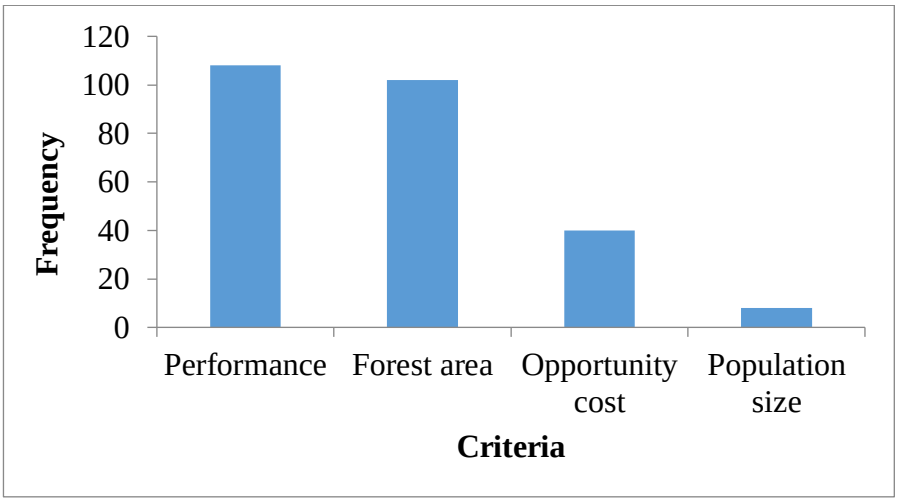


Figure. Number (frequency) of consultations on which different criteria for horizontal share were mentioned.

Table 3. Frequency of rank of each criterion and its overall weighted rank from community consultation conducted in Oromia (N= 108 consultations)

Criteria	Frequency of rank			weighted Frequency of rank (3,2,1)			Total	Rank
	1	2	3	1	2	3		
Performance	92	13	3	276	26	3	305	1
Forest area	11	84	7	33	168	7	208	2
Opportunity cost	5	2	33	15	4	33	52	3
Population size	0	3	5	0	6	5	11	4

Analysis of the weights attached to each criterion during the respective consultations showed that 60/40/0/0 for performance/forest area/opportunity cost/population size, respectively was the most frequently proposed followed by 75/25/0/0 in the same order for the criteria. Consequently, the most frequently proposed criteria namely performance (60%) and forest area (40%) were taken (Tables 4).

Table 4. Summary of criteria, rank and weight of each criteria of horizontal share suggested by communities during community consultations in Oromia

Criteria	Justification	Rank	Weight
Performance[68]	Communities in different zones are expected to differ in their performances as a result of their internal strengths, experiences, and support services by government and non-government bodies and other socio-economic and political factors. Therefore, the benefit shared should reflect performance delivered aggregated at zone level.	1	60
Forest area	Communities in different zones manage different size of forest that reflects their historic forest stewardship; therefore, benefit share should reward communities according to the size of forest they manage.	2	40

Therefore, horizontal benefit share will be calculated and allocated to forest blocks according to the formula below (see the example in table 6 for how the formula works):

*Share of Benefit/Zone = (Total community share *((0.6* performance of the zone/total performance across Oromia) + (0.4*Forest area of the zone/forest area in Oromia))*

Sharing of Benefits within blocks among FMCs

Once share of benefit of each forest block is determined using the criteria indicated above, the block share will further be distributed among the FMCs that makes up the forest block. The potential indicators of performance to be considered at the FMC level are hectares of land reforested, hectares of forest under a PFM regime and percentage of reduced. With respect to planted forest area, additional requirement could be that the stand should be at least 3 years and above since established to make sure that it reflects successful efforts of the FMCs.

Benefit Disbursement Mechanism

Effective and timely disbursement of the community share of REDD+ benefit is as essential as setting their proportional share. Several options have been explored with the various stakeholders to propose best benefit disbursement arrangement. The community consultation, specifically, proposed three options. One of these options was the use of existing government structure (option 1, figure 4), while the second options follows institutional structure of forestry at federal and regional level and then recommends direct transfer to unions and then FMCs (Option 2, Figure 4). The third option is almost similar with option 2 but recommends direct transfer from regional office (i.e. OEFCCA) to FMCs (option 3, Figure 4).

[68] For performance measurement at zonal level see section VII below.

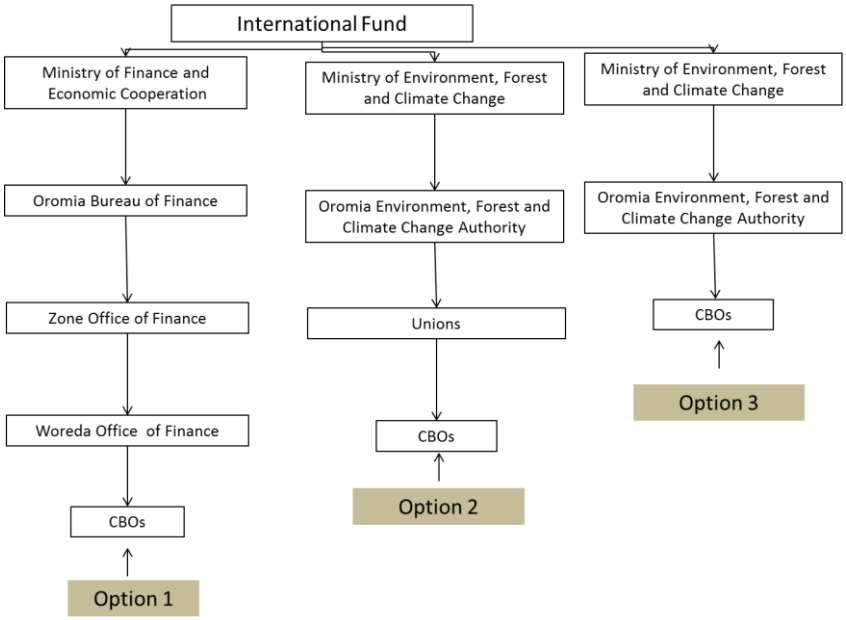


Figure. Benefit disbursement options suggested during community consultations across Oromia.

The third option which is a direct transfer of benefit from OEFCCA to the community was suggested to be the most preferred channel of benefit disbursement (Figure 5). It was supported by 80 % (N = 108) of the community consultation groups carried out across Oromia. This option was most preferred as compared to other options on the basis of efficiency in terms of time and the other two channels were not supported by majority of the community consultation groups due to likely delay in the bureaucratic chains (option 1), possibility of corruptions and absence of structures like Unions in most part of the forested landscapes of Oromia where the consultations were carried out (option 2). Most of the community consultations were in favor of direct disbursement from OEFCCA to the bank account of the respective community. The FMCs, as a matter of legal requirement, must open bank account, and database of that can be established at OEFCCA and transfer can be done accordingly.

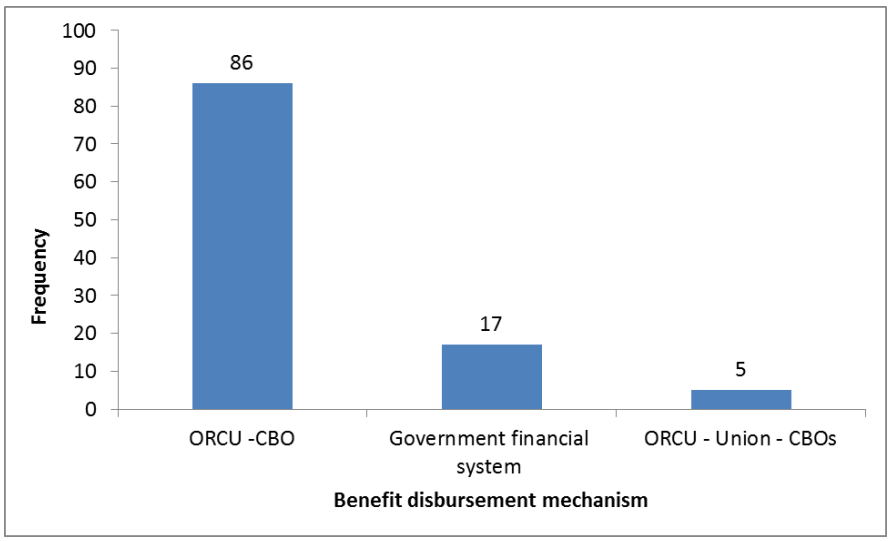


Figure. Benefit disbursement channels suggested during community and expert consultations.

The preference of direct transfer of benefits from OEFCCA to the community is on the basis of efficiency and avoidance of any bureaucratic delays in the process of transferring of benefits. In most of the consultations, it was also mentioned that the direct transfer will avoid the likely

chance of corruption when the transfer chain is elongated (Table 5). This preferred benefit disbursement channel is in line with existing experience of benefit sharing disbursement in NRM in Ethiopia, including Oromia.

Table 5. Options for institutional framework for benefit disbursement and its advantage and disadvantage

Option	• Advantage	• Disadvantage
Through normal government budgeting process (option 1)	• Will avoid redundancy of development plan for the local areas • Will foster positive government and community interaction for development	• Will suffer from slow budget transfer due to the long bureaucratic clearance problem with government budget transfer • Corruption may emerge at local governance level on the use of fund • Community may encounter challenges channeling the fund towards their preferred and priority development agenda
Through EFCCC and OEFCCA to Unions and finally CBOs (option 2)	• Short and builds on existing forestry institutional arrangement along which REDD+ is managed • Clearly linked to REDD+ activities and help community recognize that their effort pays back	• Unions are not yet uniformly established across the forested landscape of Oromia • It was suggested during some community consultations that there are concerns that it may be corrupted
Through EFCCC and OEFCCA to community (option 3)	• Clearly linked to REDD+ activities and help community recognize that their effort pays back	• The government structure at grassroots level may feel alienated and be less motivated to support

Though the most preferred disbursement channel by the community is Option 3 (direct transfer from OEFFCA to FMCs/CBOs), there are practical challenges to adopt this mechanism, including (i) woreda finance office oversight and monitoring is imperative in light of capacity limitations in financial management at FMCs/CBOs level; (ii) not all forest areas in Oromia have established FMCs/CBOs, only portion of forest areas are under PFM (FMCs), hence direct transfer to all eligible beneficiary communities is impractical due this fact; and (iii) Non- FMC Kebeles has no financial management institutional set-ups and any FM experience at all, as government fiscal budget does not cascade below woredas. Due to this fact, the most practical channeling mechanism that would ensure transparency and accountability and would be adopted by this BSP, is the disbursement mechanism that combines option 1 and 3 (Figure 6)

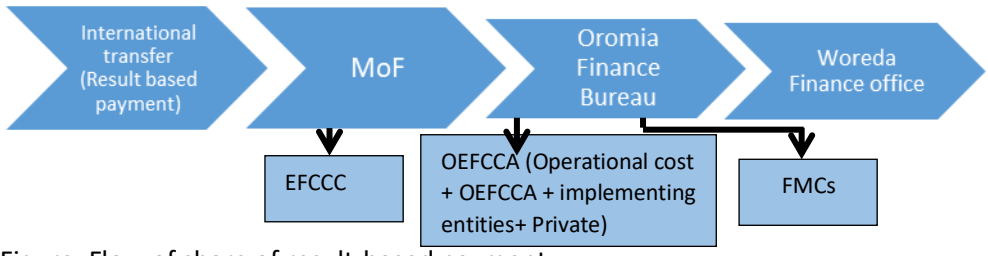


Figure. Flow of share of result-based payment

Proposed uses of the benefit

A total of about 32 different potential activities for investment using the emission reduction payments were identified on different discussions with community across Oromia (Table 6). The long list of investment options identified during the community consultations were sorted into the two categories as presented in Table 6. The categorization is based on environmental and social safeguard principles of OFLP. Of the total ER payment that would be received at community level (kebele or FMC level), 45% would be invested on social development and livelihood improvement activities, while 50% will be invested on land use and related activities that generate more ERs. The remaining 5% of the share received is dedicated to serve underserved social groups in the form of revolving fund. This will serve poor households or individuals and youths in the communities. These later group of investments should be designed carefully not to result in negative impacts, i.e. emission increase rather than reduction.

Table 6. Proposed list of potential uses of the benefit at community level. This list is screened from the long list of activities suggested during the community consultation.

No	**Activities used to generate ERs**	**Social development/livelihood improvement**
1	Seedling production for income	Maintenance of school
2	Coffee outside forest	Maintenance of clinic
3	Tree planting for income and own consumption	Maintenance of road
4	Fuel saving stove	Bee keeping
5	Fruit tree planting	Fattening (intensive and through cutting and carry system)

Grievances redress mechanism

As part of risk mitigation measures, the OFLP would support citizen's complaints or grievances in a formalized, transparent, cost-effective, and time bound manner. All program affiliated people across Oromia should be informed about how to register grievances or complaints, including concerns on any specific activities of OFLP. In almost all of the community consultations, the preference was to resolve issues first at community level using such mechanisms like using internal byelaws. In a stepwise way of grievance redress mechanism, the community suggested use of elders (e.g. Gada system and religious leaders) rather than taking the case straight to court or to OEFCCA (Figure 6). Once, the case reaches the court system, most discussions proposed to go until the end in the ladder in case the issue is not satisfactorily handled at subsequent lower levels.

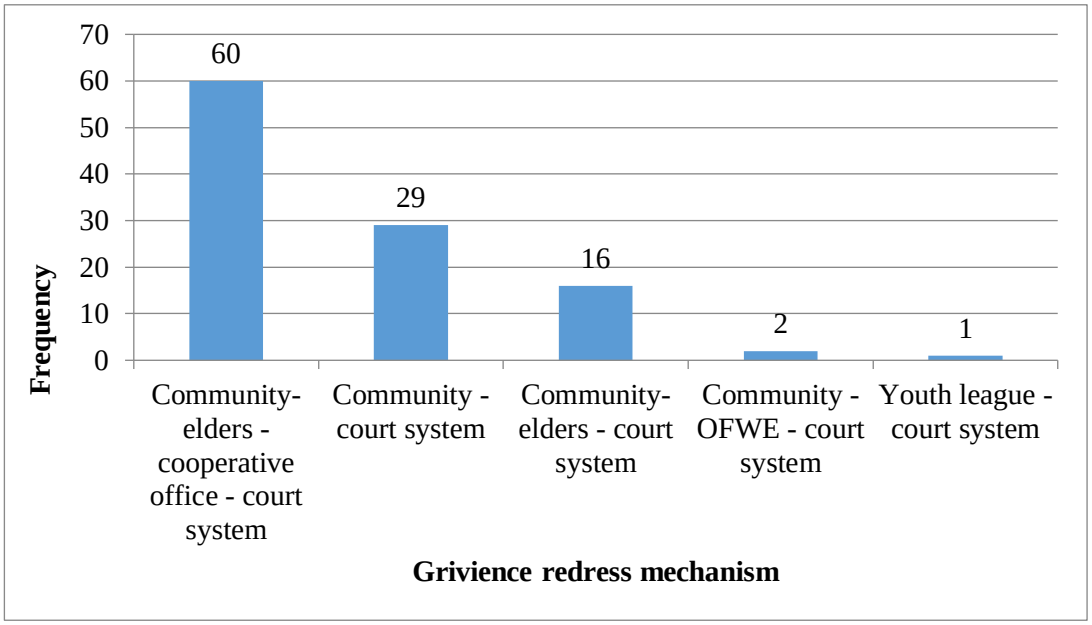
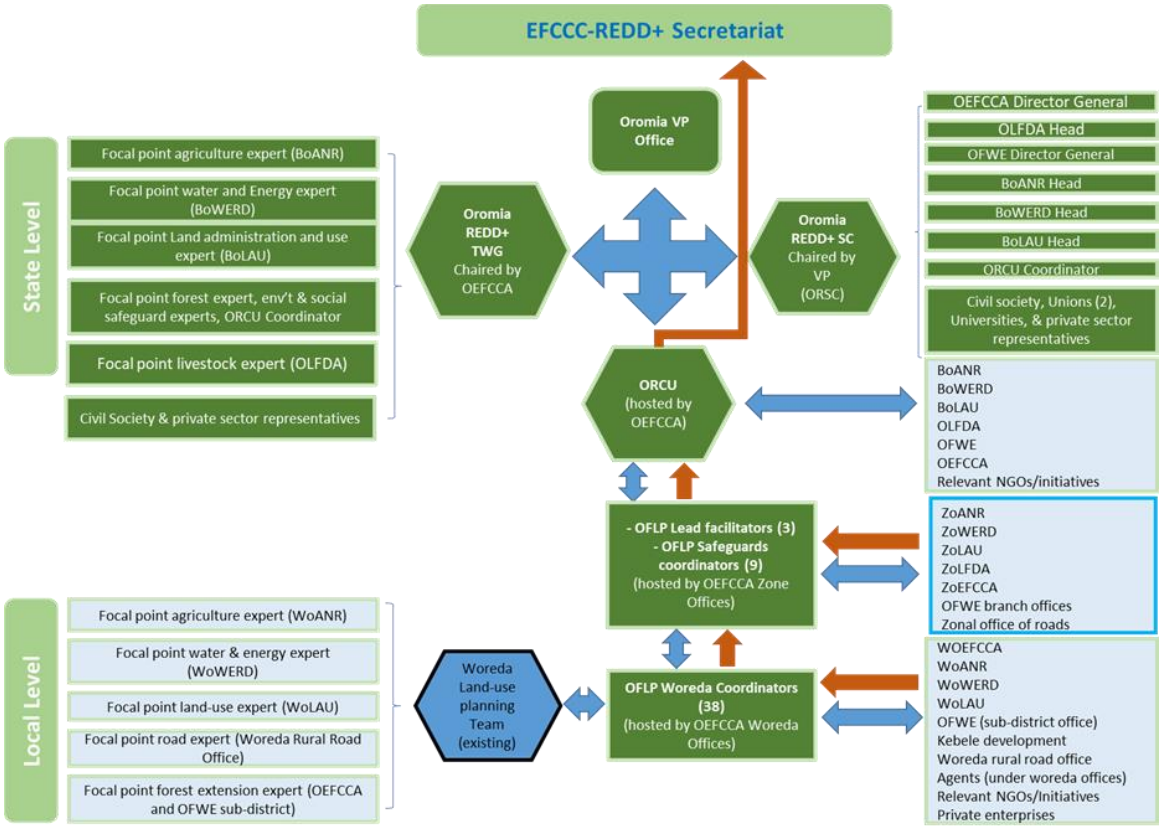


Figure 7. Grievances redress mechanisms of benefit from ERP of OFLP as suggested during community consultation across Oromia.

Governance Structure of OFLP



Note: Blue arrows - Information flow; Red arrows - OFLP reporting

Annex 5: Design Process for Benefit Sharing Arrangements for the ISFL ER Program

Please describe and provide evidence of the process for designing the benefit sharing arrangements for the ISFL ER Program, including how the process reflects inputs by relevant stakeholders, including broad community support by affected Indigenous Peoples (if relevant). Please limit the description and supporting evidence to 1,500 words or less and provide links to relevant information.

The design process for the benefit sharing arrangements for OFLP is well elaborated in the OFLP's 'Benefit Sharing Plan for Disbursing Result Based Payments from BioCF ISFL Program' report. The following is extracted from the report. The approach or design process for preparation of the BSP for OFLP is illustrated in the figure below.

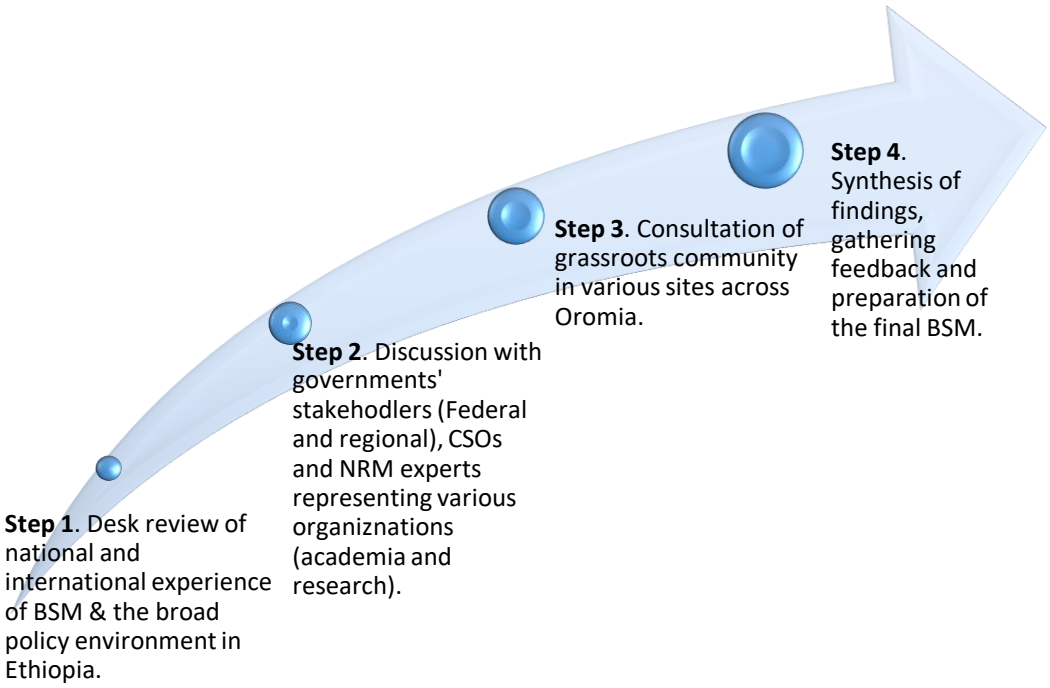


Figure. A stepwise process followed to develop the BSP for OFLP

A total of 111 consultation meetings on this BSP were held with a wide range of stakeholders in October 2016. Two of the consultations were with policy makers, one at Federal and the second at regional (Oromia National Regional State) levels; one consultation with Civil Society Organizations (CSOs) and experts in the field of natural resources management (NRM), and the remaining 108 meetings were with communities across Oromia Regional State. A total of 4647 community members, 3435 men and 1212 women, participated in the community consultations (Table 1). The consultations focused on eligible stakeholders and their roles and responsibilities, vertical and horizontal shares and criteria to employ for benefit sharing, benefit disbursement mechanism and grievance redress mechanism. In each consultation meetings introduction to the program, its objectives, goal and the need for community participation was made. This has facilitated informed and active participation of the community in the BSP discussion and accordingly participants of the consultation meetings proposed a mechanism that was felt fair, equitable and effective. Extensive review of literature on National and international experiences on BSP in REDD+ and NRM in general was also conducted and presented and discussed during the consultations.

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7	E/Wollega	Gudeya Bila	Hena Jawo Ja,	325	129	454
			Bilo Ejere	133	42	175
		Diga	Arjo Konana Bula,	107	40	147

[69] Kebele is the formal administrative unit below woreda (district) level.

No	Zone	Woreda	Kebeles	Number of participants		
				Male	Female	Total
			Bikila	200	65	265
8	Kelem Wollega	Anfilo	Duli	235	21	256
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			Burka Lomicha	138	40	178
				3435	1212	4647

Annex 6: GHG inventory of all AFOLU categories, subcategories, gases and pools in the Program Area

Agriculture, Forestry and Other Land Use Greenhouse Gas INVENTORY 2000-2017

Prepared for

Oromia National Regional State - Ethiopia

February 2019

Updated May 2021

Prepared by:

Agustin Inthamoussu

Title of Inventory	Agriculture, Forestry and Other Land Use Greenhouse Gas INVENTORY 2000-2017
Version of document	04
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Summary of Greenhouse Gas Emissions trends in Oromia

The following figure shows the evolution of GHG emissions and removals in the Oromia National Regional State for Agriculture, Forestry and Other Land Use sectors. The activity data used, emission factors applied and assumptions made to obtain the results are presented in chapters of this report.

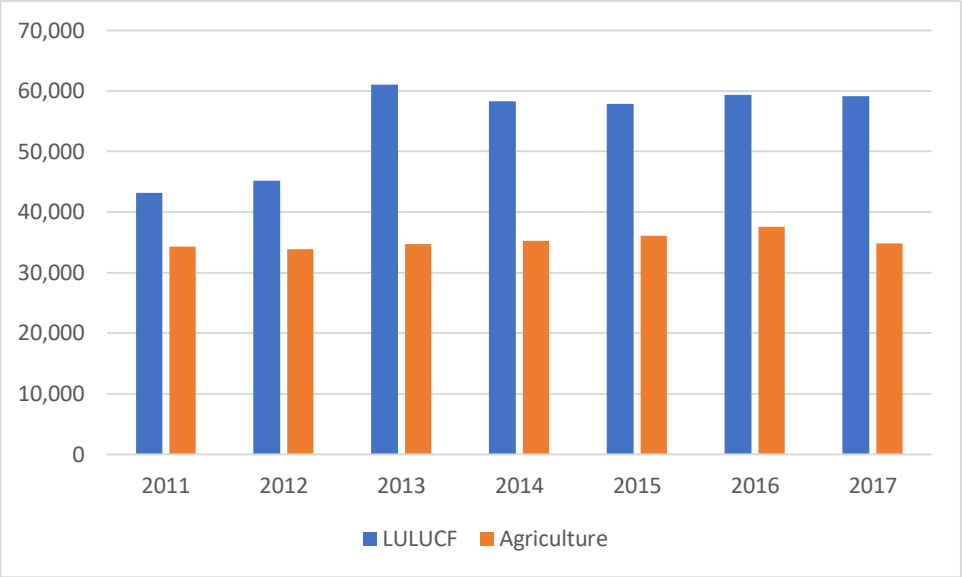

Figure. Summary of Greenhouse Gas emissions in Oromia (2003-2017)

These previous figures lead to several conclusions which will be expanded in the corresponding chapters. As a first point, it must be highlighted that the balance of the emissions and removals in the LULUCF sector is of net emissions, with an average of approximately 51,000 $ktCO_2$-eq/year, caused almost entirely by the land-use category “forestland remaining forestland”.

The level of emissions cannot be compared with Ethiopia’s GHG Inventory report presented in the Second National Communication to the United Nations Framework Convention on Climate Change because the estimations are done with different categories, areas, emissions factor and methods, among other variables.

However, part of the results can be analysed with a different perspective. If the forest data are grouped differently, they could be compared -roughly- with the Oromia National Regional State Forest Reference Level (FREL).

Acronyms

AFOLU	Agriculture, Forestry and Other Land Use
ATA	Ethiopian Agricultural Transformation Agency
BLT	Branches, leaves and twigs
BoFED	Bureau of Finance and Economic Development
COP	Conference of the Parties of the UNFCCC
CSA	Central Statistical Agency
EMA	Ethiopian Mapping Agency, currently Ethiopia Geo-Spatial Information Agency
EFCCC	Environment, Forest and Climate Change
ERPA	Emission Reductions Payment Agreement
ERSS	Ethiopia Rural Socioeconomic Survey
FAO	Food and Agriculture Organization
FREL	Forest Reference Level
GSIA	Geo-Spatial Information Agency (previously known as EMA)
GFOI	Global Forest Observations Initiative
GHG	Greenhouse Gas
HWP	Harvested Wood Products
HWSD	Harmonized World Soil Data Base
IPCC	Intergovernmental Panel on Climate Change
ISFL	Initiative for Sustainable Forest Landscapes
LULUCF	Land Use, Land Use Change and Forestry
MoF	Ministry of Finance
OEFCCA	Oromia Regional Government Environmental Forest and Climate Change Authority
OFLP	Oromia Forested Landscape Program
OFWE	Oromia Forest and Wildlife Enterprise
ORCU	Oromia REDD+ Coordination Unit
ORS	Oromia National Regional State
RCMRD	Regional Centre for Mapping of Resources for Development
UNFCCC	United Nations Framework Convention on Climate Change
WBISPP	Woody Biomass Inventory and Strategic Planning Project

1. Introduction to the Oromia GHG Inventory

Oromia National Regional State is the region with the largest forest cover and hosts the first REDD+ project in Ethiopia[70].

Currently, Oromia National Regional State is one of the target jurisdictions in the BioCarbon Fund ISFL and it is implementing the Oromia Forested Landscape Program (OFLP). The BioCarbon Fund Initiative for Sustainable Forest Landscapes (ISFL) is a multilateral facility managed by the World Bank. This initiative promotes and rewards reduced greenhouse gas (GHG) emissions and increased sequestration through better land management, including Reduced Emissions from Deforestation and Forest Degradation (REDD+), climate smart agriculture, and smarter land use planning and policies.

The OFLP is starting the process of negotiating an Emission Reductions Payment Agreement (ERPA) with the ISFL for future verified GHG emission reductions and removals. The purpose of this inventory is to assist the OFLP by meeting the ISFL ER Program Requirements for Greenhouse Gas Reporting and Accounting. The Inventory is the basic information to prepare the baseline on which the future performance of the Region will be measured.

The Inventory is prepared with the five principles that every Inventory must follow: transparency, consistency, comparability, completeness and accuracy.

Transparency

According to the UNFCCC inventory reporting guidelines which were followed to prepare this Inventory, transparency implies that the assumptions and methods used are clearly explained so that users of the information can replicate and assess the information. For an accounting system, transparency means that reported information can be traced back to the underlying data through a logical set of procedures that summarize the data.

Consistency

Dimensions of scientific consistency include carbon coverage over space, pools, and time. In the case of this inventory, consistency is understood as a principle that is applied to maintain harmony along the complete period of analysis and as a way to collate results with other documents.

Comparability

The GHG Inventory is producing information that is comparable across documents and over time. Because methods and data systems differ across documents and time, strict comparability is difficult to maintain. The results obtained in this inventory may not be comparable to the National GHG inventory in the Second National Communication.

Completeness

Completeness refers to an inventory of all applicable sources and sinks. In this case, many carbon pools are not covered given the lack of available activity data or emissions factors in Oromia. However, given the principle of transparency quoted above, the report is showing these gaps of information and results.

Accuracy

Accuracy refers to the general validity of the reported numbers from an accounting system. Accurate estimates are unbiased in that they do not systematically under- or overstate the true number. A related issue is precision. Precise estimates have small standard errors. Accuracy and precision can be independent. A system can be accurate (unbiased) but produce estimates of limited precision. On the other hand, extremely precise estimates can be biased if the system is not well designed.

[70]Bale Mountains Eco-Region REDD+ project, implemented by the Oromia Forest and Wildlife Enterprise (OFWE) and NGOs Farm Africa and SOS Sahel in the Oromia region

1.1 Background information on the Region and GHG Inventories

The Oromia National Regional State (ORS) covers almost 30,000,000 ha within the country of Ethiopia. It is a Region of incredible ecological and cultural diversity: ranging from arid to semi desert in the lowlands inhabited by transhumant pastoralists, to montane forests with high rainfall inhabited by bush fallowing agriculturists. The population of Ethiopia in 2014 was estimated to be about 95 million people and growing to at least 120 million by 2030. Up to 83% of the population lives in rural areas.

Forest cover, depending on the source of information, is approximately 9 million ha in total[71]. Based on the national REDD+ forest definition, 284 of Oromia's 287 rural woredas include some forest cover. Most of Oromia's high forest (moist montane forests) is found in the Bale landscape in the southeast and the Jimma/Wollega/Ilubabor landscape in the west. Bale serves as the water tower for Ethiopia's eastern dry lands in Oromia and the Ethiopia Somali Regional State, as well as the Federal Republic of Somalia drought-vulnerable arid areas where mobile pastoralism is the predominant livelihood system. Oromia harbors globally important biodiversity with endangered endemic species such as the Abyssinian wolf and the mountain nyala. Oromia's western forests are home to endemic coffee (Coffea arabica) that has high potential as a value-added export and they harbor wild varieties of the species.

The country has experience in the realization of GHG inventories. So far, Ethiopia has prepared two national GHG inventories, including most categories and subcategories within all sectors. Currently, the government is preparing a three-year National GHG Inventory (without LULUCF sector). Generally, it has used basic levels of methods (tier 1) for the estimation of emissions and removals, due to the lack of national emission factors and, in some cases, because it does not have the necessary activity data. The GHG Emission Reduction Verification Directorate of the Environment, Forest and Climate Change Commission is the responsible for its elaboration.

In the region of Oromia, a GHG Inventory has never been done. However, many studies have been conducted to determine the level of emissions in different activities within the Oromia National Regional State. One of them, perhaps the most important and recent one, is the determination of the reference level of emissions for deforestation and afforestation activities. This regional FRL includes deforestation and afforestation (AGB, BGB, deadwood and CO_2 emissions). It is based on a historical average of emissions and removals between 2000 and 2013.

1.2 Inventory preparation and data collection, processing and storage

1.2.1 Compilation of the GHG Inventory

Data collection for the elaboration of the Oromia Regional State was done between November 2017 and March 2018.

The main institution and ministries involved in the compilation of the Oromia GHG Inventory are:

- Ethiopian Geo-Spatial Information Agency,
- Oromia Regional Government Environmental Forest and Climate Change Authority (OEFCCA),
- Oromia REDD+ Coordination Unit (ORCU),
- National REDD+ Secretariat,
- Environment, Forest and Climate Change Commission,
- Ethiopian Environment and Forest Research Institute,
- Oromia Forest and Wildlife Enterprise (OFWE),
- Central Statistical Agency,
- Ministry of Agriculture, and
- Food and Agriculture Organization.

[71]Calculated using Ethiopia's Forest Reference Emissions Level Submission to the UNFCCC.

This inventory is a one-time estimation where the GHG emissions and removals of multiple years are presented (2000-2017). The estimation of emissions and removals is done with the best available information.

The following list presents the main documents or information -per topic- that were collected, revised and analysed during the process. The list also includes a minimum description of the information and if it was possible to obtain it and use it. If it was not available, it should be asked for its availability in the future. This information could be used to improve estimations.

- Land use and land use change. This was the critical point for the preparation of the Inventory. The Inventory started with the use of information from the Geo-Spatial Information Agency, previously called Ethiopian Geo-Spatial Information Agency, which has land use maps for the entire country for the years 2003, 2008 and 2013. The information was very helpful -as it was provided in .tiff format- because the information of the land use for all categories for those years with the same methodology was possible to obtain. The maps could also be overlaid with multiple layers of valuable information (soil types, climate, ecological zones). However, the information could not be used for a wall-to-wall analysis because the results were not congruent and were not considered as reliable. The use of this data had a significant impact on the outcome of this GHG Inventory and another alternative was proposed to obtain the new activity data. The National and Regional MRV team elaborated new data, using this as a training exercise. The methodology for obtaining it, as well as a minimum analysis of the different source of information and their results, is described in the chapter 3.2 of this Annex.
- Forest management. It was not possible to obtain national or regional data for forest management. The only information that was provided (by OFWE) is the level of timber extraction in concession areas in the region. The information was not used because it was redundant.
- Forest disturbance. The area of forest disturbance is obtained from the Regional FRL. The information of forest cover loss and gain is presented in the study. However, the information was only used for comparison results.
- Soil type. At first, soil types were obtained from the World Soil Database (HWSD, 2008) in shape format (.shp) which were overlaid with the Geo-Spatial Information Agency maps. Once the Geo-Spatial Information Agency maps were discarded, the information of the soil types was obtained from the new activity data. For every land use and land use change, the National and Regional MRV team also included the soil type information. This data was complemented with the study “Evaluation of the forest carbon content in soil and litter in Ethiopia” which only provided information for forestland soils, as indicated in its name. The Soil Organic Carbon could have also been provided by EthioSis Soil Type Classification dataset. This information is confined only to cropland areas and the program is hosted by the Ethiopian Agricultural Transformation Agency (ATA) but it was not possible to access the information.
- Cropland management. Annual fertilizer applied as calcitic limestone and dolomite. The Ethiopia Rural Socioeconomic Survey (ERSS) was consulted. The first wave of data is for 2011/2012 but it only included rural and small-town areas. The second wave is of 2013/2014, and the third one refers to the wave carried out in 2015/2016. Despite being useful information, it does not cover the entire inventory period. Moreover, no specific information was found for cropland and grassland management systems in Oromia. In conclusion, expert judgement was used to understand which emissions factors had to be used to estimate emissions and removals in these categories.
- Grassland types and management. There is a national project called EthioGIS on LULC classification. According to various technicians from the government, data set at national level is still under development. It has been said that data set has low reliability/accuracy rate and that the data is not organized at regional level. At the end, very basic information for grassland management could be obtained from expert judgement.

