Lessons and Experiences of Other Country's Forest Accounting Systems for Ethiopia's Forest Accounting System

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Abstract:

For many countries, forests play a key role by providing income and livelihoods while contributing to climate change mitigation and other vital ecosystem services. The Ethiopian system of national accounts does not properly account for the full economic, social, and environmental values of forest resources. The main objective of this study is to assess the experience of other countries accounting systems to draw important lessons for designing our robust forest accounting system. For this study, 7 countries across the world were selected for a case study based on the availability of comprehensive data and based on the contribution of forests to the economy. The result of the study shows that Sweden and the United Kingdom made efforts to improve the forest accounting system and use an alternative accounting system. For example, Sweden used forestry statistics; valuation of forest land and timber, and forest area is included in the SNA stock accounts to measure the true value of forest. The United Kingdom developed forest statistics and measure the indirect and induced employment multipliers effect of forests. Also, used annual surveys of forestry sector businesses and organizations to obtain more specific economic data relating to the sector including private woodland owners. The new lesson to be adopted for Ethiopian forest sector accounting is annual forestry statistics, supply and use information, accounting of depreciation, alternative evaluations for non-market goods and services, development survey on indirect and induced employment multipliers affecting the forest sector, quality data on private sector forest and standards data on all goods and services and application alternative forest accounting system. Further, the study recommends the Ethiopian forest sector should be contextualized and adopt the European experiences on forest accounting, in particular estimates of forest and timber values, non-wood goods, production capacity, services (recreation, protection of soils and noise, carbon sequestration), biodiversity and chemical imbalance costs.

Keywords: Lessons and experiences, forest accounting system, Ethiopia

INTRODUCTION

For many countries, forests play a key role by providing income and livelihoods, climate change mitigation, and other important ecosystem services. To properly accounting forest resources, it needs well-organized information and data that can support planning and policy implementation (Castaneda Sanchez et.al. 2017). Forest accounting is helpful for the maintenance of forest resources in a proper way, balancing economic growth and regional economic diversity (Patil, 2017). The System of National Accounts (SNA) is the standard international framework for the organization of economic statistics and has been adopted around the world to judge economic progress and performance. The SNA provides a framework and a comprehensive set of concepts, definitions, and classifications for economic accounting that allows compiling, and presenting

economic data in a format designed for purposes of economic analysis, decision-making, and policymaking (Hundessa and Alemayehu, 2019).

The Ethiopian system of national accounts in the forestry sector does not capture the true value of forest contribution to the economy as well as support services provided to other sectors. This is due to SNA estimates, the valuation of forest resources and ecosystems needs to be exchanged for cash (SNA, 2008). In neoclassical economics, exchange values result from the price (P) and the quantity (Q) exchanged at the equilibrium of supply and demand. Social values would be estimated based on changes in both producer and consumer surplus. The consumer surplus is not included in SNA-based valuations. Therefore, exchange values do not necessarily reflect social values and need to go beyond the exchange value concept by including consumer surplus through another accounting system (valuation methods).

The Ethiopian SNA framework is inadequate to better show economic performance since the contribution of the forest sector is neglected because of the non-marketed nature of most of the forest goods and services. The gap in the current practices of the forest resource accounting system needs analysis of various aspects of a forest accounting system for further improvement that could capture the total contribution of the sector. The contribution forest sector to the national economy is varied among different countries. Understanding the links between forests and the social and economic development of other countries is important to make better-informed decisions on the use of forest resources, and to design and monitor policies that can help achieve sustainable development. To this end, the objective of this study is to assess the experience of other countries in forest accounting and design a robust forest resource accounting system.

METHODS

To ensure proper accounting, different countries and international organizations will share best practices in the forest accounting system. The implementation of the SNA/SEEA needs to create conditions that improve the quality, availability, consistency, and harmonization of economic statistics and national accounts in all countries. There are various forest accounting practices across different countries. To collect the best experience for Ethiopia from other countries forest accounting experience both developing and developed countries were selected based on the availability of comprehensive data and based on the contribution of forest to the economy. Accordingly, Zimbabwe, from Africa, Indonesia, and Malaysia from Asia, Chile from Latian America, the UK, and Sweden from Europe were selected for the study. The similar sector livestock sector accounting system of Ethiopia was used to draw an accounting system for the forest sector. This study mainly depends on secondary data sources such as Forest Accounting Sourcebook, World Bank, United Kingdom forestry statistics, Afristat, and EUROSTAT.

