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**Title:**

A constructive comparison across the Atlantic to implement and use Natural Capital Accounts

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## Abstract

This paper focuses on advancing the effective use and application of Natural Capital Accounts to inform environmental and natural resource management decisions. In addition, the paper seeks to enhance connections between NCA use and NCA development, production, and expansion. The connection of NCA use and development is critical to the viability and sustainability of NCA within the UN System of Integrated Environmental and Economic Accounts (SEEA). The paper builds on collaboration between Europe's and the United States' researchers and practitioners to compare and learn from work on both sides of the Atlantic when implementing and operationalising the UN SEEA EA. The paper addresses three specific topics within this area. The first topic addresses **the piloting and the systematic production** of ecosystem accounts and addresses issues on the evolution from a general framework with experimental applications to an operational approach. In moving to an operational approach, how can results from modelling in SEEA be most effectively reported and analysed to inform decision makers? Discussion about data, including Earth Observation and the need for data estimation that includes issues relating to data reliability and modelling robustness, will also be discussed. The second topic concerns **governance** and addresses issues relating to the current and future status of NCA development and use in the EU and the US. How do efforts across different entities and levels of government vary and how does the private sector fit in? It will also assess the peculiarities of both the US's and the EU's structure and administration. The third topic focuses on **policy uses** and includes the development of a vision for routine applications of NCA for environmental and economic decisions. What is the longer-term vision for informing decision-making using a more comprehensive set of metrics and how can opportunities and challenges be identified and described? In addition, how do policies relating to monetization of ecosystem services affect the demand for and potential use of NCA? The paper concludes with key findings on the specificities of each context in terms of governance, the need for collaboration among providers and users of NCA and for further research to enhance application of NCA in support of policy making.

## 1. Introduction

The European Union (EU) and the United States (US) are both exploring ways to develop Natural Capital Accounts (NCA) consistent with the System of Environmental and Economic Accounts – Ecosystem Accounts (SEEA EA). The vision highlighted in this paper is that a system of natural capital accounts has value both in its existence and in its use. Even if NCA are not explicitly used to inform decisions, their existence has value in their availability and their potential to do so. Of course, NCA's value multiplies if they are used to inform decisions and to monitor the effectiveness of decisions that have been made. A system of NCA accounts needs to be developed before they can be used, and its development affects their existence value. Part of this existence value is in acknowledging the explicit connection between environmental and economic impacts and systems. The application of NCA is critical to its long-term viability from both policy and budgetary perspectives.

To take stock of advancements across both sides of the Atlantic, in 2021, a special issue of the journal *Ecosystem Services* published a set of research papers describing EU and US experiences developing and using NCA: "Accounting for Natural Capital: lessons learned from applications in Europe and the United States"<sup>1</sup>. Subsequent to the publication of the special issue, EU and US scientists and practitioners organized a series of discussions and meetings to advance collaborative efforts between the EU and the US to share practices on NCA.

This dialogue included participation in conferences in the EU and in the US: in Washington D.C. at the ACES (A Community on Ecosystem Services) 2022 conference ("Applying Natural Capital Accounts in the European Union and the United States: A Synthesis,"<sup>2</sup>) and in Limassol, Cyprus in 2023 at the European Association of Environmental and Resource Economists (EAERE) conference ("Exploring the policy uses of Natural Capital Accounting: a dialogue across the Atlantic"<sup>3</sup>).

To continue the dialogue, a series of online meetings was held to explore opportunities for collaboration relating to three specific topics important to advancing the development and use of NCA: from operationalization to governance and possible policy uses. This paper summarizes the outcomes from the online meetings and highlights the findings that emerged from comparison of both experiences. Indeed, the results can provide insights for other countries that are planning to develop and implement a system of NCA and need to decide how to proceed.

We are grateful to all participants in the online meetings that took place between the end of 2023 and the beginning of 2024 and acknowledge their substantial contributions in advancing ideas included by the Authors of this paper. Of course, Authors of this paper bear all responsibility for the ideas and concepts expressed.

## 2. NCA operationalization: from pilot accounts to systematic production

Natural capital accounting is complex, comprising numerous modules/components. A testing phase is required to ascertain the optimal methodology and subsequent adjustments. The initial point of reference for pilot applications in both the US and the EU is the System of Environmental and Economic Accounts – Ecosystem Accounts (SEEA EA)<sup>4</sup>, which provides a comprehensive framework, reference classifications and a series of accounting formats. Based on a general framework,

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<sup>1</sup> Ref <https://www.sciencedirect.com/special-issue/10RZK17R0JP>

<sup>2</sup> Ref. <https://conference.ifas.ufl.edu/aces/prior/aces22/documents/ACES-2022-Detailed-Agenda.pdf>

<sup>3</sup> Ref. <http://www.eaere-conferences.org/index.php?p=369>

<sup>4</sup> Ref [https://seea.un.org/sites/seea.un.org/files/seea\\_cf\\_final\\_en.pdf](https://seea.un.org/sites/seea.un.org/files/seea_cf_final_en.pdf)

practitioners require operational procedures to compile ecosystem accounts, and the development of operational procedures can be undertaken in a variety of ways, as evidenced by differing experiences across the Atlantic.

