Statistical Commission
Fifty-third session
1 – 4 March 2022
Item 3(l) of the provisional agenda
Items for discussion and decision: Environmental-economic accounting

Background document
Available in English only

Implementation Strategy for the SEEA Ecosystem Accounting

Prepared by the United Nations Statistics Division under the auspices of the Committee of Experts on Environmental-Economic Accounting

DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS
STATISTICS DIVISION
UNITED NATIONS

System of Environmental Economic Accounting

Implementation Strategy for the SEEA Ecosystem Accounting[1]

[1] This paper has been prepared by the UN Statistics Division as part of the work programme of the Committee of Experts on Environmental Economic Accounting (UNCEEA). The paper reflects comments received from the SEEA Technical Committee, the Bureau of the UNCEEA, participants of the 2021 Forum of Experts on the SEEA Ecosystem Accounting and the views of other experts that have reviewed earlier drafts.

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1 Introduction

The United Nations Statistical Commission (UNSC) adopted the SEEA Ecosystem Accounting (SEEA EA)[2] at its 52nd session in March 2021. The UNSC adopted chapters 1-7 describing the accounting framework and the physical accounts as an international statistical standard, chapters 8-11 describing the monetary valuation and integrated accounting for ecosystem services and assets as internationally recognized statistical principles and recommendations for the valuation of ecosystem services and assets, and chapters 12-14 as applications and extensions to the SEEA EA. The UNSC also encouraged the implementation of SEEA EA in countries and requested the Committee of Experts on Environmental Economic Accounting (UNCEEA) to develop an implementation strategy which takes into account country priorities and data availability[3].

The adoption of the SEEA EA has received a lot of interest and attention, not only within the statistical community, but from policy and decision makers as well. The UN Secretary General, António Guterres called the adoption a "historical step towards transforming the way how we view and value nature". The Executive Secretary of UN Environment, Inger Andersen, called the SEEA as a "game-changer in decision making". The Executive Vice Present of the European Commission Frans Timmermanns said that the SEEA EA "moves beyond GDP and takes better account of biodiversity and ecosystem in national economic planning. It is a major development in changing the way we think about prosperity and well being". Further, the Secretary General in "Our Common Agenda"[4], released in September 2021, calls "for new measures to complement GDP to better understand the impacts of business activities and how we can better support people and our planet". In this context, he "urged Member States and others to already begin implementation of the recent SEEA EA". Such high-level endorsement requires that the implementation of SEEA EA is suitably ambitious while at the same time manages expectations about the rate at which progress can be made.

Benefit of an accounting approach

The SEEA adopts an accounting approach to organize environmental information and make it coherent with economic information which is organized according to the System of National Accounts (SNA). This allows to evaluate the impacts and dependency of economic activities on the environment, the contribution of the environment and ecosystems to the economy and wellbeing, and the action taken by the economy to reduce such impacts. The accounting approach facilitates mainstreaming the environment into economic decision making by providing a common language between economists, scientists and statisticians in support of integrated decision making.

Using an accounting approach to derive the indicators allows harmonization of environmental data from multiple sources and brings coherence and consistency across disparate statistics. It also establishes a centralized system for organizing information on the environment and the economy, thereby reducing the possibilities for data being collected more than once across different government agencies and

[2] See https://seea.un.org/ecosystem-accounting

[3] See Statistical Commission - Report of the fifty-second session, Decision 52/108 https://unstats.un.org/unsd/statcom/52nd-session/documents/2021-30-FinalReport-E.pdf

[4] See https://www.un.org/en/un75/common-agenda

streamlining reporting across multiple national commitments. In addition, it ensures that information can be compared with confidence across time. Further, by organizing information from different agencies and sectors in a consistent manner, the SEEA opens up dialogue across these agencies and sectors and enables trade-offs and synergies related to environmental management decisions to be more readily revealed.

The SEEA EA is grounded in the set of concepts and classifications that is coherent with the SNA and that can be aligned with the social statistics routinely compiled by national statistical offices (NSOs). As such, the SEEA EA also provides a mechanism to mainstream environmental information into economic and national development planning. It is compatible with the Balance of Payments and International Investment Position framework, the International Standard Industrial Classification of All Economic Activities, the Central Product Classification system, and the Framework for the Development of Environment Statistics. Many of the above standards are currently being updated, and environmental considerations are considered major drivers for these updates. The UNCEEA is currently engaged in the various update processes with a particular view of ensuring that the environment is reflected within those standards. Coherence with the macro standards also opens up pathways to implement a range of integrated economic–environmental modelling approaches.

The broad consistency that the SEEA brings to organizing environmental information is clearly essential to delivering a planning approach that considers all the social, economic and environmental dimensions to sustainable development in an integrated way. As such, it is a powerful tool for multiple line ministries, especially those concerned with sustainable national development and delivering better outcomes for the environment and society.

Objectives and structure of the paper

This paper presents the implementation strategy, which was discussed in several fora including the Technical Committee on the SEEA EA, the UNCEEA and the 2021 Forum of Experts on Ecosystem Accounting.

The purpose of this strategy is to set targets for implementation that could support wider high-level engagement and identify actions at the global level that can support implementation in countries. The implementation strategy takes a flexible and modular approach which considers policy priorities, data availability and institutional framework and covers implementation at different scales, at national as well subnational level. It provides a general direction of the steps to be undertaken in setting up an implementation and mainstreaming programme at national level. It also identifies existing global initiatives and possible entry points to advance and promote SEEA EA implementation.

The audience of the implementation strategy comprises two main groups. The first group includes data producers at the management level that require an understanding of the resources needed for SEEA EA implementation, not only from NSOs but also from other agencies within the government as well as academia involved in the production of the accounts. The second group includes those involved in policy planning and decision making in ministries of finance, planning, environment and other policy agencies. It is very important to bring together users and producers of statistics from the outset of any implementation project or programme. The strategy stresses the importance of data users as key partners in the implementation programme from the outset, as it is important for them to understand

the need and potential for the accounts in support of integrated policy and decision making, as well as setting priorities and ensuring proper resources are allocated for SEEA EA implementation.

