THE SYSTEM OF ENVIRONMENTAL-ECONOMIC ACCOUNTING: APPROACHES FROM COLOMBIA

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Introduction

Since the late 1980s, environmental issues have continuously permeated the international agenda through Global Governance. States have committed to limit global warming and climate change by mitigating its effects. This is represented within ambitious international treaties that have been entered into force in relation to this matter, including the Montreal Protocol (1987), United Nations Framework Convention on Climate Change (1992), Tokyo Protocol (1997) and the Paris Agreement (2015), as well as specific agreements for each of the specific categories of the broad spectrum of the environmental international regime, including air, chemicals, industry, land use, biodiversity, waste, among many other issues. Moreover, the International Community has reached a global consensus by agreeing on the Sustainable Development Goals (SDG) within the 2030 Agenda to continue the path towards Sustainable Development, which is further related with the variables and indicators of climate change.

Every international agreement has a series of obligations that turn into legally binding commitments under the responsibility of States. Particularly, these Multilateral Environmental Agreements (MEA'S) have established different goals to be reached under specific terms.

However, one of the central elements to monitor the implementation and accomplishment of these goals is the production of timely, quality, open, and disaggregated data and statistics that are essential to formulate, implement and evaluate public policy, that will accelerate these goal's fulfillment. As mentioned throughout the report of the United Nations' Sustainable Development Goals of 2020 (The Sustainable Development Goals Report, 2020), data and statistics are the key to support the SDG acceleration. Therefore, it is needed to comply with related international agreed treaties.

Accordingly, currently there are different multipurpose statistical frameworks at the international level that contribute not only to the compilation, collection, development, and implementation of environmental statistics but also to their integration with economic and financial statistics. Some examples include the System of Environmental-Economic Accounting - Central Framework (SEEA- CF), the System of Environmental-Economic Accounting - Ecosystem Accounts (SEEA - EA), and the Framework for the Development of Environmental Statistics (FDES). These frameworks, in addition to being compatible with each other, share concepts, definitions, classifications and accounting standards, when applicable, with the System of National Accounts (SNA). However, when thinking on a medium and longer terms strategy, one of them stands out among the others.

Based on the former assertion, this paper seeks to provide conceptual and empirical inputs from the National Statistical Office of Colombia (DANE, for its acronym in Spanish) to support the prevalence of the SEEA-CF over its counterparts in the medium and longer term. To reach this goal, the first part of this paper will engage with a conceptual discussion on how the SEEA-CF is ideal for the production and analysis of indicators of environmental assets, flows and activities, besides associated transactions. The second part will assess the potential use of the SEEA-CF as the basic statistical framework for implementing a medium and long-term strategy to support policymaking in environmental accountings. Finally, DANE will present a final part with its experience regarding Colombia's environmental accountings. The conclusions will also include some challenges and recommendations viewed from this empirical experience.

The conceptual framework of the SEEA-CF

As mentioned earlier, the conceptual and methodological integration of environmental frameworks translates into the construction of coherent and solid data, which in turn, determines the delivery of objective elements for both policy formulation and monitoring. They allow public and civil society to become more aware and organize to lobby for better climate-related policies.

One of the most important frameworks is the System of Environmental-Economic Accounting (SEEA) adopted by the United Nations Statistical Commission in 2012, as an official international framework for natural capital accounting, providing a common understanding for organizing and presenting statistics on the environment and its relationship with the economy. It has a Central Framework (SEEA-CF) which "takes the viewpoint of the economy and examines how natural resources like fish, timber and water are used in production and consumption, along with resulting pollution in the form of waste, water and air emissions" (United Nations; European Union, 2020, págs. 3-5) and also an Ecosystems Accounting (SEEA-EA) that "complements the Central Framework by taking the perspective of ecosystems and their contribution to human well-being in the form of identifiable ecosystem services" (United Nations; European Union, 2020, págs. 3-5).

On the other hand, there are other frameworks that compile and measure specific items of the environmental broad spectrum, such as the Framework for the Development of Environmental Statistics (FDES), which was adopted in the 44th Statistical Commission session in 2013 as a flexible, multipurpose conceptual and statistical framework that provides an organizing structure to guide the collection and compilation of environment statistics at the national level. It covers the issues and aspects of the environment that are relevant for policy analysis and decision-making at early stages in the development of their environment statistics programmes (Department of Economic and Social Affairs - Statistics Division, 2017, p. 38).

While it is possible to recognize the benefits of all frameworks, the SEEA, and specifically its Central Framework result conceptually more pertinent for a medium and long-term strategy to support policymaking in environmental accountings. First, the SEEA- CF has the rigor of the National Accounts System (SNA), as an instrument used to monitor countries economic aggregates. Therefore, it uses its concepts, structures, rules and principles. Nevertheless, it goes beyond the SNA, by reconciling environmental and economic terms.

In the theory of sustainable development, it is recognized that the economic activity is part of a complex system: the social system, which is supported by a higher system, the biosphere. The SEEA-CF aims, from the physical and monetary measurement, to register with greater clarity the existing relationships between the three aforementioned systems.

Second, the SEEA Central Framework was designed not only to be conceptualized according to the SNA but also to be compatible with other international standards, such as the Balance of Payments and International Investment Position, the International Standard Industrial Classification of All Economic Activities (ISIC), the Central Product Classification (CPC) and the Framework for the Development of Environment Statistics (United Nations; European Union; Food and Agriculture Organization of the United Nations; International Monetary Fund;

Organisation for Economic Co-operation and Development; The World Bank, 2014, p. 9). This allows further conceptualizations from the development of these international standards and its integration with other concepts being analyzed within them.