RESULTS AND DISCUSSION

The objective of forest accounting is to provide information to give a more complete picture of forest resources, to ensure integration in economic development, and to mainstream forest information in economies that depend on the environment to achieve sustainable development. Since 1993 the release of the first System of Environmental Economic Accounting (SEEA) the development of concepts around natural resource accounting for forests, a number of countries have developed forest accounts. For example, Australia, Canada, Sweden, Finland, Guatemala, New Zealand, and the United Kingdom focused on capital accounting systems. While Latvia, Guyana, Tanzania, and Zimbabwe were not based on the SEEA to account for forests. Several

factors affected the forest accounting system such as forest management, relevance of ecosystem services, policy framework, linkage with other sectors, availability of quality and reliable data, and commitment of users accounting information.

Zimbabwean Forest Accounting System
Zimbabwe is one of the landlocked countries located in southern Africa, whose forest resources cover 66% of the total land (Mabugu, and Chitiga, 2002). For Zimbabwean forest stocks generate a wide range of timber and non-timber forest products and services. The products include fuel wood, fuel wood for charcoal making, sawn timber, pulpwood, building materials, wood for small artisanal crafts, fodder, fruits, honey, mushrooms, insects, bark for rope, medicines, leaf litter, and gum. The services include watershed conservation; carbon fixation; microclimatic stabilization; and the provision of windbreaks, shade, soil stability, and wildlife habitat (Rasmussen, 2017). The true contribution of forests to national income, wealth, and welfare is not accounted for in the SNA measures (Mabugu, and Chitiga, 2002).

The Zimbabwe system of national account does not capture the depreciation of the natural capital (the forest stocks), upon which subsequent commercial uses are based. The national accounts only measure market-based transactions and exclude consumptive uses such as domestic fuel wood cut by villagers, which occurs outside the marketplace. The country's system of national account tries to use an adjusted contingent valuation study to estimate the mean direct and indirect values of a range of timber and non-timber products woodlands at a monetary value per hectare per year and the total stock value of indigenous woodlands can be approximately estimated. Zimbabwe was unable to implement SEEA due to complexity, data, finance, and manpower. Zimbabwe focused on the way to access the data for the accounting system than SEEA or SNA. The lessons from Zimbabwean for Ethiopia are developing information systems that can support SEEA or SNA accounting systems. Training of enough manpower and sufficient budget allocation for the program as a prerequisite for the implementation proposed forest accounting system.

Indian Forest Accounting System
India ranks 10th in the list of most forested nations in the world with a total Forest Cover of 21.54% of its total Geographical Area. The forestry & logging sectors' contribution account for 1.23% of the total GDP (Madhu Verma, 2018). The study conducted in India on the Accounting of forest resources is very comprehensive. It builds on a well-established forest physical account of India using SEEA. This work provides a comprehensive picture to obtain a monetary account of timber, non-timber, and carbon wealth (Gundimeda, et.al., 2007; Garg and Sharma, 2017). They used the concept of total economic value in forest valuation considering provisioning services, regulating services, supporting services, and information services. The data regarding the quantity of timber harvested and sold was obtained from the state forest department and valuation was done based on the current market price (Ramachandra, 2017). In addition, different non-timber forest goods and services were obtained from different data sources and valuation was conducted based on the formula stated below.