This paper outlines the proposed implementation strategy. Section 2 provides the context of the implementation, including the demand for the SEEA EA, the data situation and advantages and opportunities to compile SEEA EA. Section 3 presents the objectives of the strategy and the approach and main principles. Sections 4 presents the approach to national implementation and Section 5 the global activities in support of SEEA EA implementation. Section 6 and Section 7 discuss the monitoring and activities to support implementation and Section 8 presents the need for resource mobilization.

2 Context for the implementation strategy

Ecosystem accounting is undergoing rapid growth and development, with increasing uptake of the SEEA EA by the policy community and the accounts already been used to inform policy development around the world. From a zero base in 2013, according to the Global Assessment of Environmental Economic Accounting and Supporting Statistics, 36 countries have implemented ecosystem accounts in 2021.[5] Although it is a significant achievement, it falls short of the target of 50 countries implementing ecosystem accounts by 2020 set by the UNSC at its 44th session in 2013. Further, the increase in number of countries implementing the SEEAEA between 2020 and 2021 has been modest, primarily due to the strain that COVID-19 has put on NSOs.[6]

The Netherlands and United Kingdom have published the most comprehensive accounts to date. Both countries' accounts include detailed maps and physical and monetary accounting tables with consistent applications of concepts and methods. The pilot countries of the project Natural Capital Accounting and Valuation of Ecosystem Services (NCAVES) Project- China, Brazil, India, Mexico and South Africa – have all published ecosystem accounts[7]. In many other countries, progress is being made towards comprehensive SEEA EA accounts. Australia has published two national and several sub-national accounts. Other countries with published accounts include Canada, Costa Rica, Colombia, Indonesia, Italy, Norway, Netherlands, the Philippines, Rwanda, Spain and Uganda. Supranational accounts have been developed for the European Union and efforts are under way towards a directive on ecosystem accounting which will mandate all countries in the European Union to compile selected SEEA EA accounts.

2.1 Policy demands for the SEEA EA

There is an increasing demand for integrated information to support integrated policies. It is widely recognized that economic growth as measured by GDP is no longer sufficient to inform the challenges of today and that there is a need to go "beyond GDP" to better support policies that are greener, more

[5] From the Global Assessment of Environmental-Economic Accounting and Supporting Statistics 2020: https://unstats.un.org/unsd/statcom/52nd-session/documents/BG-3f-2020_GA_report_%20draft_%20ver7_nomap-E.pdf

[6] From the Global Assessment of Environmental Economic Accounting and Supporting Statistics 2021: https://unstats.un.org/unsd/statcom/53rd-session/documents/BG-3l-Global-Assessment-E.pdf

[7] See https://seea.un.org/home/Natural-Capital-Accounting-Project

inclusive and more equitable. The SEEA EA, given its systems-based approach can support these policy questions at the heart of sustainability, including the biodiversity and climate agendas. Examples of its application in policy are emerging, including supporting the reporting to the Sustainable Development Agenda, the post-2020 global biodiversity framework and the climate change and land degradation monitoring frameworks.

The SEEA as an integrated framework for organizing information on the economy and the environment makes it an ideal framework to assist countries in reporting on a number of **SDG** indicators, in particular those related to the economy and the environment. According to an analysis carried out by the UNCEEA, the SEEA supports monitoring of 40 SDG indicators for nine SDGs.

Data from the SEEA EA accounts can also be used to inform a wide range of **climate change** related policy questions in particular, climate impacts and adaptation strategies. They can also help with mitigation strategies, for example to understand impacts of emissions into air, water and waste on ecosystems as well as to support nature-based solutions. The new data gaps initiative launched by the G20 calls for G20 countries to address data gaps related to climate change, among others. The initiative will call for the implementation of selected SEEA accounts to develop climate change data and indicators directly related to economic dimensions.

The development of the post-2020 global biodiversity framework and its associated monitoring framework present an excellent opportunity to ensure that the SEEA is considered as the underlying framework for those indicators that measure the interaction between economic activities and **biodiversity** identifying drivers of biodiversity loss and ecosystem degradation, responses by society in terms of expenditures or other economic instruments, and impacts of economic and human activities. The UNCEEA and the SEEA are recognized in the official documentation[8] of the Convention on Biological Diversity (CBD) Subsidiary Body on Scientific Technical and Technological Advice (SBBSTA) on the monitoring framework. In the same document, SBSSTA calls for the creation of an expert group that supports the development and implementation of the indicators with the participation of the statistical community. A working group on indicators that was established during the SEEA EA revision process has already provided considerable input in the development of the indicators and is developing the metadata for those indicators that can be derived directly from the SEEA.

The importance of a measurement framework to measure the contribution of nature to the economy and livelihoods that takes into account biodiversity and ecosystems is recognized in the IUCN resolution "Accounting for biodiversity: encompassing ecosystems, species and genetic diversity" (WCC-2020-Res-057-EN),[9] which was adopted by IUCN Members Assembly in the virtual lead up to the IUCN World Congress 2021. The resolution calls for IUCN members and partners, especially national governments, to implement the SEEA EA and mobilize resources to (a) support the development and implementation of the SEEA EA to describe accounting for biodiversity at ecosystem, species and genetic levels; (b) support the derivation of indicators of biodiversity change and the production and organization of biodiversity

[8] https://www.cbd.int/doc/c/9849/459f/b9fe0e74c9e1f25dd90dee23/sbstta-24-l-03-en.pdf
[9] https://portals.iucn.org/library/sites/library/files/resrecfiles/WCC_2020_RES_057_EN.pdf

and ecosystem services data; (c) support NSOs in implementing the SEEA; and (d) implementation and application of SEEA accounting for biodiversity in all relevant aspects of their work.