- Wetland drainage. Wetland inventory in Ethiopia has never been done. Wetlands or peat lands in Oromia are known to be found in South Western Ethiopia. It was concluded that there is no peat extraction, but there is conversion of the peat land to crop land. Despite wetland is not recognized as a sector and as a specific land use by the federal and regional government of Ethiopia, this land use category was included for the land use change matrix. At the end, no conversion from or to wetlands was detected.
- Amount of wood extracted. As mentioned above, OFWE Oromia Wood Extraction dataset is available for roundwood extraction. The data collection and analysis are carried out by qualified experts. These data have been documented since the establishment of OFWE in 2009. However, the information is only available for timber production in concession areas, which is a minor area of the total forest area. The amount of wood that is extracted from the woods is obtained from the Woody Biomass Inventory and Strategic Planning Project (WBISPP, 2004). This project determined the amount of 1) fallen litter or small dead branches, twigs and leaves, or small branches with leaves taken from trees cut for poles, 2) roundwood and 3) wood for charcoal.
- Organic and synthetic fertilizer applied to planted and old forest. No information was obtained for this activity.
- Synthetic or organic fertilizer applied to cropland or grassland. The Ethiopian Rural Socioeconomic Surveys have information of the amount of urea applied in these land uses. Data was obtained from Central Statistical Agency.
- Livestock population by species and categories. The information was obtained from the Central Statistical Agency which has the livestock values of every year. The method used to obtain the figures is sampling. The values are for each species, but they do not have disaggregated information for the categories. Thus, the quality of the information is reduced.
- Information about feed intake and manure management. It was not possible to find detailed information for these activities. It was decided to replicate the information previously used in the national GHG inventory that uses the same value for all manure management, regardless of the categories.
- Burned areas. At the moment of finalizing the report, the amount of area that was burned was elaborated from the MODIS Burned Area Product. This is still an important area of improvement for future GHG Inventories.
- Biomass, deadwood, soil organic carbon, litter stocks and changes stocks. Most of the information is provided by the non-published results of the National Forest Inventory (NFI). The NFI has information on stocks of biomass (m^3), deadwood, litter and SOC. This information was used to estimate emission factors when there are changes in land use, combined with other factors from other sources (wood density from the FRL, root to shoot from IPCC, among others). When the land use does not coincide for any category of the NFI or when a certain area does not undergo through a process of change during the period analysed, it is complemented with information from the WBISPP. This project has information on biomass stocks for various land uses and information on biomass growth (annual yields).

It is worth to mention that, in general, the information is kept in personal storage systems of the technicians and people involved in different topics. Data collection in most of the cases resulted in a time-consuming process, with often multiple visits to the same institutions and reiterative emails.

1.2.2 Documentation and archiving

Data obtained for the elaboration of the GHG Inventory is archived in Oromia REDD+ Coordination Unit in the Oromia Regional Government Environmental Forest and Climate Change Authority.

This information and accounting system could be used to estimate future GHG Inventories, to recalculate the baseline scenario, as well as to determine the potential and actual emissions removals achieved with the implementation of mitigation actions.

1.3 Brief general description of methodologies used

Oromia GHG Inventory was elaborated entirely with the *2006 IPCC Guidelines for National Greenhouse Gas Inventories*[72]. Part of the calculations –emissions in agriculture sector- were done with the IPCC Software (latest version available[73]), which is a friendly user tool to estimate emissions and removals with the *2006 IPCC Guidelines*. The software, as well as separated spreadsheets, were done to compile a complete, sub-national inventory of Oromia Greenhouse Gases for the Agriculture, Forestry and Other Land Use (AFOLU) sector.

The activity data used in the preparation of the GHG Inventory in Agriculture and LULUCF (Land Use, Land Use Change and Forestry) was obtained from national sources and in some cases is considered country specific. In the case of Agriculture, the information was collected from the Central Statistical Agency as it was recommended by the Ministry of Agriculture. National data on all livestock species regarding the number of animals produced annually (NAPA), fertilizer application, area of crop cultivation and crop production for the 2003-2016 period was collected from such Agency. However, data on manure management system was used from Ethiopia's Second National Communication submitted to the United Nation Framework Convention on Climate Change (UNFCCC) in 2015 because no region-specific information is available.

The activity data for LULUCF was specifically elaborated for this project. The estimation of land use and land use change was done by the National MRV team and the ORCU MRV team. The applied tool is the Collect Earth, the method is explained in detail in following chapters.

On the other hand, emissions factors were obtained from multiple sources, default values and country specific. IPCC *Tier 1* methodology and default emission factor from the *2006 IPCC Guidelines* have been used to calculate emission from all subcategories in the agriculture sector, given the lack of nationally or regionally approved emission factors. As the *2006 IPCC Guidelines* approach also allows the use of more detailed country-specific emission factors, in the LULUCF sector, the emission factors were mostly obtained from the National Forest Inventory and Woody Biomass Inventory and Strategic Planning Project (WBISPP, 2004).

The elaboration of the GHG Inventory includes good practices in inventory compilation so that the final estimates of the Oromia National Regional State GHG Inventory are neither over- nor under-estimated, and uncertainties are estimated and reported (reduced as far as possible).

Guidance was also used to identify areas of the inventory whose improvement would most benefit the inventory overall. Chapters 2.4.1 and 3.5.1 of this Annex are a complete section that identifies such areas for improvement. Hence, limited resources can be focused on those areas that most need improvement to produce the best practical inventory.

The categories' and subcategories' definitions are the same as in the *2006 IPCC Guidelines* and are presented with the same format as in the ISFL requirements.

[72] https://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html
[73] Version 2.54.6396.19217 from July 6th, 2017

Table. Categories and sub-categories in agriculture sector

Sector	Categories	Subcategories
Livestock	Enteric fermentation	Cattle
		Sheep
		Swine
		Other livestock
	Manure management	Cattle
		Sheep
		Swine
		Other livestock
		Indirect N_2O emissions
Other	Rice cultivation	Irrigated
		Rain-fed
		Deep water
		Other
	Agricultural soils	Direct N_2O emissions from managed soils
		Indirect N_2O emissions from managed soils
	Urea application	

Table. Categories and subcategories in LULUCF sector

LULUCF	Forest land	Forest land remaining forest land
		Grassland converted to forest land
		Cropland converted to forestland
	Cropland	Cropland remaining cropland
		Forestland converted to cropland
		Grassland converted to cropland
		Settlement converted to cropland
	Grassland	Grassland remaining grassland
		Forestland converted to grassland
		Cropland converted to grassland
	Wetlands	Wetlands remaining wetlands
		Land converted to wetlands
	Settlements	Settlements remaining settlements
		Cropland converted to settlements
		Grassland converted to settlements
	Other land	Other land remaining other land
		Grassland converted to other land
	Harvested wood products	

Full description of each subcategory is presented in chapter 0 (2. The Agriculture sector) and chapter 0 of this Annex.

1.3.1 Methodological consistency with national GHG Inventory

There are other documents to which the Oromia GHG Inventory can be compared in terms of methodological consistencies or discrepancies.

The Second National GHG Inventory –which is included in the Second National Communication– is the country's GHG emissions by sources and removals by sinks. The methodology and procedures used in preparing the inventory were drawn from the IPCC's 1996 Guidelines for National Greenhouse Gas Inventories, Good Practice Guidance (GPG) for 2000 and 2003, and *2006 IPCC Guidelines*. The base year for this inventory is 1994. In addition, the emissions' data is annually available until 2013.

Although there is methodological consistency between these two documents when using the IPCC Guidelines, there are important differences in the way the GHG emissions, in each document,

were determined. The large differences are due to the activity data and emission factors used, the scope, and the activities included.

These GHG Inventory results could not be compared to national GHG Inventory in the land use, land use change and forestry categories since the National GHG Inventory only considers three categories that are different from 2006 IPCC Guidelines: “Changes in forest and other woody biomass stocks”, “forest and grassland conversion” and “other”. However, ORCU and the Government of Ethiopia are working in aligning these estimations. A complete assessment is being elaborated to define next steps to achieve comparable results in both initiatives; national and regional GHG inventories.

In addition, land use cover for the National Inventory uses the MODIS Land Cover (IGBP) Type I (acquired from the United States Geological Service site) to obtain the land use data needed. The document argues that there were no consistent land cover data for the country over a sufficiently long time period to carry out change detection and to calculate percentage on land cover for the IPCC’s six land use categories. Annual land cover maps for the 2001-2010 period were generated using the MODIS dataset and the 17 classes aggregated to the IPCC’s six sectors (see table above). At the moment of the elaboration of the National GHG Inventory, the information from the Ethiopia Geo-Spatial Information Agency was not existent, neither the new activity data collected for this Inventory.

The new land use and land use change information for the Oromia National Regional State GHG Inventory was obtained with the use of Collect Earth tool, which analyses satellite images in sampling plots allocated in the Region; see full description in chapter 3.2 of this Annex.

In the agriculture sector, the differences are smaller since both documents use a low methodology level (tier) and most of the emission factors are default values of the IPCC.

1.4 General assessment of the completeness

1.4.1 Gases considered

Oromia GHG Inventory considers the main three direct Greenhouse Gases: CO_2, N_2O and CH_4. N_2O and CH_4 gases were considered in the enteric fermentation and manure management in the agriculture sector.

The global warming potential (GWP) relative to CO_2, applied to each gas to convert them in CO_2-equivalent is obtained from the Second Assessment Report from IPCC: 21 for CH_4 and 310 for N_2O.

1.4.2 Geographical coverage

The current inventory of Greenhouse Gases considers the entire territory of Oromia National Regional State. According to the information received for the realization of this inventory, the territory covers a total of 29,991,384 ha.

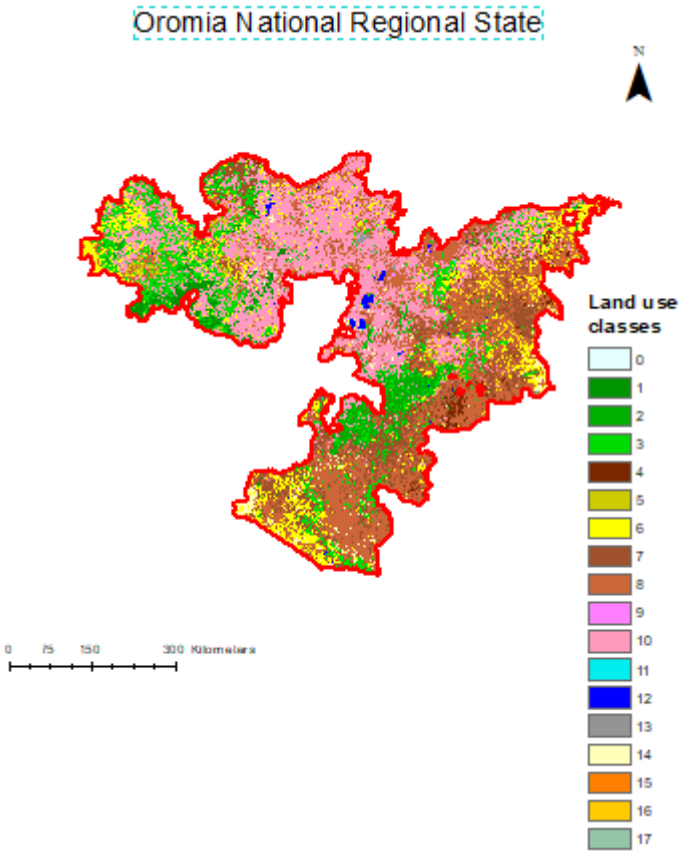

Figure. National Regional State boundaries

The previous map corresponds to the year 2013 and it was provided by Geo-Spatial Information Agency (previously known as Ethiopia Geo-Spatial Information Agency. This Agency also provided the maps for the years 2003 and 2008. The latter can also be found publicly in the Regional Centre for Mapping and Resources for Development[74].

These maps were overlapped with information on precipitation, elevation and potential evapotranspiration and soil types from different sources. The result is the land use maps for Oromia National Regional State with climate and soil information.

1.4.3 Activities, pools, sources and sinks not considered

The carbon pools included in the GHG Inventory in the LULUCF sector is above ground biomass (AGB), below ground biomass (BGB), Soil organic carbon and deadwood. The reason for selecting these pools responds to the availability of data (National Forest Inventory) and because they are the most significant pools[75].

Litter data is provided with the document "Evaluation of the forest carbon content in soil and litter in Ethiopia", implemented by Natural Resources Institute Finland (LUKE) and Ethiopia Environment and Forestry Research Institute (EEFRI).

According to some recent articles, the carbon fraction contained in litter consist of less than 0,01% of the total carbon stock (Simegn et al., 2014, Mikrewongel, 2015, Wolde et al., 2014). In the previously mentioned document by LUKE and EEFRI, the conclusion is that when the above- and belowground biomasses and deadwood are also considered, the role of litter C pool falls insignificant. Given the arguments presented, it was decided not to include the litter pool in this GHG Report.

[74] http://www.rcmrd.org/
[75] https://earthdata.nasa.gov/firms

Non-CO_2 emissions in the LULUCF sector would be expected from forest fires and crop residues fires. Unfortunately, in Ethiopia there is not systematically collection of data on the occurrence of fires. However, there is another possible source of information which is MODIS hotspot data, derived from NASA FIRMS[76].

Although MODIS fire information is georeferenced and has an associated uncertainty (only points that have a confidence level of more than 80% would be used), this information could not be used because there is no coherent land use map for each year. That is, it cannot be known with certainty if the fires reported by MODIS have occurred on forestland, grassland or cropland, and therefore, a specific emission factor cannot be applied for each land use.

In the agriculture sector, there are other activities that could not be estimated, and they are part of the improving plan. Also, information about liming and other carbon containing fertilizers was also scarce and incomplete.

2. Oromia GHG emissions and removals – summary

The total emissions and removals of the Oromia National Regional State are presented in the table below by category and subcategory. This table shows the level of emissions and removals in one particular year: 2017, which is the last year for which there is complete information in both sectors. With the purpose of dimensioning the emissions in that year, the table shows the sum of emission for the entire period under analysis, 2003-2017. The third column has the average value for the same period, 2003-2017.

Table. Total emissions in the LULUCF and the Agriculture sector for 2017, the sum and average of the complete series ($ktCO_2$-eq.)

Total emissions ($ktCO_2$)	2017	Sum Period 2008-2017	Average Period 2008-2017
Forestland remaining forestland	37,220.4	312,597.165	31,259.7
Grassland converted to forestland	-1,069.6	-5,501.194	-550.1
Cropland converted to forestland	-453.3	-2,805.168	-280.5
Grassland remaining grassland	-190.8	-10,019.299	-1,001.9
Forestland converted to grassland	6,865.7	41,517.624	4,151.8
Cropland converted to grassland	-56.3	-442.916	-44.3
Cropland remaining cropland	14,920.0	133,720.532	13,372.1
Forestland converted to cropland	986.4	44,070.344	4,407.0
Grassland converted to cropland	2,004.3	11,541.842	1,154.2
Settlemet convrted to cropland	50.1	393.081	39.3
Settlement remaining settlement	-647.4	-6,550.325	-655.0
Cropland converted to settlement	-51.3	-641.262	-64.1
Grassland converted to settlement	-0.8	-137.079	-13.7
Grassland converted to other land	-2.8	-28.139	-2.8
Wetland remaining wetland	0.0	0.000	0.0
Otherland remaining otherland	0.0	0.000	0.0
HWP - Stock-change approach	-438.9	-2,581.350	-258.1
Enteric fermentation - cattle	17,602.8	159,798.483	15,979.8
Enteric fermentation - sheep	986.4	9,731.203	973.1
Enteric fermentation - swine	0.0	0.000	0.0
Enteric fermentation - other livestock	2,380.1	21,882.224	2,188.2
Manure management - cattle	3,966.7	41,135.623	4,113.6
Manure management - sheep	258.3	2,318.865	231.9
Manure management - swine	0.0	0.000	0.0
Manure management - other livestock	818.4	7,415.717	741.6
Manure management - indirect N2O emissic	618.5	6,284.973	628.5
Direct emissions from managed soils (agricu	6,621.7	77,983.939	7,798.4
Indirect emissions from managed soils (agri	1,609.7	23,807.216	2,380.7
Urea application	9.3	266.579	26.7
Rice cultivation	1.2	6.814	0.7
TOTAL	**94,009**	**771,756.587**	**85,750.732**

The time-period considered for the elaboration of the GHG Inventory is between the 2000-2017 period. The total emission for the entire period is presented in Annex I.

2. The Agriculture sector

2.1 Overview of the sector

Enteric fermentation and manure management from dairy and non-dairy cattle are the main sources of emissions to the overall emissions in agriculture in Oromia.

The total emission in agricultural activities varies from approximately 25,000 $ktCO_2$-eq. to more than 37,000 $ktCO_2$-eq. along the period under analysis (2003-2017). In comparison to the studies, the level of emissions of 2016 represents approximately 34% of the total agriculture sector in "Ethiopia´s three years greenhouse gas inventory" (still elaborated by the Environment, Forestry and Climate Change Commission).

Methane (CH_4) and nitrous oxide (N_2O) are the primary greenhouse gases emitted as a consequence of agricultural activities. High methane emission occurs mainly as a result of enteric fermentation, whereas agricultural soil management contributes with nitrous oxide (N_2O) emission. Domestic livestock is the major source of CH_4 emissions from agriculture, both from enteric fermentation and manure management.

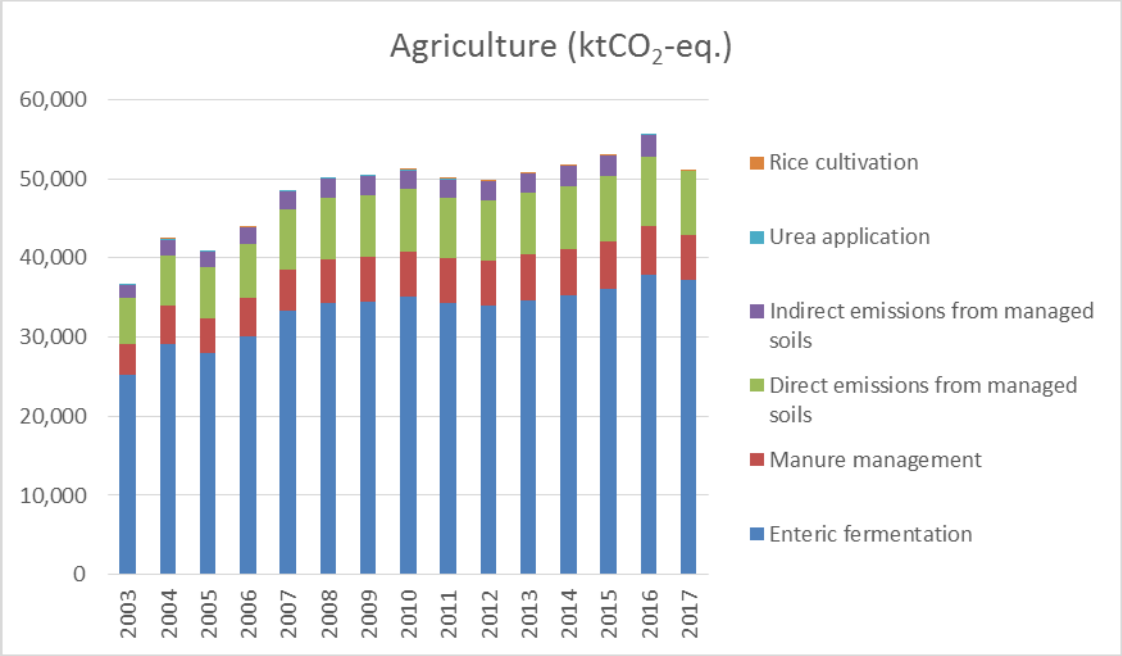

Figure. Agriculture emissions trend in CO2-eq. for the 2003-2017 period

In 2016, 53% of emissions were due to methane emission from enteric fermentation, which is mainly as a result of the level of livestock population in the Oromia Region and its growth explains the upward trend in emissions. On the other hand, direct N_2O emission from managed soil and emission from manure management contribute 23% and 14% of the total agriculture emission, respectively.

The table below shows the contribution of the sub-sectors contribution to the total GHG emissions in the Agriculture sector (CO_2-eq.) for the year 2016.

Table. Sub-sector contribution to the total GHG emissions from Agriculture (CO_2 eq.) in 2016

3 - Agriculture	37,856.8	100%
3.A.1 - Enteric Fermentation	20,114.5	53%
3.A.2 - Manure Management	5,475.5	14%
3.C.3 - Urea application	15.8	0.04%
3.C.4 - Direct N_2O Emissions from managed soils	8,826.9	23%
3.C.5 - Indirect N_2O Emissions from managed soils	2,758.0	7%
3.C.6 - Indirect N_2O Emissions from manure management	666.1	2%

2.1.1 Completeness of the sector

The agricultural activities directly contribute to the emission of greenhouse gases through various processes. The following activities have been identified as the main sources of emission and their inclusion makes the inventory for Oromia National Regional State complete.

The main categories that are quantified and reported are CH_4 emissions from enteric fermentation, CH_4 emissions from manure management, direct and indirect N_2O emissions from

manure management, CO_2 emissions from urea application and direct and Indirect N_2O emissions from managed soils.

Emission from biomass burning, rice cultivation and lime application were not considered in this study because of the absence of complete, consistent and reliable information, or simply because the activity does not occur in the Region.

2.1.2 Data and methods

Tier 1 method and default emission factor according to the *IPCC 2006 Guidelines* were used to calculate methane, nitrous oxide and carbon dioxide emissions from all subcategories. It was not possible to use a higher tier method due to the absence of available information in the Region.

In addition, the greenhouse gas emissions were calculated for the entire time series using published data from Ethiopia Central Statistical Agency to ensure consistency. The main data used includes livestock number of animals produced annually (NAPA) for all species, fertilizer application, area of crop cultivation and crop production.

Due to the absence of region-specific information on manure management systems, data from Ethiopia's Second National Communication submitted to the United Nation Framework Convention on Climate Change (UNFCCC) in 2015, was used for the estimation of CH_4 and N_2O emission from manure management for the entire time series.

2.2 Category results

2.2.1 Enteric fermentation

As it is explained in the IPCC, livestock production results in methane (CH_4) emissions from enteric fermentation and both CH_4 and nitrous oxide (N_2O) emissions from livestock manure management systems. Cattle are an important source of CH_4 because of their large population in Oromia and high CH_4 emission rate due to their ruminant digestive system.

Methane is produced in herbivores as a by-product of enteric fermentation, a digestive process by which carbohydrates are broken down by micro-organisms into simple molecules for absorption into the bloodstream. The amount of methane that is released depends on the type of digestive tract, age, and weight of the animal, and on the quality and quantity of the feed consumed. Ruminant livestock (e.g., cattle, sheep) are major sources of methane with moderate amounts produced from non-ruminant livestock (e.g., pigs, horses).

Methodology

Methane emissions from enteric fermentation for all livestock species were calculated using a *tier 1* method according to the *2006 IPCC Guidelines* using Equation 10.19 and Equation 10.20.

EQUATION 10.19
ENTERIC FERMENTATION EMISSIONS FROM A LIVESTOCK CATEGORY

$$Emissions = EF_{(T)} \bullet \left(\frac{N_{(T)}}{10^6} \right)$$

Where:

Emissions = methane emissions from Enteric Fermentation, Gg CH_4 yr^{-1}

$EF_{(T)}$ = emission factor for the defined livestock population, kg CH_4 $head^{-1}$ yr^{-1}

$N_{(T)}$ = the number of head of livestock species / category T in the country

T = species/category of livestock

EQUATION 10.20
TOTAL EMISSIONS FROM LIVESTOCK ENTERIC FERMENTATION

$$\text{Total } CH_{4\text{Enteric}} = \sum_i E_i$$

Where:

Total $CH_{4\text{Enteric}}$ = total methane emissions from Enteric Fermentation, Gg CH_4 yr^{-1}

E_i = is the emissions for the i^{th} livestock categories and subcategories

Activity Data

National livestock population data (Dairy cattle, Non-Dairy cattle (Other Cattle), Sheep, Goat, Camel, Horse, Donkey, Mule and Poultry) for Oromia National Regional State was extracted from Ethiopia Central Statistical Agency and it was used to estimate CH_4 emissions from enteric fermentation. The livestock population data used for the estimation of methane (CH_4) emission for the 2003-2017 period is shown below in Table (Oromia Region Livestock Population for the 2003-2017 period).

Table. Oromia Region Livestock population for the 2003-2017 period (Ethiopian Central Statistical Agency)

Year	Dairy	Non-Dairy	Sheep	Goat	Camel	Donkey	Horse	Mule	Poultry
2003	3,188,076	13,618,084	5,969,520	4,061,040	113,530	1,605,130	899,990	149,570	12,761,340
2004	2,610,491	14,604,049	6,905,370	4,849,060	139,830	1,703,910	959,710	153,710	11,637,074
2005	3,073,116	15,220,346	8,094,017	5,469,074	121,970	1,914,442	969,070	166,984	12,331,362
2006	3,141,683	16,572,513	9,275,727	5,880,688	131,259	2,059,718	1,045,557	160,541	12,730,685
2007	3,418,794	17,992,184	9,401,844	7,685,529	447,688	2,197,828	1,111,943	180,364	14,329,775
2008	3,366,601	19,086,734	9,098,255	7,439,725	255,328	2,395,374	1,157,906	185,360	13,673,006
2009	3,336,552	19,138,797	9,452,831	7,346,055	257,322	2,494,536	1,299,295	174,676	15,336,939
2010	3,279,189	19,679,300	8,815,290	7,531,445	326,069	2,617,107	1,176,301	181,381	18,762,281
2011	3,045,240	19,446,512	8,610,745	7,233,089	310,757	2,758,237	1,144,929	154,624	16,345,099
2012	2,661,194	19,692,864	8,748,537	7,554,869	264,175	2,810,612	1,108,850	152,345	18,398,495
2013	2,577,541	19,927,678	9,493,622	8,151,014	268,089	2,898,282	1,186,437	151,110	19,313,874
2014	2,400,051	20,525,679	9,715,587	7,849,924	239,357	3,007,027	1,222,760	156,331	20,076,129
2015	2,656,014	20,680,496	9,486,687	8,377,584	272,344	3,214,317	1,242,071	152,178	21,201,122
2016	3,093,286	21,051,075	9,866,172	8,129,784	299,422	3,446,746	1,296,520	140,114	20,408,299
2017	5.387.032	19.045.942	9.349.430	8.591.204	315.842	3.419.932	1.128.901	134.898	19.014.114

Emission Factor

The default enteric fermentation factor for all livestock species was used from *2006 IPCC Guidelines* (Table 10.10 and Table 10.11) because country-specific emission factor to estimate methane (CH_4) emission from enteric fermentation is not available for Ethiopia, neither in Oromia National Regional State. The following table shows the default emission factors used to estimate CH_4 emission from enteric fermentation.

Table. Default enteric fermentation emission factors for methane emission

Livestock Type	Enteric Fermentation Emission Factor (CH_4/head/yr.)	*2006 IPCC Guidelines*

Dairy Cattle	46	Vol. 4, Chapter 10, Table 10.11
Non-Dairy	31	Vol. 4, Chapter 10, Table 10.11
Sheep	5	Vol. 4, Chapter 10, Table 10.10
Goats	5	Vol. 4, Chapter 10, Table 10.10
Camels	46	Vol. 4, Chapter 10, Table 10.10
Horse	18	Vol. 4, Chapter 10, Table 10.10
Asses/Donkey	10	Vol. 4, Chapter 10, Table 10.10
Mules	10	Vol. 4, Chapter 10, Table 10.10

Results

In 2016, around 96.4% of the total CH_4 emissions from the Agriculture sector was emitted from enteric fermentation from livestock. The leading CH_4 emitters are cattle and sheep.

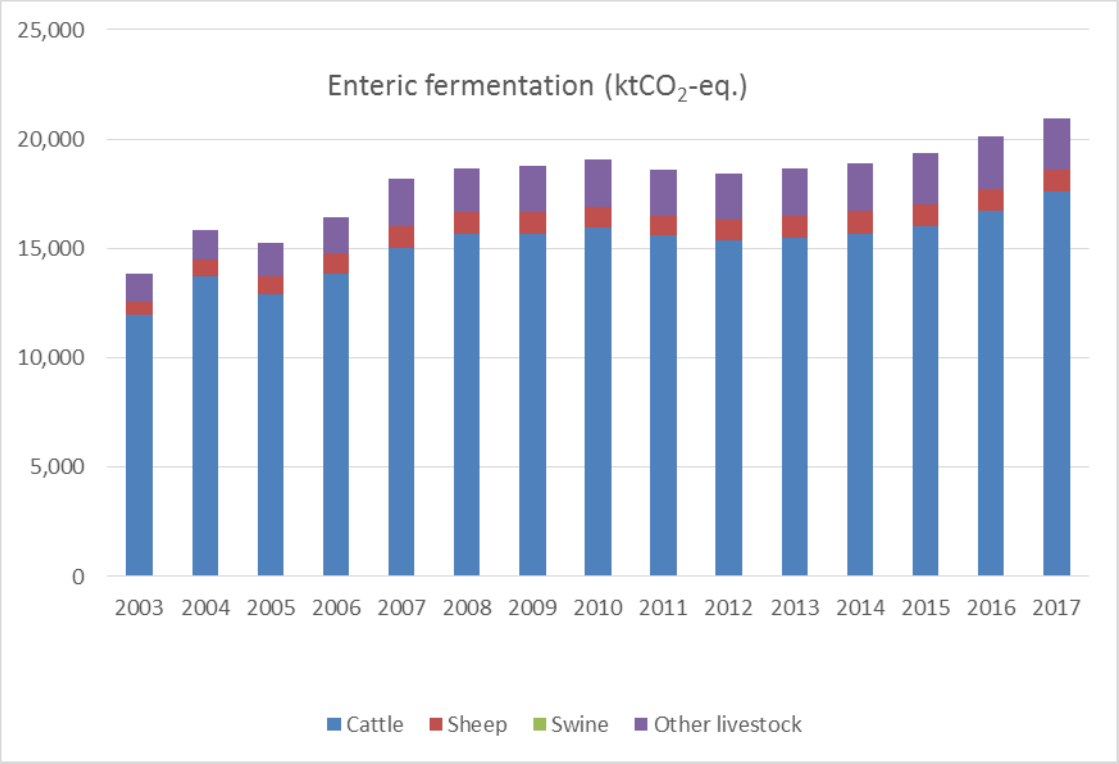

Figure. Enteric fermentation emissions (ktCO2-eq.) for all livestock categories

The increasing trend is directly related with the increasing livestock population in the region. Compared to the base year 2003, CH_4 emission from enteric fermentation increased 31.3% by the year 2016.

2.2.2 Manure management (CH_4 and N_2O)

Slurry, farmyard manure and poultry manure are an inevitable consequence of livestock products generated from housed animals. These manures are recycled back to land for plants to use the nutrients they contain. However, since they contain inorganic N, microbially available sources of C and water, they provide the essential substrates required for the microbial production of N_2O and CH_4.

The amount of CH_4 and N_2O emitted from the manure to the atmosphere depends on the conditions of manure management and use, as well as on the composition of excrements. Manure storing methods, in which anaerobic conditions prevail, are favourable for anaerobic decomposition of organic substance and for methane release.

There are two emission pathways of nitrous oxide (N2O) that occur as a result of manure management, which are direct and indirect N_2O emission. Direct N_2O emissions via combined nitrification and denitrification of nitrogen contained in the manure depends on storage and treatment types and methods. Direct N_2O emission from all animal waste management systems are estimated for all livestock, which includes solid storage, dry lot, poultry without litter and poultry with litter. Whereas, N_2O emission from Pasture, Range and Paddock (PRP) and Daily Spread are estimated under N_2O emission from managed soil according to the 2006 IPCC Guidelines. In addition, indirect N_2O emission from manure management is estimated and reported in chapter 3.2.3 below.

Methodology

The 2006 IPCC methodology, *tier 1* method was used to calculate Methane (CH_4) emission and the direct N_2O emission from manure management was estimated using tier 1 method according to the 2006 IPCC Guideline equation 10.22 and equation 10.25, respectively.

EQUATION 10.22
CH_4 EMISSIONS FROM MANURE MANAGEMENT

$$CH_{4Manure} = \sum_{(T)} \frac{\left(EF_{(T)} \bullet N_{(T)}\right)}{10^6}$$

Where:

$CH_{4Manure}$ = CH_4 emissions from Manure Management, for a defined population, Gg CH_4 yr^{-1}

$EF_{(T)}$ = emission factor for the defined livestock population, kg CH_4 $head^{-1}$ yr^{-1}

$N_{(T)}$ = the number of head of livestock species/category *T* in the country

T = species/category of livestock

Direct N_2O emissions from manure management were estimated using *tier 1* methodology (Equation 10.25) according to the *2006 IPCC Guidelines*.

EQUATION 10.25
DIRECT N_2O EMISSIONS FROM MANURE MANAGEMENT

$$N_2O_{D(mm)} = \left[\sum_S \left[\sum_T \left(N_{(T)} \bullet Nex_{(T)} \bullet MS_{(T,S)}\right)\right] \bullet EF_{3(S)}\right] \bullet \frac{44}{28}$$

Where:

$N_2O_{D(mm)}$ = direct N_2O emissions from Manure Management in the country, kg N_2O yr^{-1}

$N_{(T)}$ = number of head of livestock species/category *T* in the country

$Nex_{(T)}$ = annual average N excretion per head of species/category *T* in the country, kg N $animal^{-1}$ yr^{-1}

$MS_{(T,S)}$ = fraction of total annual nitrogen excretion for each livestock species/category *T* that is managed in manure management system *S* in the country, dimensionless

$EF_{3(S)}$ = emission factor for direct N_2O emissions from manure management system *S* in the country, kg N_2O-N/kg N in manure management system *S*

Activity Data and Emission Factor

The same livestock population as in enteric fermentation (chapter 3.2.1) was used to estimate CH_4 and N_2O emissions from manure management. The activity data is obtained from the National Livestock population data from Ethiopia Central Statistical Agency. As in the previous activity, due to the absence of country specific emission factors, CH_4 emission was calculated using default

emission factors from *2006 IPCC Guidelines,* tables 10.14 and 10.15 (Methane emission Factor for Manure Management).

