

ANALYSIS OF NATURAL CAPITAL ACCOUNTING IN THE U.S. AND THE EU

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ABSTRACT

Because "you cannot manage what you don't measure", in the context of the emerging ecological crisis, the need for measuring the contribution that ecosystems bring to the economic development has emerged. In 2012, the United Nations Statistical Commission adopted the System of Environmental-Economic Accounting (SEEA) Central Framework as the first international standard for environmental-economic accounting. Also, in 2021 it adopted the System of Environmental-Economic Accounting Ecosystem Accounting (SEEA EA). In 2020, only 89 developed and developing countries - out of 139 countries - implemented SEEA. Surprisingly, the U.S.A hadn't implemented SEEA, but still having a comprehensive Natural Capital Accounting System. The purpose of this paper is to point out the major differences regarding the way Natural Capital Accounting has been used in the U.S.A and in the EU.

We performed an analysis of how Natural Capital Accounting (NCA) has been done in the U.S. and in the EU. This paper provides a general analysis of the development of Natural Capital Accounting in the U.S. and in the EU.

KEYWORDS: *accounting, management, natural capital, system of national accounts*

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1. INTRODUCTION

Natural capital is the stock of renewable and nonrenewable natural resources utilized by economic entities (i.e., companies, families, and government), as well as nonrenewable resource flows such as energy and minerals and ecosystem services (United Nations, 2020). Natural capital is the only component of wealth that is now declining globally. Environmental constraints are increasing, posing a danger to macroeconomic performance and compromising previous and future economic progress. As a result, measuring and monitoring natural capital - the resources, systems, and services provided by nature for human economic activity, such as food, air purification, nutrient cycles, materials, and minerals - is an essential component of attaining sustainable growth and inclusive well-being. However, mainstream economics undervalues these advantages, which might have macroeconomic consequences. Natural capital that is well managed adds value to all other capitals, lowers systemic environmental risk, and ensures a steady flow of benefits for individuals, businesses, and the macroeconomy. Natural Capital Accounting (NCA) is the process of calculating the total stocks and flows of natural resources and services in a given ecosystem or region.

Natural Capital Accounting (NCA) offers physical and economic measures of natural capital stocks, as well as information on ecosystem size and condition. NCA also offers data on ecosystem service

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flows that are used by various economic entities. NCA - specifically, the System of Environmental-Economic Accounting (SEEA) - allows environmental data to be linked systematically with the System of National Accounts, which gives direction on how to construct traditional economic measurements such as GDP, expenditures, and asset values (United Nations et al., 2009).

This paper provides a general analysis of how Natural Capital Accounting (NCA) has been done in the U.S. and in the EU with the aim of formulating recommendations for exchanging good practices.

2. LITERATURE REVIEW

The System of Environmental-Economic Accounting (SEEA) is an international framework that integrates economic and environmental data to provide a more comprehensive and multipurpose view of the economy-environment interrelationships, as well as the stocks and changes in stocks of environmental assets that benefit humanity (European Commission, 2019). It provides the globally agreed-upon standard ideas, definitions, classifications, accounting standards, and tables necessary to produce internationally comparable statistics and accounts (United Nations et al., 2021). The SEEA has an accounting system that is similar to the System of National Accounts (SNA). To simplify the integration of environmental and economic information, the framework employs concepts, definitions, and classifications that are consistent with the SNA. The SEEA is a multi-purpose system that creates a variety of statistics, accounts, and indications with a variety of applications. It is a flexible system that can be tailored to the goals and policy demands of each nation while maintaining a common framework, ideas, words, and definitions (United Nations, 2014).

The technique of determining the entire stocks and flows of natural resources and services in a specific ecosystem or region is known as natural capital accounting. Physical or monetary accounting for such items is possible. The goal is to use this data to help the government make better decisions. This technique may then be used to also guide business and consumer decisions on natural resource and land usage and consumption, as well as sustainable behavior (United Nations, 2021).

The SEEA encompasses both:

- (a) the Central Framework adopted by the United Nations Statistical Commission in 2012, which focuses on individual environmental assets (resources), such as water and energy;
- (b) the SEEA Ecosystem Accounting (SEEA EA) adopted by the United Nations Statistical Commission in 2021.