The **UN Decade of Ecosystem Restoration** led by the United Nations Environment Programme and the Food and Agriculture Organization of the United Nations, which runs from 2021 to 2030, aims to halt degradation of ecosystems and restore them to achieve global goals. The initiative presents an opportunity to mainstream the SEEA in the monitoring framework that is currently being developed, make the case for ecosystem restoration and track incentives such as harmful subsidies.

The **High Level Plan for a Sustainable Ocean Economy,** an initiative launched in 2018 and signed by a number of heads of states across the globe, aims to develop an action agenda for transitioning to a sustainable ocean economy. One of the priorities of this initiative calls for accounting for the full value of ocean assets and the ocean economy to guide the sustainable development of the oceans and sets the target that "decision-making affecting the ocean reflects the value of and impacts on the ocean's natural capital by 2030" [10]. As a result, many countries are starting to experiment with applying the SEEA methodology to the ocean and a group has been established to advance the agenda under the auspices of the UNCEEA.

2.2 Data situation

One of the distinguishing characteristics of ecosystem accounting is that it is spatially explicit and generated by combining multiple layers of information (environmental, ecological, and economic) which can be displayed on maps or summarized into accounts and tables.

There are several challenges when compiling ecosystem accounts. First, the data needed are not typically collected by statistical offices, which usually rely on, surveys, administrative data, censuses and the like. Second, data is usually collected by many ministries and agencies that use it for monitoring rather than statistical purposes and thus often are collected irregularly, using definitions and classifications not consistent with standard statistical definitions, classifications or principles. Third, on the demand side, policy agencies are often not familiar with how to use the information generated from the accounts. Fourth, data are often generated from big data/earth observation and with the use of biophysical modelling, which often is undertaken outside NSOs.

There are also a number of opportunities. It is in fact possible, using global data in combination with national data and global models to develop initial estimates for the accounts, which can serve as a starting point for bringing together different data producers and generate the demand for more accurate and granular data.

National statistical offices as data stewards

The data context described in the previous section calls for a transformation of the regular operations of a NSO, which is increasingly required to integrate data that are compiled by others and often use new technologies. It requires NSOs to branch out areas of expertise beyond its usual competence. As a

[10] See https://www.oceanpanel.org/ocean-action/files/transformations-sustainable-ocean-economy-eng.pdf

consequence, NSOs need to embrace the role of data steward and increasingly rely on the expertise from other ministries, academia and the private sector, including using big data and models to compile the accounts. As data stewards, NSOs will shift from being solely producers of statistics, to also becoming service providers, whereby NSOs facilitate a collaborative approach to data and statistics across different data and statistics communities and provide appropriate oversight and governance.

Arguably, no other statistical domain demonstrates the potential role of NSOs as data stewards more than the ecosystem accounting. The implementation of the SEEA EA is often led by the official statistics community and NSOs, but given the highly cross-cutting and spatial nature of ecosystem accounting, implementation necessitates a highly collaborative approach. Implementation will require the active participation of representatives of many different agencies and disciplines, including ministries of environment, planning, finance, and national agencies for the protection of environment, water management, cartography, academia, etc. which need to be brought together, each contributing to particular aspects of the compilation of ecosystem accounting.

Projects and initiatives that support the SEEA implementation

There is a number of initiatives and projects that have been established in the past few years and emerging ones that have been particularly key for advancing the development and implementation of the SEEA EA. It is important to keep track of existing projects and initiatives to identify synergies and ensure close coordination and collaboration in order to avoid duplication of work, especially at country level.

3 Strategy for the implementation of the SEEA EA

The implementation strategy can be organized according to the theory of change logic, providing a comprehensive description of how to achieve the overall objective of the implementation strategy that is to scale up the uptake of the SEEA EA in countries following up on its adoption by the UNSC.

3.1 Objectives for the implementation

The **overall objective of the strategy is to scale up the uptake of the SEEA EA**. A suggested target of the overall objective is that **at least 60 countries implement at least one account of the SEEA EA by 2025** as defined in the Global Assessment of the SEEA and supporting statistics.

To achieve the above overall objective, a number of specific objectives need to be achieved. These include:

- Regular production of selected ecosystem accounts, starting from ecosystem extent accounts to ecosystem condition and ecosystem services in physical and monetary terms;

- Mainstreaming biodiversity and ecosystems into (sub)national policies;
- Use of the SEEA EA for monitoring and reporting in particular in National Biodiversity Strategies and Action Plans (NBSAPs), the Voluntary National Reports that present country progress towards achieving the SDGs, and the National Determined Contributions (NDCs) that present country progress towards climate targets and highlight the government actions and policies to combat climate change
- Dissemination of ecosystem accounts through global data sets

3.2 Approach and main principles

Multi stakeholder engagement

The multi-disciplinary nature of the ecosystem accounts as well as the challenge inherent in working with spatial data and novel measurement techniques requires a collaborative approach which takes advantage of the strengths of NSOs in combination with the expertise of other agencies and research organisations. Moreover, engagement with users of the accounts is important to be undertaken at the outset.

Key stakeholders in the implementation of the SEEA EA include:

- Environmental economic accountants that have expertise in applying accounting concepts to environmental and ecological data
- Scientists that have in depth knowledge of the functioning of ecosystems and their measurement and assessment (e,g, experts in ministries of Environment and other line ministries, International Union for Conservation of Nature (IUCN), Conservation International, Bird life, etc.)
- Environmental economists that have expertise in the concepts and use of valuation techniques to value ecosystem services and assets
- Geospatial experts that have knowledge of the earth observation data and spatial infrastructure (e.g. European Space Agencies, NASA, Earth Observation for Ecosystem Accounting (EO4EA), Group on Earth on Earth Observations Biodiversity Observation Network (GEOBON), national geospatial agencies)
- Users of the accounts (e.g. finance and planning ministries, ministries of the environment, private sector, etc.)