Table. Methane emission Factor for Manure Management

Livestock Type	Methane Emission Factor (kg head^{-1} yr^{-1})	*2006 IPCC Guidelines*
Dairy Cattle	1	Vol. 4, Chapter 10, Table 10.14
Other Cattle	1	Vol. 4, Chapter 10, Table 10.14
Sheep	0.2	Vol. 4, Chapter 10, Table 10.15
Goat	0.22	Vol. 4, Chapter 10, Table 10.15
Camels	2.56	Vol. 4, Chapter 10, Table 10.15
Horse	2.19	Vol. 4, Chapter 10, Table 10.15
Mules/Asses	1.2	Vol. 4, Chapter 10, Table 10.15
Poultry	0.02	Vol. 4, Chapter 10, Table 10.15

In order to estimate direct N_2O emission from manure management, the annual excretion rate for all livestock species was calculated by using Equation 10.30, according to the *2006 IPCC Guidelines.* Also, Nitrogen Excretion Rate and Typical Animal Mass is from *2006 IPCC Guidelines.* Tables 10A-4, 10A-5, 10A-9 and 10.19 were used due to the absence of country specific data.

EQUATION 10.30
ANNUAL N EXCRETION RATES

$$Nex_{(T)} = N_{rate(T)} \bullet \frac{TAM}{1000} \bullet 365$$

Where:

$Nex_{(T)}$ = annual N excretion for livestock category *T*, kg N animal^{-1} yr^{-1}

$N_{rate(T)}$ = default N excretion rate, kg N (1000 kg animal mass)$^{-1}$ day^{-1} (see Table 10.19)

$TAM_{(T)}$ = typical animal mass for livestock category *T*, kg animal^{-1}

Table. Nitrogen Excretion Rate and Typical Animal Mass

Livestock	Nitrogen Excretion Rate	*2006 IPCC Guidelines*	Typical Animal mass	*2006 IPCC Guidelines*
Dairy Cattle	0.6	Vol. 4 Chapter 10, table 10.19	275	Vol. 4 Chapter 10, table 10-4

Other Cattle	0.63	Vol. 4 Chapter 10, table 10.19	173	Vol. 4 Chapter 10, table 10-5
Sheep	1.17	Vol. 4 Chapter 10, table 10.19	28	Vol. 4 Chapter 10, table 10-9
Goat	1.37	Vol. 4 Chapter 10, table 10.19	30	Vol. 4 Chapter 10, table 10-9
Camel	0.46	Vol. 4 Chapter 10, table 10.19	217	Vol. 4 Chapter 10, table 10-9
Horse	0.46	Vol. 4 Chapter 10, table 10.19	238	Vol. 4 Chapter 10, table 10-9
Mules/Asses	0.46	Vol. 4 Chapter 10, table 10.19	130	Vol. 4 Chapter 10, table 10-9
Poultry	0.82	Vol. 4 Chapter 10, table 10.19	0.9	Vol. 4 Chapter 10, table 10-9

According to Ethiopia's Second National Communication, submitted to the United Nation Framework Convention on Climate Change in 2015, the manure management system allocation used for all livestock species is described in Table 9 (Manure Management System). Regional specific data is not available for Oromia National Regional State.

Table. Manure Management System

Livestock	PRP	Daily Spread	Burned as Fuel	Dry lot	Without Litter	With Litter	Solid Storage
Dairy Cattle	0.83	0.12					0.05
Non-Dairy	0.35		0.15	0.45			0.05
Sheep/Goats	0.8			0.2			
Camel	1						
Horse/Mules/Asses	0.7			0.3			
Poultry					0.93	0.07	

Finally, direct N_2O emission from manure management was estimated using default N_2O emission factor (EF3) from the *2006 IPCC Guidelines,* Table 10.21, due to the absence of country specific emission factor.

Results

In 2016, total emission from manure management was 5,951 Gg CO_2 eq^{-1}, considering direct CH_4 emissions and N_2O (both direct and indirect) emissions. This is 16% of the total emission from the agriculture sector. In terms of gases, CH_4 and N_2O emission contributes 14.5% and 85.5% respectively for the total emission from manure management. As in the enteric fermentation, cattle are a main source of emissions under this activity.

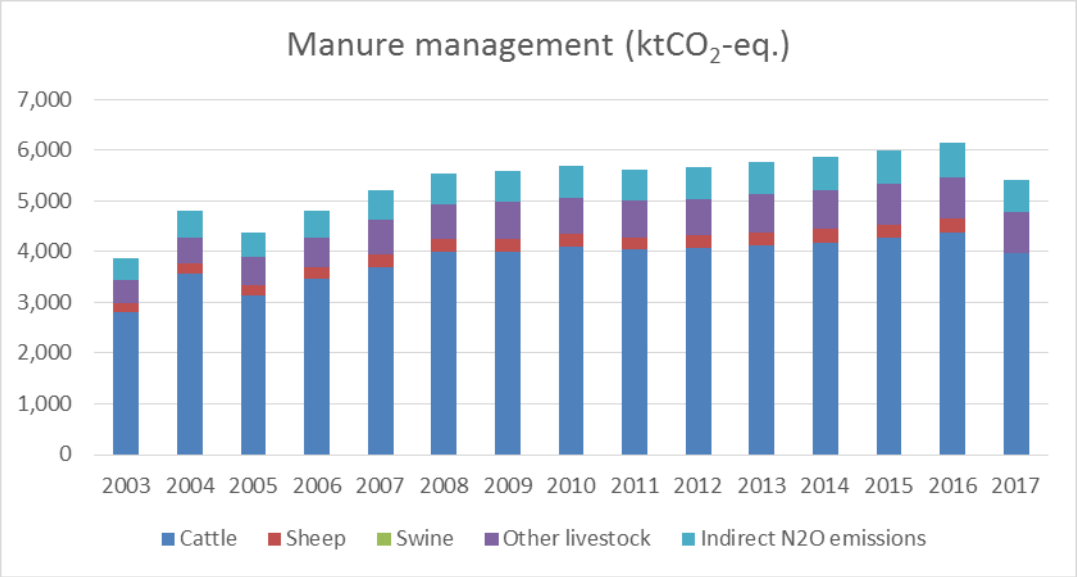

Figure. Emissions from manure management

2.2.3 Indirect emissions from manure management – N_2O

Indirect N_2O emission is the second pathway in which nitrous oxide (N_2O) is emitted from manure management. It occurs from volatile nitrogen losses that occur in the forms of ammonia and NOx, and from losses through runoff and leaching into soils. Indirect Nitrous oxide (N_2O) emissions from manure management for the 2003-2016 period are also presented in Figure. Emissions from manure management.

Methodology

Equation 10.26 according to *2006 IPCC Guidelines* is applied to Indirect nitrous oxide (N_2O) emissions from manure management, volatized N in forms of NH3 and NOx, for each manure management system from all livestock categories. Final N2O emissions are then estimated using Equation 10.27 (*2006 IPCC Guidelines*), and using default emission factors (Table 11.3, *2006 IPCC Guidelines*).

EQUATION 10.26
N LOSSES DUE TO VOLATILISATION FROM MANURE MANAGEMENT

$$N_{volatilization-MMS} = \sum_{S}\left[\sum_{T}\left[\left(N_{(T)} \bullet Nex_{(T)} \bullet MS_{(T,S)}\right) \bullet \left(\frac{Frac_{GasMS}}{100}\right)_{(T,S)}\right]\right]$$

EQUATION 10.27
INDIRECT N_2O EMISSIONS DUE TO VOLATILISATION OF N FROM MANURE MANAGEMENT

$$N_2O_{G(mm)} = \left(N_{volatilization-MMS} \bullet EF_4\right) \bullet \frac{44}{28}$$

Activity data and Emission Factor

The same activity data that was used in estimating direct N_2O emissions was used to calculate indirect N_2O emission from manure management. However, default emission factor (EF_4) of 0.01 kg N_2O-N (kg NH_3-N + NO_x-N volatilized)$^{-1}$, (Table 11.3) was used from the *2006 IPCC Guidelines*.

Results

Emissions for this activity are included in Figure. Emissions from manure management, above.

2.2.4 Direct emissions from managed soils – N_2O

In agriculture, Nitrogen is added to soil in several activities, increasing the amount of nitrogen available for nitrification and denitrification, and ultimately resulting in N_2O emission due to microbial process. The main agricultural activities through which N is added to the soil includes synthetic and organic fertilizers, deposited manure by grazing animals, crop residues, cultivation of organic soils and mineralization of N in soil organic matter due to management of organic soils.

Nitrous oxide emissions from managed soils occur mainly as direct and indirect N_2O emissions. Direct N_2O emissions occur as a result of total amount of nitrogen applied to soils through human induced N additions and/or change or practices. Specific N sources considered for estimating N_2O emission from managed soils in Oromia National Regional State are inorganic N fertilizer, organic N fertilizer, urine and dung deposited by grazing animals and N from crop residues.

Nitrous oxide emission from cultivation of organic soils and mineralization/immobilization associated with loss/gain of soil organic matter resulting from change of land use or management of mineral soils was not estimated because the activity does not occur in Oromia National Regional State.

Methodology

Direct N_2O emission from Managed Soils was calculated using *tier 1* methodology, Equation 11.1 from the IPCC 2006 Guidelines and default emission factor was used from the *2006 IPCC Guidelines*.

EQUATION 11.1
DIRECT N_2O EMISSIONS FROM MANAGED SOILS (TIER 1)

$$N_2O_{Direct}\text{–}N = N_2O\text{–}N_{N\,inputs} + N_2O\text{–}N_{OS} + N_2O\text{–}N_{PRP}$$

Where:

$$N_2O\text{–}N_{N\,inputs} = \begin{bmatrix} [(F_{SN} + F_{ON} + F_{CR} + F_{SOM}) \bullet EF_1] + \\ [(F_{SN} + F_{ON} + F_{CR} + F_{SOM})_{FR} \bullet EF_{1FR}] \end{bmatrix}$$

$$N_2O\text{–}N_{OS} = \begin{bmatrix} (F_{OS,CG,Temp} \bullet EF_{2CG,Temp}) + (F_{OS,CG,Trop} \bullet EF_{2CG,Trop}) + \\ (F_{OS,F,Temp,NR} \bullet EF_{2F,Temp,NR}) + (F_{OS,F,Temp,NP} \bullet EF_{2F,Temp,NP}) + \\ (F_{OS,F,Trop} \bullet EF_{2F,Trop}) \end{bmatrix}$$

$$N_2O\text{–}N_{PRP} = [(F_{PRP,CPP} \bullet EF_{3PRP,CPP}) + (F_{PRP,SO} \bullet EF_{3PRP,SO})]$$

Activity Data and emission factors

National published data from Ethiopia Central Statistical Agency on synthetic fertilizer application, area of crop cultivation and crop production for the year 2003-2016 was collected from Ethiopia Central Statistical Agency and default emission factor was used for all sub-sectors to calculate Direct N_2O emission from managed soils.

1. Fraction of N in Synthetic fertilizer

Nitrous oxide emission from synthetic fertilizer is estimated based on the amount of N in synthetic fertilizer that is annually used in the Oromia National Regional State. Data on the annual consumption of synthetic fertilizers, which includes UREA, DAP and NPS (Nitrogen, phosphorus and Sulphur) was obtained from published Ethiopia Central Statistical Agency report, Farm Management practice Report, for the year 2003-2016.

2. Organic Nitrogen

The annual amount of N from organic nitrogen applied to managed soils was calculated using Equation 11.3 from the *2006 IPCC Guidelines*. However, N_2O emission was only calculated from

the amount of manure applied to soils from grazing animals. Application of compost and sewage is not practiced in Oromia National Regional State. The amount of N in solid and liquid manure/slurry which is annually used for crop fertilization was calculated using the Equation 11.4 and amount of managed manure N available for soil application was estimated using Equation 10.34 from the *2006 IPCC Guidelines*.

3. N from Pasture, Range and Paddock (PRP)

The annual amount of N input deposited on pasture, range and paddock soils by grazing animals was calculated using Equation 11.5 from *2006 IPCC Guidelines*. Data on N deposited was obtained from the Direct N_2O emission from Manure Management using default nitrogen excretion rates for each livestock species.

4. Crop Residue

Tier 1 methodology is applied to calculate direct nitrous oxide emission from crop residues. The estimation is made based on the amount of crop residues returned to soils annually. The data on crop production and area of production is obtained from Statistics Agency, Report on Area and Production, which is published annually. In Ethiopia, in general, crop residues are used for different purposes such as feed and construction, therefore only nitrogen content in below ground biomass is considered to estimate N_2O emission from crop residues. In addition, default crop specific factor is obtained from Table 11.6 of the 2006 IPCC Guidelines to estimate N_2O emissions from crop residue

Due to the absence of country specific emission factors to estimate Direct N_2O emission from Managed soil, default emission factor from the IPCC 2006 Guidelines have been used.

Results

In 2016, direct N2O emission was 8,827 Gg CO_2 eq-1, which is 23% of the total agriculture emission. The following figure shows the direct emissions from managed soils

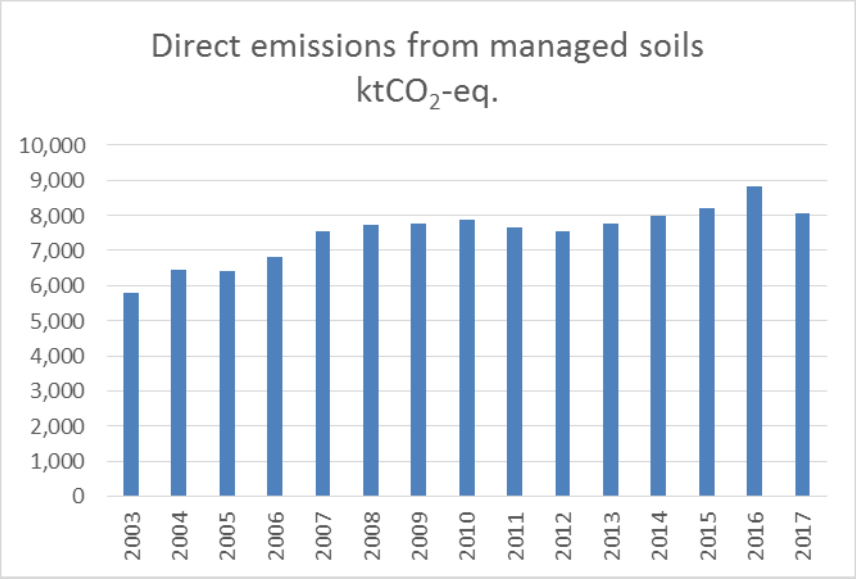

Figure. Direct emissions from managed soils

The major source of direct N_2O emission was from N applied into soil from pasture, range and paddock, and organic Nitrogen applied as fertilizer (figure below, sub-sector contribution to direct N_2O emission from managed soils)

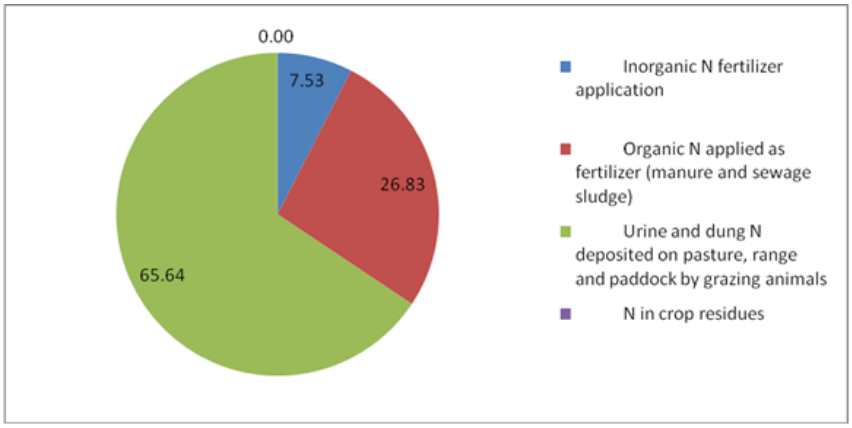

Figure. Sub-sector contribution to direct N2O emission from managed soils

2.2.5 Indirect emissions from managed soils – N_2O

Direct N_2O emissions are estimated separately from indirect emission, though both use the same set of activity data. Calculations of indirect N_2O emission from nitrogen applied to agriculture are based on volatilization and leaching/run-off of nitrogen applied to soils.

Volatilization of N as NH_3 and oxides of N (NO_x), and the deposition of these gases and their products NH_4^+ and NO_3^- onto soils. Leaching and runoff from land of N from synthetic and organic fertilizer additions, crop residues, mineralization of N associated with loss of soil C in mineral and drained/managed organic soils through land use change or management practices, and urine and dung deposition from grazing animals. Some of the inorganic N in or on the soil, mainly in the NO_3 - form, may bypass biological retention mechanisms in the soil/vegetation system by transport in overland water flow (runoff) and/or flow through soil macropores or pipe drains.

Methodology

Indirect N_2O emissions from atmospheric deposition of N volatilized and N that is lost through leaching/run-off from managed soil were estimated using *tier 1* methodology, using Equation 11.9 and Equation 11.10 respectively according to the *2006 IPCC Guidelines*, using default emission factors and fractions.

EQUATION 11.9
N_2O FROM ATMOSPHERIC DEPOSITION OF N VOLATILISED FROM MANAGED SOILS (TIER 1)

$$N_2O_{(ATD)}\text{-}N = \left[\left(F_{SN} \bullet Frac_{GASF}\right) + \left(\left(F_{ON} + F_{PRP}\right) \bullet Frac_{GASM}\right)\right] \bullet EF_4$$

EQUATION 11.10
N_2O FROM N LEACHING/RUNOFF FROM MANAGED SOILS IN REGIONS WHERE LEACHING/RUNOFF OCCURS (TIER 1)

$$N_2O_{(L)}\text{-}N = \left(F_{SN} + F_{ON} + F_{PRP} + F_{CR} + F_{SOM}\right) \bullet Frac_{LEACH-(H)} \bullet EF_5$$

Activity data and Emission Factor

The same activity data used to estimate direct N_2O emission from managed soil was used to estimate indirect N_2O emission from atmospheric deposition of N and N leaching/runoff from managed soils.

Default emission factors are obtained from the 2006 IPCC Guidelines (table 11.3), which are presented in the following table.

Table. Emission Factor and fraction used for Indirect N_2O emission from managed soil

Fraction/emission factor	Value	*2006 IPCC Guidelines*

Fraction of synthetic fertilizer N that volatilizes	$Frac_{GASF}$	0.1	Vol. 4, Chapter 11, table 11.3
Fraction of applied organic N fertilizer materials (FON) and of urine and dung N deposited by grazing animals (FPRP) that volatilizes	$Frac_{GASM}$	0.2	Vol. 4, Chapter 11, table 11.3
Emission factor for N_2O emission from atmospheric deposition of N on soils and water surfaces	EF_4	0.01	Vol. 4, Chapter 11, table 11.3
Fraction of all N additions to managed soils that is lost through leaching and runoff	$Frac_{LEACH-(H)}$	0.3	Vol. 4, Chapter 11, table 11.3
Emission factor for N_2O emission from N leaching and runoff	EF5	0.0075	Vol. 4, Chapter 11, table 11.3

Results

The following figure shows the indirect emissions from managed soils.

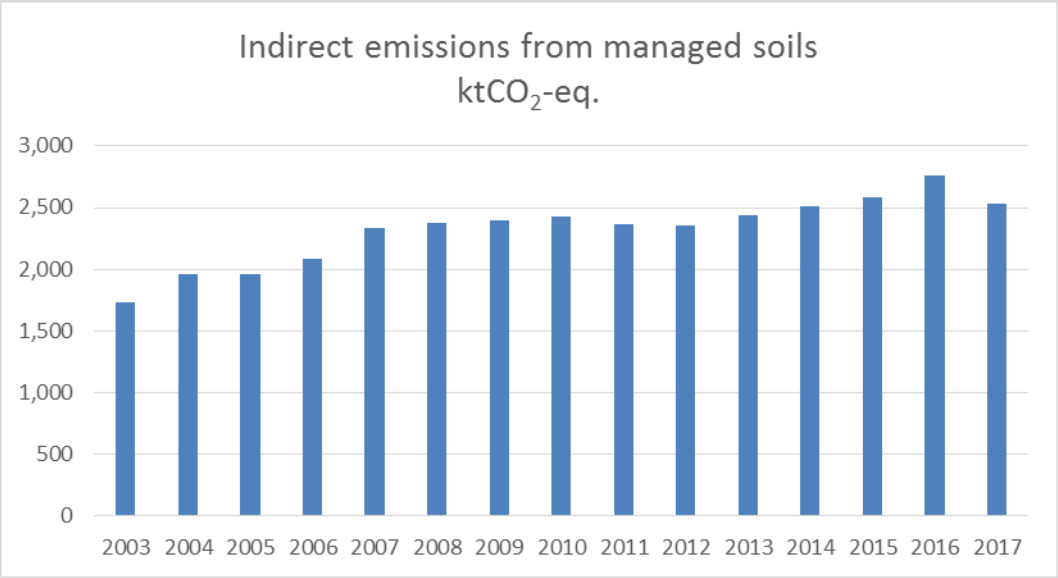

Figure. Indirect emissions from managed soils (ktCO2-eq.)

2.2.6 Urea Application – CO_2

Fertilization with urea can lead to a loss of carbon dioxide (CO2) that was fixed during the industrial production process. On its basis, the Intergovernmental Panel on Climate Change (IPCC) has proposed a value of 0.2 Mg C per Mg urea (2006 IPCC Guidelines), which is the mass fractions of C in urea, as the CO2 emission coefficient from urea for the agricultural sector.

Adding urea during fertilization results in conversion of (CO(NH2)2) into ammonium (NH4+), hydroxyl ion (OH-), and bicarbonate (HCO3-), in the presence of water and urease enzymes. Similar to the soil reaction following addition of lime, bicarbonate that is formed evolves into CO_2 and water.

Methodology

CO_2 emissions resulting from application of fertilizers was estimated using *tier 1* method. Equation 11.13 from the *2006 IPCC Guidelines* has been used, together with the use of default emission factors.

EQUATION 11.13
ANNUAL CO_2 EMISSIONS FROM UREA APPLICATION

$$CO_2\text{–}C\ Emission = M \bullet EF$$

Where:

CO_2–C Emission = annual C emissions from urea application, tonnes C yr^{-1}

M = annual amount of urea fertilisation, tonnes urea yr^{-1}

EF = emission factor, tonne of C (tonne of urea)$^{-1}$

Activity Data and emission factors

Activity data for applied urea was taken from Ethiopian Central Statistical Agency Report ad default emission factor (EF) of 0.02 for carbon emissions from urea application was obtained from the *2006 IPCC Guidelines*.

Results

CO_2 emissions from urea application for the 2003-2016 period are shown in Figure below.

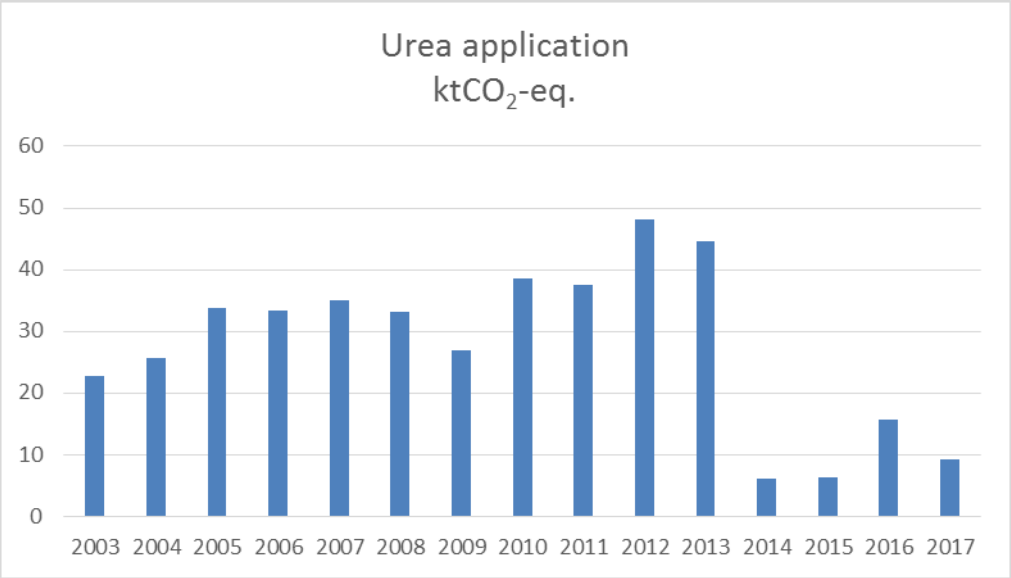

Figure. CO2 emission from Urea Application

The Central Statistical Agency has reported peculiar data for the years 2014, 2015 and 2016 in the use of urea . The activity data has been checked and no evident conclusion has been found. However, the reduction in the amount of urea for the last three years could be due to the introduction of a new type of fertilizer called NPS (Nitrogen, Phosphorous and Sulfur), which CSA has also started to report since the year 2014/2015.

Since all the activities under agriculture sector has been calculated under a *tier 1* method, they are not being considered in the Initiative for Sustainable Forestry Landscape. Thus, the inconsistent results are not affecting the baseline proposed for the Program.

2.3 Uncertainties

Uncertainty associated with livestock activity data is based on the Ethiopian Central Statistical Agency (CSA) reports. Livestock population data is not based on a census but in a survey, therefore

the CSA reports the Livestock Population Mean and Standard Error (SE). See Table, below. Uncertainty associated with emission factors is obtained from the *2006 IPCC Guidelines*.

Table. Livestock Population Mean and Standard Error (SE)

Livestock Population	Mean	Standard Error
Cattle	22,505,219	471,631
Sheep	9,493,622	396,149
Goat	8,151,014	416,600
Horse	1,186,437	92,690
Donkey	2,898,282	81,724
Mules	151,110	12,036
Camels	268,089	62.345
Poultry	19,313,874	426,105

Table. Default Emission Factor uncertainty level

Default Emission Factor	Gas	Uncertainty
Enteric Fermentation	Methane	±30%
Manure Management	Methane	±30%
Manure Management	Nitrous Oxide	50-100
Managed Soil	Nitrous Oxide	0.003-0.03
Pasture, Range and Paddock ($EF_{3\ PRP}$)	Nitrous Oxide	0.007-0.06
Sheep and other ($EF_{3\ SO}$)	Nitrous Oxide	0.003-0.03
Volatilization (EF_4)	Nitrous Oxide	0.002-0.05
Leaching (EF_5)	Nitrous Oxide	0.0005-0.025

Different sources of uncertainty are considered in the estimation of combined uncertainty. In this case, Approach 1[77] has been used, which uses simple error propagation equations.

The following table shows the results of the combination of uncertainty sources in every subcategory. The table shows the results for one year, but it is applicable to the complete series (2003-2016).

Table. Combined uncertainty of the main subcategories (%)

Subcategory	Combine uncertainty (%)

[77]More information about "Approach 1: propagation of error" can be found in Volume 1, chapter 3 of the *2006 IPCC Guidelines*.

Enteric fermentation – Dairy cows	30.073
Enteric fermentation – Other cattle	30.073
Enteric fermentation – Buffalo	0
Enteric fermentation – Sheep	30.288
Enteric fermentation – Goats	30.432
Enteric fermentation – Camel	37.961
Enteric fermentation – Horses	31.0
Enteric fermentation – Mules and asses	30.132
Enteric fermentation – Swine	0
Enteric fermentation – Other	0
Manure management – Dairy cows	100.022
Manure management – Other cattle	100.0
Manure management – Buffalo	0
Manure management – Sheep	100.087
Manure management – Goats	100
Manure management – Camel	102.67
Manure management – Horses	100
Manure management – Mules and asses	100.04
Manure management – Swine	0
Manure management – Poultry	100.024
Manure management – Other	0
Urea application	7.85
Direct N_2O emissions from managed soils	200
Indirect N_2O emissions from managed soils	400
Indirect N_2O emissions from manure management	400

2.4 Sector specific quality assurance and quality control

During the preparation of the current inventory, activity data for the entire time series has been checked and revised if necessary. Therefore, activities related to quality control were focused on completeness and consistency of emission estimates.

By applying this quality control process, it was possible to find that the activity data used to estimate direct and indirect emissions from managed soils and from urea application showed some incoherence. Different alternatives to solve the problem were managed, but it was finally decided to leave the values as they were obtained from CSA.

It should be noted that this chapter was made in the IPCC software to perform inventories. This software has multiple QAQC practices. For example, the software alerts when the user applies an emission factor that is above the maximum level of a range of possible values. In addition, the software uses the livestock manager where the activity data is entered and from where the software took the values, when necessary. With this, there is a substantial decrease in opportunities to make an error by repeatedly re-entering data.

2.4.1 Improvements

The agriculture sector in the GHG Inventory of Oromia has been done under a *tier 1* method, given the available activity data. This chapter presents a series of activities that can be implemented to enhance the quality of the following GHG inventories.

For instance, livestock population in Central Statistical Agency is roughly defined with only two major classes for “dairy” and “non-dairy” cattle. However, according to studies performed in the region, in Ethiopia there are five types of farm system involved in milk production. And dairy cattle are not only for dairy production, but also for multi-purpose.

Given the basic activity data that could be collected to prepare the inventory, this improvement plan is focused in obtaining more detailed information, rather than introducing new

methodologies. Methodologies for better estimates (tier 2 or tier 3) are already available in *2006 IPCC Guidelines*.

- Data collection on livestock population by species and categories. This is the basic information to start with. Also considering the production system under which they are being managed, one purpose production or multi-purpose production. There are several studies that are being performed in Oromia that can result in valuable information for the estimation of future GHG inventories. This is the case of the study "Reducing Enteric Methane for improving food security and livelihoods[78]", produced by FAO and "Feasibility study for climate-smart livelihoods through improved livestock systems in Oromia, Ethiopia" by Solidaridad. The inconvenient for using the studies before mentioned, is that they cover only part of the activity data and it is not compatible with other sources of information.
- Feed characterization. If better estimates of emissions are needed, there is an urgency to obtain information about the feed characterization for, at least, large categories (dairy cattle and other cattle).
- Assessment of gross energy intake (GE) and methane conversion factor. Emissions from enteric fermentation are the largest source of emissions (as seen in the present GHG Inventory - *tier 1*). In order to have better estimate of emissions, it should be necessary to develop region-specific methane emission factor.
- Data must be collected to assess region specific digestibility of feed intake.
- Start collecting relevant region-specific data on manure management systems for all livestock species.
- Collect information about Daily volatile solids (Vs), Maximum methane producing capacity (Bo) and Methane conversion factor (MCF) for each manure management system in the region. It would be necessary to develop region specific methane emission factor for manure management.
- Information about N excretion rate and typical animal mass for all livestock categories per manure management system is needed. The Region must start collecting and assessing this data.
- Improve data collection and report on fertilizer usage and on the amount of N content (synthetic fertilizers and organic fertilizer including compost, sewage and other organic amendments), to accurately and transparently report N_2O emission from managed soils. Also, the National Regional State of Oromia can start discussions with Central Statistical Agency to obtain more precise and detailed information about the synthetic fertilizers used in the region.
- Estimate region specific dry matter content for crops annually produced and determine the fraction of crop residues returned to soils.
- Since the rice cultivation area is apparently increasing in the region, Oromia National Regional State must focus on collecting information about rice yields, crop area and management systems applied in the rice fields.
- A verification entity for external QA system can also be established to improve the quality of the GHG emission report.

The improvement suggestions are broad and general; thus, it can be difficult to take it into practice. It may be necessary to clarify that the improvement plan will not depend entirely on Oromia National Regional State; the task will basically consist in managing the resources so that the information can be provided by those who are responsible for it. For example, information on

[78] http://www.fao.org/in-action/enteric-methane/challenges-and-solutions/east-africa/ethiopia/en/

the use of synthetic nitrogen fertilizers should not be collected by Oromia National Regional State or the ORCU team; the missing information should be requested to CSA. They are the entity that has generated much of the information for this inventory and perhaps they can continue doing it in greater detail. For this, it is necessary to officially communicate with this entity and duly request the missing data. Or even asking for the data not to be grouped, in order to have the necessary detail to obtain better GHG estimates.

3. LULUCF

3.1 Overview of the sector

Total emissions in the LULUCF sector vary from approximately 28,769 $ktCO_2$ (positive value means emissions) in 2000 to 61,099 $ktCO_2$ (emissions) in 2013. Aboveground, belowground, deadwood and soil organic carbon pools are considered in the estimation of emissions and removals.

The following figure shows the results of the estimations of emissions and removals in LULUCF sector for the 2000-2017 period.

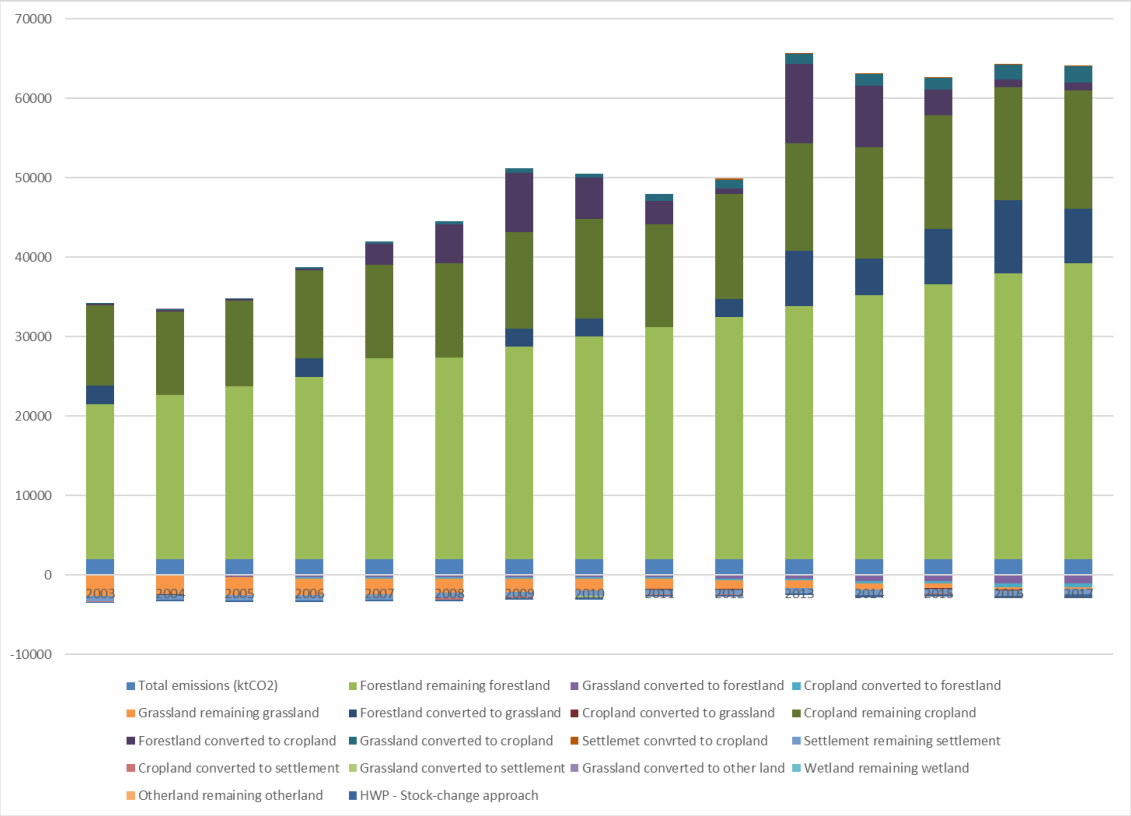

Figure. Level of removals in LULUCF sector. Values below X-axis represent removals and values above the X-axis represent emissions. This is how emissions (positive values) and removals (negative values) are represented internationally and in this report

Forestland remaining forestland is the major contributor to the overall emissions, with an increasing trend level given by the increase in harvesting volume through the years. Although there are forest area losses and gains, they do not affect substantially the total level of emissions and removals. But, at the same time, it is an activity with a large uncertainty level, since the emission factor used to estimate removals in forestland remining forestland is of very low quality.

