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Understanding Forest Accounting through the SEEA Central Framework

Mr. Akhil Majhi

Ph.D Research Scholar, Commerce, University of Calcutta

ABSTRACT

Forests play a vital role in maintaining ecological balance and supporting economic activities. However, traditional economic measures often fail to reflect the true value of forest resources and the impact of their depletion. In this context, forest accounting has become important for integrating environmental information with economic data. This study aims to understand forest accounting through the framework of the System of Environmental-Economic Accounting (SEEA) Central Framework. The study follows a descriptive research approach and is based on secondary data, particularly the SEEA Central Framework (2012) developed by the United Nations. The paper explains how the framework measures forest resources through land accounts and timber asset accounts in both physical and monetary terms. It also highlights how the integration of environmental and economic accounts helps in better understanding the contribution of forests to the economy and supports sustainable resource management.

Keywords: Forest Accounting, SEEA Central Framework, Timber Resources, Forest Land

1. INTRODUCTION

Forests are an important part of the environment and contribute both economically and ecologically. They provide resources such as timber, fuel wood, and raw materials for industries, while also supporting the livelihoods of millions of people. Ecologically, forests maintain environmental balance by acting as carbon sinks, regulating the climate, preventing soil erosion, and supporting biodiversity. Despite these benefits, forests are facing serious degradation due to the expansion of economic activities and climate change. Forest depletion leads to the loss of carbon sinks, which accelerates climate change, and also causes the loss of biodiversity as many species lose their natural habitats.

To address these problems, proper accounting of forest resources and their degradation has become necessary. Traditional economic measures often fail to reflect the true value of forests because they ignore the depletion of natural resources. As a result, the economic contribution of forests is often underestimated and environmental degradation remains unnoticed in policy decisions.

To overcome this limitation, the United Nations developed the **System of Environmental-Economic Accounting (SEEA)** framework. The SEEA Central Framework (System of Environmental-Economic Accounting) is an international statistical standard adopted by the United Nations Statistical Commission in 2012. It serves as a bridge within the UN system to integrate environmental data with standard economic data into a single, coherent accounting system. This allows the UN and its member states to measure the true relationship between the environment and the economy and to support evidence-based sustainable development policies.

The SEEA Central Framework identifies seven individual components that constitute the scope of environmental assets. The seven assets covered by the framework are **Mineral and energy resources, Land, Soil resources, Timber resources, Other Biological Resources, Water Resources.** For each of these, the framework provides specific and detailed measurement approaches to account for them in both physical terms (e.g., tonnes, cubic metres, hectares) and monetary terms.

While the **SEEA Central Framework (SEEA CF)** identifies seven asset categories, it approaches **forests** primarily through **Timber resources** and **Forest land**. These accounts track the physical volume of wood (in cubic meters) and the spatial extent of land (in hectares).

2. LITERATURE REVIEW

Forest accounting has emerged as an important tool for integrating environmental and economic information within a coherent statistical framework. The development of the System of Environmental-Economic Accounting (SEEA) by the United Nations has significantly strengthened the conceptual and methodological base of forest accounting. Against this background, a brief review of selected studies related to the SEEA framework and forest accounting is presented below.

Baltranaitė, Inacio and Pereira (2026) analyze the **SEEA Ecosystem Accounting (SEEA-EA)** framework as a vital mechanism to address tourism's environmental impact. By integrating physical accounts (extent and condition) with the monetary valuation of ecosystem services, the framework aims to mainstream ecological data into economic decision-making. The authors identify significant gaps in **data harmonization** with **Tourism Satellite Accounts (TSA)** and **SDGs**, particularly at the destination level. They conclude that localized implementation of SEEA-EA is essential for achieving sustainable tourism governance.

Alarcon Blazquez, van der Veeren, Gacutan, and James (2023) present a pioneering attempt to compile **SEEA Ecosystem Accounts** at a **Regional Sea scale** for the OSPAR maritime area in the North-East Atlantic. They argue that traditional economic measures like **GDP** often lead to the prioritization of short-term growth because they fail to account for the **depletion of natural capital**. Their research demonstrates that by measuring ecosystem extent, condition, and services, authorities can **internalize ecological degradation** into decision-making. This work serves as a blueprint for other regional maritime areas to track environmental status and sustainable development despite data limitations.

Patil (2017) explores the nexus between **forest accounting and ecological sustainability**, asserting that forests are a critical component of the terrestrial environmental system. The author highlights that forests provide multi-dimensional inputs—both **visible (timber, fodder) and invisible (climate regulation, pollution control)**—which are systematically underestimated in traditional national income measures. Patil concludes that a robust forest accounting system is essential to **safeguard biodiversity**, mitigate inflated economic production figures, and ensure that the "invisible" life-support systems of forests are recognized as a nation's true wealth.

From the above discussion, it becomes evident that understanding how valuable environmental resources such as forests can be systematically accounted for through the SEEA framework is essential for integrating ecological sustainability with economic decision-making.