Because the advantages a society obtains from ecosystems are dependent on where those assets are in the landscape in relation to the beneficiaries, the SEEA EA uses a spatial approach to accounting (Edens et al, 2022).

The location and amount of environmental assets, the ecosystem services delivered, and the location of beneficiaries are all identified through this spatial emphasis (households, businesses and governments). Beneficiaries of ecosystem services such as water filtration, for example, are more typically located downstream of the environmental asset that delivers that benefit (United Nations, 2022).

As a result, maps and tables are frequently used in ecosystem accounting to bring together geographical, environmental, ecological, and economic data in one location.

Before its adoption by the United Nations Statistical Commission in 2021, SEEA EA passed through a revision process that started in 2018. Over 100 experts from a variety of disciplines, sectors, and nations worked directly on it, and over 500 experts examined the final versions in a worldwide consultation (United Nations, 2022). Moreover, by testing and experimenting, a number of worldwide initiatives have contributed to the creation of the updated SEEA EA.

The Natural Capital Accounts (NCA) uses accounting concepts and definitions to more systematically track the quantities and values of natural capital stocks and ecosystem service flows. It is built on the success of the System of National Accounts in informing policy and public discourse regarding how countries manage their economies - and private-sector companies manage their assets (Boyd et al., 2018). The NCA may be used to track the stocks and flows of market and, in particular, nonmarket natural resource-related goods and services, which are frequently left off of both governmental and business balance sheets. This data has helped to evaluate the effectiveness and results of natural resource management while also helping to more precisely define and rate the economic and business sustainability (Obst, 2015).

NCA offers significant benefits to decision-makers. It offers a reliable framework for reporting and analyzing historical patterns and current situations. For instance, water accounts may be used to assess potential hazards to water users across economic sectors and the effects of various management strategies. They can also give information regarding the timing, location, and severity of water shortage (Bagstrad et al., 2020).

The United States (U.S.) and the European Union (EU) have similar issues when it comes to managing natural capital and balancing conservation and resource usage with other types of capital use. However, the Global Assessment made in 2020 by United Nations Statistics Division regarding the implementation of SEEA showed that the United States of America had not started the implementation of SEEA by that time, but only planning to do so (United Nations Committee of Experts on Environmental-Economic Accounting, 2021).

Both the EU and the U.S. have vast geographic areas, economies, and people, but political factors have influenced how each has created and utilized NCA data. Importantly, the EU is a supranational organization, whereas the U.S. government is a federal one. Federal, state, and municipal governments, as well as nongovernmental users, all use the official statistics and environmental data that the U.S. government gathers for the country. In contrast, Eurostat, the EU's statistics agency, compiles EU statistical data, incorporating mostly national (or regional) data provided by member states (Vallecillo, 2019). Using uniform data and methodologies, EU-level statistical data may be included into EU accounting systems. However, national governments also create ecosystem accounting utilizing their own methodologies, national data, and the best available research (Capriolo et al., 2020).

3. METHODOLOGY

The current analysis is based on policy briefs, UN reports, EU reports and US Government reports on the topic of Natural Capital Accounting published since 1999 till 2022. It is based on the analysis of several official reports, studies, research papers and EU regulations such as:

- (a) Nature's Numbers: Expanding the National Economic Accounts to Include the Environment, report published by the National Research Council in 1999 in the U.S.
- (b) Regulation (EU) No 691/2011 of the European Parliament and of the Council of 6 July 2011 on European environmental economic accounts.
- (c) Accounting for ecosystems and their services in the European Union. Final report from phase II of the INCA project aiming to develop a pilot for an integrated system of ecosystem accounts for the EU, published in 2021.
- (d) Accounting for ecosystems and their services in the European Union (INCA). Final report from phase II of the INCA project aiming to develop a pilot for an integrated system of ecosystem accounts for the EU. Statistical report from 2019.
- (e) Reflections on natural capital accounting at the national level: Advances in the system of environmental-economic accounting – a research paper published in 2015 in the Sustainability Accounting, Management and Policy Journal.