3.1.1 Land use categories

The Initiative for Sustainable Forest Landscape (ISFL) considers the emissions, removals and emission reductions across certain eligible subcategories. In other words, the Program requests the identification of subcategories that are eligible to receive result-based payments. The accounting of emission reductions is done by comparing monitored emissions and removals with a baseline formed by these eligible subcategories.

The present inventory has been elaborated with the intention of being consistent with the terminology used in the ISFL Emission Reduction Program and with the *2006 IPCC Guidelines*. The following LULUCF subcategories have been established to perform the GHG Inventory:

Sector	Categories	Subcategories

LULUCF	Forest land	Forest land remaining forest land
		Grassland converted to forest land
		Cropland converted to forestland
	Cropland	Cropland remaining cropland
		Forestland converted to cropland
		Grassland converted to cropland
		Settlement converted to cropland
	Grassland	Grassland remaining grassland
		Forestland converted to grassland
		Cropland converted to grassland
	Wetlands	Wetlands remaining wetlands
		Land converted to wetlands
	Settlements	Settlements remaining Settlements
		Cropland converted to Settlements
		Grassland converted to settlements
	Other land	Other land remaining other land
		Grassland converted to other land
	Harvested wood products	

3.1.2 Completeness of the sector

All land use categories considered in the *2006 IPCC Guidelines* have been considered: forestland, grassland, cropland, wetland, settlement and other land.

Within each land use category, carbon stock changes and emission/removal estimations involve four carbon pools: aboveground and belowground biomass, deadwood and soil organic carbon.

Litter has been excluded from the accounting. Litter data is provided from the document "Evaluation of the forest carbon content in soil and litter in Ethiopia", implemented by Natural Resources Institute Finland (LUKE) and Ethiopia Environment and Forestry Research Institute (EEFRI). According to some recent articles, the carbon fraction contained in litter consist of less than 0.01% of the total carbon stock (Simegn et al., 2014; Mikrewongel, 2015; Wolde et al., 2014). The previously mentioned document by LUKE and EEFRI concludes that when the above- and belowground biomasses and deadwood are also considered, the contribution of litter carbon pool is insignificant. Given the presented arguments, it was decided not to include the litter pool in this GHG Report.

GHG emissions from biomass burning (forest fires) have not been considered due to the lack of information. The MODIS Burned Area Product can be used to identify burned areas at a spatial resolution of 500m, on a monthly basis. The problem is that the burnt areas cannot be linked to a specific land use and therefore, it is not possible to determine the available fuelwood at each fire.

Liming is not practised in LULUCF in the region. Emissions from urea application have been considered in the agriculture sector.

3.1.3 Data and methods

The activity data was specifically prepared for this report. The previously available activity data could not be used due to its inconsistency throughout the period under study (Ethiopia Geo-Spatial Information Agency Maps). The method and result for obtaining the new results are presented in section 4.2, Representation of lands.

On the other hand, emission factors were obtained basically from the National Forest Inventory. Although the results are not yet published, the MoEFCC provided the raw data from the sample

plots. With the use of different parameters (wood density from FRL, root to shoot ration from IPCC), the above ground and below ground biomasses, deadwood and soil organic carbon could be obtained for different land uses, including grassland and croplands.

The method used in the estimation of emissions and removals in Oromia Regional National State is the Gain-Loss Method. The Gain-Loss Method has been used to estimate change in the carbon stock in biomass on land remaining in the same category, using the following equations:

ANNUAL CHANGE IN CARBON STOCKS IN BIOMASS IN LAND REMAINING IN A PARTICULAR LAND-USE CATEGORY (GAIN-LOSS METHOD)

$$\Delta C_B = \Delta C_G - \Delta C_L$$

Where:

ΔC_B = annual change in carbon stocks in biomass (the sum of above-ground and below-ground biomass terms in Equation 2.3) for each land sub-category, considering the total area, tonnes C yr^{-1}

ΔC_G = annual increase in carbon stocks due to biomass growth for each land sub-category, considering the total area, tonnes C yr^{-1}

ΔC_L = annual decrease in carbon stocks due to biomass loss for each land sub-category, considering the total area, tonnes C yr^{-1}

When there is a land conversion, the following equation is applied.

ANNUAL CHANGE IN BIOMASS CARBON STOCKS ON LAND CONVERTED TO OTHER LAND-USE CATEGORY (TIER 2)

$$\Delta C_B = \Delta C_G + \Delta C_{CONVERSION} - \Delta C_L$$

Where:

ΔC_B = annual change in carbon stocks in biomass on land converted to other land-use category, in tonnes C yr^{-1}

ΔC_G = annual increase in carbon stocks in biomass due to growth on land converted to another land-use category, in tonnes C yr^{-1}

$\Delta C_{CONVERSION}$ = initial change in carbon stocks in biomass on land converted to other land-use category, in tonnes C yr^{-1}

ΔC_L = annual decrease in biomass carbon stocks due to losses from harvesting, fuel wood gathering and disturbances on land converted to other land-use category, in tonnes C yr^{-1}

Dead organic matter is also considered in the total emissions and removals and the same Gain-Loss method has been applied to this pool.

Soil organic carbon has been estimated on mineral soils, given that there is no available data for organic soils. Despite the fact that they have lower amounts of organic matter compared to organic soils, they occupied almost the entire region. Annual change in organic carbon stocks in mineral soils follows the equation 2.25 from the *2006 IPCC Guidelines*, see below.

$$\Delta C_{Mineral} = \frac{(SOC_0 - SOC_{(0-T)})}{D}$$

$$SOC = \sum_{c,s,i} \left(SOC_{REF_{c,s,i}} \bullet F_{LU_{c,s,i}} \bullet F_{MG_{c,s,i}} \bullet F_{I_{c,s,i}} \bullet A_{c,s,i} \right)$$

Where:

$\Delta C_{Mineral}$ = annual change in carbon stocks in mineral soils, tonnes C yr^{-1}

SOC_0 = soil organic carbon stock in the last year of an inventory time period, tonnes C

$SOC_{(0-T)}$ = soil organic carbon stock at the beginning of the inventory time period, tonnes C

SOC_0 and $SOC_{(0-T)}$ are calculated using the SOC equation in the box where the reference carbon stocks and stock change factors are assigned according to the land-use and management activities and corresponding areas at each of the points in time (time = 0 and time = 0-T)

T = number of years over a single inventory time period, yr

D = Time dependence of stock change factors which is the default time period for transition between equilibrium SOC values, yr. Commonly 20 years, but depends on assumptions made in computing the factors F_{LU}, F_{MG} and F_I. If T exceeds D, use the value for T to obtain an annual rate of change over the inventory time period (0-T years).

c = represents the climate zones, *s* the soil types, and *i* the set of management systems that are present in a country.

SOC_{REF} = the reference carbon stock, tonnes C ha^{-1} (Table 2.3)

F_{LU} = stock change factor for land-use systems or sub-system for a particular land-use, dimensionless

[Note: F_{ND} is substituted for F_{LU} in forest soil C calculation to estimate the influence of natural disturbance regimes.

F_{MG} = stock change factor for management regime, dimensionless

F_I = stock change factor for input of organic matter, dimensionless

A = land area of the stratum being estimated, ha. All land in the stratum should have common biophysical conditions (i.e., climate and soil type) and management history over the inventory time period to be treated together for analytical purposes.

3.2 Representation of lands and National Forest Inventory

The actual GHG Report is elaborated for the National Region State of Oromia, Ethiopia. Oromia is Ethiopia's largest region in terms of land area coverage, around 30 million hectares. It is roughly the size of Italy. Population is over 30 million people, and forest cover is approximately 9 million hectares in total (around 52% of the country's total forest land).

The total area of the Region is 29,991,384 ha and it is divided in 17 land use types according to the land use maps produced by the Geo-Spatial Information Agency (previously known as Ethiopian Mapping Agency - EMA). The Agency has prepared the land use classification for the entire country for the years 2003, 2008 and 2013, see Figure below.

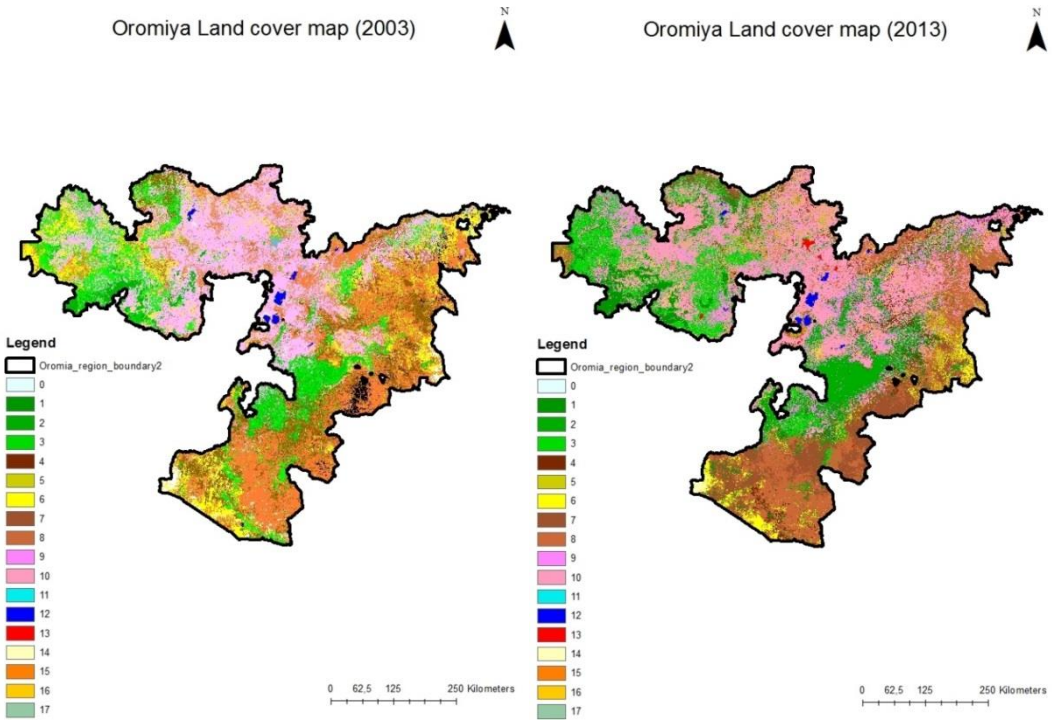

Figure. Land use maps obtained from GSIA (ex EMA)

Although there are land use maps available in the country and in the region, the land use change information was not obtained from these sources. The analysis of the land use change using the available maps (wall-to-wall comparison) resulted in highly inconsistent results and uncertain values.

The land use maps, available at Geo-Spatial Information Agency for the years 2003, 2008 and 2013, were overlaid to detect the land use changes. The result was compared to reality and expert judgement, and the conclusion was to reject that information and create new and reliable data. The error of the land use map in one year is added to the error of the overlaid land use map when doing a wall-to-wall analysis, resulting in unrealistic results.

Therefore, it is decided to apply a new method to detect changes in land use, see chapter 0.

3.2.1 Land use and land use change matrix

The proposed approach to estimate activity data and later emissions and removals for the LULUCF sector in Oromia, follows the Global Forest Observations Initiative (GFOI) guiding principle 1, for remote sensing (GFOI, 2014): 'When mapping forest change, it is generally more accurate to find change by comparing images as opposed to comparing maps estimated from images.

The land use change analysis was done by the National and Regional MRV team with the use of Collect Earth and supporting tools. The team formed by nine people assessed 3,758 sample plots in 21 days, from 27th July to 17th August 2018. The team faced important internet connection problems and part of the work was performed in FAO labs. However, they have demonstrated that they have the capacity to continue this work in the future, improving the results with more land use classes and collaborating with National REDD+ Program and National GHG Inventory Report.

Methodology

The methodology used to improve the quality of data in the short term is based on a sampling approach to target potential areas of change and to assess the land use and land use changes of the samples. A grid of 10km totalling 3,745 samples where distributed across Oromia. The samples were assessed by the MRV team and other trained experts from ORCU. Each sample was labelled with the IPCC land use subcategory and with the year of change, if a change occurred. This exercise

also had the objective to improve the quality of data that can be used for GHG Inventory. The sample data has been used for statistics of land use and land use change.

Land Use definitions

The top-level land categories for greenhouse gas (GHG) inventory reporting are:

(i) **Forest land**

This category includes all land with woody vegetation consistent with thresholds used to define forest land in the national GHG inventory, sub-divided into managed and unmanaged, and by ecosystem type, as specified in the IPCC Guidelines. It also includes systems with vegetation that currently fall below, but are expected to exceed, the threshold of the forest land category.

(ii) **Cropland**

This category includes arable and tillage land, and agro-forestry systems where vegetation falls below the thresholds used for the forest land category, consistent with national definitions.

(iii) **Grassland**

This category includes rangelands and pastureland that are not considered cropland. It also includes systems with vegetation that fall below the threshold used in the forest land category and that is not expected to exceed, without human intervention, the threshold used in the forest land category. The category also includes all grassland from wild lands to recreational areas, as well as agricultural and silvi-pastural systems subdivided into managed and unmanaged, consistent with national definitions.

(iv) **Wetland**

This category includes land that is covered or saturated by water for all or part of the year (e.g., peatland) and that does not fall into the forest land, cropland, grassland or settlements categories. The category can be subdivided into managed and unmanaged, according to national definitions. It includes reservoirs as a managed sub-division and natural rivers and lakes as unmanaged sub-divisions.

(v) **Settlements**

This category includes all developed land, including transportation infrastructure and human settlements of any size, unless they are already included under other categories. This should be consistent with the national definitions.

(vi) **Other land**

This category includes bare soil, rock, ice, and all unmanaged land areas that do not fall into any of the other five categories. It allows the total of identified land areas to match the national area, where data are available.

For further descriptions of the land use categories and their transitions, refer to 2006 IPCC Guidelines.

National definitions must be integrated with the IPCC categories. The following nationally relevant considerations were developed at the land cover mapping for the development of greenhouse gas inventories in the Ethiopia workshop in June 2014.

(i) Forest land

Considerations

i. 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 (National Forest Reference Level Submission, 2017; Minutes of Forest sector management, MEFCC, Feb. 2015).

Forest subcategories

a) Natural forest
b) Plantation forest
c) Bamboo

(ii) Cropland

Considerations

i. A land use category that includes areas used for the production of adapted crops for harvest; this category includes both cultivated and non-cultivated lands.
ii. Cultivated crops include row crops or close-grown crops and hay or pasture in rotation with cultivated crops.
iii. Non-cultivated cropland includes continuous hay, perennial crops and horticultural cropland.
iv. Cropland also includes land with alley cropping and windbreaks, as well as lands in temporary fallow or enrolled in conservation reserve programs. Roads through Cropland, including interstate highways, state highways, other paved roads, gravel roads, dirt roads, and railroads are excluded from Cropland area estimates and are, instead, classified as Settlements.
v. It was advised that Ethiopia is a unique case in cropland mapping due to the vast production of teff that usually has the same reflectance as grasslands.

Cropland subcategories

a) Annual Cropland
b) Perennial Cropland

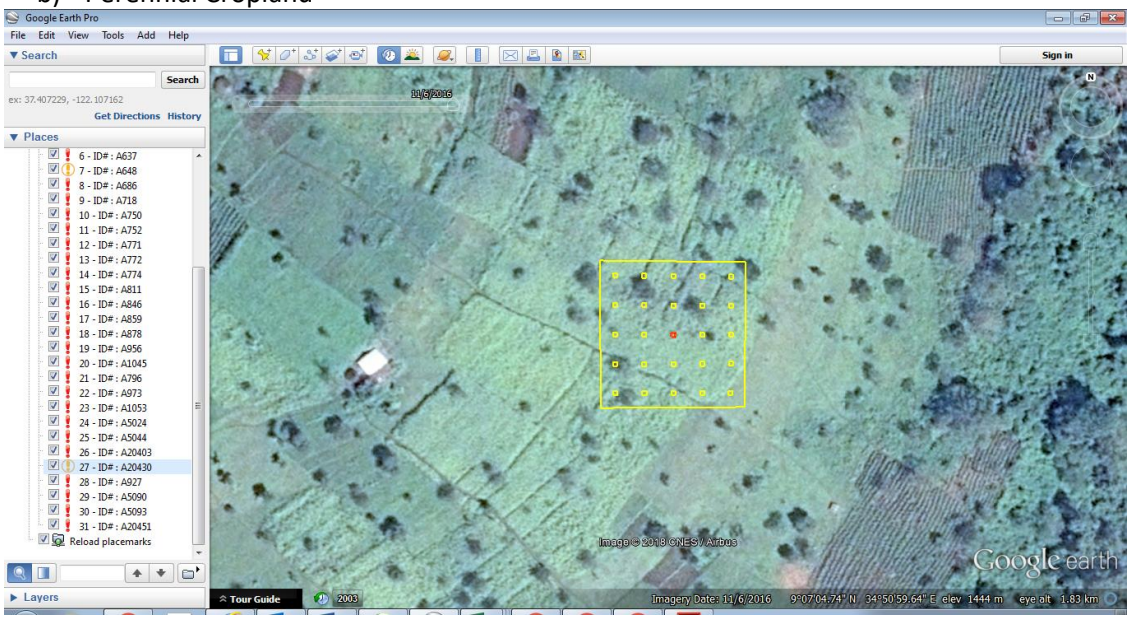

Figure. Example of cropland in Oromia

(iii) Grassland

Considerations

i. A land use category on which the plant cover is mainly composed of grasses, grass-like plants, forbs, or shrubs suitable for grazing and browsing; it includes both pastures and native rangelands. This includes areas where practices such as clearing, burning, chaining, and/or chemicals are applied to maintain the grass vegetation.

ii. Savannahs, waterlogged areas, low woody plant communities and shrubs, such as mesquite, mountain shrub, etc. are also classified as Grassland if they do not meet the criteria for Forest Land.

iii. Grassland includes land managed with agro-forestry practices such as silvi-pasture and windbreaks, assuming that the stand or woodlot does not meet the criteria for Forest Land.

iv. Roads more than 5m wide through Grassland, including highways, other paved roads, gravel roads, dirt roads, and railroads are excluded from Grassland area estimates and are, instead, classified as Settlements.

Grassland subcategories

a) Shrubland

b) Grassland

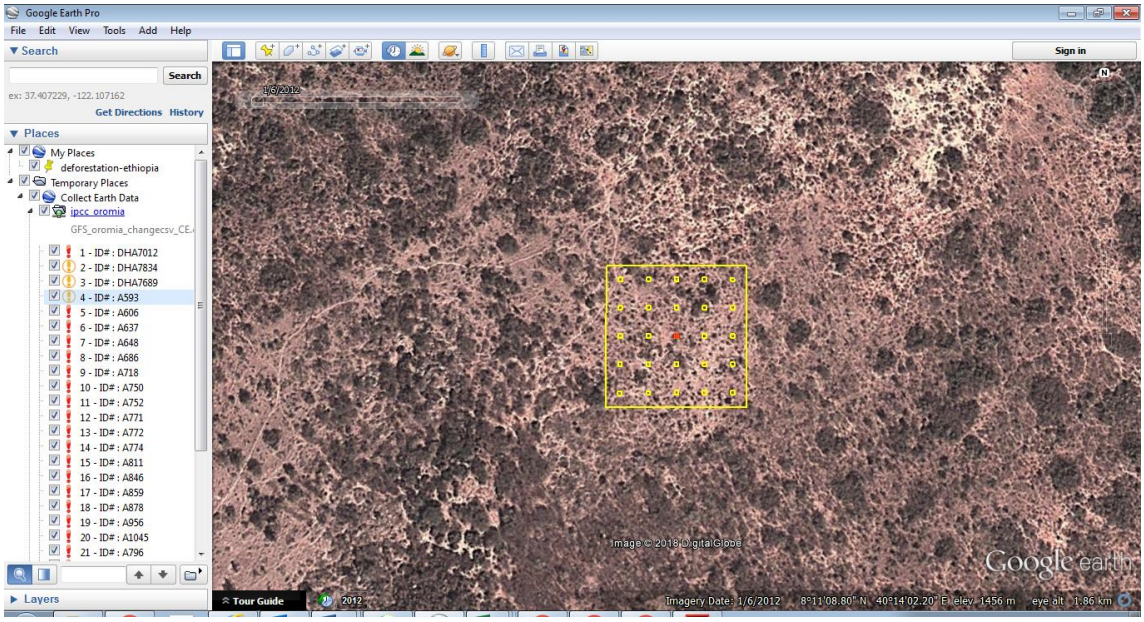

Figure: Example of grassland (subcategory= shrubland) in Oromia

(iv) Wetland

Considerations

i. A land use category that includes land covered or saturated by water for all or part of the year.

ii. Managed Wetlands are those where the water level is artificially changed or were created by human activity.

iii. Certain areas that fall under the managed Wetlands definition are covered in other areas of the IPCC guidance and/or the inventory, including Cropland (e.g., rice cultivation), Grassland, and Forest Land (including drained or un-drained forested wetlands).

(v) Settlement

Considerations

i. A land use category representing developed areas consisting of units of 0.25 acres (0.1 ha) or more that includes residential, industrial, commercial, and institutional land; construction sites; public administrative sites; railroad yards; cemeteries; airports; golf courses; sanitary landfills; sewage treatment plants; water control structures and

spillways; parks within urban and built-up areas; and highways, railroads, and other transportation facilities.

ii. Tracts of less than 10 acres (4.05 ha) that may meet the definitions for Forest Land, Cropland, Grassland, or Other Land, but are surrounded by urban or built-up land, are included in the settlement category.

iii. Rural transportation corridors located within other land uses (e.g., Forest Land, Cropland) are also included in Settlements.

(vi) Other land

Considerations

i. All land areas that do not fall into any of the other five land use categories.

In summary, the following IPCC subcategories have been considered for the activity data analysis.

Table. Land use categories applied in the land use and land use change matrix

IPCC land use category	IPCC land use subcategory
Forest land	Natural forest
	Plantation forest
	Bamboo
Cropland	Annual cropland
	Perennial cropland
Grassland	Grassland
	Shrubland
Wetland	Wetland
Settlements	Settlements
Other land	Other land

<u>Steps followed to obtain data</u>

With the support of FAO, a file was created with the location of the sample plots with a systematic sampling design. The file automatically opens in Collect Earth with the project loaded and Google Earth.

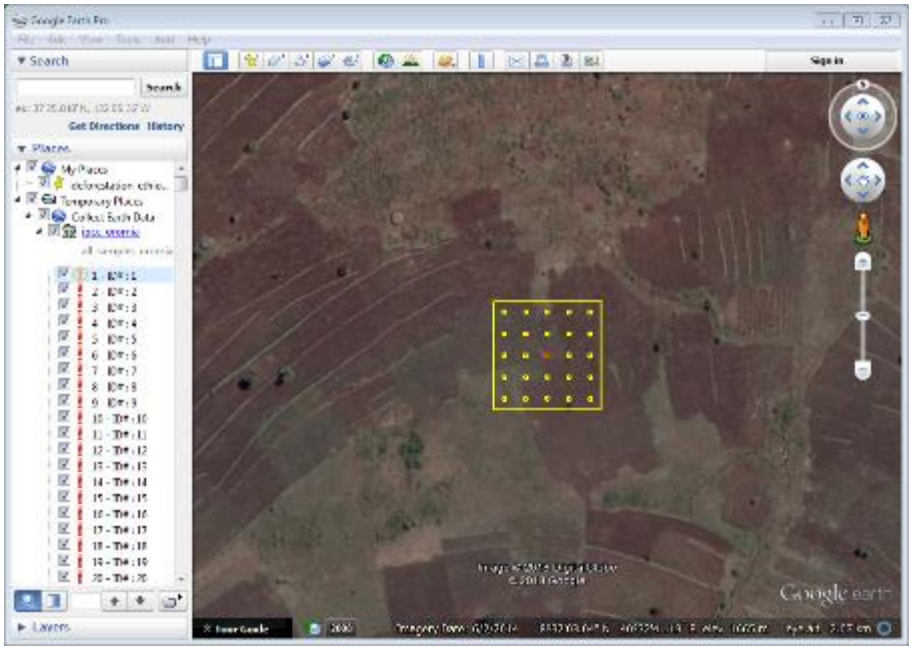

Figure. Sampling plots in Google Earth

Bing Maps and Google Earth Engines were displayed in every plot and can be used to assist with assessing the land use of it. Bing Maps provides high-resolution imagery, which can supplement the imagery available in Google Earth. Google Earth Engine provides a time series of Landsat imagery, dating back to 1984, although imagery is more consistently available after 2000. The slider bars in the four images in Google Earth Engine can be used to explore different years with medium resolution imagery. Time series graphs for the sample point show the NDVI over time, by using MODIS imagery (500-meter resolution) with fire alerts and Landsat imagery (30-meter resolution).

With the use of Collect Earth, the land use information for the plot is entered by users in six main land use categories and land use sub-divisions. The plot is also assessed to determine the land use subcategories' conversions from one land use to another. The year of the change is significant for interpreting land use change dynamics and estimating emissions from land use change. The software allows users to indicate their level of certainty (confidence) about their selections. Confidence is a required field in the land use category, land use subcategory and land use sub-divisions sections.

The Element tab (see figure below) allows users to specify the coverage of topographical elements within each plot (e.g., tree cover, roads, agricultural land, etc.). The final coverage is estimated via proportions (Bey et al, 2016). Each plot contains a certain number of sample points, each one presenting a discrete percentage of the total area within the plot. The percentage of the plot covered by a topographic element is the ratio of (a) the number of points overlaying the element being measured, and (b) the total number of points. The cover percentage can be calculated from the ratio of plot points under canopy cover to the total number of plot sampling points (25). The user also indicates if there are more than 30 trees in the plot in non-forest plots to assess trees outside forests. If there are less than 30 trees, the user must count the number of trees in the plot and specify the number.

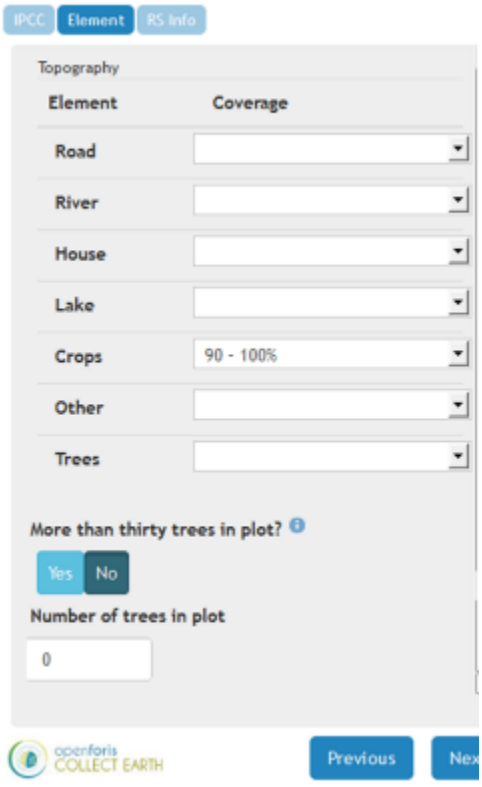

Figure. Element tab in Collect Earth

Under RS Data, the type of satellite imagery that was used to assign the sampling plot to one of the six basic land use categories is selected. The imagery used should be the most recent imagery available that has enough spatial resolution to assess land use.

In the Google Earth Places panel, a red exclamation mark appears beside plots without data. The exclamation mark turns yellow when data is entered but not saved. A green check appears once the data has been submitted and validated.

Results of the analysis of all sample plots are exported as CSV files, which tabulate all data that has been entered in Collect Earth and it can be opened in Excel. The following table shows, in a summarized format, the land use and land use changes occurred between the years 2000 and 2017.

Table. Land use and land use change matrix (2000-2017)

Etiquetas de fila	Cropland	Forest	Grassland	Other Land	Settlement	Wetland	Total general
Cropland	10,151,384	196,923	413,538		19,692	9,846	10,791,384
Forest	29,538	5,996,308	98,462				6,124,308
Grassland	9,846	196,923	11,766,154				11,972,923
Other Land			9,846	492,308			502,154
Settlement	39,385		9,846		216,615		265,846
Wetland						334,769	334,769
Total general	**10,230,154**	**6,390,154**	**12,297,846**	**492,308**	**236,308**	**344,615**	**29,991,384**

3.2.2 Accuracy assessment and bias-corrected area estimates

According to IPCC, it is good practice for countries to produce emission estimates. These should not over- or underestimate actual emissions, as far as can be judged, by introducing a systematic error (or bias), and by reducing uncertainties, as practicable given national circumstances. It is also good practice to quantify uncertainties and report them in a transparent manner.

The land use change data was obtained with the method mentioned in 0, using sampling method distributed and a systematic sampling design. Areas are reported with confidence intervals. There is no need to bias-correct the area estimates.

There is no quality assessment to check for other sources of error, such as interpreter error.

The following figures show the different land use with its confidence interval. It is not possible to include the legend of every land use in the horizontal axis, but this is an illustrative figure that dimensions the confidence interval of different land uses.

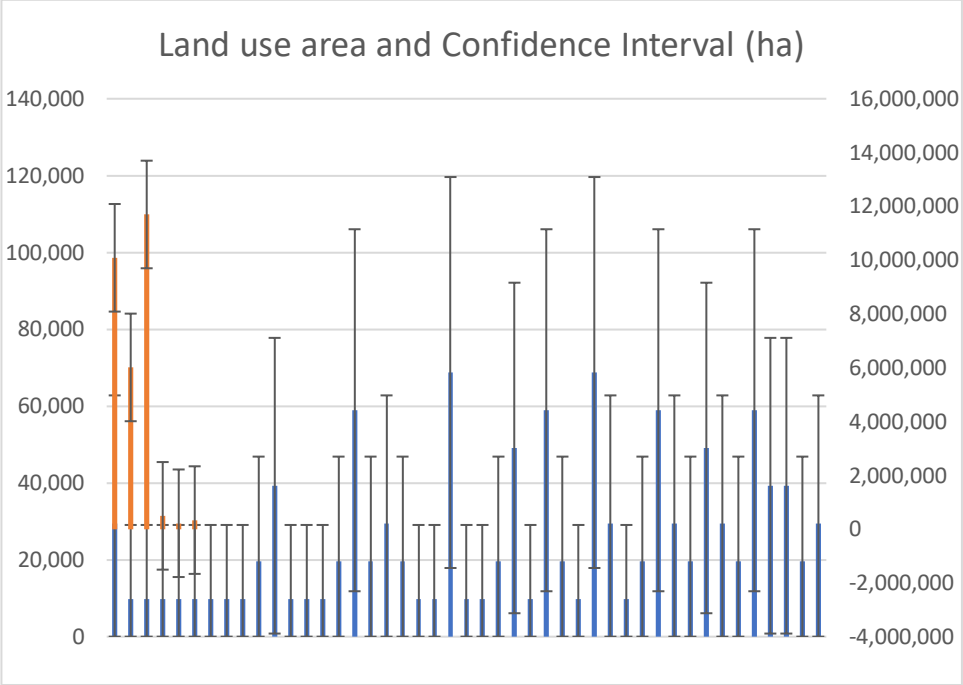

Figure. Land use area and their confidence of interval.

Blue bars and red bars (secondary vertical axis on the right-hand side) represent the area under different land uses. Each bar has a line that shows the confidence interval. Red bars are for the land use categories with large representation and that cannot be represented in the same scale of smaller land use classes. Red bars are, for example, cropland remaining cropland, forestland remaining forestland and grassland remaining grassland. Blue bars are, for example, Land converted to settlements.

3.2.3 Land monitoring system

Land monitoring system is under the scope of the National MRV team within the MoEFCC, with the collaboration of the sub-national MRV team (Oromia).

There is no established periodicity to elaborate new activity data, and the working group prepares it on demand. This group is also assigned to other tasks, so whenever it is necessary to conduct a monitoring event, it is necessary to check its availability and to redefine priorities.

In addition, the work team does not yet have a laboratory with all the necessary tools to carry out monitoring events efficiently and diligently. If the Greenhouse Gases Inventory is made annually (not defined), then the team should also be able to carry out the land use change study annually, to detect the recent land use changes. The team should also include more plots and reduce the uncertainty of the previous analysis.

On the other hand, the national and regional MRV team has demonstrated capacities to monitor the changes in land use. They were able to obtain the raw activity data for this inventory in 21 days. However, the team has a high staff turnover, which sometimes makes it necessary to dedicate time to train new users.

Therefore, it is necessary to define the preparation of the inventories and the elaboration of the activity data periodicities. This is important, as it is known that the users have the technical capacity, but a process of previous training and calibration is also necessary.

3.2.4 IPCC Climate regions

Climatic zones are necessary to define different values for multiple variables, for example emission factors or root-to-shoot ratios. The 2003 IPCC Good Practice Guidance for LULUCF defines twelve general climatic zones which are defined by the combination of Mean Annual

Temperature (MAT), elevation, Mean Annual Precipitation (MAP), of MAP and Potential Evapotranspiration (PET) and frost occurrence. The following figure shows the decision tree to determine the climatic zones in Oromia.

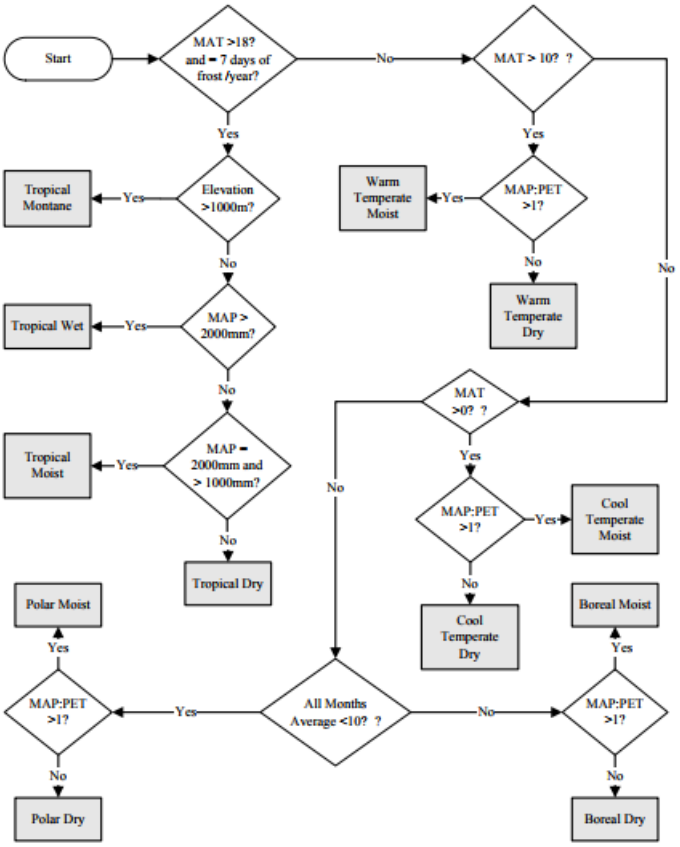

Figure. Classification scheme for default climate regions.