In the EU, there were three different channels to test the SEEA EA modules: extent, condition and services. The testing phase in the EU started with a major initiative, the INCA (Integrated system for Natural Capital Accounting) project. INCA is a top-down initiative that brought together different European institutions to test and implement aspects of the SEEA EA<sup>5</sup>. Eurostat steered the testing phase together with the European Environment Agency as data provider, the Joint Research Centre as scientific hub, Directorate General (DG) Environment as the policy actor and DG Research and Innovation for enhancing synergies with relevant EU-funded research projects. Starting in 2015, INCA has been articulated in two phases. At the end of the first five years, INCA released ecosystem extent accounts and nine ecosystem services accounts for the 27 European Union member states and it is now producing and validating most recent data. Another avenue for carrying out the testing phase was led by Eurostat by providing grants to EU National Statistical Offices to test and implement SEEA EA modules. This set of applications is bottom-up within the context of statistical offices. In addition, DG RTD through the Horizon Europe programme funded a research project called MAIA, where European practitioners and researchers tested different SEEA EA modules. Once again, it is a bottom-up set of applications mainly in an academic context.

As a result of this testing phase, the EU adopted a regulatory approach through the amendment of the EU Regulation on European environmental economic accounts No 691/2011 (COM/2022/329)<sup>6</sup>, introducing ecosystem services accounts, largely based on the results and lessons resulting from INCA outcomes<sup>7</sup>. However, it also relies strongly on so-called extent accounts produced by the European Environment Agency<sup>8</sup>.

In the US, between 2002 and 2008 the H. John Heinz III Center for Science, Economics and the Environment published two editions of “The State of the Nation’s Ecosystems.” These documents were an effort to formalize the reporting of status and trends of US ecosystems by identifying strategic indicators of the condition and use of US ecosystems, to lay the groundwork for periodic, high-quality, and non-partisan reporting. The Heinz Center reports contain highly visible useful information and remains an important resource to researchers and policymakers interested in environmental statistics.

In 2016 an ad-hoc collaboration of scientists, practitioners, and managers, initiated efforts to develop experimental accounts for land, water, and ecosystems, resulting in preliminary accounts for these types of natural capital<sup>9</sup>. In addition, separate efforts in the US were initiated to develop satellite accounts relating to Oceans and Outdoor Recreation.

In 2022, the White House and the Department of Commerce established an Interagency Policy Working Group to develop the U.S. National Strategy to Develop Statistics for Environmental Economic Decisions (National Strategy)<sup>10</sup>. It evolved into the Policy Working Group on NCA, with the goal of

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<sup>5</sup> Ref. <https://ecosystem-accounts.jrc.ec.europa.eu/>

<sup>6</sup> Ref. [EUR-Lex - 52022PC0329 - EN - EUR-Lex \(europa.eu\)](#)

<sup>7</sup> Ref. <https://oneecosystem.pensoft.net/article/84925/>

<sup>8</sup> Ref. <https://www.eea.europa.eu/en/analysis/maps-and-charts/ecosystem-extent-accounts-data-viewers#references-and-footnotes>

<sup>9</sup> Ref. <https://www.usgs.gov/centers/john-wesley-powell-center-for-analysis-and-synthesis/science/accounting-us-ecosystem>

<sup>10</sup> Ref. <https://www.journals.uchicago.edu/doi/abs/10.1086/730513>

establishing coordination among agency leaders representing 27 different offices, agencies and departments. The process moved into more technical work with the organization of the Council of Account Leads, which provides coordination between the technical leads for each account and the Interagency Working Groups, which are more task-specific (e.g., classification, valuation standards, and data sharing). In the US, the National Strategy establishes a phased approach to developing SEEA-compatible modules (across both the Central Framework and the Ecosystem Accounts). Three main phases on environmental sectors (such as land, water, air emissions, marine natural capital) are accompanied by supporting activities (such as data sharing protocols and valuation standards). The purpose of the phases is to prioritize what is needed and at what pace: depending on the phase, the pilot phase may actually end in 2025 (phase I environmental sectors), 2027-28 (phase II environmental sectors) or 2031 (phase III environmental sectors). After the pilot phase, more mature releases leading to prototype accounts are envisaged before moving to the official statistical products fully endorsed by the US scientific and statistical community. The time horizon for the completion of all accounts is 2036.