- (f) Defining and Measuring the U.S. Ocean Economy report in 2020 by the Bureau of Economic Analysis and the National Oceanic and Atmospheric Administration in the U.S.
- (g) Experience with the implementation of SEEA EEA in the European Union, Eurostat report from 2020.
- (h) Biophysical and economic assessment of four ecosystem services for natural capital accounting in Italy – a research paper published in 2020 in Ecosystem Service Journal.
- (i) Natural Capital Accounting: Overview and Progress in the European Union – the 6th report of the European Commission, from 2019.
- (j) Global Assessment of Environmental-Economic Accounting and Supporting Statistics 2020 prepared by the United Nations Committee of Experts on Environmental-Economic Accounting for the Statistical Commission Fifty-second session from March 2021.

The reason we chose take into consideration EU/US regulations or policy briefs as well as papers published in Ecosystem Service Journal is because the papers published in the Ecosystem Service Journal present best practices, pilot projects and other relevant initiatives related to NCA both in U.S. and in EU.

4. RESULTS AND DISCUSSION

From the historical perspective, the background of Natural Capital Accounting is different among the two regions, while the EU has not been only and early adopter but one of the main contributors to the development of SEEA (System of Environmental-Economic Accounting), the U.S. can be considered a late adopter.

Early in the 1990s, autonomous country compilations of accounts served as the catalyst for the creation of SEEA CF accounts in the EU. Following these initiatives, task forces were established under the direction of Eurostat, the European Union's statistical office, to develop specific accounting modules, including a national accounting matrix with environmental accounts, environmental protection expenditure accounts, forest accounts, and material flow accounts. This work cleared the way for Regulation (EU) No 691/2011, a regulation governing European environmental economic accounting (European Commission, 2011). The EU member states are required by this regulation to compile six SEEA CF modules: the economy-wide material flow accounts, the physical energy flow accounts, the air emissions accounts, the environmental goods and services sector accounts, the environmental taxes, and the environmental protection expenditure accounts. Ongoing work covers additional environmental accounts, such as forest accounts, accounting for environmental subsidies, and similar transfers, which are not required by EU law. These accounts are now included in the statistical data that can be found in the Eurostat database (Eurostat, 2020). Eurostat started working on a proposal to change Regulation 691/2011 in the early months of 2020 to suggest additional modules to be covered, especially for ecosystem accounts. The proposal for the new ecosystem accounts modules is still being created and will need to go through a protracted and difficult approval process (Vysna, 2020).

On a national level in the EUR, the Netherlands (Horlings et al., 2020) and the United Kingdom (Natural Capital Committee, 2013) have carried out ground-breaking work on SEEA EA during the past ten years. In the EU Member States of Bulgaria, Denmark, Estonia, Finland, Hungary, Italy, the Netherlands, Sweden, and the United Kingdom from 2017, Eurostat has co-financed SEEA EA initiatives. There were few applications for cultural services, and the majority of project ideas dealt with extent and condition accounting, provisioning, and regulation of services. The European Commission and the European Environment Agency established the Integrated system for Natural Capital and ecosystem services Accounting (INCA) in 2015, which operates on a continental basis. As part of the EU's Mapping and Assessment of Ecosystems and Services (MAES) effort, which seeks to map and assess ecosystems and services, INCA supports the spread of SEEA EA across the

EU. Additionally, the European Commission has provided funding for research initiatives through its Horizon 2020 programme, such as We Value Nature (2020) and MAIA (Mapping and Assessment for Integrated Ecosystem Accounting), which assist the incorporation of NCA data into private-sector accounting.

In the US, NCA is considerably more recent. In the 1990s, preliminary work on mineral accounting was carried out (Carson, 1995), and suggestions were made to broaden and continue this work (National Research Council, 1999). After the SEEA CF and SEEA EA standards were published in the early 2010s, experimental work on SEEA accounts started in late 2016 as a result of a partnership between many U.S. government entities (Boyd et al., 2018). In addition, the Bureau of Economic Analysis has lately worked with the Departments of Agriculture and the Interior on outdoor recreation accounts as well as the National Oceanic and Atmospheric Administration on ocean accounts (Nicolls et al., 2020). Although not SEEA accounts, this effort involved more extensive interagency collaboration with organizations in charge of managing natural resources and demonstrates the significance of natural resources in supporting market activity. Academic NCA work in the US has developed SEEA EA accounts for Long Island's South Shore Bays and evaluated the worth of groundwater in Kansas from a wealth accounting viewpoint (Fenichel et al., 2016). The U.S. pilot accounts presented in this special issue show that assembling natural capital accounts is feasible while also highlighting data shortages that will eventually allow for the development of more thorough and regular accounts (Dvarskas, 2019). They are, however, often less thorough than second- and third-generation European accounts and have a more limited history of usage in decision-making because to the considerably more recent status of U.S. NCA.