The following maps were elaborated from different data sources and combined to define the climatic zones in the National Regional State. Mean Annual Rainfall was elaborated from the digitalization of the information present in the National Atlas of Ethiopia (available only as a hard copy in the Ethiopian Geo-Spatial Information Agency). The elevation map was obtained from the Regional Centre for Mapping of Resources for Development.

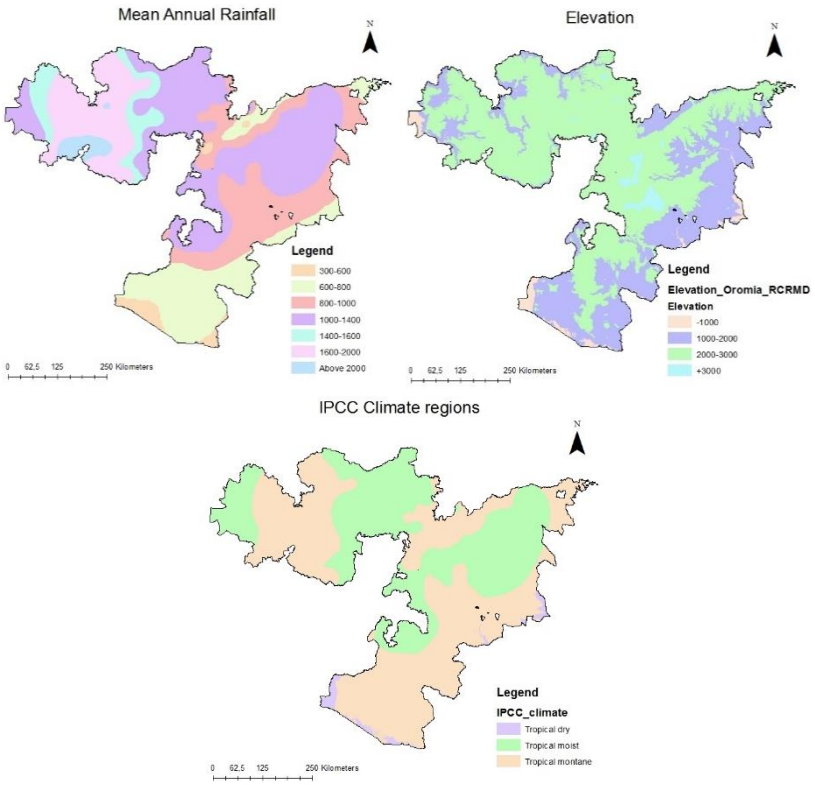

Figure. Mean Annual Rainfall, elevation and IPCC Climate regions maps for Oromia National Regional State

The information used to determine the climate and the soil types was provided by the analysis made to determine the use of land and the change in land use, described in chapter 0.

3.2.5 Soil types

Soil types are obtained from the FAO Harmonised World Sild Database (HSDB) converted to IPCC default soil classes. The HWSD summarizes the latest regional soil information as compiled by the various partners (FAO, International Institute for Applied Systems Analysis, ISRIC – World Soil Information, Institute of Soil Science – Chinese Academy of Sciences and the Joint Research Centre of the European Commission – JRC) using the best (and sometimes only) available data.

GHG Inventory assessments involve the estimation of stock and net fluxes of carbon from different land use systems in each area over a given period, which, in this case, is the Oromia Regional State for the 2000-2017 period.

Default data sets for soil types were primarily used at this regional level, given the lack of available sub-national information. In fact, more detailed information of Soil Organic Carbon data could be provided by the EthioSIS Soil Type Classification dataset, but it is confined only to cropland areas and hosted by the Ethiopian Agricultural Transformation Agency. The information could never be obtained from the Agency.

Stratification by broad soil types underlies tier-1 approaches (*2006 IPCC Guidelines*) and the results are provided in the following figure.

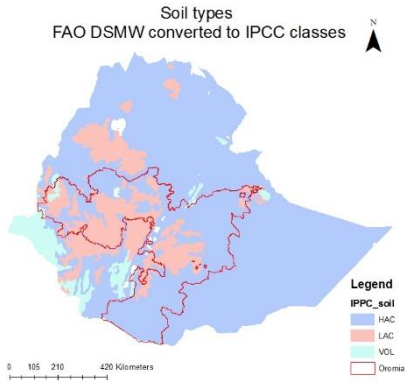

Figure. Soil types in Ethiopia. Oromia National Regional State is represented with a red contour line

When the Geo-Spatial Information Agency (ex EMA) information on land use was used for the years 2003, 2008 and 2013 and a wall-to-wall analysis was done, this geographically explicit information about soil types was of extreme help. Every land use change could be defined under a certain climate and soil type. However, due to inconsistencies found with Geo-Spatial Information Agency maps, the process for obtaining the activity data was modified. The alternative method to obtain the activity data, see chapter 0, also provided the information for the soil type when a land use change occurred, which was also obtained from FAO Harmonised World Sild Database (HSDB) converted to IPCC default soil classes.

The result is that 78% of the soils in Oromia are High Activity Clay Soils (HAC), 20% are Low Activity Clay Soils (LAC) and the other 2% corresponds to Sandy soils (SAN) and Volcanic Soils (VOL). Considering the climate regions in Oromia, the Soil Organic Carbon of reference (SOC_{REF}) for each soil is obtained from *2006 IPCC Guidelines* and it is presented below.

Table. Soil Organic Carbon of Reference by climate

Soil type	**SOC_{REF} tC ha^{-1}**
HAC	
Cold temperate moist	95
Tropical dry	38
Tropical Moist	65
Warm Tropical dry	38
Cold temperate moist	88
LAC	
Tropical Montane	63
Tropical Moist	47
Warm Temperate Moist	63

3.2.6 National Forest Inventory

Introduction

The National Forest Monitoring and Assessment (NFMA) programme is based on nation-wide sampling and field data collection.

The institutions responsible for forestry in Ethiopia are the Environment, Forestry and Climate Change Commission (EFCCC), the Institute of Biodiversity Conservation (IBC) for most forest ecosystems, the Ministry of Culture and Tourism (MoCT) and the Ethiopian Wildlife Conservation Authority for national parks.

Objective

The overall objective of the NFA of Ethiopia will be to generate reliable information on forest resources for policy formulation, institutional capacity building, planning, conservation and utilization of natural resources on a sustainable basis.

Sampling design

The number of sampling units or sampling units to be surveyed was determined by the required statistical reliability of the data, the available financial and human resources for the assessment, and with a view to enabling periodic monitoring. In order to optimize the sampling intensity of the National Forest Inventory (NFI), subdividing the whole country into reasonable stratums is the primary task. In this regard, the Forest Inventory Team has conducted series of consultative meeting with foresters, plant ecologists and statisticians. Moreover, experience of the forest inventory was revised, and important lessons were drawn.

The field sampling is divided into 5 strata, where stratum I comprises the natural forest and plantation and Bamboo; stratum 2 (woodland Stratum I) comprises the North and South Eastern part of the woodland, mainly *Acacia Comiphora* woodland of Somali and the Afar region; and stratum 3 (Woodland Stratum II) comprises the North and South Western woodland part where *Termilania-Comberatum* is dominated. Stratum IV and V are other land, Beriha (Desert) stratums where agricultural and other land uses dominated, and bare land mosaics features existed. See figure below.

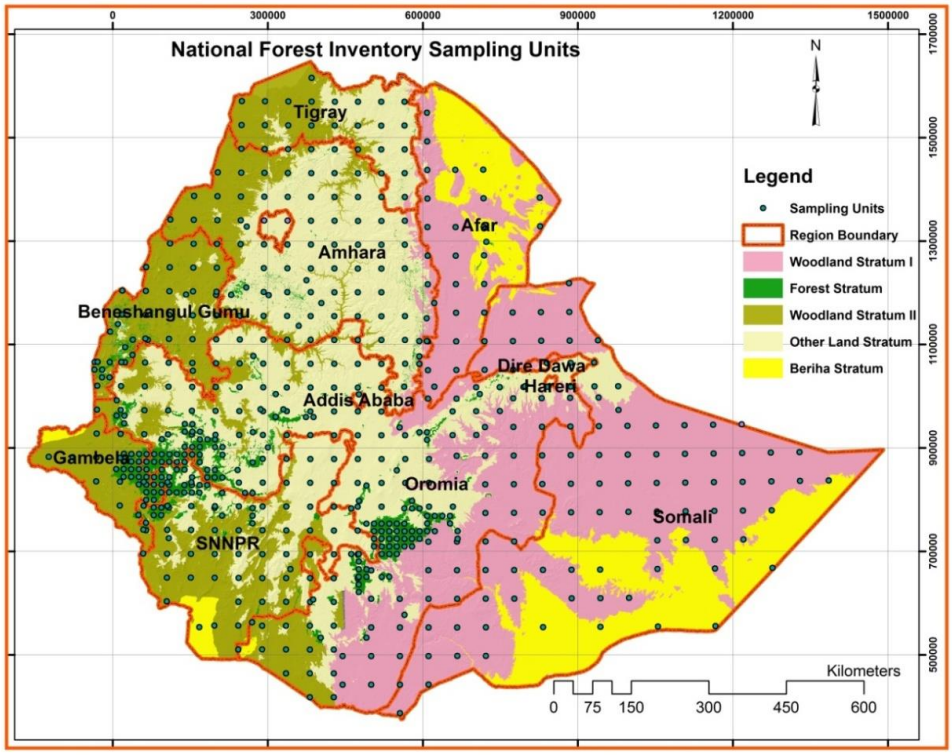

Figure. Distribution of Sampling Units (or Tracts) in Ethiopia

Land use/cover classification

The classification system used to define land use/cover classes (LUCC) is based on a dichotomous approach and it includes different levels:

- The first level is composed of the global designated for the assessment of resources at global level and it is based on the classification system developed by the Forest Resources Assessment Programme of FAO to ensure harmonization between countries for regional or global assessments. The global classes include forests, other wooded land, other land and inland water.
- The second, third and fourth levels are country specific, and include additional classes designated to meet specific federal and regional information needs:

⇒ The second level applies to all classes and it differentiates between land use/land cover;

⇒ The third level refers to evergreen, semi deciduous and deciduous forests and it describes its naturalness;

⇒ The fourth level mainly applies to vegetation canopy cover and it is applicable only to evergreen, shrubs and natural grassland.

A code with 2 to 5 characters has been associated to each class in order to facilitate data collection and input.

The complete classes definition and related codes used in NFMA are shown in Annex III to Annex 6. Global Land use/cover classes definitions (FRA 2010).

Additional information about the National Forest Monitoring for REDD+ in Ethiopia can be found in "Manual for integrated field data collection"[79].

Results

The results of the National Forest Inventory were used to estimate the carbon stock in different land uses in Oromia. The following table shows the above ground and below ground stock in tCO_2/ha, with the number of plots measured, standard deviation and coefficient of variation.

Table. Carbon Stocks in different land uses in Oromia

Land Use	AGB&BGB (tCO2/ha)	N Plots	SD	CV
Annual crop	59	105	123	210%
Perennial crop	131	10	194	148%
Bamboo forest	8	2	2	19%
Broadleaved planted forest	15	3	10	67%
Coffee plantation	229	17	215	94%
Coniferous planted forest	164	4	109	67%
Deciduous forest	63	3	49	78%
Evergreen forest	1067	45	991	93%
Fallow	14	9	16	113%
Mixed annual and perennial crop	99	6	199	201%
Natural forest coffee	1472	2	1386	94%
Natural grassland	22	45	32	143%
Semi-deciduous forest	6	2	4	67%
Wood lot	77	2	64	83%
Other wooded lands	66	56	95	145%
Wooded grassland	79	20	108	136%
Built up area	20	10	16	82%
Wooded wetland	15	3	25	167%
Forest	655	14	955	146%

Emission factors for above ground and below ground are obtained from the difference in stocks in conversion to land uses. Not every land use was used, since the activity data was not subdivided with the same nomenclature and quantity of classes. Some of the previous values were extrapolated to the land use classes obtained in chapter 4.2.1, and others were merged.

The table above was complemented with information from the National Forest Reference Level for forest areas, the Woody Biomass Inventory and the Strategic Planning Project for specific land

[79]Dan Altrell, Selmi Khemaies, Melekeneh Gelet, Zerihun Asrat. Adapted from the original Edited by Anne Branthomme. In collaboration with Dan Altrell, Kewin Kamelarczyk and Mohamed Saket. FAO, Rome, 2012. Version 3.0 (1st Edition).

uses (not available in the National Forest Inventory), land use remaining in the same land use (increment of biomass).

Deadwood is also measured in National Forest Inventory sample plots. The result is presented below as carbon stock per land use type.

Table. Carbon stock (tCO_2/ha) by land use class

Land Use class	tCO_2/ha
Annual cropland/cropland	0.94
Mixed annual and perennial cropland	3.69
Perennial cropland	6.44
Unknown agriculture	0.94
Bamboo	1.93
Forest/Natural forest	5.79
Plantation	2.93
Grassland	2.95
Shrubland	3.20
Unknown grassland	2.95
Settlement	0
Wetland	0

3.3 Category results

3.3.1 Forestland

As trees grow, they absorb CO_2 from the atmosphere through photosynthesis, and some of this carbon is stored in biomass, dead organic matter and litter. Carbon dioxide and other GHGs are returned to the atmosphere by respiration and the decay and burning of organic matter. Human interactions with the land can directly alter the size and rate of these natural exchanges of GHGs in both the short and long term. Land use change and land use practices in the past still affect current GHG fluxes to and from the managed forest. This long-term effect is a unique characteristic of the LULUCF sector, that makes it very distinct from other inventory sectors.

Methodology

The methodology applied is mentioned in 3.1.3.

Activity Data

The forest area showed a net decrease in the period under analysis, as the result of multiple interactions with other land uses: conversion of other land uses to forestland and conversion from forestland to other land uses. However, the activity data is only presented with the format of the

2006 IPCC Guidelines and the land use change of forestland to other land uses is not presented in this chapter.

Forestland remaining forestland and land converted to forestland are presented in the table below.

Table. Land use change in forestland (ha)

Etiquetas de fila	2005	2006	2011	2012	2014	2016	no change	Total general
Forestland remaining Forestland							5,996,308	5,996,308
Grassland converted to Forest land	19,692		9,846	19,692	19,692	29,538		98,462
Cropland converted to Forest land		9,846			9,846	9,846		29,538
Total general	**19,692**	**9,846**	**9,846**	**19,692**	**29,538**	**39,385**	**5,996,308**	**6,124,308**

Emission factors

Land converted to forestland

Carbon stocks in forestland were derived from the National Forest Inventory (NFI) in Ethiopia. The assessment methodology and the approach of the National Forestry Assessment (NFA) were developed by the Support to Forest Resources Assessment programme of the FAO, currently known as the National Forest Monitoring and Assessment (NFMA) programme. It is based on nation-wide sampling and field data collection. The raw data was processed to determine the aboveground biomass with *Chave et al., 2014* and applying the method described by Sarndal et al. (1992).

Basic wood density is needed to estimate aboveground biomass with the allometric equation of *Chave et al., 2014*. Most of the species' basic density is obtained from the Ethiopia National Forest Reference Level[80] (submitted to the UNFCCC) where the basic density value is included as an annex to the document. Other species' basic densities were obtained from the *2006 IPCC Guidelines* and few species' basic density is collected from the Woody Biomass Inventory and Strategic Planning Project.

The Forest Inventory Directorate from the Environment, Forest and Climate Change Commission is planned to update the National forest Inventory every five years. However, at the moment, there is only one measurement event, what makes impossible the use of the National Forest Inventory data to determine the emission factor in land remaining under the same category. In these cases, data from the Woody Biomass Inventory and Strategic Planning Project was used, which has a very low-quality level because of its high uncertainty.

In future GHG Inventories, more accurate results (higher tier) could be achieved with the new data arriving from the Second National Forest Inventory.

For more information see chapters 3.2.5 and 3.2.6.

Forestland remaining forestland

As it was previously mentioned, the result of emissions under this category is highly uncertain, given the low-quality value of the annual removals in forestland remaining forestland or the woody stocks in the region by zone. As explained before, the emission factors are obtained from the Woody Biomass Inventory and Strategic Planning Project: annual yield by forest type and harvesting volume for fuelwood.

Results

Forestland remaining forestland

The result for this land use category is presented in the following figure. The total emissions are estimated assuming that forest is permanently in the same state (yield) as it has been reported in the Woody Biomass Inventory and Strategic Planning Project. This does not represent the reality,

[80] http://redd.unfccc.int/files/ethiopia_frel_3.2_final_modified_submission.pdf

since forests stocks can vary by multiple variables that can never be extrapolated or be assumed constant.

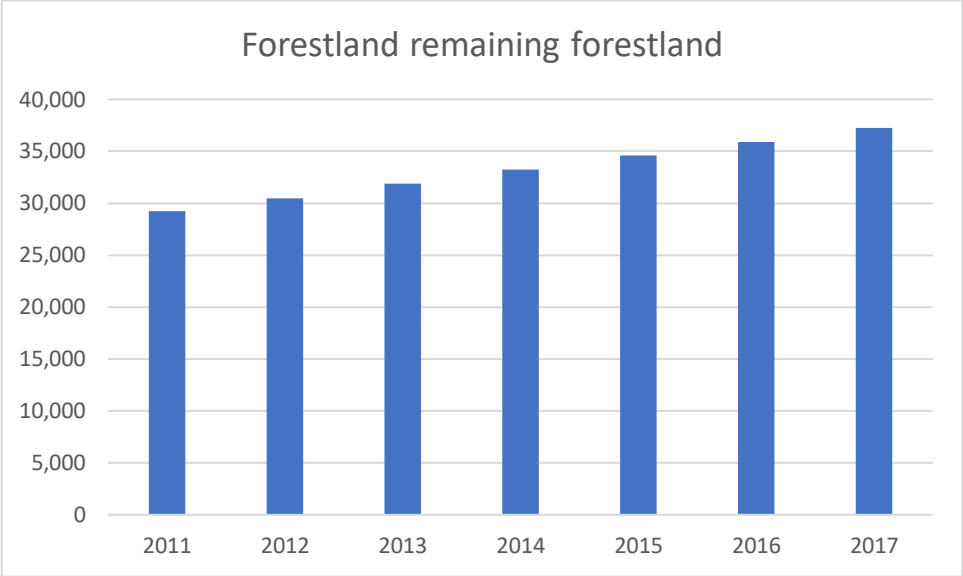

Figure. Removals in forestland remaining forestland

The increasing tendency in net emissions is explained by the increase in population and the amount of fuelwood extracted from the forest.

Land converted to forestland

These results are showing the combination of grassland converted to forestland and cropland converted to forestland.

In the case of land converted to forestland, it is assumed that any land use converted to forestland has a period of five years needed to reach the carbon stocks of the corresponding forest. After that transition is detected, the land remains under the category "land converted to forestland" for the next 20 years, as established in 2003 Good Practice Guidance for GHG Inventories. Every year, after the conversion, the area corresponds to a specific forest type and forest removals are considered in such area.

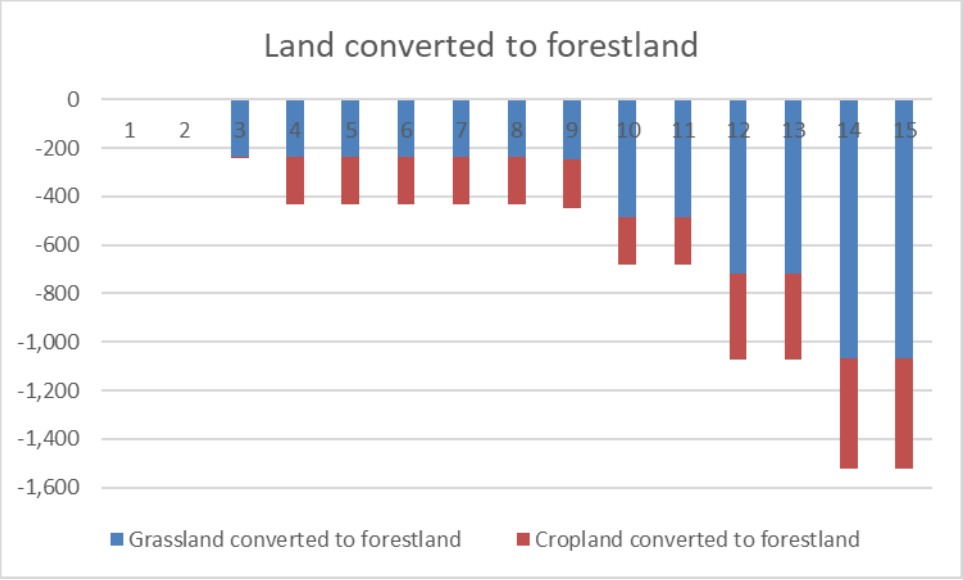

Figure. Removals in land converted to forestland

3.3.2 Cropland

Methodology

The applied methodology is mentioned in 3.1.3.

Activity Data

The following table shows the land use matrix for cropland area for the 2000-2017 period. In this case, there are more land use transitions than in forestland (section 3.3.1), what is explained by the agricultural activity of the region. The difference is the amount of area under each land use type. As it can be seen in table 15, cropland and grassland areas represent more than 75% of the total territory in Oromia.

Table. Land use change matrix for cropland area (ha)

Etiquetas de fila	2001	2002	2003	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	no change	Total general
Cropland remaining Cropland																	10,151,384	10,151,384
Forest converted to Cropland	19,692	9,846				9,846	19,692	29,538	19,692	9,846		39,385	29,538	9,846				196,923
Grassland converted to Cropland	9,846		9,846	9,846	39,385	9,846	39,385		49,231	39,385	49,231	29,538	19,692	39,385	59,077	9,846		413,538
Total general	**29,538**	**9,846**	**9,846**	**9,846**	**39,385**	**19,692**	**59,077**	**29,538**	**68,923**	**49,231**	**49,231**	**68,923**	**49,231**	**49,231**	**59,077**	**9,846**	**10,151,384**	**10,761,846**

Emission Factors

Emission factors for aboveground and belowground biomasses are obtained from the National Forest Inventory. As it was already explained in section 0, the NFI collected information about aboveground biomass for every land use type, including cropland. A specific emission factor for annual cropland and perennial cropland is considered under this GHG Inventory.

It is assumed that, under *tier 1*, carbon stocks change in deadwood is zero in cropland remaining cropland and there is no national or sub-national information to assume a different value. However, when any land use is converted to cropland, emissions from deadwood pool are considered. On the contrary, a conversion from cropland to other land use can result in emissions or removals (depending the final land use), but these emissions or removals are not considered in this section.

For more information see chapter 4.2.5 and 4.2.6.

Results

Cropland remaining cropland

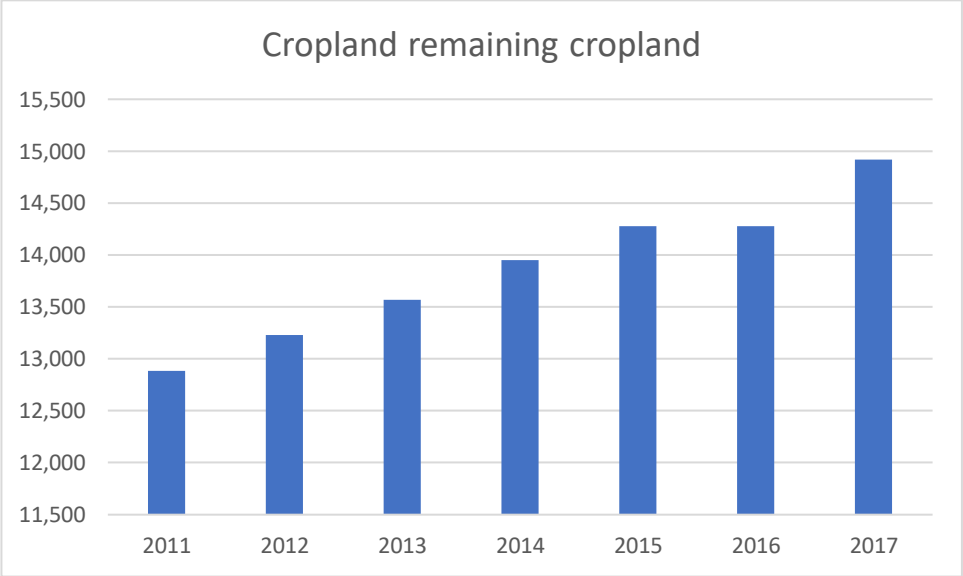

Figure. Emissions and removals in cropland remaining cropland (ktCO2)

The previous figure shows that cropland remaining cropland under the LULUCF sector has have always had net emissions. The explanation is the same as in forestland remaining forestland; the increase of population has demanded more fuelwood, not only from forestland land but also from cropland. There are some soil organic carbon emissions and is explained by land use changes from perennial cropland to annual cropland. This land use change also implies the release to the atmosphere of an existing carbon stock in aboveground and belowground biomass. On the contrary, when land use changes from annual cropland to perennial cropland, there is an increase of carbon stock that results in net removals from the atmosphere.

There are two land use subcategories that most contribute to these figures: “perennial cropland remaining as perennial cropland” and “mixed annual and perennial cropland remaining as mixed annual and perennial cropland”. The National Forest Inventory does not have information about the changes in stock in these land use subcategories. According to the Woody Biomass Inventory and Strategic Planning Project (together with carbon stocks from NFI), the annual increase in living biomass is 1.99 tCO_2/ha/year in the case of mixed annual and perennial cropland and 6.57 tCO_2/ha/year for perennial cropland.

Land converted to cropland

These results are showing the combination of forestland converted to cropland, grassland converted to cropland, and settlement converted to cropland.

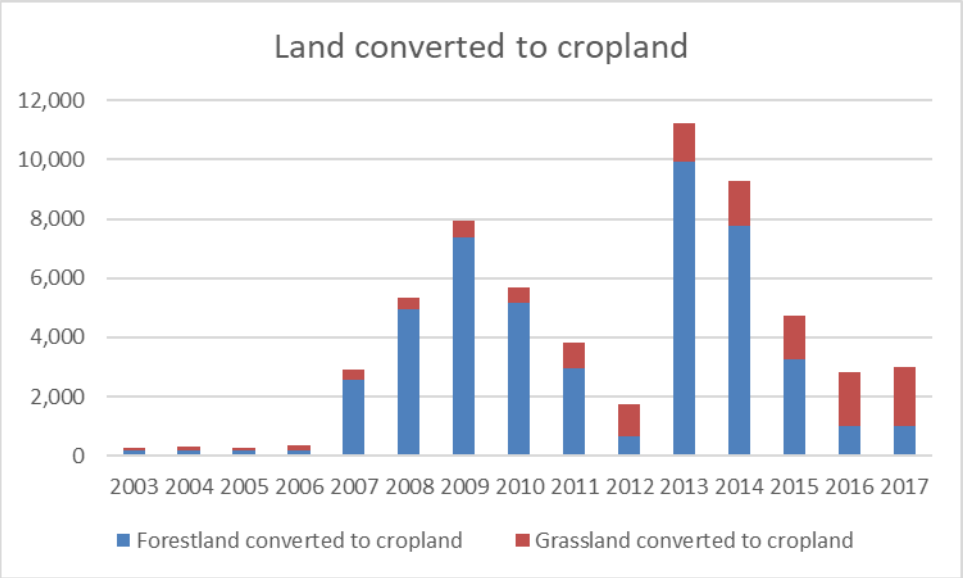

Figure. Emissions and removals in land converted to cropland (ktCO2)

In general terms, the conversion to cropland implies the release of carbon stocks in aboveground, belowground, deadwood and soil organic carbon to the atmosphere. As it can be seen in Table. Land use change matrix for cropland area, there is a large transition from forestland and grassland to cropland over the period of analysis.

3.3.3 Grassland

Methodology

The applied methodology is mentioned in 3.1.3.

Activity Data

The following table shows the land use matrix for grassland area for the 2000-2017 period. As in cropland area, there are several land use changes from forestland and cropland to grassland. The conversion occurring under the category “grassland remaining grassland” corresponds to the conversion of shrubland to grassland and vice versa. The following table shows the results of the transition between the different land use classes.

Table . Land use and land use change in grassland category

Etiquetas de fila	2003	2006	2009	2010	2012	2013	2014	2015	2016	2017	no change	Total general
Grassland remaining Grassland											11,766,154	11,766,154
Forest converted to Grassland	9,846	9,846	9,846	9,846	9,846	29,538	19,692	29,538	39,385	29,538		196,923
Cropland converted to Grassland			9,846									9,846
Total general	**9,846**	**9,846**	**19,692**	**9,846**	**9,846**	**29,538**	**19,692**	**29,538**	**39,385**	**29,538**	**11,766,154**	**11,972,923**

Emission Factors

Emission factors for aboveground and belowground biomasses are obtained from the National Forest Inventory. As it was already explained in section 0, the NFI collected information about aboveground biomass for every land use type, including grassland. Specific emission factors for grassland are obtained from the NFI. However, as there is no information for the shrubland subcategory in the NFI, information from the Woody Biomass Inventory and Strategic Planning Project was obtained. The difference in the sources of emission factors is a concrete source of uncertainty that will be considered in the overall uncertainty.

It is assumed, under *tier 1*, that carbon stocks in deadwood is zero. There is no national or sub-national data to assume a different value.

For more information see chapters 4.2.5 and 4.2.6.

Results

Grassland remaining grassland

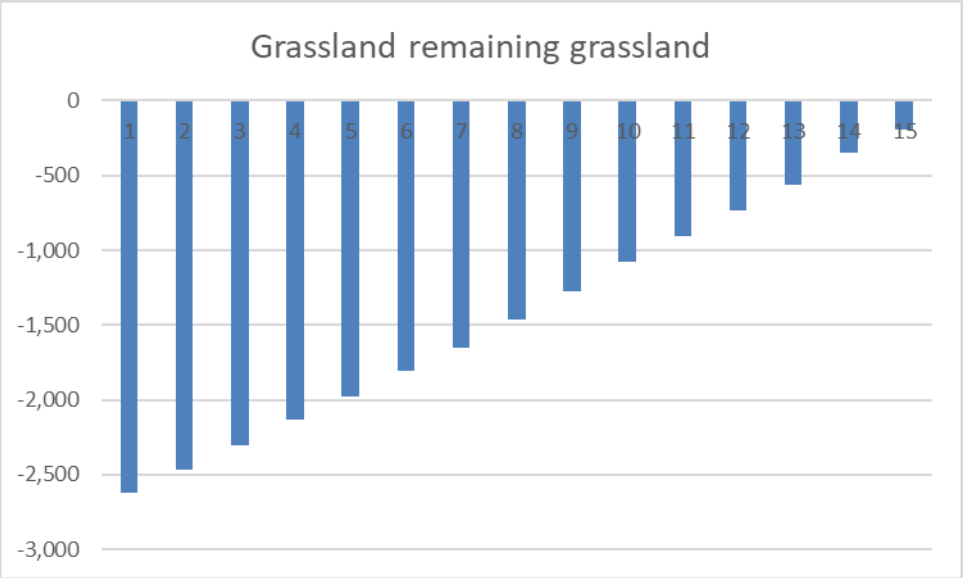

Figure. Emissions and removals in grassland remaining grassland (ktCO2)

The previous figure shows a tendency in decreasing removals (negative values) in grassland remaining grassland. This is explained by the reduction in area in the category "grassland remaining grassland" (conversion to other land use) and by the fuelwood that has been extracted from this land use (shrubland).

Soil organic carbon is stable, assuming *tier 1* method from *2006 IPCC Guidelines*. Deadwood pool is also stable under this land use and does not generate emissions or removals in the period under analysis.

This land use category represents a large sink of carbon dioxide. As commented above, the emission factors are obtained from NFI and the Woody Biomass Inventory and Strategic Planning Project, 0.812 tCO_2/ha/year for shrubland and 0.893 tCO_2/ha/year for grassland. The values, which are low compared to other emission factors, are applied to a very large area (over 11 million ha) and results in the amount of removals are presented above.

Land converted to grassland

These results are showing the combination of forestland converted to grassland and cropland converted to grassland,

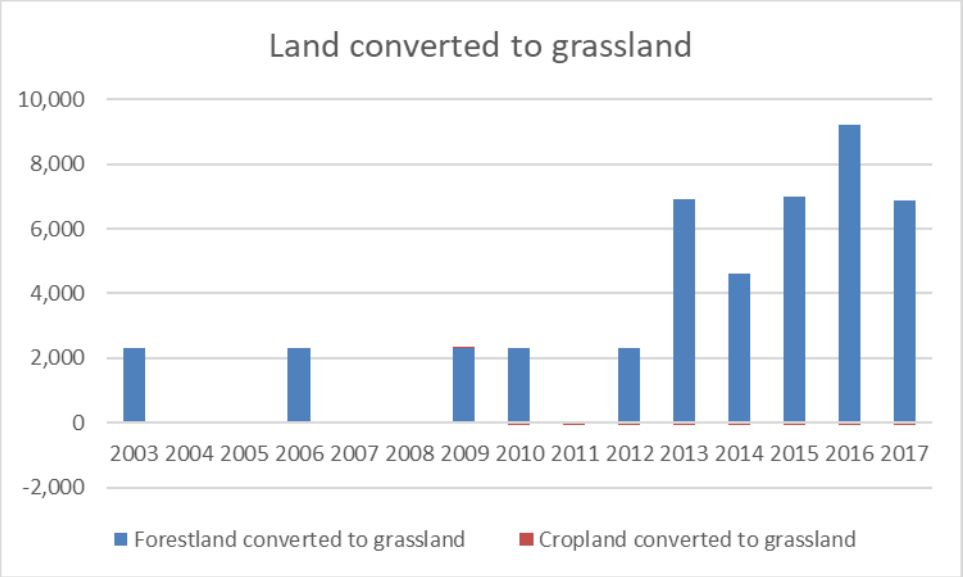

Figure. Emissions in land converted to grassland (ktCO2)

Land converted to grassland generates emissions of GHG to the atmosphere, mainly from the conversion from forestland to grassland. Deadwood, SOC and biomass stocks in previous land use (forestry) are emitted to the atmosphere when converted to grassland. These pool´s stocks in grassland are lower than in forest.

3.3.4 Wetlands

Methodology

The 2013 Supplement of the *2006 IPCC Guidelines* for National Greenhouse Gas Inventories: Wetlands (Wetlands Supplement) provides methods for estimating anthropogenic emissions and removals of greenhouse gases from lands with wet and drained soils, and from constructed wetlands for wastewater treatment. It follows the same approach to estimating emissions and removals as the *2006 IPCC Guidelines* for National Greenhouse Gas Inventories (*2006 IPCC Guidelines*).