Coordination and communication at the international level involves collaboration with key stakeholders such as the UN Conventions (i.e. CBD, the International Platform on Biodiversity and Ecosystem Services (IPBES), the United Nations Framework Convention on Climate Change (UNFCCC), the United Nations Convention to Combat Desertification (UNCCD)), IUCN, CI, UNEP WCMC, etc.

Flexible and modular approach

A key element of the proposed SEEA EA implementation strategy is to allow for a flexible and modular approach. This entails that rather than proposing a 'one size fits all approach,' it recognizes that countries differ in terms of their specific policy issues and their level of statistical development. The SEEA EA is a system conceived as an integrated, internally consistent series of accounts. At the same

time, its design is such that it can be implemented equally well in part or as a whole, i.e., the implementation can be flexible and modular.

Depending on the specific environmental and economic context, a country may choose to implement only a selection of the accounts or to compile accounts for selected regions within the country. Particularly relating to the compilation of accounts in monetary terms, some compilers may be concerned that the data requirements and methodological assumptions are too significant to justify their compilation as part of official statistics. At the same time, there may be substantive demand for well-defined and comparable estimates in monetary terms for use in policy and analysis. Therefore, in the short term, the compilation of experimental accounts may be an important step to support capacity development and engagement with users.

Tiered implementation

Considering the novelty of the implementation of ecosystem accounts and often lack of data at the national level, a tiered implementation is recommended, starting first from global data sets and improving on them using national data where available. It is important to note that while the SEEA EA has been adopted, the results of the accounts are often released as experimental or pilot to indicate that further refinement of the data and methodology needs to take place. Many countries have adopted this approach and have released accounts on an experimental basis with the objective to mainstream them into the statistical production process and in due course elevate them to the level of official statistics. It is encouraged that countries release their results with the proper flagging, as their experience can provide further input in advancing the methodology and generate interest and possibly resources at the national level to improve on the basic data.

(Sub)regional approach

To aid countries in implementing the SEEA EA, a regional or sub-regional approach is being taken. The UN Regional Commissions as well as multilateral development banks and other bodies have an important role to play to advance the implementation in countries by providing opportunities for countries to share their experiences, supporting regional communities of practice, leading capacity building activities, raising awareness on the SEEA EA within NSOs and user communities, supporting country implementation and facilitating south-south collaboration. In this context, it is particularly important that the Regional Commissions and multilateral development banks include environmental economic accounts at the core of their work programmes and establish regional groups with a clear mandate and work programme under the auspices of their committees (i.e. Statistical Conference of Americas, Conference of European Statisticians, Committee on Statistics in Asia, Statistical Commission for Africa and the Statistical Committee in ESCWA). Sub-regional bodies can also support the implementation, as they often have been established to support trade and regional integration and as such, foster close collaboration among countries of the subregion. Increasingly, issues such as the management of common environmental resources and addressing common problems such as climate change have also come to the forefront in the agenda of sub-regional groups. From a statistical point of view, regional and sub-regional organizations have played important roles in bringing together countries, compiling existing statistics, promoting standards, developing capacity in countries and fostering south-south cooperation.

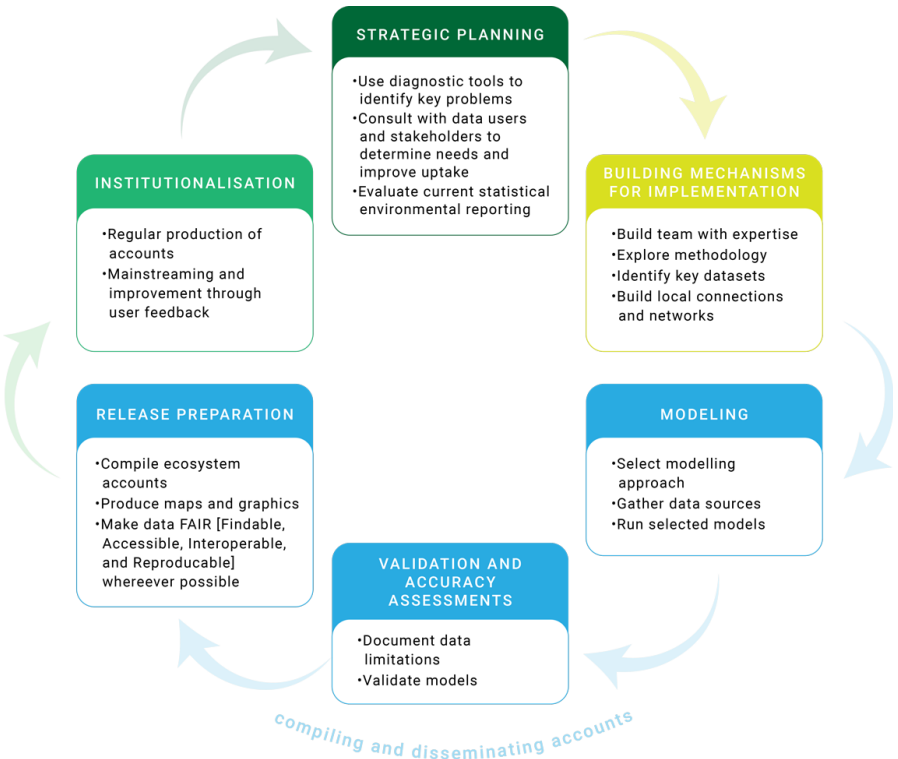
South-south cooperation

Within each region or sub-region, it is intended that one or more countries will be selected as lead countries. Lead countries will not only have begun to implement the accounts in earnest, but also are expected to be leaders and advocates for ecosystem accounts, share technical knowledge with other countries in the region or sub-region that are interested in implementing the accounts, and foster south-south cooperation.