Provisioning services	Equation	Details
Timber	$$V_{Timber} = \sum_{i=1}^{11} \sum_{j=1}^{6} Q_{ij} \times P_{ij}$$	Q= Quantity of Timber; P= Price of Timber; i= no. of taluks; j= variety of timber
NTFP	$$V_{NTFP} = \sum_{i=1}^{11} \sum_{j=1}^{30} Q_{ij} \times P_{ij}$$	Q= Quantity of NTFP; P= Price of NTFP; i= no. of taluks; j= variety of NTFP
Litter	$$V_{Litter} = \sum_{i=1}^{11} Q_i \times P_i$$	Q= Quantity of Litter; P= Price of Litter; i= no. of taluks
Mulching leaves	$$V_{Mulch} = \sum_{i=1}^{11} Q_i \times P_i$$	Q= Quantity of Mulching leaves; P= Price of Mulching leaves; i= no. of taluks
Fodder	$$V_{fodder} = \sum_{i=1}^{11} Q_i \times P_i$$	Q= Quantity of fodder; P= Price of fodder; i= no. of taluks
Fuelwood	$$V_{fuelwood} = \sum_{i=1}^{11} Q_i \times P_i$$	Q= Quantity of fuelwood; P= Price of fuelwood; i= no. of taluks
Food	$$V_{food} = \sum_{i=1}^{11} \sum_{j=1}^{22} Q_{ij} \times P_{ij}$$	Q= Quantity of food; P= Price of food; i= no. of taluks; j= variety of food products
Inland fish catch	$$V_{fish} = \sum_{i=1}^{11} Q_i \times P_i$$	Q= Quantity of fish catch; P= Price of fish catch; i= no. of taluks
Hydrological services	$$V_{water} = \sum_{i=1}^{11} Q_i \times P_i$$	Q= Quantity of water utilization for different purposes; P= Price of water utilization for different purposes; i= no. of taluks
Wild fruits	$$V_{wild\ fruits} = \sum_{i=1}^{11} Q_i \times P_i$$	Q= Quantity of wild fruits; P= Price of wild fruits; i= no. of taluks
Oxygen	Value of oxygen provision from forests was quantified based on the values of oxygen production per hectare of subtropical forest (Maudgal and Kakkar, 1992)	
NB: Taluk is an administrative district for taxation purposes, typically comprising a number of villages.		

The value of carbon sequestration was calculated by considering 10 Euros Per ton of CO_2 (Ramachandra, 2017). In addition, the valuation of fodder is using the opportunity cost of allotting alternate acreage of land to it. There are so more details on deriving monitory accounts.

There is greater flexibility for making forest-related adjustments in asset accounts than in current accounts as produced & non-produced assets under economic assets include natural assets (e.g., livestock & timber plantations) & land and natural forests, respectively. Forest resource accounting (FRA) comprises management tools that integrate forest information from various sources thereby making it useful for policymaking and planning and contributing to the development of natural resource accounts. Environmental accounts have been constructed for forest resources more often than for most other resources. The earliest set of forest accounts was constructed by Norway in the late 1970s. At that time only physical asset accounts for standing timber were constructed (Garg and Sharma, 2015).

Their GDP contribution of forest resources excluded natural forests (non-produced assets). This now adds the value of the accumulation of natural forests and hence increases GDP. Consumption

of capital to include the cost of depletion of natural forests, which decreases net domestic product (NDP). Gross Domestic Product (GDP) and Net Domestic Product (NDP) from the forestry sector are computed as follows:

$$GDP = Value\ of\ Output - Repairs, Maintenance\ and\ other\ Operational\ Costs$$
$$NDP = GDP - Consumption\ of\ Fixed\ Capital$$

Where: Consumption of Fixed Capital is Depreciation of Fixed Assets

The GDP from the forestry sector can be estimated by following either the production approach through Gross Value Added (GVA) like timber or the consumption approach (e.g. Fuelwood). It aims at estimating the value of output at factor cost in the first instance and then deducting the value of various inputs at purchasers' prices (Mali *et al.,* 2011; Garg and Sharma, 2015). The lesson from Indian forest accounting is:

- They used valuation was done based on the current market price from the data obtained from the state forest department.
- They also calculated the value of carbon sequestration by considering 10 Euros Per ton of CO_2;
- They used one of the two approaches (the production approach through Gross Value Added) in the calculation of the GDP contribution of the forest sector,
- They considered the value of the annual depletion of natural forests which was previously excluded from Indian forest contribution to GDP;
- They also used different formulas to calculate the value of forest goods and services.