Even though there is a methodology available for estimation of emissions and removals under this category, it was not possible to estimate emissions in wetland areas. The first reason is that the 2013 Supplement divides the wetlands in Managed peatlands and flooded land. There is no information on peatlands in Oromia. Activity data for flooded land (wetlands) in Oromia is only for "wetland remaining wetland" and the 2013 Supplement does not provide methodologies for such category. As there is no activity data for land converted to flooded land, it is not possible to estimate emissions under this land use.

Activity Data

Wetland area is the Region is stable in 333,903 ha. Although there are conversions from wetland to other land use, they are not reported under this section. This section is only reporting the conversion from other land uses to wetland, which in this case is inexistent.

Table. Land use and land use change in wetland category

Etiquetas de fila	no change	Total general
Wetland remaining wetland	334,769	334,769
Total general	**334,769**	**334,769**

3.3.5 Settlements

Methodology

The applied methodology is mentioned in 0., *mutatis mutandis*.

Activity Data

Settlements in Oromia occupy an area of 265,158 ha, which is smaller than the area under wetlands. The uncertainty for both land uses is presented in chapter 0: 3.2 Representation of lands and National Forest Inventory.

Table. Land use and land use change in settlement category

Etiquetas de fila	2003	2008	2009	2010	no change	Total general
Settlements remaining settlements					216,615	216,615
Cropland converted to Settlement	9,846	19,692	9,846			39,385
Grassland converted to Settlement				9,846		9,846
Total general	**9,846**	**19,692**	**9,846**	**9,846**	**216,615**	**265,846**

Emission Factors

Emission factors are obtained from the National Forest Inventory and Woody Biomass Inventory and Strategic Planning Project. In the case of settlements remaining settlements, the emission factor for biomass considers the carbon stock from the National Forestry Inventory and the yield of "urban" category from the Woody Biomass Inventory and Strategic Planning Project.

Deadwood pool is considered when there is a land use change from any land use to settlement. In settlement remaining settlement is stable and does not generate emissions or removals.

For more information see chapters 4.2.5 and 4.2.6.

Results

Settlements remaining settlements

The following figure shows the tendency in removals in settlements remaining settlements. Only aboveground and belowground is considered, given the available information.

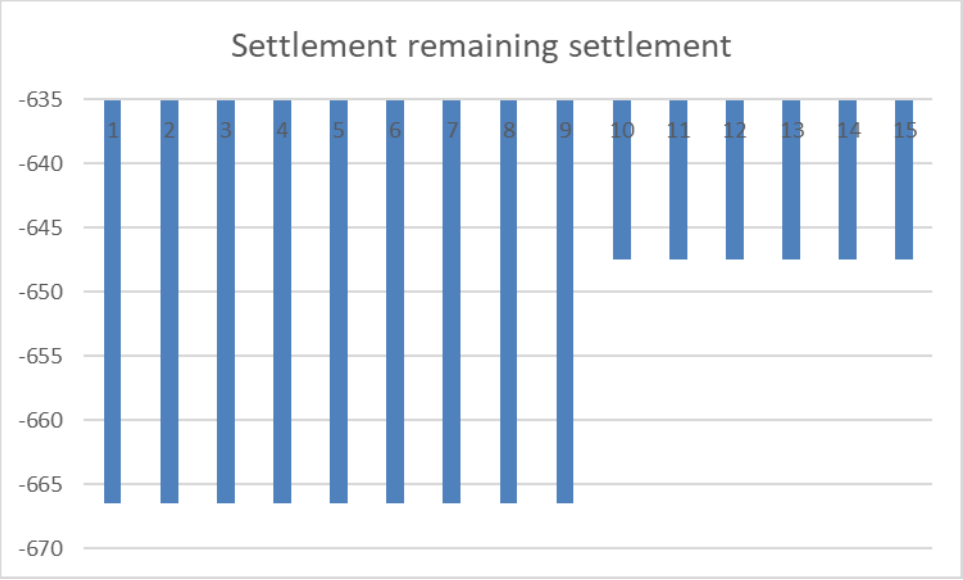

Figure. Removals in settlements remaining settlements (ktCO2)

Land converted to settlements

These emissions result from the combination of cropland converted to settlement and grassland converted to settlements.

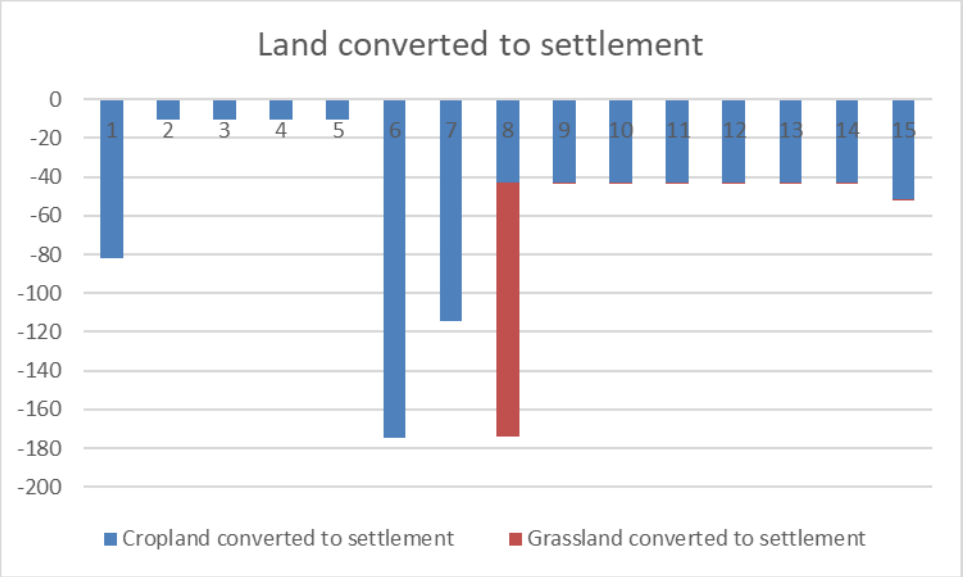

Figure. Emissions and removals in land converted to settlements (ktCO2)

The figure above shows the emissions and removals in different pools under the category "land converted to settlements". There are some peaks in years 2003, 2008, 2009 and 2010, which correspond to conversions from cropland and forestland to settlements.

3.3.6 Other land

Methodology

The applied methodology is mentioned in 0., *mutatis mutandis*.

Activity Data

The table below shows the land use and land use change in Other land. Other land remaining other land is approximately half million ha and the only conversion is from grassland to other land.

Table . Land use and land use change in other land

Etiquetas de fila	2004	no change	Total general
Other land remaining Other land		492,308	492,308
Grassland converted to Otherland	9,846		9,846
Total general	**9,846**	**492,308**	**502,154**

Emission factors

For more information see chapters 3.2.5 and 3.2.6.

Results

Land converted to other land

In this case land converted to otherland only means grassland converted to other lands

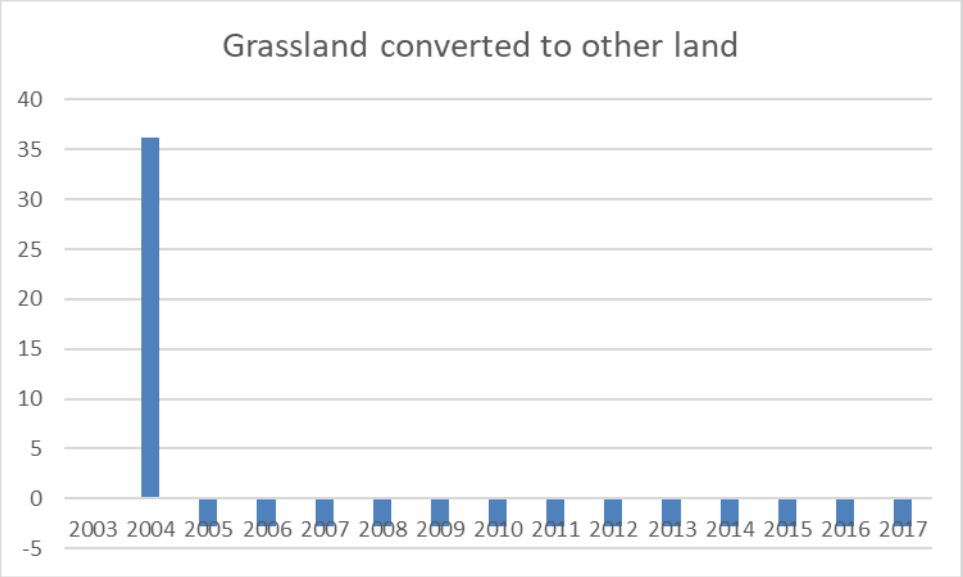

Figure. Emissions and removals in land converted to other land (ktCO2)

3.3.7 Harvested Wood Products

The carbon cycle is affected when forests are harvested. Along this report, it is assumed that CO_2 is released during harvesting as it is the default approach in the Revised 1996 IPCC Guidelines. All CO_2 emissions and removals associated with forest harvesting and with the oxidation of wood products are accounted for in the year of harvesting (removal).

The proposed method recommends that storage of carbon in forest products be included in a separate account only in the case where a country can document that existing stocks of long-term forest products are in fact increasing. The current report assumes this.

Harvested wood products (HWP), according to the IPCC Good Practice Guidance (2003), include wood and paper products. It does not include carbon in harvested trees that are left at harvest sites.

Although there is a methodology available in *2006 IPCC Guidelines*, there is still no consensus about the approach to follow when accounting at national level. Different approaches end in different results, as they differ in scope of analysis. In this GHG it is different; all different approaches were estimated, and the Oromia National Regional State government needs to decide which one to use.

Methodology

Methodologies and good practice for the estimating and reporting of emissions and removals from HWP can be found in Appendix 3a.1 in the IPCC good practice guidance for LULUCF (2003). For this specific case, the IPCC software was used to estimate the amount of carbon stored in this pool.

There are four different approaches that were applied to estimate the carbon stocks in HWP: “Stock-change approach”, “atmospheric flow approach”, “production approach” and “simple decay approach”. Full description of the approaches can be found in Annex 12.A.1 of the *2006 IPCC Guidelines*.

Activity Data

The activity data was collected from FAOSTAT. The FAO Statistics webpage provides free access to food and agriculture data for over 245 countries and territories. Every country is responsible for providing the information that FAO finally publishes. In the case of Oromia, the complete set of data for Ethiopia was obtained for the 1993-2017 period, but it weighted by the forest land

area in the region. This is a proxy estimation of the quantity of produced, imported and exported products from Oromia.

Emission Factors

Emission factors are the default factors from the *2006 IPCC Guidelines*. The following list shows the values applied.

Table. Emission factors used to estimate HWP pools

Half lives	Solid wood products	30 years
	Paper products	2 years
Conversion factors	Sawn wood, other industrial roundwood	0.5 tC/m^3
	Wood-based panels	0.295 tC/m^3
	Paper products	0.450 tC/m^3
	Wood charcoals	0.765 tC/m^3
	Bark	1.120 tC/m^3
Growth rate of HWP consumption prior to starting year		0.0287 1/year

Results

Table. HWP pools with four methods

Year	Stock-change method	Atmospheric flow approach	Production approach	Simple decay approach
2000	-85.78	-39.36	-58.4	-58.4
2001	-79.08	-32.49	-55.51	-55.51
2002	-71.43	-37.15	-58.74	-58.74
2003	-83.38	-29.43	-52.11	-52.11
2004	-185.81	-119.4	-135.22	-135.22
2005	-181.93	-103.27	-117.06	-117.06
2006	-186.25	-98.4	-111.41	-111.41
2007	-173.35	-92.48	-106.76	-106.76
2008	-170.59	-84.5	-102.83	-102.83
2009	-209.87	-117.42	-142.15	-142.15
2010	-282.57	-176.5	-194.22	-194.22
2011	-219.02	-142.5	-168.66	-168.66
2012	-158.23	-121.36	-149.87	-149.87
2012	-217.6	-70.96	-135.88	-135.88
2014	-261.9	-80.27	-125.3	-125.3
2015	-339.47	-53.76	-117.16	-117.16
2016	-283.25	-61.42	-110.75	-110.75
2017	-438.85	-22.18	-105.58	-105.58

3.4 Uncertainties and sensitivity analysis

Activity data used for the estimation of GHG emissions and removals is obtained with the use of the Collect Earth tool. The confidence interval and standard deviation of the activity data and the emission factors are used to estimate the overall uncertainty and to perform the sensitivity analysis of the total emissions and removals in the LULUCF sector.

Overall uncertainty has been measured as the coefficient of variation of the net balance of emissions and removals in the LULUCF sector.

3.5 Sector-specific quality assurance and quality control

Quality Control activities included general methods such as accuracy checks on data acquisition and calculations, and the use of approved standardised procedures for emission calculations (*2006 IPCC Guidelines*). The estimation of uncertainties has also been done with approved standardized procedures.

The estimation of emissions and removals in LULUCF has been done with the use of traditional Excel sheets. While the Agriculture sector has been elaborated in the IPCC software, where multiple quality controls exist, the quality control and quality assurance of the estimation of the LULUCF emissions has been done manually.

One of the first practices applied to the estimation of emissions and removals is the creation of a unique database with information about the emissions factors, activity data and assumptions used. Every calculation must be referred to that database.

The estimation of emissions and removals is prepared together with the completion of a written report. This report presents and identifies omissions in sources of emissions, sinks, activities or pools.

Quality Assurance activities include a planned system of review procedures conducted by personnel not directly involved in the inventory compilation/development process. The Inventory will be reviewed by independent third parties, once the finalised inventory is submitted to Oromia National Regional State. Reviews verify that data quality objectives were met; they ensure that the inventory represents the best possible estimates of emissions and sinks, given the available information and methods.

Verification of emissions results are also compared with other estimations realized with other purposes. For example, part of the LULUCF GHG Inventory is compared to the Forest Reference Level (FRL) for Oromia. Any land converted to forestland from GHG Inventory can be compared to "afforestation" in the FRL, and forestland converted to any other land is comparable to "deforestation".

3.5.1 Time series consistency

Time series consistency should be ensured using the same methods, activity data and emissions factors over time.

Methods are already established in the *2006 IPCC Guidelines* and Oromia Regional State must keep elaborating the sub-national GHG Inventory following said guidelines. In case there is a new methodology available (*2006 IPCC Guidelines* are currently under review), and if Oromia applies this new methodology, the GHG Inventory must be recalculated.

Activity data was elaborated with the use of Collect Earth by the National and regional MRV team. The team has proven to have the capacity to generate this information in the future. Every new year the land use and land use change data can be elaborated with the same methodology and the assumptions presented in chapter 0. Moreover, every year a new land use category or subcategory can be introduced for more detailed results.

The emission factors used in this sub-national GHG Inventory were obtained from the IPCC Guidelines, the National Forest Inventory and literature review data, e.g. Woody Biomass Inventory and Strategic Planning Project. Such different sources of emission factors are generating certain level of inconsistencies between sectors, categories and pools. The future GHG Inventory estimations must be updated and harmonized if newly available information is generated, for example with the results of the Second National Forest Inventory. The Forestry Directorate from the Environment, Forest and Climate Change Commission is planned to be update it every five years.

As a result of this study, Oromia Regional State is obtaining, as a product, the database of the AFOLU emissions and removals for the 2000-2017 period. The continuation of the use and actualization of the database will ensure time series consistency over time.

3.5.2 Improvements

The LULUCF sector in the GHG Inventory of Oromia is relatively complete, see chapter 0 for detailed information about its completeness. However, there is still place for improvements in relation to the quality of the estimations, by improving the accuracy (higher tier with national emission factors) or increasing completeness (e.g. adding pools).

The National Forest Inventory has collected information to determine the litter and Soil Organic Carbon pools in the sampling plots. However, information about litter is still preliminary and needs to be further analysed to be included in the Inventory. Soil organic carbon measured in these sample plots is only attributable to forestland. For the rest of the land use categories, default IPCC values had to be applied. In the future, reliable and robust information from the Second National Inventory can substitute the default values from *2006 IPCC Guidelines*.

The estimation of emissions and removals in this Inventory is done under the gain-loss method. However, the stock-difference method is applicable when a national inventory system for forests and other land use categories are already in place, where the stocks of different biomass pools are measured at periodic intervals. The Forest Inventory Directorate from the Environment, Forest and Climate Change Commission is planned to update the National Forest Inventory every five years. In future GHG Inventories, more accurate results (higher tier) could be achieved with the new emission factors arising from the NFI.

Basic wood density is needed to estimate aboveground and belowground biomasses with the allometric equation of *Chave et al*. This variable had to be inferred in certain forestry species, given the lack of available information. This is an important value used in the allometric equation from *Chave et al*. to determine the aboveground biomass (tdm/ha) and ultimately the emission factor. Most of the species' basic densities were listed in the Ethiopia National Forest Reference Level[81] (submitted to the UNFCCC) and the same values could be applied. Other species' basic densities were obtained from the *2006 IPCC Guidelines* and few species' basic density were collected from the Woody Biomass Inventory and Strategic Planning Project. There is room for improvement in relation to this variable. For example, the National Forest Inventory has identified some species within the plots with its vernacular name and it is not possible to recognize its scientific name, making the usage of its correct basic density impossible. Once the final validated values are prepared for the National Forest Inventory, these basic wood densities shall be corrected. The list of densities in the FRL also considers some air-dry densities and not the basic wood density, as requested by *Chave et al*. The air-dry density can be transformed in basic wood density, but a laboratory test must be performed.

For the elaboration of the GHG Inventory, the National Forest Inventory raw data was obtained. The analysis of the raw data, however, resulted in the discovery of outliers' values for the diameter at breast height. There is no doubt these values were wrongly digitalized and, consequently they were taken out of the database. Official results of the National Forest Inventory have been recently presented and the author is working in the revision and comparison of results.

Soil Organic Carbon pool was considered in the estimation of emissions and removals in the present GHG Inventory. However, very broad soil types from FAO HSDM were used and converted to default SOC stock values with *2006 IPCC Guidelines*. Still, there is a project EthioSis (hosted by the Ethiopian Agricultural Transformation Agency) that has classified the soil types in Ethiopia for cropland areas. The information was not accessible for the preparation of this study, but it is highly recommended to include such data for more accurate estimation. In addition to this, the factors used to estimate the soil organic carbon prior to and after the land use conversion where obtained from *2006 IPCC Guidelines* with the same values as the National GHG Inventory. It is still possible to increase the accuracy in the carbon emissions and removals in this pool by applying the same factor according to different management practices.

[81] http://redd.unfccc.int/files/ethiopia_frel_3.2_final_modified_submission.pdf

Annex I to Annex 6. Total emissions and removals

Total emissions ($ktCO_2$)	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Forestland remaining forestland	19,502	20,634	21,765	22,934	25,292	25,366	26,704	28,005
Grassland converted to forestland	0	0	-235	-235	-235	-235	-235	-235
Cropland converted to forestland	-2	-2	-2	-198	-198	-198	-198	-198
Grassland remaining grassland	-2,617	-2,467	-2,303	-2,132	-1,982	-1,804	-1,653	-1,462
Forestland converted to grassland	2,304	-4	-4	2,300	-9	-9	2,295	2,317
Cropland converted to grassland	-2	-2	-2	-2	-2	-2	10	-56
Cropland remaining cropland	10,164	10,490	10,817	11,143	11,798	11,858	12,201	12,543
Forestland converted to cropland	197	197	197	197	2,558	4,959	7,375	5,164
Grassland converted to cropland	56	95	85	139	342	378	570	501
Settlemet convrted to cropland	0	0	0	0	0	0	0	0
Settlement remaining settlement	-666	-666	-666	-666	-666	-666	-666	-666
Cropland converted to settlement	-82	-11	-11	-11	-11	-175	-114	-43
Grassland converted to settlement	0	0	0	0	0	0	0	-131
Grassland converted to other land	0	36	-3	-3	-3	-3	-3	-3
Wetland remaining wetland	0	0	0	0	0	0	0	0
Otherland remaining otherland	0	0	0	0	0	0	0	0
HWP - Stock-change approach	-83	-186	-182	-186	-173	-171	-210	-283
Enteric fermentation - cattle	11,945	13,728	12,877	13,824	15,015	15,678	15,682	15,979
Enteric fermentation - sheep	627	725	850	974	987	955	993	926
Enteric fermentation - swine	0	0	0	0	0	0	0	0
Enteric fermentation - other livestock	1,247	1,397	1,495	1,606	2,159	2,007	2,072	2,138
Manure management - cattle	2,817	3,579	3,129	3,477	3,688	3,992	4,001	4,106
Manure management - sheep	164	190	223	228	259	250	260	242
Manure management - swine	0	0	0	0	0	0	0	0
Manure management - other livestock	448	500	541	581	685	691	720	723
Manure management - indirect N2O emissic	431	541	482	524	569	602	605	623
Direct emissions from managed soils (agricu	5,788	6,441	6,412	6,811	7,560	7,730	7,759	7,865
Indirect emissions from managed soils (agri	1,731	1,963	1,958	2,081	2,330	2,377	2,392	2,424
Urea application	23	26	34	33	35	33	27	39
Rice cultivation	0	1	0	0	0	0	0	2
TOTAL	**53,989**	**57,203**	**57,457**	**63,417**	**69,997**	**73,613**	**80,585**	**80,520**

Total emissions ($ktCO_2$)	2011	2012	2013	2014	2015	2016	2017	Sum Period 2008-2017	Average Period 2008-2017
Forestland remaining forestland	29,230	30,456	31,869	33,244	34,582	35,920	37,220.4	312,597.165	31,259.7
Grassland converted to forestland	-249	-485	-485	-719	-719	-1,070	-1,069.6	-5,501.194	-550.1
Cropland converted to forestland	-198	-198	-198	-354	-354	-453	-453.3	-2,805.168	-280.5
Grassland remaining grassland	-1,277	-1,080	-908	-737	-559	-349	-190.8	-10,019.299	-1,001.9
Forestland converted to grassland	-18	2,318	6,918	4,620	6,982	9,228	6,865.7	41,517.624	4,151.8
Cropland converted to grassland	-56	-56	-56	-56	-56	-56	-56.3	-442.916	-44.3
Cropland remaining cropland	12,886	13,229	13,572	13,954	14,279	14,279	14,920.0	133,720.532	13,372.1
Forestland converted to cropland	2,948	669	9,941	7,784	3,257	986	986.4	44,070.344	4,407.0
Grassland converted to cropland	875	1,087	1,309	1,496	1,483	1,839	2,004.3	11,541.842	1,154.2
Settlemet convrted to cropland	0	143	50	50	50	50	50.1	393.081	39.3
Settlement remaining settlement	-666	-647	-647	-647	-647	-647	-647.4	-6,550.325	-655.0
Cropland converted to settlement	-43	-43	-43	-43	-43	-43	-51.3	-641.262	-64.1
Grassland converted to settlement	-1	-1	-1	-1	-1	-1	-0.8	-137.079	-13.7
Grassland converted to other land	-3	-3	-3	-3	-3	-3	-2.8	-28.139	-2.8
Wetland remaining wetland	0	0	0	0	0	0	0.0	0.000	0.0
Otherland remaining otherland	0	0	0	0	0	0	0.0	0.000	0.0
HWP - Stock-change approach	-219	-158	-218	-262	-339	-283	-438.9	-2,581.350	-258.1
Enteric fermentation - cattle	15,601	15,391	15,463	15,681	16,029	16,692	17,602.8	159,798.483	15,979.8
Enteric fermentation - sheep	904	919	997	1,020	996	1,036	986.4	9,731.203	973.1
Enteric fermentation - swine	0	0	0	0	0	0	0.0	0.000	0.0
Enteric fermentation - other livestock	2,104	2,090	2,204	2,182	2,319	2,386	2,380.1	21,882.224	2,188.2
Manure management - cattle	4,048	4,078	4,120	4,178	4,275	4,371	3,966.7	41,135.623	4,113.6
Manure management - sheep	237	241	261	267	261	41	258.3	2,318.865	231.9
Manure management - swine	0	0	0	0	0	0	0.0	0.000	0.0
Manure management - other livestock	716	566	766	770	812	833	818.4	7,415.717	741.6
Manure management - indirect N2O emissic	614	622	629	651	653	666	618.5	6,284.973	628.5
Direct emissions from managed soils (agricu	7,655	7,564	7,771	7,979	8,212	8,827	6,621.7	77,983.939	7,798.4
Indirect emissions from managed soils (agri	2,366	2,357	2,434	2,511	2,579	2,758	1,609.7	23,807.216	2,380.7
Urea application	37	48	45	6	6	16	9.3	266.579	26.7
Rice cultivation	1	1	1	1	1	0	1.2	6.814	0.7
TOTAL	**77,493**	**79,104**	**95,789**	**93,572**	**94,055**	**97,024**	**94,009**	**771,756.587**	**85,750.732**

Annex II to Annex 6. Area and Crop Production for the 2003-2016 period

	2003/1996		2004/1997		2005/1998		2006/1999	
Cereals	Area	Production	Area	Production	Area	Production	Area	Production
Teff	820,135	7,074,475.00	918,461	9,504,843.00	985,665.52	10,553,003.85	1,082,756.17	11,335,912.04
Barely	412,329	5,522,277.00	532,141	7,681,312.00	514,377.35	7,722,069.80	477,231.31	6,597,458.67
Wheat	556,354	9,151,025.00	765,528	13,028,288.00	816,572.28	13,967,865.59	809,195.61	14,272,862.59
Maize	786,365	16,858,711.00	791,686	15,653,498.00	858,096.17	23,282,470.83	948,732.18	22,158,048.20
Oats	19,998	292,061.00	34,807	453,549.00	34,794.57	474,035.80	23,921.43	276,832.87
Pulse								
Faba beans/Horse bean	132,865	1,468,742.00	160,342	1,992,877.00	170,873.42	2,009,036.84	173,036.83	2,190,092.99
Field peas	70,063	556,317.00	86,828	882,614.00	92,857.59	841,287.66	90,388.85	879,856.09
Haricot beans	91,766	984,136.00	129,591	1,420,864.00	85,169.69	1,139,918.38	104,103.64	1,117,297.52
Chick peas	42,444	380,113.00	49,571	502,586.00	59,060.11	689,229.47	57,647.77	792,046.37
Lentils	9,897	54,664.00	17,201	128,514.00	28,583.71	239,318.48	33,723.59	329,920.76
Grass peas/Vetch	20,064	222,136.00	42,496	499,865.00	44,582.26	564,122.53	45,176.88	674,165.75
Soya beans	1,027	4,574.00	1,520	0.00	2,509.52	34,542.77	4,321.84	50,411.08
Fenugreek	6,507	47,322.00	7,925	58,276.00	4,338.62	25,277.08	10,546.55	89,583.47
Oilseeds								
Neug	117,736	518,101.00	163,507	990,473.00	144,965.17	737,942.38	137,199.18	780,535.65
Linseed	102,326	623,046.00	192,424	1,317,340.00	157,345.16	1,001,867.08	115,248.20	787,731.14
Groundnuts	12,653	118,554.00	17,998	212,776.00	27,588.37	251,902.66	28,529.31	376,554.99
Safflower	988	0.00	1,407	578.00	1,834.84	8,999.51	1,191.55	4,018.60
Sesame	25,520	143,759.00	37,882	347,828.00	57,744.67	369,979.19	55,679.30	323,724.47
Rape seed	6,171	45,777.00	16,550	145,323.00	7,434.74	60,369.88	11,359.77	92,222.78
Root Crops								
Beet root	845	112,199.00	1,118	131,392.00	1,193.04	144,165.08	1,255.24	121,836.21
Onion	10,244	1,397,159.00	10,186	1,375,724.00	9,452.26	871,696.87	13,280.49	1,052,189.39
Potatoes	22,955	2,560,427.00	23,222	2,518,684.00	24,924.27	1,874,780.11	34,947.22	2,404,313.97
Garlic	4,237	619,353.00	6,020	884,261.00	5,193.16	627,462.40	3,358.31	290,777.25
Taro	7,619	577,302.00	6,355	494,001.00	6,730.31	388,722.10	8,408.56	575,831.29

Sweet Potato	13,416	1,441,353.00	14,713	1,471,638.00	18,168.67	855,950.31	22,468.12	1,268,625.71

	2007/2000		2008/2001		2009/2002		2010/2003	
Cereals	Area	Production	Area	Production	Area	Production	Area	Production
Teff	1,082,816.68	12,665,032.88	1,081,501.00	13,552,631.09	1182811	15076191.92	1289405.3	1672091064
Barely	466,222.61	7,650,479.91	451,955.50	8,138,579.59	542476.1	10723547.23	513707.03	9823596.03
Wheat	768,544.05	14,055,557.56	794,835.80	15,810,996.87	857603	17456335.11	815975.59	16505730.14
Maize	968,922.12	23,862,527.48	933,712.50	24,116,361.13	1000056	27429332.69	1109276	31539253.45
Oats	21,383.10	392,499.54	21,899.10	429,655.66	14147.33	318862.31	24494.31	526544.2
Pulse								
Faba beans/Horse bean	196,861.89	2,605,996.72	207,597.10	2,632,521.60	205519.6	2654650.18	199063.27	3258989.47
Field peas	80,860.91	1,283,068.08	83,646.84	1,069,193.02	77397.47	1053548.22	77605.85	1112570.97
Haricot beans	116,708.42	1,334,301.04	146,451.90	2,212,334.20	114707	2234855.94	112779.68	2092279.23
Chick peas	66,797.45	902,043.74	74,068.80	934,137.40	79404.89	1141574.58	85119.16	1285867.67
Lentils	34,624.08	314,614.79	31,713.13	305,452.35	34248.11	514696.11	26560.42	331558.18
Grass peas/Vetch	51,614.86	668,797.22	61,469.07	848,165.08	40673.13	636170.52	40691.03	720244.08
Soya beans	3,372.10	33,884.51	1,688.00	19,483.57	1738.72	18326.84	4835.54	74897.61
Fenugreek	13,573.18	109,349.10	9,388.71	120,991.83	6054.22	61254.49	5303.58	56725.93
Oilseeds								
Neug	142,846.62	792,657.69	180,630.30	991,707.53	163785.4	950343.18	158747.75	904928.5
Linseed	105,811.50	1,006,218.67	130,900.40	1,172,323.80	92674.57	1183155.03	40778.05	427061.87
Groundnuts	27,989.62	301,371.38	27,075.40	267,506.79	26654.89	240285.24	32967.8	422650.44
Safflower	1,225.30	4,779.99	1,727.81	9,363.63		9381.41		0
Sesame	47,711.05	297,303.87	34,022.59	208,579.38	34154.17	279718.7	70238.66	544242.35
Rape seed	10,284.92	96,783.57	18,810.80	200,495.55	4535.35	37872.59	3655.13	52731.03
Root Crops								
Beet root	1,523.07	145,705.75	1,549.18	151,861.82	668.51	69390.97	932.49	93544.12
Onion	11,202.97	1,034,442.04	10,242.52	885,816.82	9968.38	924840.94	12054.97	1012330.34
Potatoes	198,839.52	1,495,274.67	16,965.10	1,250,207.20	32032.32	249560745	24343.19	1850836.69
Garlic	3,567.68	414,547.97	6,259.68	723,328.34	6078.33	752000.62	4109.7	513027.27
Taro	10,117.73	599,160.08	7,734.50	487,083.53	8452.26	524731.34	6748.83	426494.17

Sweet Potato	30,301.24	2,180,179.36	21,538.28	1,579,121.50	31448.4	2322047.8	33733.44	2494416.17

	2011/2004		2012/2005		2013/2006	
Cereals	Area	Production	Area	Production	Area	Production
Teff	1,293,514.25	16944327.12	1,256,564.80	17866483.19	1397797.4	21440547.36
Barely	460,544.73	9333339.74	448,545.32	9758835.64	471134.15	11099239.49
Wheat	740,810.94	17297316.61	872,971.81	20262900.1	837000.48	23678175.77
Maize	1,102,256.20	36548559.69	1,115,957.40	38731711.36	1083332.8	38796807.75
Oats	27,343.84	498368.01	21,889.32	474089.26	29979.5	643975.53
Pulse						
Faba beans/Horse bean	185,910.75	3201412.72	237,162.85	4262593.48	222434.09	4600652.07
Field peas	85,958.69	1202622	99,940.64	1514365.75	108295.07	1344118.99
Haricot beans	153,814.40	2354512.17	171,666.55	2965758.5	77182.87	1211174.91
Chick peas	87,721.26	1629503.93	90,757.25	1629204.96	88716.9	1797008.25
Lentils	36,827.56	481709.86	37,049.94	471468.54	47917.21	689424.81
Grass peas/Vetch	58,085.55	1013841.11	67,422.87	1169791.48	57602.29	1127142.34
Soya beans	10,679.44	0	14,117.84	251840.46	13858.08	310073.67
Fenugreek	17,347.91	154675.79	15,738.77	148374.47	11031.04	119527.52
Oilseeds						
Neug	193,175.26	1087003.21	188,558.40	1251069.84	1922222.3	1488831.47
Linseed	69,996.56	818504.03	73,862.71	846667.43	55640.38	593460.21
Groundnuts	42,348.13	633202.38	56,950.52	756518.38	52921.26	682939.31
Safflower		4757.63	2,070.23	29096.02	1499.23	14547.95
Sesame	78,748.66	552783.96	42,219.83	317423.85	48182.44	379240.81
Rape seed	13,952.84	221539	14,901.25	229299.44	16444.77	238942.77
Root Crops	84,860.99	6916955.25	**82,072.45**	14007793.5	81942.21	17466419.67
Beet root	1,677.41	173844.86	1,110.74	116638.19	1244.86	124531.24
Onion	15,639.41	1368391.39	11,024.47	1218814.03	12171.66	1175407.28
Potatoes	28,166.61	2384530.76	39,254.57	3296479.48	35720.46	3450684.96
Garlic	6,612.24	603667.27	8,620.34	1122266.07	5748.78	669541.95

Taro	7,517.47	480150.7	5,500.96	1325617.65	4954.97	1239598.37
Sweet Potato	22,850.41	1787142.96	15,900.75	6885407.76	21113.47	10744407.83

	2014/2007		2015/2008		2016/2009	
Cereals	Area	Production	Area	Production	Area	Production
Teff	1,427,548	2,358,576,939.00	1,369,934	272,780.87	1,441,030	2,520,470,895.00
Barely	456,192	1,094,327,465.00	439,971	883,844.82	454,663	1,162,288,801.00
Wheat	875,641	3,102,765,318.00	872,253	542,125.50	898,456	2,705,632,246.00
Maize	1,129,850	4,195,810,523.00	1,125,748	4,776,597.08	1,142,654	4,816,610,478.00
Oats	22,370	49,789,296.00	18,685	93,602.36	20,656	50,867,000.00
Pulse						
Faba beans/Horse bean	190,434	406,129,831.00	206,182	446,941,327.00	204,914	466,424,063.00
Field peas	87,945	157,112,241.00	83,439	156,797,976.00	83,157	165,550,288.00
Haricot beans	75247.24	170,688,753.00	83765.08	211,924,388.00	80466.44	241,008,646.00
Chick peas	102,669	214,253,549.00	103,585	221,316,471.00	81,286	181,606,062.00
Lentils	33,390	52,597,136.00	36,479	58,148,094.00	47,782	81,752,196.00
Grass peas/Vetch	40,393	82,667,160.00	46,705	98,260,744.00	46,453	103,568,637.00
Soya beans	17,116	36,245,094.00	14,627	31,832,611.00	1	100.00
Fenugreek	6,817	6,823,502.00	10,729	12,242,282.00	15,497	19,293,192.00
Oilseeds						
Neug	161,799	144,590,164.00	180,347	171,589,067.00	178,848	209,348,913.00
Linseed	46,742	57,474,737.00	56,949	69,675,805.00	48,646	63,950,859.00
Groundnuts	41,089	62,995,791.00	39,469	59,788,954.00	41,055	70,365,730.00
Safflower	570	697,536.00	462	602,613.00	188	240,258.00
Sesame	82,018	60,276,539.00	58,202	46,386,121.00	36,028	27,905,844.00
Rape seed	10,462	19,437,224.00	11,479	21,379,511.00	5,880	11,846,879.00
Root Crops						
Beet root	1,124	13,633,596.00	2,202	24,183,857.00	1,953	23,050,582.00
Onion	10,623	103,504,502.00	12,424	134,334,604.00	13,670	158,012,069.00
Potatoes	38,256	522,009,945.00	36,071	1,004,317,649.00	35,913	991,741,642.00
Garlic	3,237	46,277,465.00	4,486	52,832,673.00	6,430	90,372,924.00
Taro	6,114	162,001,280.00	6,780	132,884,001.00	5,553	107,519,394.00

Sweet Potato	26,935	1,881,661,647.00	17,213	890,785,560.00	16,319	1,103,966,758.40

Annex III to Annex 6. Global Land use/cover classes definitions (FRA 2010)

Level 1	*Level 2*	*Level 3*	*Brief description*	*Code*
Forest	*Area ≥ 0.5 ha; Tree canopy cover ≥10%; Tree height ≥ 5 m at maturity in situ; Width > 20 m.* *Excludes land that is predominantly under agricultural or urban land use (orchards, agroforestry systems...).*			***F***
	Natural regenerated forest	*Forest predominantly composed of trees established through natural regeneration.*		
		Evergreen forest	*Naturally regenerated forest composed of more than 75% of evergreen trees species.* Includes: • Moist forest • Dry forest	***FE***
		Deciduous forest	*Naturally regenerated forest composed of more than 75% of deciduous trees species.* Includes: • Moist forest • Dry forest • Secondary young	***FD***
		Semi-deciduous forest	*Naturally regenerated forest where trees are at least 25% each of evergreen and deciduous species.* Includes: • Moist forest • Dry forest • Secondary young	***FSD***
		Bamboo forest	*Naturally regenerated forest predominantly composed of bamboo vegetation.*	***FB***
		Raffia/Palms	*Naturally regenerated forest predominantly composed of palm or raffia vegetation.*	***FRP***
		High woodland		***HW***
		Forest predominantly composed of trees established through planting and/or deliberate seeding. Includes coppice from trees that were originally planted or seeded.		