4 Implementation in countries – key elements

The multi-disciplinary nature of the accounts, as well as the challenge inherent in working with spatial data and novel measurement techniques, requires a collaborative approach which takes advantages of the strengths of NSOs in combination with the expertise of other agencies and research organisations. The implementation of ecosystem accounting at the country level can be broken into four phases: 1. Strategic planning; 2. Building mechanisms for implementation; 3. Compiling and disseminating accounts; 4. Institutionalization (strengthening national statistical systems). Figure 1 presents the process of implementation which is cyclical with each phase involving an in-depth evaluation and reassessment at the end of each reporting cycle. In addition to the four phases outlined above, capacity building and communication are fundamental throughout national implementation.

Figure 1. National implementation phases



Source: Guidelines on Biophysical Modelling for Ecosystem Accounting (United Nations, forthcoming)

Phase 1 – Strategic planning

The initial phase of the project, which can be identified as a scoping phase, involves the creation of a *national stakeholder group* and the development of an *assessment report* of policy and data needs. The stakeholder group usually relatively small will drive the implementation and should be composed of

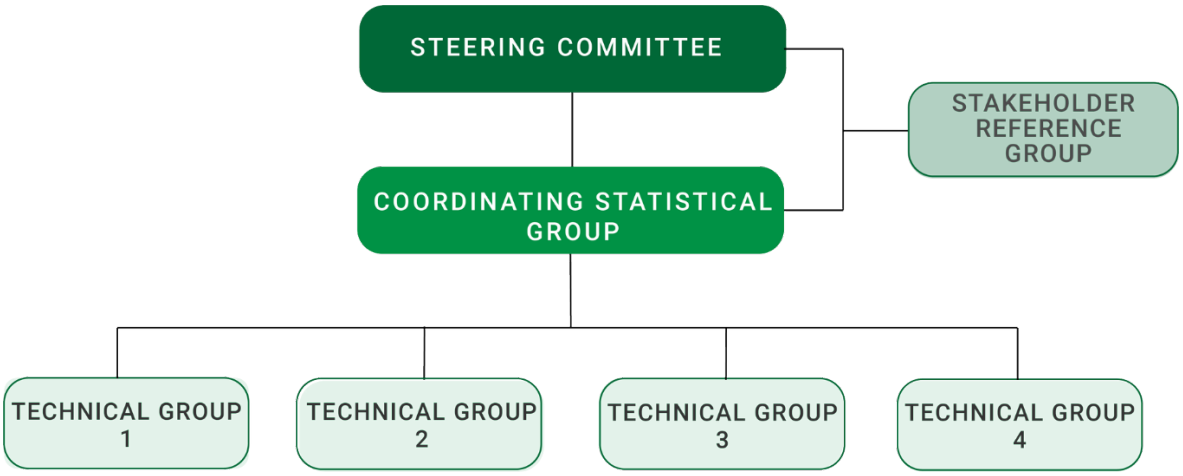
representatives from ministries beyond the NSO, including the ministry of environment and possibly line ministries that compile and use data on ecosystems and biodiversity, planning and finance ministries, that can use the accounts in their policy and planning, national mapping agencies that have experience on spatial data infrastructure, and academia that uses and develops biophysical models and has expertise on valuing ecosystem services and assets.

The national assessment consists of a policy mapping, which will support the prioritization of the accounts to be compiled, the identification of key stakeholders, and an assessment of data sources and national models to be used in the compilation of the accounts.

Phase 2 -Building mechanisms for implementation

The establishment of a coordination mechanism that has a clear mandate to advance the national implementation and mainstreaming into policy of the SEEA EA is key for institutionalizing ecosystem accounting into official statistics. A proposed structure for such mechanism, which has been applied in several countries is presented in Figure 2.

Figure 2. General structure of a coordination mechanism for the implementation of the SEEA EA



Source: Guidelines on Biophysical Modelling for Ecosystem Accounting (United Nations)

The steering committee is composed of a small group of senior members of the key agencies, usually including the ministry of finance or planning, the NSO, and the ministry of environment and provides direction to the production and use of the SEEA EA, sets priorities, develops, and oversees the work programme and ensures that resources are available to carry out the work programme. The coordinating statistical group oversees the compilation of the accounts that are undertaken by several technical groups that focus on specific accounts (e.g. specific ecosystem services or measurement of condition for selected ecosystem assets) and is composed of experts from relevant ministries, academia. The coordinating technical group also ensures linkages between the groups and reviews the outputs before they are disseminated. The stakeholder reference group is an important component of the structure and needs to be engaged at the beginning of the project and on a regular basis to ensure that users demands are met and that the accounts are mainstreamed into policy and decision making.

Phase 3 – Compiling and disseminating the accounts

This phase consists in integrating the different data compiled from different data sources into the accounts. A number of challenges are usually encountered in this phase, ranging from lack of data, to data compiled on a one-off basis and not collected according to standard classifications, to data not meeting the quality standards and to big data that result from biophysical modelling. It is important in this phase to take a pragmatic approach and compile the accounts with the available data and release them, possibly with an "experimental" label. The collaboration of experts from different disciplines is particularly important to ensure that the accounts are the results of the collective expertise of different experts. This phase is usually a learning phase from a compilation point of view as well as for demonstration of the policy relevance of the accounts. This phase should also be undertaken in a relatively short time frame to maintain the interest of the various stakeholders.

The dissemination of the accounts in ways that are relevant to user needs is also very important. Some users may need data at a relatively aggregated level, whereas others may be more interested in micro data for specific geographical areas. Active engagement with the stakeholders is key throughout the process of compilation of the accounts.