Malaysian Forest Accounting System

Malaysia is in Southeast Asia with a total land area of 330 242 km2 (33 million ha) and is one of the few remaining heavily forested tropical countries with 20.06 million ha of natural forest (Talib, 2015). The forests of Malaysia have been systematically managed with the establishment of the forestry department in 1901, whereby ecologically and environmentally sound forest conservation and management practices have been developed to ensure forest renewal and sustained yield (Mokthsim, 2018). Malaysia was favored in economic integrated accounts, and natural capital directly into the SNA. To improve the forest accounting system the country developed a manual providing a procedure accounting economically for changes in the quantity and quality of natural resources in 1993. Natural resource accounts (NRA) are an extension of the SNA, providing more detailed economic information on natural resources of interest, without distorting the central structure of the conventional national accounts (WWF, 1993). The system focused on timber, carbon sequestration, biodiversity, game in natural forests, subsoil assets, and agricultural soils. The WWF, 1993 accounting system was updated and revised to capture the asset value of forests by (WWF, 1998).

To effectively implement economic system of environmental economic accounting Malaysia developed collection of Environment Statistics (CES) and adopted framework for the development of environment statistics (FDES) in 1998 from United Nations 1984.
- Since 2009, Periodical survey on Environment Protection Expenditure captured through Environmental Expenditure Statistics adopted from 2005 – Eurostat.
- Working closely with other agencies and technical collaboration with the local university (data estimation & analysis).

- First-time system is not applied at the national level. But, also considered Peninsular Malaysia, Sabah, and Sarawak explicitly.

Indonesian Forest Accounting System

Indonesia is endowed with some of the most extensive and biologically diverse tropical forests in the world. Tens of millions of Indonesians depend directly on these forests for their livelihoods, whether gathering forest products for their daily needs or working in the wood-processing sectors of the economy (Barber et.al.2002). The forest area in Indonesia amounts to 137,090,468.18 ha consisting of 133,694,685.18 ha of terrestrial forest area and 3,395,783 ha of water area. About 48.8 million people of the Indonesian population live in or around the forest, of which 10.2 million people are categorized as poor communities (Ministry of Forestry 2010). The SNA lays down the ground value of the interaction of the economy and forest. Post-2015 development agenda, the country starts efforts to address the issues of sustainable development, climate change, biodiversity, and green economy goals. Environmental Economic Accounting (SEEA) has been adopted as an international statistical standard and as the measurement framework for a variety of related international policy activities. The following actions were undertaken to improve forest accounting:

- National Statistical System that collects data periodical with collaboration stakeholders, and international agencies was established.
- A comprehensive environmental-economic accounting information system that responds to the requirements of information on sustainable development and the green economy was established.
- Institutional coordination within Indonesia and between national and provincial governments for the advancement of the accounting system was achieved.
- Provide training and capacity building in environmental-economic accounting!
- Enhanced coordination of support from international and donor agencies for assistance
- Improved data quality, access, and technical capacity
- Set a priority for accounting, such as ecosystem services like flood control and eco-tourism.
- System is implemented in three phases.
- The first phase would cover a period of 6 to 8 months and would aim to establish the working groups and institutional arrangements required for developing the accounts, as well as a confirmation of currently identified priority accounts. Identifying priority area accounts collaboration with other Indonesian stakeholders and a pilot comprehensive ecosystem services account for one province. In a second phase, would last between 2 to 3 years. Capacity building and institutional coordination is a key element in both the first and second phase. Previous experience has shown that a feasible approach involves bi-annual hands-on training workshops where the selected team (five to ten people, of which at least of which are three full-time) of accountants, economists, and (spatial) modelers that would construct the accounts would be trained based on the progress they have made and the specific issues they are experiencing. In a third phase, the accounts could be integrated in the national accounts production, depending upon the outcome of the second phase. This phase would require that data providers regularly provide updated data to the accounts compilers, that staff is in place to conduct quality assessment and compilation of the accounts, and that the results are regularly published.

Chilean Forest Accounting System

Chile has a strong forest sector based on plantations of exotic species and an extensive area of temperate rainforests with unique ecological features and a wealth of biodiversity and endemism (Salas et.al. 2016). Chile's forestry resources consist of 16 million hectares of forest, 86% of which corresponds to natural forests and 14% to plantations. The main planted species are the Radiata Pine (64% of the plantations), the *Eucalyptus Globulus,* and the *Eucalyptus Nitens* (Raga, 2009). Chile´s economic development is based on the exploitation and intensive use of natural resources. This generates a significant impact on the environment and people´s quality of life. The country developed a comprehensive economic-environmental account that helps connect the economic system with its impact on natural capital to have a more precise view of the development strategy as well as support public policy (Ministry of the Environment (MMA), 2016). Environmental Accounts in Chile were started in 1993 by the National Accounts Department of the Central Bank of Chile with World Bank support and which is focused on physical accounts (mining, fisheries, forestry), matrices of emission coefficients and abatement costs, defensive expenditures, and valuation. Preliminary results, particularly regarding the forestry sector, produced extensive debate that led to political conflicts, keeping the project from attaining its objectives (MC). In recent years, the Government of Chile, through the Ministry of the Environment, has taken on the challenge of designing and implementing a comprehensive system of Environmental, Ecosystem, and Economic Accounts for Chile's forest sector. To implement the approach very intensive work has been done by the government such as:

- Build and validate an institutional framework that effectively manages an integrated system of environmental, ecosystem, and economic accounts
- Construct a conceptually coherent information system through economic environmental accounting that responds to the needs of the sectorial strategies.
- Place environmental quantification and statistics in the different ministerial programs that are related to the environment, forest, and forest ecosystem service.
- Develop and publish prioritized sectorial forest accounts,
- Implementation budget from different international agencies and collaboration
- The forest accounting implementation period in different
    1. Phase 1: Development of databases and methodological background prior to the development of environmental accounts.
    2. Phase 2: Development of pilot accounts (draft) with the existing information, while at the same time identifying the existing information gaps.
    3. Phase 3: Development of the complete account considering the development of the missing data sources in Phase 2.

Sweden Forest Accounting System

In relation to forest accounting, the European Union has been a leading player. The countries such as Austria, Denmark, France, Netherlands, Norway, Sweden, and the United Kingdom were the pioneer and released a range of different SEEA accounts and have developed relevant data sources and methods. Among these countries, Sweden is one of the leading nations in forestry and forest industry research. Swedish companies are at the forefront of industrial wood construction and the development of new wood and cellulose-based products, such as bioplastics, biocomposites carbon fiber materials, and textile fibers (Hodge, 2016). In total Sweden's forestland amounts to about 28 million ha (Mha) of which 23.4 Mha is regarded as a productive forest. There are 4.7 Mha low-productive forests. Until today, 1.1 million hectares have been designated for nature protection in formally protected areas (Arets et.al. 2019). The forest-

products industry accounts for 15 to 20 percent of the total industrial investments. Together with indirect employment in sectors that supply it with goods and services, it employs around 180,000 people over the entire country, more than a quarter of total industrial employment (SFIF, 2008). The forest industry is highly export-oriented, e.g., paper exports amounted to 89% of the production in 2009 (SFIF, 2010).

Calculating environmental income has become a popular method of highlighting the importance of environmental resources in livelihoods, but few studies have quantified the provisioning of ecosystem services and environmental income in the same landscape and environmental income by source land cover (Pritchard et. al., 2019). Forest accounts in Sweden, describe stocks and changes of stocks for the environmental division and the national account division of Statistics Sweden have earlier developed forestland and timber, together with analyses of the supply and use of timber jointly. This Forest Accounts developed value ecological and social functions of the forest by linking physical data with economic valuation methods, which consists of two sections. Section one comprises a discussion of the physical tables of non-SNA functions of forests and section two includes a monetary valuation of the non-SNA functions produced by the Swedish forest ecosystems (Eriksson et.al 2003). From the review of forest sector accounting in Sweden:

- The forestry sector has its own forestry statistics
- Forest product supply and use table compiled yearly.
- The Swedish Forest accounts, have three subtotals, such as timber values, on-wood goods, and the value of forest services.
- The data availability for forest accounts, compiled on a five-year basis.
- Accounting of timber and non-timber goods by SNA in the forestry sector by using of market prices and Forest services by using of non-SNA.
- Qualitative changes (biodiversity non-SNA avoidance/restoration cost).