The different actors (offices, agencies and departments) may play different roles (i.e., lead or supporting agencies) depending on the account (e.g., forest accounts, emissions accounts) and the action to be taken (e.g., providing biophysical data vs. estimating monetised values vs. compiling and normalizing).

Both the US and Europe share a need to continually improve the quality and timeliness of SEEA accounts, to meet respectively EU regulatory needs and the vision laid out by the US National Strategy to produce annual accounts. Topics related to data sharing and interoperability<sup>11</sup> are particularly important in order to achieve these goals. As regular users of large, complex data, the EU and US have a unique opportunity to collaborate to advance best practices that support global implementation of SEEA.

### **3. Governance**

The European Union and the United States have different institutions and policies concerning the development and management of NCA.

In the EU there is a centralized system with a coordinating agency, Eurostat, the European Statistical Office. Eurostat is a Directorate-General of the European Commission that collects and publishes statistical data for the EU. In this capacity, Eurostat manages and collects NCA applications across the EU. There is partnership between Eurostat and the National Statistical Offices (NSOs) in each EU country. Because most statistical data in the EU are collected by the EU Member States, Eurostat also provides guidelines for their consistency and availability.

The EU is awaiting the imminent publication of the amended Regulation for environmental economic accounts that already received the approval from EU co-legislators. Since Ecosystem Accounts will become mandatory as of 2026 in the EU with data publication in 2027, Eurostat (supported by National Statistical Offices) is now focussing its efforts on providing Guidelines and Tools to support EU Member States. For the production of Ecosystem Accounts in the 27 Member States, Eurostat will make several resources available, notably guidelines, tools, training sessions and materials supporting the harmonization of results across the EU.

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<sup>11</sup> Ref. <https://esa-people-ea.org/en>

By contrast, the United States, has a decentralized statistical system, wherein the development of environmental-economic statistics is distributed across a number of government organizations with environmental or natural resource responsibilities. There is no uniform set of statistics relating to the environment, nor a lead agency. Several science and environmental agencies, such as USDA, NOAA, USGS, EPA, NASA, have independent responsibility for collecting and developing the data that will underpin environmental-economic statistics.

In January 2023, the White House released the “National Strategy to Develop Statistics for Environmental-Economic Decisions<sup>12</sup>.” The National Strategy calls for a US system of natural capital accounts and associated environmental-economic statistics<sup>13</sup>. It explicitly highlights their importance in informing government decisions.

The Strategy includes plans for Federal agencies to collect and develop environmental-economic statistics and to formalize this process. It calls for an implementation plan for each account, with the aim of building a consensus that is not agency-specific but government-wide, i.e. sharing best practices across the federal government, and building the infrastructure to share the data needed to compile each account. While there is a great deal of diversity among the various agencies and departments, the Chief Statistician’s Office within the Office of Management and Budget (OMB) has statutory authority to coordinate the statistical process.

Both the EU and the US are advancing plans to improve NCA through coordinated planning and in doing so are establishing momentum to make systematic production of such accounts happen (the US National Strategy and proposed legislation in the EU). Although efforts on both sides of the Atlantic cite the importance of applications that use NCA to inform decisions, the sustainability of efforts to develop and populate NCA databases requires that coordinated efforts to expand the use of NCA in public and private decision making are included in the institutions and the governance associated with environmental-economic statistics. The existence of NCA does have important value. However, the realized value of NCA in practice will determine how visible and significant are the benefits that must be demonstrated to ensure that NCA development and use continue.

#### **4. Policy uses**

Although the pace of production of full-fledged Natural Capital Accounts differs in the US and the EU, in practice the actual use of such accounts in public policies is still limited on both sides of the Atlantic. In fact, the EU has a considerable time advantage when we consider the production of NCA, with EU Member States starting the production phase as of 2026, according to the amended Regulation (soon entering into force), whereas the US is implementing an articulated stepwise pilot until 2031, successively covering different environmental domains, before starting “production-grade” statistical accounts.

Some of the most straightforward applications for Natural Capital Accounts support specific environmental policy making, from a management perspective that ranges from the national to the local. Examples may include assessing and containing forest wildfire risks and defining the level of agricultural payments that take into account sustainability issues, or the restoration of degraded ecosystems across a country, using a partial equilibrium analytic perspective. In most cases, decision-

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<sup>12</sup> Ref. <https://www.whitehouse.gov/wp-content/uploads/2023/01/Natural-Capital-Accounting-Strategy-final.pdf>

<sup>13</sup> Ref. <https://www.journals.uchicago.edu/doi/10.1086/730513>

making at the local level will use such accounts as a data resource when conducting Benefit-Cost Analyses or Impact Assessments.