Phase 4 – Institutionalization of the SEEA EA

Building on the experiences gained in the previous phases, and in particular having identified the data gaps and challenges in implementation, the next step is to mainstream the production of the accounts into regular statistical production process and mainstream its use in policy. This entails the regular production of input data according to agreed metadata outlining the definitions, classifications, data sources and methods, and establishment of regular data flows formalized through, for example, a memorandum of understanding with different agencies.

Promoting the use of the accounts for policy is key to the uptake of the SEEA EA in a country. This would require presenting the results in a compelling narrative, for example in the form of policy briefs. The use of the accounts in scenario analysis may also support making the case for the compilation of the accounts.

Capacity building and communication

Throughout the implementation of the SEEA EA, it is important to build capacity in compilation as well as the use of accounts for policy. A number of E-learnings have been developed and are available on the UNSD website[11]. National and regional workshops that bring together different stakeholders are also an excellent opportunity for training and pulling expertise from the various communities and learning from other countries. The Forum of Experts on Ecosystem Accounting as well as regional communities of practice are a practical way to exchange experience and learn from those countries that are more advanced in the implementation.

Considering that ecosystem accounting is a new area of statistics which sits at the intersection of accounting, geospatial information, ecology, and environmental economics and which can support a

[11] E-learning on the SEEA Central Framework, SEEA Ecosystem Accounting (currently being updated), SEEA Energy, SEEA Water, policy applications of the SEEA are available https://seea.un.org/content/seea-e-learning-resources

number of policies including climate change, biodiversity, and broader macroeconomic policies that go beyond GDP, a communication strategy throughout the implementation process will support the understanding of its use and uptake into policies.

5 Implementation at the global level-key elements and activities

International agencies and the global statistical community support the implementation of the SEEA EA in countries by building capacity through E-learning and workshops, in-country work, on the job training, developing methodological guidelines and supporting communities of practice at the global and regional levels, all of which allow exchange of ideas and advancing the research and implementation agenda. Implementation at the global level also includes coordinating activities to ensure a common approach to implementation and no duplication, as well as the development of tools that can facilitate national implementation. Communication and advocacy, as well as resource mobilization, are critical to ensure that the accounts are mainstreamed into policy and decision making and that resources are made available for countries to be able to start the compilation of the accounts.

5.1 Capacity building

Capacity building is one of the key elements of the implementation strategy. Capacity building programmes include **training and E-learnings and in-country support**. The Global Assessment on Environmental-Economic Accounting and Supporting Statistics has indicated that all countries compiling the SEEA EA have received some sort of in-country technical assistance provided either by international agencies or more advanced countries. Countries that have experience in implementing the SEEA EA should support implementation in other countries through providing training and in-country support, as is in their capacity.

The SEEA EA is a new area of statistics, and its implementation requires skills and expertise that go beyond the regular activities of an NSO. Establishing a common language among experts from different disciplines requires great efforts. In addition, working with different data sources such as geospatial information and big data in addition to surveys and administrative data requires extensive training. Further understanding the accounting framework of the SEEA EA requires training on the accounting concepts and principles. Thus, training and capacity building programmes should aim at audiences from different disciplines beyond NSOs.

Training programs will be implemented through both online and in-person activities, including training seminars, workshops and meetings. Several E-learning training resources are already available, especially in the form of self-paced modules and webinars. In addition, a number of in-person workshops have been conducted.[12] However, the current training materials have been based on the SEEA 2012 EEA and the Technical Recommendations from 2017 and is hence outdated. The training materials are currently being updated to reflect the latest SEEA EA concepts and definitions. The objective would be to translate the training materials into several languages, such as French, Spanish

[12] All UNSD training resources are presented on the SEEA website: https://seea.un.org/content/seea-e-learning-resources.

and Russian for example, to make them more accessible to countries and to roll out a programme of regional trainings across the globe.

Actively pursuing training and capacity building initiatives at a (sub-)regional level should enable regional organizations and their member countries to share experiences (peer-to-peer) in developing sustainable environmental-economic accounting programs. Regional communities of practice have proven to be a very valuable resource for practitioners at the regional level form both statistical and policy communities.

For example, the Africa Natural Capital Accounting Community of Practice[13] is a regional learning and knowledge platform that brings together professionals from governments institutions, nongovernmental organizations and academia that are interested in or working on natural capital accounting in Africa. It was initiated in November 2019, following the first Africa Forum on Natural Capital Accounting in Kampala, Uganda. A similar, but a less formal, community of practice is also functional in the Latin American and the Caribbean region,[14] and interest in other regions has also been expressed.

5.2 Development of guidelines and material to support compilation

While the SEEA EA has been adopted, further methodological development is needed in particular concerning the compilation of the concepts outlined in the SEEA EA. Specifically, it is important to set priorities with regard to the implementation agenda, for example concerning the choice of ecosystem services and agree on a common method to measure them. The methodological guidelines and reports that have been developed as part of the EU funded NCAVES project to support implementation include (1) Guidelines on Biophysical Modelling for Ecosystem Accounting[15]; (2) Monetary Valuation of Ecosystem Services and Assets for Ecosystem Accounting, interim version (forthcoming); and (3) Policy Scenario Analysis Using SEEA Ecosystem Accounting[16] .

The guidelines for biophysical modelling are specifically designed for statistical agencies interested in compiling ecosystem accounts. They provide an overview of biophysical modelling techniques and the main modelling platforms and tools available, as well as an overview of available global data sets. They also contain chapters on modelling terrestrial ecosystem extent, condition and ecosystem services. The Guidelines will serve as starting point for developing agreed methods for the compilation of physical accounts.

The report on the valuation of ecosystem services and assets is intended to provide practical guidance on the most common valuation methods. It will also discuss, for each ecosystem service, the methods best suited for valuation in an accounting context and provide practical examples to illustrate how to apply the valuation methods.