United Kingdom Forest Accounting System
Woodland land cover in the United Kingdom is estimated to be 3.2 million hectares. This represents 13% of the total land area in the UK, 10% in England, 15% in Wales, 19% in Scotland and 9% in Northern Ireland. Of the total UK woodland area, 0.86 million hectares (26%) is owned or managed by Forestry England, Forestry and Land Scotland, Natural Resources Wales, or the Northern Ireland Forest Service. The total certified woodland area in the UK is 1.39 million hectares. Overall, 43% of the UK woodland area is certified. 13.7 thousand hectares of new woodland were created in the UK in 2019-20, accounting for 57% (Forestry Commission, 2018).
The United Kingdom accounts for forest contribution to the economy based on the European forest accounts collect data on stocks and flows of woodland and timber, and economic data on forestry UK applied the principles of the SEEA-CF and the SEEA EEA in forest accounting system (Rosenkranz et.al. 2018). The forest accounting standard specifies good forest management including criteria covering sustainable yield, conservation of biodiversity, and natural resources such as water, as well as carbon stocks.

Forest accounting systems also assess the gross value added, grown timber production and processing, and recreation, tourism, and employment supported by the forestry-related sector. With the use of methodology, forest economic contribution to Scotland's economy is **£954 million, of which about** £771 million comes from forestry and timber processing, and £183 million comes from forest recreation and tourism. In addition, employment levels in Scotland are up with more than **25,000** people now working in the sector (Forestry Commission, 2012). National-level

Forest accounts have two objectives: providing a framework in which information on forests can be brought together to give a more complete picture of forests, and ensuring that this information can be integrated within broader discussions on economic development and planning. This second goal is often referred to as "mainstreaming." The need for mainstreaming of forest information emerges from the increasing recognition that societies and their economies have an inherent dependence on their environment and that achieving sustainable development requires more holistic and integrated ways of thinking (Castaneda Sanchez et.al. 2017). The lesson and experience from the United Kingdom Forest sector in forest accounting system are mentioned below:

- Indirect and induced *jobs* created by the sector adequately by forestry statistics,
- Employment ratios and earnings from employment adequately identified by business survey
- Forest benefits to the public that are not recorded in economic statistics are valued through contingent valuation and other techniques.
- Annual survey on forestry sector businesses and organizations in order to obtain data relating to the sector
- Timber processing sector accounted under the forestry sector.
- For detailed information on private woodland owners' survey methodology used.
- Input-Output employment multipliers used for indirect employment resulting from the backward linkages to suppliers and indirect employment related both to direct and indirect employment.

ACCOUNTING EXPERIENCE LIVESTOCK SECTOR IN ETHIOPIA

There are studies conducted by the Intergovernmental Authority on Development (IGAD) livestock policy initiatives and the Ethiopian Ministry of Finance and Economic Development (MoFED) on the contribution of livestock to the Ethiopian economy (Roy Behnke and Fitaweke Metaferia, 2011; ICPALD, 2013). This study was conducted with the main objective to assess the extent to which livestock's contribution to the Ethiopian national economy is reflected in national accounts, by assigning monetary values to the non-marketed services that livestock provide. It can be considered as one of the country's sector experiences. There are also other studies conducted by different scholars on the contribution of livestock resources to Ethiopian economy (Aleme and Lemma, 2015).

There are three major works conducted in the study of the economic benefits that Ethiopians and the Ethiopian economy derive from livestock. It quantifies the volume and value of livestock product output from the agricultural sector. Then the study states the estimates of the monetary value of livestock products (goods and services), primarily but not exclusively as contributions to sustaining the livelihoods of Ethiopian farmers and herders.

Lastly, the study characterizes the 'multiplier' or spread effects of livestock goods and services primarily outside rural areas, as the outputs provided by livestock are taken up and used by other sectors of the national economy – as exports in the trading sector, inputs into manufacturing and transport, or consumed by households (Roy Behnke and Fitaweke Metaferia, 2011; ICPALD, 2013). The study emphasized on quantifying the volume and value of livestock product output from the agricultural sector, by updating the livestock off-take rate. Correction of livestock outputs that used to be under another account- crop. Value role of livestock – credit, insurance,

transport, Livestock output as input to other sectors. The huge change came from the role of livestock in crop traction power.

Generally, the result of the study identified unaccounted livestock goods and services. Those livestock attributes which are accounted for under different sectors/sub-sectors were also accounted for livestock. Thus, the result brought a huge change in indicating the contribution of the livestock sector to the national economy of Ethiopia. The accounting procedure indicated in the study can be used as the basis for accounting of contribution forest resources to the national income of Ethiopia.

