

Ecosystem Accounting: a step further to achieve the Green Deal objectives

The System of Environmental Economic Accounting (SEEA)[1] is the accepted international standard for environmental-economic accounting, providing a framework for statistics on the environment and its relationship with the economy.

In March 2021 the United Nations Statistical Commission adopted the SEEA Ecosystem Accounting (SEEA EA) as a new international statistical standard to integrate ecosystems and their services into national accounting, and to account for biodiversity and ecosystems in national economic planning and policy decision-making.

It brings together economic and environmental information in an internationally agreed set of standard concepts, definitions, classifications, accounting rules and tables to produce internationally comparable statistics. The adoption of the SEEA framework by the United Nations was a major milestone for the statistical community and beyond. The system is, by design, reliant on earth observation to systematically assess the health and status of ecosystems and the benefit of ecosystem flows to human well-being and the economy.

This article intends to bring awareness on this emerging international concept and introduce the opportunities for the EO community.

- The SEEA Framework

The SEEA was developed in two steps. In 2012, the SEEA Central Framework was adopted by the United Nations Commission, and it was then extended and accepted as a statistical standard in 2021. The Central Framework measures economic activities of governments, households, businesses and looks at how much is spent for protecting the environment and examines at exchanges of some of these environmental related products (energy, water...) between the different economic units. It enables to measure the spin overs and the trade-offs and report on stocks and flows of natural capital. It also measures the individual assets within the environment (e.g., in a wetland ecosystem we can account for things like the stock and quality of the water, and the richness of the species present, this gives us a clear description of the asset – or natural capital, other assets are those related to mineral energy resources, timber etc).

The Central Framework constitutes a paradigm shift in the appreciation and valuation of natural resources as the economy sits within the environment component. In other words, the economy must consider the environment as the measurements of activities and economic instruments are related to the environment. On that account, SEEA brings together environmental accounting and economic information to produce internationally comparable statistics.

Ecosystem accounting takes a special approach as it measures the functioning of the ecosystem as an integrated entity and relationships between the biotic and its components within an ecosystem and it is focused on a specific area such as a country, an administrative region, a river basin, etc. It identifies ecosystem units (in which each ecosystem is contiguous) and presents the typology of ecosystems to measure in a consistent way the ecosystem types.

If we take the example of forestry, ecosystem accounting measures the extent of the ecosystem, the conditions (quality of the ecosystem, such as the soil depth), the ecosystem services (biomass of forests filters water and cleans it...), and the contribution of the ecosystem to the economy and benefits (cleaner water being used by beneficiaries such as households or businesses...). Organizing this information can help decision-makers understand how the environment interacts with the economy.

- Policy context

The overall policy context demonstrates a serious effort in the European Union (EU) to have ecosystem accounting becoming part of the standard of environmental information datasets that policy makers will consider.

First, the European Union's Green Deal[2] covers many environmental dimensions and address transformations of the economy's components and consumers' behaviours (example: Farm to Fork strategy[3]). At the core of the Green Deal is the acknowledgment of the interconnections between the environment and economy. Therefore, SEEA Central Framework helps to make more informed decisions across a range of sectors and is key measuring progress to reach these objectives.

The European Commission adopted the [New EU Forest Strategy for 2030](#)[4], a flagship initiative of the [European Green Deal](#) that builds on the [EU Biodiversity Strategy for 2030](#). As forest management is the main source of biomass for energy and wood production, more robust accounting rules and governance for forest management will provide a solid basis for Europe's future renewables policy in the context of the 2030 climate and energy framework. This is particularly relevant in the context of the Land use and Forestry Regulation (LULUCF)[5] where the Council and Parliament agreed on various pieces of legislation which set the framework for how emissions from the LULUCF sector will be measured and monitored and the role they will play in meeting the EU's 2030 targets with the objective to decrease gas emissions and increase removals in the land and forestry sector.

Finally, the statistical office of the European Union, EUROSTAT is currently working at anchoring ecosystem accounting at the EU level by developing a proposal for a module for ecosystem accounting to be including in EU environmental accounts (to be adopted), which is a statistical obligation under the members states responsibility.

- The next steps and challenges ahead

The development and the implementation of Ecosystem Accounting will present many opportunities and challenges. At the UN level, the next challenge will be to promote the implementation of the standard with 89 countries implementing the SEEA Central Framework, 34 countries compiling SEEA Ecosystem Accounts and 27 countries planning to start implementing the SEEA.

At EU level and over the past few years, Eurostat, the United Nations, statistical offices and the research community have been working together to provide and overview on ecosystem accounts at EU-level in the (INCA) project. This project has been a model on how Ecosystem accounts addresses key European policy objectives such as the EU Biodiversity Strategy. All this information can be useful for other policies that have an impact on natural capital, such as agriculture or transport allowing for monitoring the status of ecosystem assets over time and thus give an indication of the change of their status.

At EARSC, we have organized a first EOcafe[6] to respond to the question on how geospatial data and Earth Observation can contribute to ecosystem accounting. EO is widely recognized as a major source of information to monitor the extent, condition and services of their ecosystems. Therefore, for the EO community, it is interesting to note that EO datasets constitute an important source in the construction of ecosystem accounting and can support their implementation by tracking changes in the extent and the condition of ecosystems or measuring ecosystem services. Ecosystem accounts are inherently spatial accounts, with the implication that they strongly depend on the availability of spatially explicit datasets, including Earth Observations. The emergence of dense EO data streams at appropriate scale combined with the advances in digital technologies offer unprecedented opportunities for countries to efficiently monitor the extent and conditions of their ecosystems determine ecosystems services and implement their ecosystem accounting.

Many opportunities will arise to use global databases and Earth Observation to try to compile stage 1 ecosystem account for all countries and the objective is to nationalize these ecosystem accounts and improve them with national datasets and implement them at the national level.

The international Research & Innovation platform ARTificial Intelligence for Environment and Sustainability (ARIES for SEEA[7]) is an Artificial Intelligence Tool using global models, with the objective to support the compilation of some Central Framework accounts. ARIES for SEEA provides initial functionality for assessing ecosystem extent, condition (including pilot set of accounts for forests, which can be easily expanded to other ecosystems and condition variables), and physical accounts for selected ecosystem services using earth observation combined with the appropriate biophysical models.

There is little doubt that the Ecosystem Accounting will provide many opportunities for the EO sector to contribute to the objectives of the Green Deal. ESA plans to issue a first call on Earth Observation for ecosystem accounting, as part of a broad activity called "Pioneer – EO science for society".

[1] Framework that integrates economic and environmental data to provide a more comprehensive and multipurpose view of the interrelationships between the economy and the environment and the stocks and changes in stocks of environmental assets, as they bring benefits to humanity. More at <https://seea.un.org/> and <https://seea.un.org/ecosystem-accounting>

[2] The European Green Deal is a set of policy initiatives by the European Commission with the overarching aim of making the European Union (EU) climate neutral in 2050. More information https://ec.europa.eu/clima/eu-action/european-green-deal_en

[3] aiming to make food systems fair, healthy and environmentally-friendly. More info at https://ec.europa.eu/food/horizontal-topics/farm-fork-strategy_en

[4] https://ec.europa.eu/environment/strategy/forest-strategy_en

[5] https://ec.europa.eu/clima/eu-action/forests-and-agriculture/land-use-and-forestry-regulation-2021-2030_en

[6] Ecosystem Accounting, one step further to achieve the Green Deal objectives: <https://www.youtube.com/watch?v=kSPqmqU9eSU>

[7] <https://seea.un.org/news/aries-seea-rapid-generation-natural-capital-accounts>