[13] https://seea.un.org/content/africa-community-practice
[14] http://comlac.website/
[15] See https://seea.un.org/ecosystem-accounting/biophysical-modelling
[16] See https://seea.un.org/content/policy-scenario-analysis-using-seea-ecosystem-accounting

The scenario analysis technical report focuses on describing what types of analyses are possible when using the revised SEEA EA and what types of policy questions can be answered when using the accounts in modelling exercises. It provides an overview of the different types of models that are being used in scenario analysis. The intended audience of these guidelines goes beyond the statistical community and will include model developers and policymakers.

5.3 Strengthening collaboration

Coordinating activities at the global level is at the heart of the implementation strategy, as it will allow to leverage expertise and resources from all involved in advancing the measurement and policy agenda on ecosystems and biodiversity. Coordination is a cross cutting activity that should be undertaken in all areas of work of the UNCEEA, including development of methodology, capacity building and data. One of the primary issues of coordination is identifying and prioritizing those activities and initiatives that call for timely and quality data on ecosystems and biodiversity and develop an engagement strategy, as for example, the monitoring framework of the post-2020 biodiversity framework.

International workshops and fora such as the Forum of Experts on SEEA Ecosystem Accounting and the Policy Forum on Natural Capital Accounting for Better Decision Making take place yearly and provide an opportunity to discuss on-going initiatives and better coordinate their development and implementation.

Coordination at the country level is also very important to ensure a coordinated approach to implementation and an efficient use of resources, particularly as different international agencies are oftentimes working with similar objectives in countries. It is important that the national steering committee coordinates national activities and identifies synergies between different projects.

To facilitate coordination and support the SEEA implementation, the UNCEEA maintains a database of SEEA focal points in countries. The focal points have broad knowledge of the SEEA and are responsible for designing and driving forward the strategy for SEEA implementation and mainstreaming of its use interacting with stakeholders. The focal points serve as a first point of contact to address requests and questions related to the SEEA, distributing them to the relevant people in the country and ensuring follow-up. A country may nominate one or more focal points from the NSO or other ministry. Depending on the country context, it may be the case that one focal point is from the NSO or agency responsible for the accounts, and others from different agencies. While the SEEA focal points are technical experts, they should work in close collaboration with senior management of their institutions to further the national implementation and coordination of activities.

5.4 Data and tools

The compilation of global datasets for ecosystem accounts is important to ensure that the SEEA EA is taken up in global reporting such as the National Biodiversity Strategies and Action Plans as well as reporting for the SDGs, climate change and desertification agreements. The spatially explicit nature of the accounts allows to compile selected accounts using earth observation global data sets. In many instances, a first tier of ecosystem accounts could be developed using purely global data and basic modelling approaches. Such accounts can then be improved and updated, in the second tier, by using

national and local datasets and ground truthing together with more sophisticated and locally applicable biophysical models, resulting in both improved data for existing models and better, locally specific, models using better and additional data. To allow for such tiered approach, interoperability of data and tools is very important.

Tools

The ARIES for SEEA Explorer[17] has been developed with the objective of compiling Tier 1 ecosystem accounts for ecosystem extent, selected ecosystem services and ecosystem condition for selected ecosystem assets. ARIES as a tool itself, over a decade in development, has long supported modelling approaches by building a *semantic web*[18] of data and spatial models that achieve high-level *semantic interoperability* (which enables a receiving system to properly understand the meaning of data that are exchanged and reusing it in an appropriate manner, as opposed to lower-level *syntactic interoperability*, which relies on the use of compatible data formats and communication protocols). ARIES makes a large and growing collection of data and models easily accessible to users with limited experience in spatial modelling, including NSOs, and can also facilitate reporting on key global initiatives such as the SDGs, post-2020 global biodiversity framework and Paris Climate Agreement. The objective is to gradually expand the coverage of ecosystem services and ecosystem condition measures as new data layers become available and can be integrated in the technology.

There are, however, many different tools and datasets that exist and can support the compilation of SEEA EA accounts, among others, Data4Nature (formerly Ensym), ESTIMAP, InVEST, iTree, Nature Braid (formerly LUCI/Polyscape), SWAT, just to name a few. The aim is to move toward ambitious yet achievable goals for interoperability in the SEEA community, and to align the responsibilities of various stakeholders working in the geospatial modelling community to achieve global use of SEEA (e.g., data providers, modelers, platform hosts).

At the heart of the ARIES for SEEA is the interoperability of data and models. A long-term shared vision is that (1) all key data and models needed to compile SEEA accounts and related global indicators (e.g., SDGs, post-2020 biodiversity goals) are interoperable, while (2) researchers independently use principles of interoperability when developing new data and models, making them seamlessly ingestible by interoperability-cantered modelling approaches. Nations with limited data and technical capacity can benefit strongly from an interoperability-focused approach, by gaining access to context-appropriate data and models that can be properly assembled by computers.

It also useful to caution that interoperable, but lower quality global remote sensing data, may be very useful but not a sufficient long-term solution. At the same time, it is possible that an interoperable system that countries can progressively adapt their data to is a sensible approach, but the steps towards that and the rationale for the additional costs need to be clearly articulated, in particular related to the fitness for purpose question underpinning this discussion.

[17] See https://seea.un.org/content/aries-for-seea.

[18] A "web of data" interlinked so that both people and computers could traverse across databases over the network

A number of global data sets and models that have been developed by space agencies, academia or NGOs are candidate for use in the compilation of the SEEA EA. A list of these data sets is being compiled in the context of an effort led by EO4EA, a GEO initiative to support the SEEA EA, and discussions are underway with a number of partners to make some of these datasets interoperable.

5.5 Communication and advocacy

As an integral component of the implementation strategy, advocacy aims to support an ongoing dialogue among statistical producers, the various levels of government, the business sector, the academic community and the general public about user needs for official statistics and the progress in meeting those needs. This recurrent communication can be established through targeted workshops, conferences, press releases and promotional materials that highlight the benefits of high-quality official statistics in general, and SEEA EA accounts in particular. These regular engagements between the producers of statistical outputs and providers of basic data on one hand and the users of the accounts on the other will reinforce a better funded and more effective SEEA EA programme that provides reliable data for an evidence-based policy formulation. The focus of the advocacy should be on stimulating demand and engaging with users.