However, the attractiveness of producing such environmental economic accounts lies in structuring environmental information in an accounting framework that can connect to conventional national economic accounts. Both for the US and the EU, the use of Natural Capital Accounts in economic and financial affairs can be enhanced if accounts were to be further developed down to specific sectors of the economy, in order to be integrated into macro-economic accounts and modelling. Appreciating environmental elements in macro-economic modelling would enable more sensible budget forecasting and Debt Sustainability management, as the depletion of natural resources and the contribution of ecosystem services would then be factored in. Once these accounts are produced by all countries, applications in trade policy would also be promising, as well as the assessment of ecosystems' contribution to price stability or financial stability<sup>14</sup> that takes into account both climate and biodiversity risks<sup>15</sup>.

The integration into macro-economic models implies that accounts are not only calculated in biophysical, but also in monetary terms. In line with their National Strategy, the US has pushed for monetary accounts to be included in the testing and then the piloting phase, whereas in the EU monetary valuation has not been central in the implementation of the amended Regulation. Having said this, monetary valuation is included in most INCA accounts, and in the final text of the amended Regulation, monetary valuation has been spelt out explicitly as a possible further development.

The future use of such accounts may depend on the involvement of different branches of government. At present, there seems to be a diverse level of awareness of the potential of Natural Capital Accounts to affect decision-making, depending on the actors involved in the piloting phases. In Europe, the steering role was played by Eurostat, as it was mandated to steer the development and deployment of Ecosystem accounts, with the support of the Member States' National Statistical Offices. By their very nature, they have been playing a technical role, with the policy one, which was essentially played by the Directorate General for Environment (DG ENV) of the Commission. A game-changer is the relatively recent involvement of other European Commission's departments, especially the Economic and Financial Affairs (DG ECFIN) and the Working Group represented by Member States experts. In the US the involvement of 27 Government Departments and agencies, including agency-level statistical offices, all providing technical contributions, seems to have spread awareness about NCA and its development needs across different levels of government, including raising awareness among those in charge of economic policy. Further work is needed to continue to build awareness of NCA and its uses in decision making for subnational governments, the private sector, and other actors<sup>16</sup>.

## 5. Conclusions

The dialogue across the Atlantic has resulted in several key findings. These include:

1. **Collaboration efforts are important to advance NCA production and use.** There are great opportunities for developing an operational set of NCA that can inform decision making in the EU and in the US. Significant challenges also remain. Sharing experiences and ideas can help

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<sup>14</sup> Ref.

<https://www.esrb.europa.eu/pub/pdf/reports/esrb.report202312~d7881028b8.en.pdf?bc89d982ac0f87466507bbe82686f64a>

<sup>15</sup> Ref. <https://www.sciencedirect.com/science/article/abs/pii/S2950370124000130>

<sup>16</sup> Ref. <https://royalsocietypublishing.org/doi/10.1098/rstb.2022.0328>

both sides move NCA implementation forward. The collaboration between the EU and the US could be expanded to include other nations that have similar opportunities and challenges.

2. **Governance is an important factor in advancing NCA implementation.** It requires top-down efforts such as the proposed Regulation in the EU and the National Strategy in the US. Without support at the policy level, efforts at the scientist or resource manager level will not advance as quickly or as fully. However, bottom up efforts are also needed. Scientists and resource managers need to capitalize on opportunities to advance the production and use of NCA. Efforts like the INCA project in the EU and the ad hoc NCA project to develop experimental accounts in the US are critical to advances, even with top-down support.
3. **Expanded efforts and research are needed to develop NCA applications to inform decision makers.** Data does not by itself activate the full potential value of these accounts. In many cases, research is needed to develop improved ways of applying NCA data. This effort requires partnerships between scientists, managers, and information scientists. In this way, improved methods of applying NCA can be developed to inform decisions and to monitor trends in NCA. Developing important uses of NCA before NCA is operational is challenging. However, it is critical that applications be explicitly considered even in the planning phase, so that benefits can be achieved quickly.
4. **The NCA community needs to be broad, including scientists, practitioners, and decision makers from the physical, biological, economic, and social sciences disciplines.** The community needs to expand to include people beyond the environmental community. To be sustainable, NCA requires not just suppliers, but a new cohort of those demanding this new and impactful stream of environmental-economic statistics. The community needs to welcome and even develop potential NCA users beyond those that are also involved in its production, users who understand the importance of applying NCA to inform decisions and trade-offs.