	Plantation	***Broadleaved planted forest***	*Planted forest composed of more than 75% of broadleaved species.* Includes: • Eucalyptus sp. • Rubber • Gravillia	***FPB***
		Coniferous planted forest	*Planted forest composed of more than 75% of coniferous species.* Includes: • Cupressus lusita. • Juniperus • Pinus patula	***FPC***
		Mixed	*Planted forest of at least 25% each of coniferous*	***FPM***
		Forest Plantation of	*Planted forest composed of more than 75% of Bamboo*	***BFP***
Other wooded lands	Area ≥ 0.5 ha, tree crown cover 5- 10% or shrubs/bushes canopy cover ≥10%			***W***
	Woodland	Includes: • *Acacia comiphora* • *Combretum terminalia* • Others (bushes...)		***W***
	Wooded grassland	*Land covered by natural growth of graminea and herbaceous vegetation, with some scattered trees (tree canopy cover between 5-10%); Land not covered seasonally or permanently by water.* Includes: • *Acacia sp*. • Others (Combretum sp...)		***WG***
	Wooded wetland	*Land seasonally or permanently covered by water with natural growth of graminea and herbaceous vegetation and some scattered trees (canopy cover between 5-10%).*		***WW***
	Land not classified as forest or other wooded land, as described above (Includes land with tree canopy cover <5% or with shrubs/bushes <10% or with predominant agricultural/urban land use or with shrubs/ trees<0.5ha).			***O***

Other Land	**Natural**	***Natural Forest Coffee***		***ONC***
		Barren Land	*Land where vegetation cover is less than 2%. Includes land covered of sand, soil and rocks.*	**OX**
		Natural Grassland	*Land covered with natural growth of graminea and herbaceous vegetation.*	***OG***
		Marsh	*Land seasonally or permanently covered by water and dominated by natural growth of graminea, reed and other herbaceous.*	***OM***
	Cultivated	***Coffee plantation***		***OCC***
		Improved pastures	*Land sown with introduced grass and leguminous for the grazing of livestock.*	***OP***
		Annual Crop	*Area covered by crops that are sown and harvested during the same production season/ agricultural year.*	**OCA**
		Perennial crop	*Crops that are sown or planted once and need not to be replanted after each annual harvest. Includes trees (e.g. apples or other fruit trees), bushes and shrubs (e.g. berries, coffee...), palms (e.g. dates), vines (e.g., grapes), herbaceous stems (e.g. bananas) and stemless plants (e.g. pineapples).*	***OCP***
		Mixed annual and perennial crop	*Association of annual and perennial crops.*	***OCM***
		Fallow	*Previously cultivated land kept free from crops or weeds during at least one growing season, where woody vegetation is and will not reach 5m height.*	***OF***
		Wood lot of Bamboo	*Bamboo areas spanning between 0.2 and 0.5 ha, with trees >5m at maturity mainly used is for wood stock*	***OWB***
		Wood lot	*Other areas spanning between 0.2 and 0.5 ha, with trees >5m at maturity mainly used for wood stock*	***OW***

	Built up area	*Populated areas with significant constructions. Includes homes scattered in the field.* *<u>Notes</u>: a road is considered as a distinct Land Use/Cover Section (built-up area) if wider than 15 meters (from bottom of ditch on one side to the bottom of ditch on the other side, when ditches exist, otherwise the width of the road bank) and if not a forest road.*	***OB***
	Quarry/Mining site	*Areas used for extraction of minerals, rocks, sands, clay...* *Includes: quarry, mining, extraction areas, oil/gas wells.*	***OQ***
Inland water	*Area occupied by major rivers (width ≥ 15m), lakes, ponds and reservoirs.*		***IW***
	Perennial River	*Rivers (width ≥ 15m) that maintains water in its channel throughout the year.*	***IRP***
	Intermittent River (seasonal)	*Rivers (width≥ 15m) that flows only at certain times of the year.*	***IRS***
	Lake	*Large body of salt or fresh water surrounded by land.*	***IL***
	Dam	*Reservoir created by a barrier constructed to hold back the water and raise its level.*	***ID***
	Pond	*Small body of still water formed naturally or by hollowing or embankment.*	***IP***

Annex 7: Review of the available data and methods for the subcategories from the initial selection against the quality and baseline setting requirements for ISFL Accounting

Selected subcategory in section 4.2.1 (of the ER-PD): “Grassland and cropland converted to forestland”

- Activity data and emission factors

The activity data has been specifically generated for this study by the national and regional MRV team. This is also applicable to all AFOLU categories listed below: “forestland remaining forestland”, “land converted to cropland” and “land converted to grassland”. A complete description of the generation process can be found in Annex 6 "GHG inventory of all AFOLU categories, subcategories, gases and pools in the Program Area".

This work resulted in the land use and land use change area for the Oromia region (approximately 30 million ha), with very low uncertainty for the main land use categories.

In summary, there were no major drawbacks (beyond the availability of computers and their internet connection) to obtain the activity data. The only area for improvement is the reduction of the estimation error in land use or land use change categories with reduced area.

With respect to the emission factors, the parameters that were used to estimate the emissions and removals are:

- Carbon stocks in every forest type in the National Forest Inventory (biomass and soil organic carbon), following the land use classification in the NFI, for which it was necessary:
  - Diameter at breast height and total height of trees within the plot
  - *Chave et al*. model
  - Basic Wood density by species
- Carbon stocks enhancement (annual yield), from WBISPP, 2004.

Once the carbon stocks in the plots within the Oromia region are known and the land use changes are known with the use of Collect Earth, the "stock-change" method is applied to determine the emissions or removals of the category "Land converted to forestland”.

As it was explained in section 4.2: "Time bound plan to improve data and methods for the subsequent ERPA Phases during the ERPA Term", the various sources of information should be reduced to one: NFI. By doing this, the gain-loss method could be changed to stock-change method, which is more accurate for the determination of emissions and removals of forestland remaining forestland, and therefore, it may be included in the Program. Work should also be done on matching the land use categories from Collect Earth to NFI land use categories.

- Historic time series

In the case of the activity data, as explained above, it was obtained by the national and regional MRV team. The analysis of satellite images with the use of the Collect Earth tool was made for the entire Oromia region. More than 3,600 plots were installed to analyse land-use and land use change. The analysis was carried out for the 2000-2017 period.

The analysis was also conducted with a definition of land-use classes compatible with IPCC: forestland, cropland, grassland, wetland, settlements and other land. And considering subcategories of land-use that could be detected by technicians, as in the case of forest: natural forest, plantation forest and bamboo forest were defined.

Therefore, after carrying out the analysis of satellite images, land-use and land use change are determined for the 2000-2017 period, at a subcategory level. The following figure shows the changes in land-use grouped by the IPCC categories, only for the 2001-2005 and 2016-2017 periods (the complete table is not included because of its size). "No change" is the area that remains under the same subcategory of land-use for the 2000-2017 period.

Etiquetas de fila	2001	2002	2003	2004	2005	2016	2017	No change	Total general
Cropland remaining Cropland						21,126		10,848,114	10,890,366
Forestland remaining Forestland								6,464,504	6,464,504
Grassland remaining Grassland		10,563			10,563			12,580,432	12,654,373
Land converted to Cropland	31,689	10,563	10,563		10,563	63,377	21,126		686,590
Land converted to Forestland					21,126	42,252			137,318
Land converted to Grassland			10,563			42,252	31,689		221,821
Settlements remaining settlements								232,384	232,384
Land converted to Settlements			10,563						52,815
Other land remaining Other land								528,146	528,146
Wetland remaining wetland								359,139	359,139
Land converted to Other land				10,563					10,563
Total general	**31,689**	**21,126**	**31,689**	**10,563**	**42,252**	**169,007**	**52,815**	**31,012,720**	**32,238,018**

In the case of emission factors, information on carbon stocks is available from the NFI. This is the information for a single moment in time, but it is enough to determine carbon emissions or removals in the main categories of land-use, through the application of the stock-change method. In order to fully determine emissions within the LULUCF sector, data from other data source is included, such as the WBSIPP. Although this source of information helps to estimate emissions completely, it adds uncertainty to the estimates, especially in the land-use categories that remain in the same category under the period of analysis, mainly forestland remaining forestland.

Therefore, carbon emissions and removals are estimated for the entire LULUCF sector for the 2000-2017 period. The ISFL baseline end date is 2017 and it is estimated by complying with the requirements of the ISFL: the end date for the Baseline Period for this ERPA Phase is the most recent date prior to two years before the submission of the ISFL ER Program document for each ERPA Phase for independent technical assessment. If this ISFL PD is being delivered in 2019, the end-date of 2017 is consistent with the requirements.

Other requirement that is also accomplished is that the emissions baseline is constructed based on the average annual historical GHG emissions and removals over a baseline period (Baseline Period) of approximately 10 years. In the case of Oromia, it is of exactly 10 years.

According to the ISFL requirements, this Emissions Baseline should be constructed based on at least two data points. For the case of Oromia, the baseline is estimated as the average value of annual emissions from 2008 to 2017.

- Source of the parameters to estimate activity data, its spatial level and analysis, if the parameters comply with the requirements on the methods and data

The proposed approach to estimate activity data and later emissions and removals for LULUCF sector in Oromia, follows the Global Forest Observations Initiative (GFOI) guiding principle 1, for remote sensing (GFOI, 2014): ‘When mapping forest change, it is generally more accurate to find change by comparing images as opposed to comparing maps estimated from images.’

IPCC approach 3 is characterized by spatially explicit observations of land use categories and land use conversions, often tracking patterns at specific point locations and/or using gridded map products, such

as those derived from remote sensing imagery. The data may be obtained by various sampling (which is the case in Oromia), wall-to-wall mapping techniques, or combination of the two methods.

The land-use and land-use change data are generated specifically for Oromia, with an approach 3. The land-use change analysis was done by the National and Regional MRV team with the use of Collect Earth and supporting tools. The team formed by nine people assessed 3,758 sample plots in 21 days, from 27th July to 17th August 2018. The team faced important internet connection problems and part of the work was performed in FAO labs. However, they have demonstrated that they have the capacity to continue this work in the future, improving the results with more land use classes and collaborating with the National REDD+ Program and the National GHG Inventory Report.

The methodology used to improve the quality of data is based on a sampling approach to target potential areas of change and to assess the land-use and land-use changes of the samples. A grid of 10km totalizing 3,745 samples where distributed across Oromia. The samples were assessed by the MRV team and other trained experts from ORCU, visualizing Bing Maps and Google Earth images. Each sample was labelled with the IPCC land use subcategory and year of change, if a change occurred. This exercise also had the objective to improve the quality of data that can be used for the GHG Inventory. The sample data has been used for statistics of land-use and land-use change.

Full description of the method for determining the activity data is presented in annex 6 “GHG inventory of all AFOLU categories, subcategories, gases and pools in the Program Area”.

Selected subcategory in section 4.2.1 (of the ER-PD): “Forestland remaining forestland”

- Activity data and emission factors

Activity data for land-use and land-use change categories are obtained in the same process. See annex 6 for a complete description of the process.

Emission factors in this category use diverse parameters. The main variable is the data obtained from the NFI, which is used to estimate the carbon stocks. As this is not a land-use change category, the carbon stock-change method could not be applied, and the gain-loss method is used (for categories maintaining in the same land use). Another parameter is used to estimate annual carbon gains: “annual yields”, from the WBISPP.

- Historic time series

The historic time series is the same as in “land converted to forestland” (see above).

- Source of the parameters to estimate activity data, its spatial level and analysis, if the parameters comply with the requirements on the methods and data

The proposed approach to estimate activity data and later emissions and removals for the LULUCF sector in Oromia, follows the Global Forest Observations Initiative (GFOI) guiding principle 1, for remote sensing (GFOI, 2014) and IPCC approach 3. More detailed information can be found in paragraphs above or annex 6.

Parameters used to estimate emission factors in “forestland remaining forestland”, however, resulted in the non-compliance of the requirements on the use of, at minimum, IPCC tier 2 methods and data. There is comprehensive analysis of this in the time-bound plan to increase the scope of accounting and to improve data and methods throughout the ERPA Term, annex 8.

Selected subcategory in section 4.2.1: “land converted to cropland”

- Activity data and emission factors

Activity data and emissions factors are the same as in “land converted to forestland” (see above).

- Historic time series

The historic time series is the same as in “land converted to forestland” (see above).

- Source of the parameters to estimate activity data, its spatial level and analysis, if the parameters comply with the requirements on the methods and data

Source of information, spatial level and analysis of method, and data requirements are the same as in “land converted to forestland” (see above).

Selected subcategory in section 4.2.1: “land converted to grassland”

- Activity data and emission factors

Activity data and emissions factors are the same as in “land converted to forestland” (see above).

- Historic time series

The historic time series is the same as in “land converted to forestland” (see above).

- Source of the parameters to estimate activity data, its spatial level and analysis, if the parameters comply with the requirements on the methods and data

Source of information, spatial level and analysis of method, and data requirements as the same as in “land converted to forestland” (see above).

Selected subcategory in section 4.2.1 (of the ER-PD): “Enteric fermentation in cattle”

- Activity data and emission factors

In the case of the agricultural sector, emissions could be calculated for the 2003-2017 period.

Activity data is obtained directly from the Central Statistical Agency (CSA) which surveys and reports the livestock population by category and Ethiopia´s regions. The livestock population data has a very low uncertainty level, but it is grouped in such a level that it does not permit the use of tier 2 or higher methods. At the moment of elaboration of this report, the CSA had not emitted the 2017 report with more updated values.

Emission factors are obtained from the 2006 IPCC Guidelines, having used the default emission factors. No national or regional emission factors are available. More detailed information in annex 6.

- Historic time series

The CSA has available data for livestock population for several years. Activity data was obtained for the 2003-2017 period which is the latest published report. The data is accurate and consistent over the period, which is necessary for a complete GHG estimation. However, the resolution is low, and it did not allow the use of a higher tier. More detailed information in annex 6.

- Source of the parameters to estimate activity data, its spatial level and analysis, if the parameters comply with the requirements on the methods and data

The source of information, as described earlier, is the official statistics which provide the activity data for the estimation of emissions and removals. Given the level of detail of this reliable information, the estimations of emissions and removals are done with a tier 1 method and data. This is not sufficient to comply with the ISFL requirements. For more information, see annex 8 “time bound plan to improve data and methods”.

Annex 8: Time bound plan to increase the completeness of the scope of accounting and to improve data and methods for the subsequent ERPA Phases during the ERPA Term

Agreed GHG Accounting Scope and Improvement Plan

Section A: Institutional processes and responsibilities

A.1 Summary of the process of developing and reaching agreement to this plan

The GHG inventory for Oromia was carried out complying with "completeness" principle, meaning that no activity has been left outside the scope of study. That is why the plan is made considering the need to improve the quality of existing data and not completing or adding new sources of emissions and data. A concrete example is the realization of a second national forest inventory, which is already considered in the EFCCC plans, and which will help to improve the estimates for the following phases of the program.

The proposal is prepared respecting the responsibilities of each national and regional institution and its area of competence and knowing the existing institutional arrangements in the government of Ethiopia at different levels. The time-bound plan is developed based on "Ethiopia's Framework for the MRV under the REDD + program" from the Environment, Forest and Climate Change Commission, elaborated in May 2017. Another important guidance is the MRV plan for the realization of the National GHG Inventory, also prepared by the EFCCC. Said plan explains that there are several MoU signed between the EFCCC and all the Line Ministries and Agencies.

The intensive capacity building programs on MRV, provided by the Commission, represent a significant improvement in the Government's commitment to addressing the issue of monitoring and reporting on climate change to support CRGE and the Growth and Transformation Plan II.

However, line ministries are not still reporting following the requirements, and that could be affecting the time-bound plan to improve data. The main challenges were:

- Institutional setup which affected the coordination and on time report preparation;
- absence of disaggregated data, data management and database in all ministries;
- inconsistency in collected data within line ministries, as well as between line ministries and Ethiopia Geospatial Information Agency, which have an implication in data quality;
- absence of a sustainable and proper data collection system at different levels;
- lack of coordination among different stakeholders; and
- limited knowledge in GHG inventory according to the required IPCC guidelines due to high turnover of trained experts.

Given the existing synergies between institutions, projects, agencies and ministries related to the ISFL program, it is not necessary to create additional obligations to institutions involved in the MRV system. The only activity that still needs to be incorporated in the time-bound plan, to improve data quality, is the generation of activity data for the agriculture sector, specifically for enteric fermentation in cattle. This must still be arranged between the EFCCC and the institutions involved. Ministry of Agriculture and livestock with the Livestock and Fishery sector Development Project have elaborated a Data/Inventory Improvement Plan for the Monitoring of Livestock Emission for Cattle Using Tier 2 Approach for Oromia Forest and landscape Program – OFLP.

For the realization of this time-bound plan, it will be necessary to include additional agreements between national institutions and ORCU. The key point in the institutional processes and responsibilities of the time-bound plan is the relationship between ORCU, which is a regional institution leading the development of the ISFL program, and the national level, who obtains the data for the estimation of the baseline and monitoring emissions and removals.

A.2 Overview of entities that have agreed to this plan

Table 1.Entities that have agreed to this plan

Name of entity	Role of entity	Name of entity representative	Job title of entity representative
Forest Sector – State Minister	Political coordinator for the LULUCF sector	Ato Kebede Yimam	State Minister
Environmental sector – State Minister	Political coordinator for the agriculture sector within Oromia GHG Inventory	TBD	TBD
Forest Inventory & Monitoring Directorate (National MRV Unit)	Data provider, activity data and emission factors for LULUCF	Bizuayehu Alemu	Forest Inventory & Monitoring Director
Redd+ Secretariat	Linkage between Redd+ Regional Coordination and the Forest Sector State Minister	Dr. Yitebitu Moges Abebe	National REDD+ Coordinator
Redd+ Regional Coordination (ORCU)	Follow-up of general process to improve data quality	Tesfaye Gonfa	Oromia REDD+ Program Coordinator
Oromia National Regional Government - Environment, Forest and Climate Change Authority	Regional authority for ORCU	Dr. Hassan Yusuf Ararsa Regasa	Director General Deputy, Director General, Forest and Wildlife Division
Central Statistical Agency	Data provider, activity data for agriculture	Mr. Habekiristos Beyene; Director: Agriculture, Natural Resource and Environment Statistics Directorate Email habekiristosbeyene@gmail.com Mr. Alemesht Ayele; Senior Statistician: Agriculture, Natural Resource and Environment Statistics Directorate ; aalemesht5@gmail.com	

Ministry of Agriculture	Support for agriculture emission factors. Information that needs to be created with new investigating projects	Dr. Thomas Cherenet	
Ethiopian Institute of Agricultural Research (EIAR)	Data provider for agriculture activity data and emission factor, in collaboration with CSA and MoA	TBD	Director, Livestock Research Directorate
Livestock and Fishery sector Development Project	Identification of data gaps and methodology to collect new information	TBD	TBD

The institutional arrangements are also already established in different MoUs which were used for the elaboration of the national GHG Inventory and there is no need to generate additional arrangements. There is one activity that will have to be generated within the EIAR, which is a two-year project to develop a tier 2 method to estimate emissions in enteric fermentation in cattle.

Section B: Summary of analysis underlying this plan

Table 2. Summary of analysis underlying this plan

Subcategory from initial selection	Emissions Baseline setting requirement(s) met? (Yes/No)	Methods and data requirement(s) met? (Yes/No)	Spatial information requirement(s) met? (Yes/No)	Eligible for ISFL Accounting? (Yes/No)
Forestland remaining forestland	Y	N	Y	N
Forestland converted to grassland	Y	Y	Y	Y
Forestland converted to cropland	Y	Y	Y	Y
Grassland converted to forestall	Y	Y	Y	Y
Cropland converted to forestland	Y	Y	Y	Y

Enteric fermentation in cattle	Y	N	N/A	N

Section C: Agreed actions to be undertaken to increase the completeness of the scope of accounting and to improve data and methods for the subsequent ERPA Phases during the ERPA Term

C.1 Actions to be undertaken to bring required subcategories into alignment with ISFL accounting requirements

For each subcategory identified in Table 2 above that is required under paragraph 4.3.4 of the ISFL ER Program Requirements but that is not yet eligible for ER Program Accounting, please describe the actions that have been agreed to improve data to fully meet the requirements on the Emission Baseline and quality for ISFL accounting. Use the table below and copy the table for each relevant subcategory and add rows as necessary.

Note that actions are expected to be completed in time to include the remaining subcategories during the Term of the ERPA. Should this not be possible, provide a detailed explanation of the data gaps and when sufficient baseline data will be available to meet ISFL Accounting Requirements.

Subcategory	Methane emission from Enteric Fermentation - Cattle	
Identification of gaps		
ISFL Accounting requirements	Requirements met? (Yes/No)	If not met, detailed description of the gap(s)
• Historic time series for baseline setting	Yes	Methane emission from Enteric Fermentation for cattle was estimated using tier 1 method and default emission factors from the 2006 IPCC Guidelines. This is due to the absence of national or regional detailed livestock population and country-specific data on methane conversion factor (Ym) and Gross Energy (GE), required to estimate emission under tier 2 method. Livestock population with a basic classification (tier 1) is complete for the 2003-2017 period.	
• Quality of data and methods	No	Despite previous comments, the Ministry of Agriculture has worked in the estimation of a "Guideline on Data Collection and Estimation of GHG Emission from Livestock and Manure Management" as part of a GHG Emission Assessment Guideline. The report was produced by an independent consulting firm and has established a tier 2 approach for an enhanced characterization for livestock population and for	

		the calculation of methane emission factor for enteric fermentation. However, based on the analysis of the report, the procedure used to estimate the emission factors is still based on literature review and expert judgement. Also, the enhanced emission factors are not correspondent with the livestock categories that could be obtained as activity data. Despite all, this report is the starting point to improve estimations and move to a tier 2 method in the estimation of emissions in enteric fermentation in cattle. Ethiopia Central Statistical Agency is the authorized institution to report national data about many variables since a long time. Thus, it is a reliable and complete source of information with historical data, when compared to other information generated by other stakeholders, which generally do not provide historic time series information/data. CSA reports cattle for both male and female in 5 classes (<6 months, 6 Mon – 1 year, 1 year<3 years, 9 years< 10 years and 10years & above). However, it does not provide the associated animal mass, feed type, or other variables for each subcategory. In addition, CSA only reports livestock population of sedentary community without considering the population of livestock in non-sedentary community and commercial farms. This affects the quality of the livestock population data generated for the country and used for the estimation of methane emission from enteric fermentation. Due to the absence of country specific emission factor following the CSA cattle classification, 2006 IPCC tier 1 method was applied to estimate methane emissions. Tier 1 method only requires livestock population and default emission factor. 2006 IPCC Guidelines provides methane emission default factor for dairy cattle and non-dairy cattle, to estimate methane emission. Tier 2 method is applied to more disaggregated livestock population categories and with country specific emission factor, instead of default values. The key element for moving to a tier 2 method is the collection of detailed activity data and the development of emission factors according to the detailed cattle classification. The data required	

		for the development of country specific emission factor includes methane conversion factor (Ym) and Gross Energy (GE). The institution that has the technical capacity to generate more detailed information is the CSA. The institution has 25 Branch Statistical Offices, field staff and training programs, experience in surveying, data processing. Every year the CSA issues the "Agricultural sample survey" report on livestock and livestock characteristics. The information provided is livestock number by breed, age, sex and purpose, animal feed, and livestock per region and zone. Despite the number of variables, the information is coarse in the sense that every variable is considered independently. For example, the information on animal feed is specified for Oromia but not with livestock category. The CSA together with the Oromia Bureau of Agriculture and Natural Resources must work in collaboration to obtain an enhanced cattle characterization to estimate emission with tier 2 method for enteric fermentation of cattle. So, continuous and regular data collection of livestock population by categories, species or performance for non-sedentary communities and commercial farm is required. Animal weight should also be collected for each cattle subcategory identified. This information can be collected with the existing survey methodology, applied with more technical questions in Oromia National Region. The method for estimating methane emission from enteric fermentation using tier 2 methodology requires three basic steps: Step 1: To divide the livestock population into subcategory and characterize each subcategory as described before. Step 2: To estimate feed intake (gross energy) required for calculation of methane emission factor. Step 3: To calculate methane emission factors for each subcategory in terms of kilograms of methane per animal per year. Gross Energy intake of feed intake is a variable that needs to be estimated in the future. To calculate the GE, it will be necessary to assess the	

		net energy requirement for different activities such as maintenance, growth, lactation, pregnancy etc., for each cattle subcategory identified, characteristics of the feed available livestock and feed digestibility. The first year will be for data collection at different seasons of the year and the second year will be for analysis, reporting and review. Finally, and in order to develop a country specific emission factor, it is necessary to calculate the percentage of feed energy that is converted to methane for each cattle subcategory identified (Ym). For this variable, the Ethiopia Institute of Agricultural Research is the most suitable institution. Ethiopia Institute of Agricultural Research is a pioneer research institute established in 1940. The institute has around 17 research centres in the country including Oromia National Regional State. In addition, their research mainly focuses on 11 research areas, out of which livestock is one of them. Thus, with the experienced researchers, equipped facility and different research centres in the regions, EIAR can assist in the data collection system and conduct researches to develop country specific emission factors required for using 2006 IPCC Guidelines tier 2 method.		
• Spatial land representation for land-use change-related subcategories	N/A	N/A			
Identification of actions to address the gap					
Identified gap	Description of what is technically needed to address it	Potential data sources	Responsible entity	Planned completion	Sources of funding/support
Livestock population	An enhanced cattle characterization should be used to	Survey/Census.	Ethiopia Central Statistical	Maximum 1 year after implementation	OFLP/Livestock Project

	improve estimation of emissions with tier 2 for enteric fermentation in cattle. So, continuous and regular data collection of livestock population by categories, species or performance, for non-sedentary communities and commercial farm is required.		Agency/Oromia Livestock and Fishery Agency/Livestock and Fisheries Sector Development Project/MoA	of the Data/Inventory Improvement Plan for the Monitoring of Livestock Emission for Cattle Using Tier 2 Approach for Oromia Forest and landscape Program - OFLP	(WB)/Livestock and Fishery Development Agency/others to be defined
Gross Energy (GE)	To calculate the GE, it will be necessary to assess the net energy requirement for different activities, such as maintenance, growth, lactation, pregnancy etc., for each cattle subcategory identified, characteristics of the feed available livestock and feed digestibility.	See lines below.	EIAR[82] /Oromia Regional Agriculture Research Institute/Livestock and Fisheries Sector Development Project/MoA	Maximum 1 year after implementation of the Data/Inventory Improvement Plan for the Monitoring of Livestock Emission for Cattle Using Tier 2 Approach for Oromia Forest and landscape Program - OFLP	OFLP/Livestock Project (WB)/Livestock and Fishery Development Agency/others to be defined
Protein content of milk	Protein content of milk (%)	Survey/Census.	EIAR /Oromia Regional Agriculture Research Institute/	Maximum 1 year after implementation of the Data/Inventory Improvement	OFLP/Livestock Project (WB)/Livestock and Fishery

[82] Ethiopia Institute of Agricultural Research is a pioneer research institute established in 1940. The institute has around 17 research centers in the country including Oromia National Regional State. In addition, their research mainly focuses on 11 research area out of which livestock is one of them. Thus, with the experienced researchers, equipped facility and different research centers in the regions, EIAR can assist in the data collection system and conduct research to develop a country specific emission factors required for using tier 2 method according to the 2006 IPCC Guidelines

			Livestock and Fisheries Sector Development Project/MoAL	Plan for the Monitoring of Livestock Emission for Cattle Using Tier 2 Approach for Oromia Forest and landscape Program - OFLP	Development Agency/others to be defined
Crude protein content of diet	Average crude protein content of the diet (%)	Survey/Census.	EIAR /Oromia Regional Agriculture Research Institute/ Livestock and Fisheries Sector Development Project/MoAL	Maximum 1 year after implementation of the Data/Inventory Improvement Plan for the Monitoring of Livestock Emission for Cattle Using Tier 2 Approach for Oromia Forest and landscape Program - OFLP	OFLP/Livestock Project (WB)/Livestock and Fishery Development Agency/others to be defined
Mean annual temperature	Mean annual temperature where livestock are located (°C)	Survey/Census.	EIAR /Oromia Regional Agriculture Research Institute/ Livestock and Fisheries Sector Development Project/MoAL	Maximum 1 year after implementation of the Data/Inventory Improvement Plan for the Monitoring of Livestock Emission for Cattle Using Tier 2 Approach for Oromia Forest and landscape Program - OFLP	OFLP/Livestock Project (WB)/Livestock and Fishery Development Agency/others to be defined

Fraction of manure managed in different systems	Fraction of manure from each type of livestock managed in different manure management system in different climate regions	Survey/Census.	EIAR /Oromia Regional Agriculture Research Institute/ Livestock and Fisheries Sector Development Project/MoAL	Maximum 1 year after implementation of the Data/Inventory Improvement Plan for the Monitoring of Livestock Emission for Cattle Using Tier 2 Approach for Oromia Forest and landscape Program - OFLP	OFLP/Livestock Project (WB)/Livestock and Fishery Development Agency/others to be defined
Body weight, mature weight, average live weight	Live-weight, average value, for each livestock category.	Survey/Census.	EIAR /Oromia Regional Agriculture Research Institute/ Livestock and Fisheries Sector Development Project/MoAL	Maximum 1 year after implementation of the Data/Inventory Improvement Plan for the Monitoring of Livestock Emission for Cattle Using Tier 2 Approach for Oromia Forest and landscape Program - OFLP	OFLP/Livestock Project (WB)/Livestock and Fishery Development Agency/others to be defined
Cf_i	Coefficient for calculating Net energy for maintenance. MJ/day/kg which varies for each animal category (for example IPCC values 0.386 for matured cows; 0.370 for lactating, non-lactating and	Expert judgement in workshop for validation.	EIAR /Oromia Regional Agriculture Research Institute/ Livestock and Fisheries Sector Development Project/MoAL	Maximum 1 year after implementation of the Data/Inventory Improvement Plan for the Monitoring of Livestock Emission for Cattle Using Tier 2 Approach for	OFLP/Livestock Project (WB)/Livestock and Fishery Development Agency/others to be defined

	bull; and 0.322 for growing cattle).			Oromia Forest and landscape Program - OFLP	
Ca	Coefficient corresponding to animals' feeding situation (for example IPCC activity coefficients for stall feed=0, pasture animal with limited movement=0.17; range grazing animal =0.36).	Survey/census, plus expert judgement in workshop for validation.	EIAR /Oromia Regional Agriculture Research Institute/ Livestock and Fisheries Sector Development Project/MoAL	Maximum 1 year after implementation of the Data/Inventory Improvement Plan for the Monitoring of Livestock Emission for Cattle Using Tier 2 Approach for Oromia Forest and landscape Program - OFLP	OFLP/Livestock Project (WB)/Livestock and Fishery Development Agency/others to be defined
WG	Average daily weight gain for every animal category in the population, kg per day.	Surveys/Census/Literature review and validation.	EIAR /Oromia Regional Agriculture Research Institute/ Livestock and Fisheries Sector Development Project/MoA	Maximum 1 year after implementation of the Data/Inventory Improvement Plan for the Monitoring of Livestock Emission for Cattle Using Tier 2 Approach for Oromia Forest and landscape Program - OFLP	OFLP/Livestock Project (WB)/Livestock and Fishery Development Agency/others to be defined
Fraction of adult females pregnant				Maximum 1 year after implementation of the Data/Inventory Improvement Plan for the Monitoring of	

				Livestock Emission for Cattle Using Tier 2 Approach for Oromia Forest and landscape Program - OFLP	
Milk yield, milk fat	Fat content of milk, % by weight, per animal category.	Survey, literature review and validation.	EIAR /Oromia Regional Agriculture Research Institute/ Livestock and Fisheries Sector Development Project/MoAL	Maximum 1 year after implementation of the Data/Inventory Improvement Plan for the Monitoring of Livestock Emission for Cattle Using Tier 2 Approach for Oromia Forest and landscape Program - OFLP	OFLP/Live stock Project (WB)/Live stock and Fishery Developm ent Agency/o thers to be defined
Hours of work	Number of hours of work per day.	Survey/cens us.	EIAR /Oromia Regional Agriculture Research Institute/ Livestock and Fisheries Sector Development Project/MoAL	Maximum 1 year after implementation of the Data/Inventory Improvement Plan for the Monitoring of Livestock Emission for Cattle Using Tier 2 Approach for Oromia Forest and landscape Program - OFLP	OFLP/Live stock Project (WB)/Live stock and Fishery Developm ent Agency/o thers to be defined
DE	Digestible energy expressed as a percentage of gross	Survey, field measureme nts.	EIAR /Oromia Regional	Maximum 1 year after implementation of the	OFLP/Live stock Project (WB)/Live

	energy, per feed situation.		Agriculture Research Institute/ Livestock and Fisheries Sector Development Project/MoAL	Data/Inventory Improvement Plan for the Monitoring of Livestock Emission for Cattle Using Tier 2 Approach for Oromia Forest and landscape Program - OFLP	stock and Fishery Developm ent Agency/o thers to be defined.