The application of NCA in European policy has been extensively discussed elsewhere (EEA, 2019) notably in the supporting background technical publications (Vallecillo et al., 2019). The European Court of Auditors' recent assessment on the application and policy uses of the SEEA CF accounts in the EU and its member states (European Court of Auditors, 2019) found that the different environmental accounting modules were not fully utilised for monitoring important environmental policies. Ecosystem accounts are slowly but surely becoming more integrated into EU policy. The INCA project's EU-level ecosystem accounting (Vallecillo et al., 2019) are progressively included into the European Commission's actual policy actions. These include the proposed law for nature restoration, the framework for sustainable investment, and the EU policy on pollinators. These policy initiatives, which are all a part of the European Green Deal, are based on ecosystem accounting theory or employ ecosystem accounting data for reporting or effect evaluation. Although ecosystem accounts have been employed in the aforementioned efforts, there has been no widespread adoption of ecosystem accounting findings in important policy sectors including trade, agriculture, economy, and finance. Up until now, the mainstreaming of ecosystem accounts has been hampered by the previously experimental nature of ecosystem accounting, the laborious production of these accounts, and the uncertainty surrounding the physical and monetary estimates of ecosystem services (Vysna et al., 2021).

Given that NCA is still in a very immature stage in the U.S. there hasn't been much adoption in American decision-making to far. Notable outreach initiatives to date to increase stakeholder understanding of NCA and enhance its application in decision-making include:

- (a) discussions on how to utilize water accounting to manage water resources in Hawaii.
- (b) collaborate with cities to include urban ecosystem considerations into decision-making about urban forestry and concerns related to climate resilience
- (c) a continuing partnership with the Office of Policy Analysis of the Department of the Interior to apply NCA in decision-making for the Department, which oversees over 450 million acres of public land in the United States. Environmentally expanded input-output analyses have been developed by the U.S. NCA effort in parallel. (Yang et al., 2017).

These are mostly used by the business sector to support benchmarking and the creation of plans that will reduce the effect of resource consumption and emissions. There is need for improvement in the

way NCA and ecologically extended input-output models are combined to produce better environmental-economic data for use by the public and commercial sectors. Finally, it is interesting that natural capital-adjacent satellite accounts have recently emerged in the United States. By employing alternate industry definitions and concentrating on pertinent subsets of economic activity, satellite accounts, which are built on the System of National Accounts' framework but focus on a specific area of economic activity, increase analytical capability (United Nations et al., 2014).

This analysis broadens the awareness regarding NCA adoption in the U.S. and EU. Also, this paper contributes to the literature on Natural Capital Accounting. Apart from policy makers, others who could benefit from these findings are the entrepreneurs and the innovators in sustainable businesses, those from the field of ecology as well as those from extractive industries because those industries will be the first impacted by the adoption of NCA in the U.S. and EU.

5. CONCLUSIONS

The articles and the reports under analysis demonstrate how NCA is intended to enhance decision making at many sizes, from the global to the local level. In terms of reporting on international conventions and agreements, such as the U.N. Framework Convention on Climate Change, the Convention to Combat Desertification, the Convention on Biological Diversity, and the Sustainable Development Goals, SEEA's consistency enforcement makes it potentially effective (SDGs). The possibility of SEEA accounts to assist reporting on the SDGs and comparable potential to inform reporting to the Convention on Biological Diversity have been emphasized in a number of special issue articles. Despite this promise, additional work may be necessary to modify SEEA data for these purposes before it can be integrated with current supranational or global reporting systems. The results of research can also be used to guide choices made at the national or state level in the United States, as well as at supranational and national levels in Europe. Additionally, NCA can be helpful for city decision-makers or perhaps even for site-level land management.

Historically, due to the development of NCA in the U.S. and in the EU, the gaps between the two regions are significant in terms of adoption and measurement and also in terms of the use of NCA in policymaking.

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