The result of the study conducted on livestock production shows that the new adjustment resulted in more than double the contribution of livestock accounted by the Ministry of Finance and economic development of Ethiopia (Roy Behnke and Fitaweke Metaferia, 2011; ICPALD, 2013). This brings significant change to the policies related to the livestock sector. From the experience of the livestock contribution in the Ethiopian economy, we can take the lesson to adjust for those forest products already accounted in the conventional system of national accounts but underestimated, those forest goods and services misallocated to other sectors of the economy and those goods and services unaccounted in the GDP of the country.

LESSONS FOR ETHIOPIA FOREST ACCOUNTING

The Ethiopian SNA framework is inadequate to capture the true economic value of forests. Some contribution of the forest sector is misallocated in agriculture, industry, and tourism and other is underestimated. India on accounting of forest based on SEEA and obtains monetary account of timber, non-timber, and carbon wealth, provisioning services, regulating services, supporting services, and information services. The data regarding the quantity of timber harvested and sold was obtained from state forest department and valuation was done based on the current market price. The Sweden on forest accounting system contains five sections including:(i) timber values, (ii) non-wood goods (iii) production capacity (iv) services (recreation, protection of soils & noise, carbon sequestration), (v) biodiversity and (vi) chemical imbalance costs (acidification).

 While the United Kingdom Forest accounting structure includes (i) ecosystem services; (ii) changes in both stocks of assets (iii) flows of services and (iv) woodland and timber. Chile used economic-environmental accounts for forest accounting focused on physical accounts (forestry), matrices of emission coefficients and abatement costs, defensive expenditures, and valuation. Indonesia changed from SNA to environmental-economic accounting (SEEA) in 2015 to address the issue of development agenda such as climate change, biodiversity, and green economy. Malaysia used in economically integrated accounts, natural capital directly into the SNA. Natural resource accounts (NRA) are an extension of the SNA, providing more detailed economic information on forests without distorting the central structure of the conventional national accounts. The system focused on timber, carbon sequestration, biodiversity, game in natural forests, subsoil assets, and agricultural soils.

 In general, from other countries experiences, there are several lessons for the Ethiopian forest accounting system. These are periodic forest statistics, supply and use information, accounting system for depreciation of natural capital, non-market costs and benefits valuation from Sweden, accounting indirect employment multipliers, accounting of forest and timber processing sector to forest sector, develop an information system for accounting on private sector forest owners, develop quality and standards data on all goods and services for a forest accounting system and

implementation of alternative accounting system from the UK. The lessons from Latin America Chile are building and validating an institutional framework, conceptually coherent information system, development of pilot accounts (draft) with the existing information, strong statistics at different ministerial programs, and collaboration with international agency.

Similarly, lessons from the Asian Indian accounting concept are based on the total economic value in forest valuation considering provisioning services, regulating services, supporting services, and information services. The data regarding the quantity of timber harvested and sold was obtained from the state forest department and valuation was done based on the current market price and forest accounting is flexible for making forest-related adjustments in asset accounts than in current accounts. Indonesia, improved data quality, training, and capacity building on environmental-economic accounting, develop a comprehensive environmental-economic accounting and institutional framework, prioritize the accounting system on goods and services of forest, and divide implementation into phases and lessons from Malaysia developing strong stockholder coordination and technical cooperation local and international and phase-based implementation to improve forest accounting. On another hand lesson drawn from the parallel sector of the Ethiopian livestock accounting system, the accounting system estimated the monetary value of livestock products (goods and services), primarily but not exclusively as contributions to sustaining the livelihoods of Ethiopian farmers and herders. The 'multiplier' or spread effects of livestock goods and services primarily outside rural areas, as the outputs provided by livestock are taken up and used by other sectors of the national economy as exports in the trading sector, inputs into manufacturing and transport. The livestock accounting system identified unaccounted livestock goods and services to different sectors and accounted for livestock. Thus, the result brought a huge change in indicating the contribution of the livestock sector to the national economy of Ethiopia. This brings significant change to the policies related to livestock sector. From the experience of the livestock contribution in Ethiopian economy, we can take the lesson to adjust for those forest products already accounted in the conventional system of national accounts but underestimated, those forest goods and services misallocated to other sectors of the economy and those goods and services unaccounted in the GDP of the country. Some of the lessons from experiences of other countries' budgetary demand, and technological innovation can easily adopt. However, other experiences are highly important lessons that can be adopted because of budgetary demand, technological innovation, and other factors. Based on the other countries' forest accounting system and contextualizing a few adjustments for Ethiopia as suggested in (see table 1 below).