Given the high priority given to the climate and biodiversity crises, a number of initiatives at the national and global level are emerging. Advocacy and communication efforts will need to be made to ensure that the SEEA EA is explained to fit the purpose of the specific initiative so as to ensure coordinated efforts to develop statistical data consistent with statistical standards and integrated within the national statistical system.

Several materials are available to increase policymakers' understanding of applications of natural capital accounting according to the SEEA EA and encourage its uptake for policymaking. Among others, the publications developed under the Enhance Natural Capital Accounting Policy Uptake and Relevance (EnhaNCA) project, are aimed for a broad, non-technical audience, including government ministries and central banks and cover natural capital accounting's contribution to integrated policies including: (1) policies for sustainability; (2) biodiversity policies; (3) climate change policies; and (4) sustainable macroeconomic strategies.[19] Events, such as the Forum on Natural Capital Accounting for Better Policy, also support the advocacy and uptake of natural capital accounting in policy making.

Related to the requirement of multi-stakeholder coordination for the implementation of the SEEA EA and the trend towards NSOs becoming data stewards, national level coordination among ministries and agencies is becoming more prominent. There may also be a need to develop more guidance materials to assist NSOs with national level coordination and governance, as well as compile best practices such coordination mechanisms been put in place in other countries. In addition, the UNCEEA developed a communication strategy on the SEEA, which may be reviewed and updated to reflect current demands and visibility of the SEEA EA.

[19] https://seea.un.org/content/enhanca-enhance-natural-capital-accounting-policy-uptake-and-relevance

6 Monitoring implementation

Monitoring implementation of the SEEA EA has been undertaken through the Global Assessment of Environmental Economic Accounting and Supporting Statistics. The aim of the Global Assessment is to assess the progress made in implementation of the SEEA Central Framework and SEEA EA. The number of countries implementing the SEEA informs Sustainable Development Goal (SDG) target 15.9 on integrating ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts. In particular, the number of countries implementing the SEEA provides data for indicator 15.9.1(b). The Global Assessment will also inform progress towards the targets of the current implementation strategy

The Global Assessment was first implemented in 2006 and then has been implemented every three years, starting since 2014. However from 2021 and onwards, the Global Assessment will be conducted on an annual basis to inform SDG indicator 15.9.1(b) and provide information to track implementation of the SEEA EA.

The Global Assessment could be reviewed to also include appropriate key performance indicators to monitor the strategy, including the number of people trained, amount of financial and human resources provided by donors or national funding, number of indicators derived from the SEEA EA used for reporting, etc.

7 Supporting SEEA implementation

In the multi-stakeholder environment, a mechanism is needed in order to coordinate, monitor and report progress at (sub) regional and international level. In the current context, the purpose of this mechanism would be to share information on the development and the execution of the SEEA EA implementation strategy.

The implementation of the SEEA EA is a cross cutting issue involving all groups operating under the Bureau of the UNCEEA. The Technical Committee on the SEEA EA (Area B2) composed of experts from NSOs, international organizations, NGOs and academia has the know-how to review the technical materials supporting the implementation; Area D on capacity building is responsible for running the Global Assessment and developing an implementation programme at the sub(regional) level; Area C is involved in data; and Area A is responsible for establishing collaboration among different stakeholders and identifying entry points for the use of the SEEA EA.

To advance the methodology to support implementation, two thematic groups have been established under the Technical Committee on the SEEA EA, one on forest accounts and the other on ocean accounts. The objective of these groups is to develop practical guidelines for the implementation of SEEA EA accounts, identify global data sources and model that can support implementation, and identify a minimum set of data, statistics and indicators to meet policy demands. Additional thematic accounts will be established depending on resources. In particular, groups on biodiversity and urban areas have been identified as priorities, with several stakeholders expressing interest in forming such groups.

A dedicated working group on indicators was established in 2020 to support the revision and the drafting of Chapter 14 of the SEEA EA. The group will continue its work to provide input into the global processes for developing the monitoring framework of the post-2020 global biodiversity framework, including to support in the development of metadata for the SEEA EA indicators in the monitoring framework.

8 Resourcing the strategy

Considering the interest that the adoption of the SEEA EA has generated and the policy demand, it is expected that the demand for technical assistance in compiling ecosystem accounts will increase at a rapid pace. It is therefore important to develop a fundraising strategy that will leverage on existing funding initiatives (e.g. European Union, multilateral development banks, national development agencies, the Global Environment Facility, PARIS 21) as well as on existing resources and the comparative advantages of all stakeholders and partners. It is suggested that a trust fund be established that would support the implementation of the SEEA EA in a coordinated fashion.

It is important for national statistical systems to be properly resourced to undertake the regular compilation of ecosystem accounting. The development of the accounts is usually included as a small component of bigger project aimed at the use of the information developed from the accounts. However, this often results in a short-term approach to compiling the accounts with whatever data is available, often by an international consultant. National statistical offices should avoid the risk that projects are undertaken on an ad-hoc basis creating burden, rather than facilitating or training staff and establishing a regular programme of implementation. The engagement of NSOs and resourcing the compilation of the accounts towards a regular production process should be at the heart of such projects.

In addition to the need for funding the strategy, consideration should also be given to the usually limited human resources available to support implementation in countries. Considering the novelty of this area of statistics and the challenges posed by multidimensional data and multistakeholder involvement, countries need individual technical assistance. At the same time, the number of experts in this field of statistics is limited. A strategy to increase the number of experts in this field through train the trainer programmes and further develop south-south cooperation is urgent.