Despite the table above is identifying actions to address the information gap, the OFLP is still in the process of defining the best strategy to collect this information in collaboration with the key actors including the World Bank *Livestock and Fisheries Sector Development Project* (LFSDP) . This project is being coordinated with the *Ethiopia - Oromia Forested Landscape Program* (OFLP) to build capacity on the quantification and reporting of GHG emissions in the livestock sector, and their reduction. The LFSDP has prepared an initial work plan for the development of nation-wide Tier 2 Emission Factors (T2EFs) for livestock; and guidance for the collection of baseline data on GHG emissions. The LFSDP organized a workshop and consultations with multiple stakeholders from Ministry of Agriculture, Project Implementation Units (PIUs) for both Livestock and Fisheries Sector Development Project and the Oromia Forested Landscape Program, Oromia Environment Forest and Climate Change Authority, Environment, Forest and Climate Change Commission (EFCCC), Food and Agriculture Organization (FAO), UNIQUE and CGIAR Research Program on Climate Change and Food Security (CCAFS) and International Livestock Research Institute (ILRI).

The workshop began with a discussion on the data availability, gaps, and modelling for estimation of GHG emissions in the livestock sector. The workshop helped build consensus around the way forward with a clear methodology for data collection and roles and responsibilities of each stakeholder. Specifically, the workshop concluded on the following:

(iv) There is alignment between the needs of OFLP (i.e. the development of a baseline of direct emissions from the livestock sector) and the needs of the LSFDP (i.e. the development of T2EF for the livestock sector, that can be used by the Ministry of Agriculture and the Environment, Forest and Climate Change Commission to prepare national communication on GHG emissions). A joint plan can thus be developed for or tier2 GHG emission reporting in the livestock sector, including data collection and computation.

(v) Activities planned in the context of OFLP and LSFDP also align well with ongoing complementary activities and technical assistance provide to the GoE by partners such as ILRI, FAO and UNIQUE-LANDUSE. This offers ample opportunity for collaboration.

(vi) A two-phased approach will be adopted to address the needs of OFLP and LSFDP going forward. Phase I will consist in the preparation of a plan for Tier 2 GHG emission reporting in the livestock sector, including data collection and computation. Phase II will see the implementation of plan and finalization of the national level T2EF as well as the livestock emission baseline for Oromia.

The conclusion of the phase II shall be achieved before the start of the second phase of the ERPD period.

Pivotal role of the Central Statistics Agency (CSA) in collecting time series on animal numbers (disaggregated as required) necessary for the Tier 2 reporting on a regular and sustainable basis.

It was agreed that the LFSDP will take the lead in implementation of Phase I developing the overall methodology for data collection and computation, the OFLP, will implement Phase II, piloting the approach in Oromia.

Finally, the working group elaborated the report: "Data/Inventory Improvement Plan for the Monitoring of Livestock Emission for Cattle Using Tier 2 Approach for Oromia Forest and landscape Program – OFLP". Livestock and Fisheries Sector Development Project has planned for the development of Tier 2 emission factors (T2EF) for the livestock sector and monitoring of an emission indicator in the result framework of the LSFDP. The monitoring of emissions in the livestock sector using an IPCC Tier 2 approach was planned to be done in two phases:

c. Phase I: validated plan for data Improvement and computation; and
d. Phase II to implement Data Improvement Plan: collect data and compute Tier 2 emissions.

The two GHG inventory reports using IPCC Tier 2 approach done by UNIQUE at national (from cattle, sheep and goats) and Oromia (from cattle) level have identified a number of data gaps which contributes to high uncertainty in the T2EF computation. The inventory covers the period from 1994 to 2018. These reports have recommended improving the data for improved accuracy of the T2EF calculation and hence better emission inventory of the livestock sector (cattle, sheep and goat) using Tier 2 method. The data gaps are either missing data or poor quality data or both. The main data gaps identified by the reports are described under section 3 below.

The objective of the data improvement plan is to develop a detailed improvement plan for the monitoring of livestock emissions using IPCC Tier 2 approach. The plan should suit for the needs of OFLP (i.e. the development of a baseline of direct emissions from the livestock sector) that can be used OFLP to compute the baseline for the second phase of the program.

The scope of the data improvement plan and its subsequent work encompasses: (i) the cattle herd and (ii) direct GHG emissions from enteric fermentation and manure management in Oromia region.

The detailed plan that identifies the data gaps to be filled, data improvement plan, time frame to undertake the assignment and the budget estimated, can be consulted in the "Data/Inventory Improvement Plan for the Monitoring of Livestock Emission for Cattle Using Tier 2 Approach for Oromia Forest and landscape Program – OFLP" report.

Subcategory	Forestland remaining forestland	
Identification of gaps		
ISFL Accounting requirements	Requirements met? (Yes/No)	If not met, detailed description of the gap(s)
• Historic time series for	Yes	N/A

baseline setting			
• Quality of data and methods	No	Spatial information requirement is met for all categories; however, error of estimation in activity data can be reduced as part of this improvement plat. Error was calculated as the coefficient of interval (ha) divided by the mean value (ha) of a certain category. In the case of land converted to forestland, the area is 127,669 ha, its confidence interval is 69,265 and the error 54.3%. This value shows that there is still room to reduce the estimation error when new activity data is obtained in the future. There are two ways to reduce the error, one is by including additional plots to the network of already established plots (around 3,600) for the Collect Earth analysis. The problem is that it will not be a cost-efficient method, since the plots were installed systematically and to reduce the error, plots should be installed until they cover the small areas where error is large. Another method is to stratify the land use; in this way you can install more plots where it is known that there are small changes in land-use. And the areas with the largest share, “cropland remaining cropland”, “forestland remaining forestland” or “grassland remaining grassland”, and fewer plots should be installed. To achieve this, it is necessary to have a base map that allows the stratification. In conclusion, there is a necessity for the MRV team to elaborate a land-use map, including all IPCC classes, in order to stratify and allocate sampling plots proportionally to the area of each class. The estimation of emissions and removals of greenhouse gases within this land use category is based on the gain-loss method and with three different sources of information. In one hand, the activity data is estimated based on a sampling method with the use of satellite images (Collect Earth). The forest land that remain under forest land are classified into three forest classes. This data meets the quality requirements, since they are estimated with an approach 3.	

		On the other hand, aboveground and belowground biomasses emissions and removals are estimated based on the carbon stock in each forest class, provided by the National Forest Inventory (raw data processed only for Oromia), which defines other categories of land-use, with three levels of classification. The result is thirty-six different classes. Finally, a growth factor (yield) is applied to the carbon stock to know the annual growth or decrease in biomass in forest areas. This yield is extracted from WBISPP which uses a third type of forest area classification, with twenty-seven classes. The result is the combination of three data sources, using expert judgment to connect one classification to another. Emissions and removals in the sector are estimated complying with "completeness" principle. However, despite having used expert judgment to connect one data source with another, the result is not a reliable estimate and, therefore there is a need for an improvement plan. For example, it is assumed that forest growth at a constant level for 17 years, which is not realistic for a grown forest. The detailed time-bound plan to improve data and methods for this subcategory "forestland remaining forestland" is under construction. However, there is an agreed draft workplan that came out from the discussion of several institutions like FAO, FCPF, SilvaCarbon, FDRE National MRV team, Regional MRV team, USGS (US Geological Service). These entities have gathered and drafted a plan to harmonize and unite efforts to improve activity data for several purposes including forestland remaining forestland. The information that is needed for the OFLP (monitoring report 1 or second baseline) can also be used for the regional baselines for the benefit sharing plan, National Forest Reference Level (second) or National 2020 Greenhouse Gas Inventory. A series of activities for capacity development and support have already been elaborated and distributed among institutions.	

		The plan is still being drafted and subject to modifications, as it is under negotiations The work plan also must consider to find the equivalences between the NFI land use categories, and the land use categories obtained with the new algorithms It is known that all thirty-six land use classes used in the NFI, cannot be obtained with the use of satellite images. The the image analysis will need to coincide with the location of the NFI plots in Oromia. By this way, every sample plot from NFI will be classified and it could be possible to infer a C Stock. . In addition, it will be necessary to eliminate the use of the WBISPP data source, since its inclusion increases uncertainty to the estimates. And therefore, the method will change from gain-loss to stock-change. This can be achieved with the implementation of a second national forest inventory. The first inventory was done between February 2014 and July 2016. An intensification of NFI sampling in the future can expand the use of NFI data to subnational levels and improve the accuracy of the estimates. And, as it is stated in the NFI final document, the current NFI is not an end; rather it is a beginning for future periodic monitoring and inventories. This second part will depend on the MEFCC resources to perform a large activity in terms of time, human resources and finance. At least another NFI measurement will be needed, at national scale or in Oromia region. The frequency of NFI proposed to update Emission Factor is every 5 years. The second NFI may be conducted by 2020. If the second NFI lasts the same time as the first one, in 2023 there could be new emission factors. If it is not with national budget from MEFCC, then it is with Regional budget or international finance. Finally, activity data for forest fires in forest areas needs to be generated for a comprehensive GHG inventory, and for accounting purposes in the program area.	

• Spatial land representation for land use change-related subcategories	Yes	N/A			
Identification of actions to address the gap					
Identified gap	Description of what is technically needed to address it	Potential data sources	Responsible entity	Planned completion	Sources of funding/support
Land-use and land-use change (activity data),	Installation of additional sampling plots to reduce the level of uncertainty with Collect Earth. Use of new algorithms to analyse land use changes		National MRV – EFCCC and Regional MRV Unit - OEFCCA	1 year.	SilvaCarbon
Forest fires in forestland remaining forestland and forestland converted to other land uses	Measurement of historical amount of areas under forest fires and its level of magnitude	Different international sources (e.g. NASA)	National MRV – EFCCC and Regional MRV Unit - OEFCCA	1 year	ORCU
Carbon stock in forest in most recent date (diameter at breast height, total height of trees, deadwood and litter sampling)	Carbon stock per forest type and pool.	Plot assessment in NFI.	National MRV Unit- EFCCc	2 years, starting in 2020.	International cooperation (FAO), ISFL advanced payment, EFCCC

Basic wood density for important species	Measurement of basic wood density by direct or indirect methods.	Extraction in sample plots and delivery to laboratories.	MEFCC	6 months, once the second national inventory starts.	International cooperation (FAO), ISFL advanced payment, EFCCC

As in the sub-category enteric fermentation in cattle, this subcategory “forestland remaining forestland” is also under definition of the best and practical way to collect the information gap.

Several institutions like FAO, FCPF, SilvaCarbon, FDRE National MRV team, Regional MRV team, USGS (US Geological Service) have gathered and drafted a plan to harmonize and unite efforts to improve data for several purposes. The information that is needed for the OFLP (monitoring report 1 or second baseline) can also be used for the regional baselines for the benefit sharing plan, National Forest Reference Level (second) or National 2020 Greenhouse Gas Inventory. A series of activities for capacity development and support have already been elaborated and distributed among institutions. The plan is still being drafted and subject to modifications, as it is under negotiations. Thus, it cannot be shared for at the moment of elaboration of this document.

C.2 Additional planned improvement to bring not-required subcategories into alignment with ISFL accounting requirements

For any additional improvements planned, provide a description of the planned action to enhance data quality, reduce uncertainty, or improve the scope of reporting and accounting and indicate an estimated timeline. Copy the table for each relevant subcategory and add rows as necessary.

Subcategory	N/A	
Identification of gaps		
ISFL Accounting requirements	Requirements met? (Yes/No)	If not met, detailed description of the gap(s)
• Historic time series for baseline setting		
• Quality of data and methods		
• Spatial land representation for land use		

change-related subcategories					
Identification of actions to address the gap					
Identified gap	Description of what actionis needed to address it	Potential data sources	Responsible entity	Expected completion	Sources of funding/support
				Month/Year	

Financing Plan

Using the table below, provide a summary of the financing plan for implementing the actions detailed in above,

Table F

Subcategory	Action	Finance requirements (per year in US$)					Total (US$)	Finance available (US$)	Source and type of finance (grant/ loan/ government budget) (US$)	Finance gap (US$)
		Y1 - 2019	Y2	Y3	Y4	Y5				
Methane emission from Enteric Fermentation - Cattle	*Livestock population*	*15,000*	*15,000*	*15,000*			*45,000*	*45,000*	LFSDP/*Grant-ORCU*	
Methane emission from Enteric Fermentation - Cattle	*Average live weight per category*	10,000	10,000	10000			*30,000*	*30,000*	LFSDP/*Grant-ORCU*	
Methane emission from Enteric Fermentation - Cattle	Coefficient for calculating Net energy for maintenance	10,000	10,000	10,000			*30,000*	*30,000*	LFSDP/*Grant-ORCU*	
Methane emission from	Coefficient corresponding to	10,000	10,000	10,000			*30,000*	*30,000*	LFSDP/*Grant-ORCU*	

Enteric Fermentation - Cattle	animals' feeding situation									
Methane emission from Enteric Fermentation - Cattle	Average daily weight gain for every animal category in the population	10,000	10,000	10,000			*30,000*	*30,000*	LFSDP*/Gran t-ORCU*	
Methane emission from Enteric Fermentation - Cattle	Amount of milk produced per animal category,	10,000	10,000	10,000			*30,000*	*30,000*	LFSDP*/Gran t-ORCU*	
Methane emission from Enteric Fermentation - Cattle	Fat content of milk	10,000	10,000	10,000			*30,000*	*30,000*	LFSDP*/Gran t-ORCU*	
Methane emission from Enteric Fermentation - Cattle	Hours of work	10,000	10,000	10,000			*30,000*	*30,000*	LFSDP*/Gran t-ORCU*	
Methane emission from Enteric Fermentation - Cattle	Digestible energy	10,000	10,000	10,000			*30,000*	*30,000*	LFSDP*/Gran t-ORCU*	

Forestland remaining forestland	Land-use and land-use change, nomenclature coincidence with NFI land-use classes nomenclature	15,000					*15,000*	*15,000*	*Grant-ORCU*	
Forestland remaining forestland	Carbon stock per forest type and pool, with measurement of basic wood density for most important species	100,000	100,000				*200,000*	*200,000*	*Grant-ORCU*	
TOTAL							*500,000*	500,000	*Grant-ORCU*	

Annex 9: Estimation of the Emissions Baseline

The construction of the Emissions Baseline in current ERPA phase follows the ISFL requirements. The first step is the preparation of the GHG Inventory for Agriculture, Forestry and Other Land Use (AFOLU) sector, applying the methodology, categories and subcategories from the 2006 IPCC Guidelines (described in detail in section 3.1.1 and Annex 6 of the ISFL PD).

The final estimation of the emission baseline does only include LULUCF categories, thus, the following paragraph is a description of the step-by-step calculation of the emission baseline considering only this sector.

The best available data was used to provide the historical emissions and reductions of greenhouse gases in the sector. For the case of Land Use, Land Use Change and Forestry (LULUCF), emissions and removals were estimated for the 2000-2017 period, with activity data generated specifically for this study, and mainly two other sources of information: National Forest Inventory (2016) and Woody Biomass Inventory and Strategic Planning Project (2004).

The national and regional (Oromia) MRV team elaborated the activity data for this study. The methodology is based on a sampling approach to target potential areas of change and to assess the land-use and land-use changes of the samples when analysing satellite images. A grid of 10km totalizing around 3,600 sample plots where distributed across Oromia. The samples were assessed by the MRV team and other trained experts from ORCU. Each sample was labelled with the IPCC land-use subcategory and year of change, if a change occurred. This exercise also had the objective to improve the quality of data that can be used for GHG Inventory. The sample data has been used for statistics of land-use and land-use change. Full description of the process of elaboration is presented in annex 6, chapter 4.2.1. “Land use and land use change matrix”.

If a land-use change in a sample is detected by user, the information of the previous and post land-use is recorded together with the year of change. The result is the land-use and land-use change matrix for the 2000-2017 period, considering IPCC categories and nationally determined subcategories. See table below.

Etiquetas de fila	2014	2015	2016	2017	no change	Total general
Wetland remaining wetland					334,769	334,769
Wetland converted to Cropland	9,846					9,846
Settlements remaining settlements					216,615	216,615
Settlement converted to Cropland				9,846		19,692
Other land remaining Other land					492,308	492,308
Grassland remaining Grassland					11,766,154	11,766,154
Grassland converted to Settlement						9,846
Grassland converted to Otherland						9,846
Grassland converted to Forest land	19,692		29,538			98,462
Grassland converted to Cropland	19,692	39,385	59,077	9,846		413,538
Forestland remaining Forestland					5,996,308	5,996,308
Forest converted to Grassland	19,692	29,538	39,385	29,538		196,923
Forest converted to Cropland	29,538	9,846				196,923
Cropland remaining Cropland					10,151,384	10,151,384
Cropland converted to Settlement						39,385
Cropland converted to Grassland						9,846
Cropland converted to Forest land	9,846		9,846			29,538
Total general	**108,308**	**78,769**	**137,846**	**49,231**	**28,957,538**	**29,991,384**

The methodology applied in land-use change categories follows the carbon stock-difference method, defined in 2006 IPCC Guidelines, see equation below.

CARBON STOCK CHANGE IN A GIVEN POOL AS AN ANNUAL AVERAGE DIFFERENCE BETWEEN ESTIMATES AT TWO POINTS IN TIME (STOCK-DIFFERENCE METHOD)

$$\Delta C = \frac{(C_{t_2} - C_{t_1})}{(t_2 - t_1)}$$

Where:

ΔC = annual carbon stock change in the pool, tonnes C yr^{-1}

C_{t_1} = carbon stock in the pool at time t_1, tonnes C

C_{t_2} = carbon stock in the pool at time t_2, tonnes C

Carbon stocks are also defined by land-use type, not only by time. This information is obtained from the NFI which has established approximately 200 plots in Oromia and has obtained diameter at breast height and total height in such plots. With the use of *Chave et. al* equation, the basic wood density from the National Forest Reference Level and the root-to-shoot ration from 2006 IPCC Guidelines, and applying the method described by Sarndal et al. (1992)., a net carbon stock approach was applied for the estimation of carbon stocks of different land-use classes.

$$AGB = 0.0673 * (WD * DBH^2 * H)^{0.976}$$

Where:

AGB = above ground biomass (in kg dry matter)

WD = wood density (g/cm3)

DBH = diameter at breast height (in cm)

H = total height of the tree (in m)

Emissions and removals in land remaining in the same land-use are estimated using the gain-loss method, see equation below.

ANNUAL CARBON STOCK CHANGE IN A GIVEN POOL AS A FUNCTION OF GAINS AND LOSSES (GAIN-LOSS METHOD)

$$\Delta C = \Delta C_G - \Delta C_L$$

Where:

ΔC = annual carbon stock change in the pool, tonnes C yr^{-1}

ΔC_G = annual gain of carbon, tonnes C yr^{-1}

ΔC_L = annual loss of carbon, tonnes C yr^{-1}

The annual gain of carbon is estimated based in the carbon stocks from the NFI and the annual yield for every land-use obtained from WBISPP. **The** Once the emissions and removals are estimated for the entire 2000-2017 period, considering all carbon pools but litter and including all land-use and land-use changes detected in the activity data analysis, the baseline estimation is estimated for the 2008-2017 period to comply with the ISFL requirement.

Results are presented in the table below.

Total emissions ($ktCO_2$)	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
	53,989	**57,203**	**57,457**	**63,417**	**69,997**	**73,613**	**80,585**	**80,520**
Forestland remaining forestland	19,502	20,634	21,765	22,934	25,292	25,366	26,704	28,005
Grassland converted to forestland	0	0	-235	-235	-235	-235	-235	-235
Cropland converted to forestland	-2	-2	-2	-198	-198	-198	-198	-198
Grassland remaining grassland	-2,617	-2,467	-2,303	-2,132	-1,982	-1,804	-1,653	-1,462
Forestland converted to grassland	2,304	-4	-4	2,300	-9	-9	2,295	2,317
Cropland converted to grassland	-2	-2	-2	-2	-2	-2	10	-56
Cropland remaining cropland	10,164	10,490	10,817	11,143	11,798	11,858	12,201	12,543
Forestland converted to cropland	197	197	197	197	2,558	4,959	7,375	5,164
Grassland converted to cropland	56	95	85	139	342	378	570	501
Settlemet convrted to cropland	0	0	0	0	0	0	0	0
Settlement remaining settlement	-666	-666	-666	-666	-666	-666	-666	-666
Cropland converted to settlement	-82	-11	-11	-11	-11	-175	-114	-43
Grassland converted to settlement	0	0	0	0	0	0	0	-131
Grassland converted to other land	0	36	-3	-3	-3	-3	-3	-3
Wetland remaining wetland	0	0	0	0	0	0	0	0
Otherland remaining otherland	0	0	0	0	0	0	0	0
HWP - Stock-change approach	-83	-186	-182	-186	-173	-171	-210	-283
Enteric fermentation - cattle	11,945	13,728	12,877	13,824	15,015	15,678	15,682	15,979
Enteric fermentation - sheep	627	725	850	974	987	955	993	926
Enteric fermentation - swine	0	0	0	0	0	0	0	0
Enteric fermentation - other livestock	1,247	1,397	1,495	1,606	2,159	2,007	2,072	2,138
Manure management - cattle	2,817	3,579	3,129	3,477	3,688	3,992	4,001	4,106
Manure management - sheep	164	190	223	228	259	250	260	242
Manure management - swine	0	0	0	0	0	0	0	0
Manure management - other livestock	448	500	541	581	685	691	720	723
Manure management - indirect N2O emissic	431	541	482	524	569	602	605	623
Direct emissions from managed soils (agricu	5,788	6,441	6,412	6,811	7,560	7,730	7,759	7,865
Indirect emissions from managed soils (agri	1,731	1,963	1,958	2,081	2,330	2,377	2,392	2,424
Urea application	23	26	34	33	35	33	27	39
Rice cultivation	0	1	0	0	0	0	0	2
TOTAL	**53,989**	**57,203**	**57,457**	**63,417**	**69,997**	**73,613**	**80,585**	**80,520**

Total emissions ($ktCO_2$)	2011	2012	2013	2014	2015	2016	2017	Average Period 2008-2017
	77,493	**79,104**	**95,789**	**93,572**	**94,055**	**97,024**	**94,009**	
Forestland remaining forestland	29,230	30,456	31,869	33,244	34,582	35,920	37,220.4	31,259.7
Grassland converted to forestland	-249	-485	-485	-719	-719	-1,070	-1,069.6	-550.1
Cropland converted to forestland	-198	-198	-198	-354	-354	-453	-453.3	-280.5
Grassland remaining grassland	-1,277	-1,080	-908	-737	-559	-349	-190.8	-1,001.9
Forestland converted to grassland	-18	2,318	6,918	4,620	6,982	9,228	6,865.7	4,151.8
Cropland converted to grassland	-56	-56	-56	-56	-56	-56	-56.3	-44.3
Cropland remaining cropland	12,886	13,229	13,572	13,954	14,279	14,279	14,920.0	13,372.1
Forestland converted to cropland	2,948	669	9,941	7,784	3,257	986	986.4	4,407.0
Grassland converted to cropland	875	1,087	1,309	1,496	1,483	1,839	2,004.3	1,154.2
Settlemet convrted to cropland	0	143	50	50	50	50	50.1	39.3
Settlement remaining settlement	-666	-647	-647	-647	-647	-647	-647.4	-655.0
Cropland converted to settlement	-43	-43	-43	-43	-43	-43	-51.3	-64.1
Grassland converted to settlement	-1	-1	-1	-1	-1	-1	-0.8	-13.7
Grassland converted to other land	-3	-3	-3	-3	-3	-3	-2.8	-2.8
Wetland remaining wetland	0	0	0	0	0	0	0.0	0.0
Otherland remaining otherland	0	0	0	0	0	0	0.0	0.0
HWP - Stock-change approach	-219	-158	-218	-262	-339	-283	-438.9	-258.1
Enteric fermentation - cattle	15,601	15,391	15,463	15,681	16,029	16,692	17,602.8	15,979.8
Enteric fermentation - sheep	904	919	997	1,020	996	1,036	986.4	973.1
Enteric fermentation - swine	0	0	0	0	0	0	0.0	0.0
Enteric fermentation - other livestock	2,104	2,090	2,204	2,182	2,319	2,386	2,380.1	2,188.2
Manure management - cattle	4,048	4,078	4,120	4,178	4,275	4,371	3,966.7	4,113.6
Manure management - sheep	237	241	261	267	261	41	258.3	231.9
Manure management - swine	0	0	0	0	0	0	0.0	0.0
Manure management - other livestock	716	566	766	770	812	833	818.4	741.6
Manure management - indirect N2O emissic	614	622	629	651	653	666	618.5	628.5
Direct emissions from managed soils (agricu	7,655	7,564	7,771	7,979	8,212	8,827	6,621.7	7,798.4
Indirect emissions from managed soils (agri	2,366	2,357	2,434	2,511	2,579	2,758	1,609.7	2,380.7
Urea application	37	48	45	6	6	16	9.3	26.7
Rice cultivation	1	1	1	1	1	0	1.2	0.7
TOTAL	**77,493**	**79,104**	**95,789**	**93,572**	**94,055**	**97,024**	**94,009**	**86,576.549**

The identification and assessment of uncertainty in the determination of the Emissions Baseline are presented in the GHG Inventory report as part of the emission and reduction calculations. In the agriculture sector the uncertainty analysis is conducted with the use of the IPCC software which uses approach 1. Enteric fermentation in dairy and non-dairy cows are one of the largest sources of emissions and the uncertainty is 30%. However, the overall uncertainty for all categories in the agriculture sector is 22%, when using approach 1 “combining uncertainties” from the 2006 IPCC Guidelines.

In the LULUCF sector, uncertainty is measured as the coefficient of variation, applying the Monte Carlo method. In addition, a sensitivity analysis was performed, and the result is the detection of the main variable contributing to the overall estimation of emissions and removals: C stock in natural forest.

In future ERPA phases, the Emission Baseline can change with the inclusion of more detailed information. The weakest point of this baseline is the determination of the carbon stock in every land-use. As it was explained in section 4.2 “Summary of time-bound plan to increase the completeness of the scope of accounting and to improve data and methods for the subsequent ERPA phases during the ERPA term” and previous sections, there is one source of information from Collect Earth (activity data) that determines certain land-use classes and another source of information that defines the carbon stocks in every land-use (national forest inventory), with a different land use classification. If the time-bound plan to improve data is applied, the extrapolation of carbon stock data will not depend on expert judgement, as it was done for this Inventory. The definition of carbon stock to Collect Earth land use classes will have a more accurate base.

Approaches, methods, and assumptions used for the elaboration of the GHG Inventory and afterwards the baseline, are presented in chapter 3.1.1 and annex 6. Activity data and emission factors are sufficiently detailed as to enable the reconstruction of the emission baseline. Uncertainty has been quantified and sources of uncertainty have been assessed.

Annex 10: Data and parameters to be monitored

Parameter:	Area
Description:	Area of Oromia classified by its land-use and detection of land-use changes.
Data unit:	ha
Source of data or measurement/calculation methods and procedures to be applied (e.g. field measurements, remote sensing data, national data, official statistics, IPCC Guidelines, commercial and scientific literature), including the spatial level of the data (local, regional, national, international):	Calculation based on sampling analysis.
Fixed value or monitored? If monitored, frequency of monitoring/recording:	Monitored, every year.
Quality Assurance/Quality Control procedures to be applied:	SOP to conduct sample analysis and land-use and land-use change detection with Collect Earth. Capacity training with external trainers (FAO).
Identification of sources of uncertainty for this parameter following approaches from the most recent IPCC guidance and guidelines:	Systematic errors from operators classifying incorrectly the land-use and land-use change.
Process for managing and reducing uncertainty associated with this parameter:	Training, calibration of visual interpretation by operators, 10% of sampling are re-assessed by a different operator.

Parameter:	DBH
Description:	Diameter at breast height.
Data unit:	cm

Source of data or measurement/calculation methods and procedures to be applied (e.g. field measurements, remote sensing data, national data, official statistics, IPCC Guidelines, commercial and scientific literature), including the spatial level of the data (local, regional, national, international):	Field measurement in sample plots.
Fixed value or monitored? If monitored, frequency of monitoring/recording:	Monitored, every 5 years in the NFI.
Quality Assurance/Quality Control procedures to be applied:	Standard operating procedures (SOPs) prescribed under national forest inventory are applied (MEFCC) "Field manual". SOPs from published handbooks, or from the IPCC GPG LULUCF 2003 will also be applied.
Identification of sources of uncertainty for this parameter following approaches from the most recent IPCC guidance and guidelines:	Systematic errors from field measurements, digitalization of field measurements.
Process for managing and reducing uncertainty associated with this parameter:	Quality control/quality assurance (QA/QC) procedures prescribed under national forest inventory are applied.

Parameter:	H
Description:	Height.
Data unit:	m
Source of data or measurement/calculation methods and procedures to be applied (e.g. field measurements, remote sensing data, national data, official statistics, IPCC Guidelines, commercial and scientific	Field measurement in sample plots.

literature), including the spatial level of the data (local, regional, national, international):	
Fixed value or monitored? If monitored, frequency of monitoring/recording:	Monitored, every 5 years in the NFI.
Quality Assurance/Quality Control procedures to be applied:	Standard operating procedures (SOPs) prescribed under national forest inventory are applied (MEFCC) “Field manual”. SOPs from published handbooks, or from the IPCC GPG LULUCF 2003 will also be applied.
Identification of sources of uncertainty for this parameter following approaches from the most recent IPCC guidance and guidelines:	Systematic errors from field measurements, digitalization of field measurements.
Process for managing and reducing uncertainty associated with this parameter:	Quality control/quality assurance (QA/QC) procedures prescribed under national forest inventory are applied.

Parameter:	a
Description:	Area of sampling frame.
Data unit:	m^2
Source of data or measurement/calculation methods and procedures to be applied (e.g. field measurements, remote sensing data, national data, official statistics, IPCC Guidelines, commercial and scientific literature), including the spatial level of the data (local, regional, national, international)	Field measurement in sample plots.
Fixed value or monitored? If monitored, frequency of monitoring/recording:	Monitored, every 5 years in the NFI. Sample plot location is registered with a GPS.

Quality Assurance/Quality Control procedures to be applied:	Standard operating procedures (SOPs) prescribed under national forest inventory are applied (MEFCC) “Field manual”. SOPs from published handbooks, or from the IPCC GPG LULUCF 2003 will also be applied.
Identification of sources of uncertainty for this parameter following approaches from the most recent IPCC guidance and guidelines.	Systematic errors from field measurements, digitalization of field measurements.
Process for managing and reducing uncertainty associated with this parameter	

Parameter:	WD
Description:	Basic Wood density of every species.
Data unit:	g/cm^3
Source of data or measurement/calculation methods and procedures to be applied (e.g. field measurements, remote sensing data, national data, official statistics, IPCC Guidelines, commercial and scientific literature), including the spatial level of the data (local, regional, national, international) :	Extraction of samples on field and delivery to laboratories for measurement.
Fixed value or monitored? If monitored, frequency of monitoring/recording:	Once estimated for one species, it is fixed.
Quality Assurance/Quality Control procedures to be applied:	SOP applicable to this activity, ISO standards.
Identification of sources of uncertainty for this parameter following approaches from the	Laboratory practices measurements.

most recent IPCC guidance and guidelines:	
Process for managing and reducing uncertainty associated with this parameter:	Proper sample size, SOP in laboratories activities.

Parameter:	CF
Description:	Carbon fraction.
Data unit:	Dimensionless
Source of data or measurement/calculation methods and procedures to be applied (e.g. field measurements, remote sensing data, national data, official statistics, IPCC Guidelines, commercial and scientific literature), including the spatial level of the data (local, regional, national, international):	IPCC default value.
Fixed value or monitored? If monitored, frequency of monitoring/recording:	Fixed value.
Quality Assurance/Quality Control procedures to be applied:	N/A
Identification of sources of uncertainty for this parameter following approaches from the most recent IPCC guidance and guidelines:	Consideration of carbon fraction range of possible values in IPCC guidelines.
Process for managing and reducing uncertainty associated with this parameter:	N/A

Parameter:	**R**

Description:	Root-to-shoot ratio to estimate belowground biomass.
Data unit:	Dimensionless
Source of data or measurement/calculation methods and procedures to be applied (e.g. field measurements, remote sensing data, national data, official statistics, IPCC Guidelines, commercial and scientific literature), including the spatial level of the data (local, regional, national, international)	IPCC default values.
Fixed value or monitored? If monitored, frequency of monitoring/recording:	Fixed value.
Quality Assurance/Quality Control procedures to be applied:	N/A
Identification of sources of uncertainty for this parameter following approaches from the most recent IPCC guidance and guidelines:	Consideration of the range of possible values in IPCC guidelines.
Process for managing and reducing uncertainty associated with this parameter:	N/A

Parameter:	**SOC**
Description:	Soil organic carbon in forestland and other land-use. The SOC in forest is already measured in the NFI. The continuous measurement of SOC in forestland will provide more accurate results. However, if the time and resources are scarce, it would be more efficient to estimate other land use SOC, such as grassland or cropland.
Data unit:	tC/ha (measured in 30 cm depth)
Source of data or measurement/calculation	Samples obtained on NFI plots and delivery to laboratories.

methods and procedures to be applied (e.g. field measurements, remote sensing data, national data, official statistics, IPCC Guidelines, commercial and scientific literature), including the spatial level of the data (local, regional, national, international):	
Fixed value or monitored? If monitored, frequency of monitoring/recording:	Monitored value.
Quality Assurance/Quality Control procedures to be applied:	SOP applicable to this activity, ISO standards.
Identification of sources of uncertainty for this parameter following approaches from the most recent IPCC guidance and guidelines:	Laboratory practices measurements.
Process for managing and reducing uncertainty associated with this parameter:	Proper sample size, SOP in laboratories activities.

Parameter:	**Emission factors**
Description:	Emission factors in different land uses have been estimated as described in annex 6 and section 4 of this ERPD, based on the National Forest Inventory. The assumptions made and factors estimated will be monitored and assessed in every verification event.
Data unit:	tCO_2/ha
Source of data or measurement/calculation methods and procedures to be applied (e.g. field measurements, remote sensing data, national data, official statistics, IPCC Guidelines, commercial and scientific	Samples obtained on NFI plots

literature), including the spatial level of the data (local, regional, national, international):	
Fixed value or monitored? If monitored, frequency of monitoring/recording:	Monitored value. Frequency of monitoring: depending on the National Forest Inventory frequency
Quality Assurance/Quality Control procedures to be applied:	SOP applicable to the NFI.
Identification of sources of uncertainty for this parameter following approaches from the most recent IPCC guidance and guidelines:	Data collection, data processing, emission factors calculation and emissions factor comparison between different NFIs
Process for managing and reducing uncertainty associated with this parameter:	Proper sample size, SOP data collection and data processing as stated in the NFI.