Table 1: Suggested techniques for Ethiopia Forests account

Forest good and service	Suggested techniques for Forests accounts	Comments
Non-timber goods Harvested products like mushrooms hunted game, forest coffee, medical plants, fruits, and vegetables Change of production capacity of non-wood forest goods	Values should be measured monetary value included in SNA in the forest sector than the agricultural sector	The valuation of non-timber products should be based on price and set up comparable time series On expert estimates.

Non-wood services Carbon binding	➢ Carbon balance and accumulation in standing timber, tons of carbon ➢ Balance and accumulation of woody biomass dry matter ton of carbon ➢ Changes in carbon stored in the forest ecosystem and Changes in land cover, ➢ Changes in total carbon storage (forest-related resources and products)	All tables concerning the binding of carbon should be harmonized with the Kyoto agreement
Recreation services	This should be measured using recreational areas, Visits by the main purpose, accessibility to recreation areas, and Forest areas free from noise using valuation for recreation.	The forest or tree services in urban areas and rural areas provide recreation and cultural services such value should include in SNA through willingness to pay or hedonic price measurement. The sector needs strong suggested monitoring of the environmental objective and Evaluation the service monetary
Protective functions	Measured in monetary value of forest protects the primary production sectors. The Primary management objective of forest land in the agrarian economy is multipurpose and each function should be listed	Based on estimates by expert's attached monetary value of forest protection of soil, shielding urban areas from noise
Maintenance of biodiversity, quality changes, and Health Service	➢ Forest-occurring species at risk or endangered Forest balance : Protection of the forest and other wooded land and regeneration and extension of forest and other wooded land	The base for the valuation of biodiversity can be done with CVM studies and Valuation based on the difference between the actual protected area and the national target.
Wood	➢ Construction material, Charcoal, and fuel, Furniture	Accounted in monetary value and estimated the informal /non-taxed use of wood and wood products
Chemical quality changes and Quantitative changes in forest ecosystem area	➢ Chemical quality changes of soils, affecting production Capacity in the future and loss of production capacity	Valuation by the cost of liming to counteract acidification. Possible physical data could be areas with the need for liming and Based on statistics of area changes, valuation by estimates by experts

CONCLUSION AND RECOMMENDATION

For many countries, forests play a key role by providing income and livelihoods while contributing to climate change mitigation and other important ecosystem services. The System of National Accounts (SNA) is the standard international framework for the organization of economic statistics and has been adopted around the world to judge economic progress and performance. SNA is the standard international framework for the organization of economic statistics and has been adopted around the world to judge economic progress and performance. The Ethiopian

system of national accounts in the forest sector does not capture the social value of forest and consumer surplus is excluded from SNA-based valuations. The current accounting system needs further improvement and goes beyond the exchange value concept by including consumer surplus. The experience of other countries is important to design robust accounting systems or improving SNA for the forest sector. Assess the experience of other countries' forest accounting systems to design the roust forest accounting system in Ethiopia. The result of the study shows that Sweden and UK made efforts to improve forest accounts and use alternative accounting systems. For example, Sweden used Forestry statistics, Valuation of forest land and timber, and the forest area is included in the SNA stock accounts to measure the true value of the forest. The UK developed forest statistics and measure the indirect and induced employment multipliers effect of forests. The UK also used an annual survey of forestry sector businesses and organizations to obtain more specific economic data relating to the sector including private woodland owners. While Zimbabwe has not made many efforts to forest accounting and the social values of the forest are underestimated. The new lesson to be adopted for Ethiopian forest sector accounting is annual forestry statistics, Supply and use information, accounting of depreciation, alternative evaluations for non-market goods and services valuation, data on indirect and induced employment multipliers affects the forest sector, quality data private sector forest quality and standards data on all goods and services and application alternative forest accounting system. Further, the study recommend the Ethiopian forest sector should be contextualized and adopt the European experiences on forest accounting, in particular estimates of forest values timber values, non-wood goods, production capacity, services (recreation, protection of soils & noise, carbon sequestration), biodiversity and chemical imbalance costs.

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