3. RESEARCH OBJECTIVES

The primary objective of this study is to understand forest accounting through the framework of the System of Environmental-Economic Accounting (SEEA). It also aims to examine how the SEEA framework

measures and records forest resources in both physical and monetary terms. Furthermore, the study attempts to highlight the importance of forest accounting in understanding the economic and environmental value of forests and supporting sustainable resource management.

4. RESEARCH METHODOLOGY

This study follows a **descriptive research approach**. The study is based on secondary sources of information, particularly the **SEEA Central Framework (2012)** developed by the United Nations. The research mainly describes and explains the concepts and structure of forest accounting as presented in the SEEA framework. No primary data has been used; instead, the analysis is based on the interpretation of the SEEA (2012) framework and related literature.

5. FOREST ACCOUNTING UNDER THE SEEA CENTRAL FRAMEWORK

The **System of Environmental-Economic Accounting 2012-Central Framework (SEEA CF)** provides a structured approach for accounting for forest resources by distinguishing between the **area of forest land** and the **volume of timber resources**. The framework measures these components in both **physical and monetary terms**, allowing environmental information to be integrated with economic data. Through this approach, the SEEA Central Framework helps track changes in forest resources and their economic contributions over time.

5.1. Land Accounts for Forest and Other Wooded Land

Land accounts focus on measuring the **extent and changes in forest land and other wooded areas**. According to the framework, **forest land** is defined as land covering more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent. In addition, **other wooded land** refers to areas with a tree canopy cover between 5 and 10 percent or land where shrubs, bushes, and trees together cover more than 10 percent of the area.

Within this classification, forest land can be further categorized into **primary forests**, which consist of naturally regenerated native species without significant human disturbance; **other naturally regenerated forests**, which develop naturally but may show signs of human intervention; and **planted forests**, which are established through deliberate seeding or planting. The accounts record changes in forest land over time by identifying **additions to stock**, such as afforestation and natural expansion, and **reductions in stock**, including deforestation and natural regression. These accounts help monitor how forest land resources expand or decline due to both human activities and natural processes.

5.2. Asset Accounts for Timber Resources

In addition to land accounts, the SEEA Central Framework provides **asset accounts for timber resources**, which measure the volume of standing timber available for wood supply or fuel. These accounts distinguish between **cultivated timber** and **natural timber resources**. Cultivated timber refers to trees grown under the direct management of institutional units, such as forest plantations, and their growth is recorded within the economic production boundary as an increase in inventories. In contrast, natural timber resources grow without direct human control, and their growth is considered a flow outside the production boundary until the timber is harvested.

The accounts also record **physical changes in timber stock**. Additions to the stock occur through **natural growth**, often measured as the gross annual increment. Reductions occur through **removals**, which represent timber extracted from forests, **felling residues**, which include damaged or unusable wood left after harvesting, and **natural losses** caused by events such as fire, pests, or diseases. When removals

exceed the level that can be sustainably harvested, the framework records this as **depletion** of natural timber resources.

5.3.Monetary Asset Accounting

The SEEA Central Framework also provides guidance for measuring forest resources in **monetary terms**. Timber resources are valued based on their ability to generate future economic benefits. Since timber in its natural state is rarely traded directly in markets, its value is estimated using the **Net Present Value (NPV)** method, which discounts the expected future income from harvesting timber to the present period. In practice, the estimation of resource rent is often based on the **stumpage price**, which represents the payment made to the forest owner for the right to harvest timber. Changes in the value of timber resources over time, caused by fluctuations in prices or changes in valuation assumptions, are recorded as **revaluations** in the monetary asset accounts.

5.4.Integration with Economic Accounts

The SEEA Central Framework integrates forest information with the broader economic system through several accounting tools. **Physical supply and use tables** record the flow of forest products, such as timber, cork, and medicinal materials, from the environment to industries and households. In addition, **energy accounts** track the use of timber resources as fuelwood and other energy sources. The framework also supports **carbon accounting**, which measures the amount of carbon stored in timber resources and the changes in carbon stocks resulting from natural growth or timber removals.

Through these integrated accounts, the SEEA Central Framework presents both **physical indicators**, such as the volume of timber resources, and **economic indicators**, including value added, employment, and capital formation in the forestry sector. This integrated approach helps provide a clearer understanding of the relationship between forest resources and economic activities.

6. CONCLUSION

In conclusion, forests play a crucial role in maintaining both economic development and ecological balance. However, traditional economic systems often fail to properly reflect the real value of forest resources and the impact of their depletion. As a result, environmental degradation and the loss of natural capital may remain unnoticed in economic decision-making.

The System of Environmental-Economic Accounting (SEEA) Central Framework provides a comprehensive method to overcome this limitation by integrating environmental data with economic information. Through land accounts, timber asset accounts, and monetary valuation methods, the framework makes it possible to measure forest resources in both physical and monetary terms. This approach helps track changes in forest stock, identify depletion, and understand the economic contribution of forests more accurately.

Therefore, forest accounting under the SEEA framework is an important step toward recognizing the true value of forest resources. It supports better policy decisions, promotes sustainable forest management, and helps balance economic growth with environmental protection.

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