Third, as previously stated, the environment must be understood in a broader multidimensional sense, as it is not just about natural stocks, but also it is important to understand its relationship with society and the economy. The SEEA-CF considers information regarding water, minerals, energy, timber, fish, soil, land and ecosystems, pollution and waste, production, consumption and accumulation.

Hereby, the coherent integration of environmental and economic statistics facilitates the concurrence of dialogue between decision-makers and formulators of different policy lines, promoting effective and integrated management in favor of the achievement of climate change measurement needs. This also allows countries that implement the SEEA - CF, to establish depletion patterns and levels of use (extraction); and characterizing the pressure that economic activities exert on natural resources, allowing to obtain solid and sufficiently detailed data to support the formulation and monitoring of public policies.

All of the conceptualization of the SEEA-CF translates into two main arguments to support it as the best strategy to promote global efforts to mitigate climate change effects. The first one is the production of indicators of environmental assets, flows, activities and associated transactions that allow to comply with international standards and the global agenda, and second, the possibility to analyze environmental indicators through their relationship with the economy.

The institutionality of the SEEA-CF

Additional to the conceptual considerations previously shown, it must be taken into consideration one of the most important benefits of the SEEA-CF, considering as the best mean and long-term strategy to meet countries needs for climate change: its broad institutionality.

The SEEA-CF has the benefits of being created within the United Nations (UN) System which translates into a broader international consensus and participation of actors of different nature, ranging from the States, Academia, Non-Governmental Organizations, and International Institutions. In fact, besides the UN, the SEEA is backed by important International Organizations such as the European Commission (EC), the Food and Agriculture Organization of the United Nations (FAO), the Organization for Economic Co-operation and Development (OECD), the International Monetary Fund (IMF) and the World Bank Group (WBG) (United Nations; European Union, 2020, pág. 6).

Furthermore, the SEEA-CF has, by itself, an institutional framework that monitors and supports its development. The United Nations Committee of Experts on Environmental-Economic Accounting (UNCEEA) has been mandated by the United Nations Statistical Commission (UNSC) to "elevate the System of Environmental-Economic Accounts (SEEA) to an international statistical standard" and "advance the implementation of the SEEA in countries" (United Nations, 2021). On the other hand, the London Group on Environmental Accounting, a city group created in 1993, that provides an informal expert forum to advance on methodological research and develop advices on its implementation (United Nations, 2021)[1].

Additionally, different instruments have been put in place to support the development of the SEEA-CF worldwide. Some of them include:

- The "Seminar on SEEA Implementation". Since 2015, the United Nations Economic Commission for Europe (UNECE) and the OECD jointly gather producers and consumers of the SEEA, not only from their member-States but from all regions, to exchange knowledge and experiences on its implementation. The sixth Seminar was held in March 2021.

- The "Global Assessment of Environmental-Economic Accounting and Supporting Statistics" was undertaken by the United Nations Statistics Division (UNSD), which assesses the progress made in the implementation of the SEEA. It does not only provide inputs for the UNSD to monitor its implementation but also for countries to compare their advancements with other countries and to find further cooperation exchanges with other partners.

All these conceptual and institutional advantages have in turn converted into a continuous preference of its development on countries' national accounts. In fact, as shown on the 2020 Global Assessment of Environmental-Economic Accounting and Supporting Statistics (United Nations Committee of Experts on Environmental-Economic Accounting, 2021, pág. 2), the number of countries that are implementing the SEEA have increased from 54 in 2014 to 89 in 2020, meaning an increase of 64% in 6 years, while 27 additional countries revealed having the intention to start compiling the accounts.

An approach from Colombia

Colombia is a country with several biomes and one of the few nations in the world that is megadiverse and also benefits economically from minerals, oil and other goods (UNEP-WCMC, 2016). Nevertheless, it is highly exposed to climate change-related disasters, ranking 10th globally in terms of economic risk posed by three or more hazards (The World Bank, 2021).

[1] City groups are informal groups of experts are created, mainly from National Statistical Offices, whose participation is voluntary. In the case of the London Group it generally meets annually, and the meetings provide a forum for review, comparison and discussion of work underway by participants towards development of environmental accounts.

Consequently, Colombia recognizes the importance of preserving its biodiversity, while taking advantage of the economic benefits of the environment and being aware of its exposure to natural hazards.

DANE has been developing the Environmental Satellite Account (ESA) as an inter-agency cooperation project, for the technical construction of the Environmental and Economic Accounts in Colombia, following the recommendations of the SNA and the SEEA-CF. Thus, DANE advances in the SEEA implementation process, within the ESA, allowing to conduct specific analyzes, the inclusion of alternative statistical concepts and classifications, and the use of statistical information and non-monetary variables without distorting or overloading the central framework of economic measurement (National Administrative Department of Statistics of Colombia, 2018).

Regarding the conceptual, methodological and measurement advances of the ESA, DANE annually updates and publishes the following economic-environmental accounts, within the framework of the implementation of the SEEA:

Assets:

- Environmental and economic asset account of mineral and energy resources (CAE-ARME), in physical units, for assets mineral coal (provisional 2005-2020), natural gas (provisional 2005-2020), oil (provisional 2005-2020), iron ore (provisional 2016-2020), copper ore (provisional 2014-2020), and nickel ore (provisional 2014-2020).

Flows:

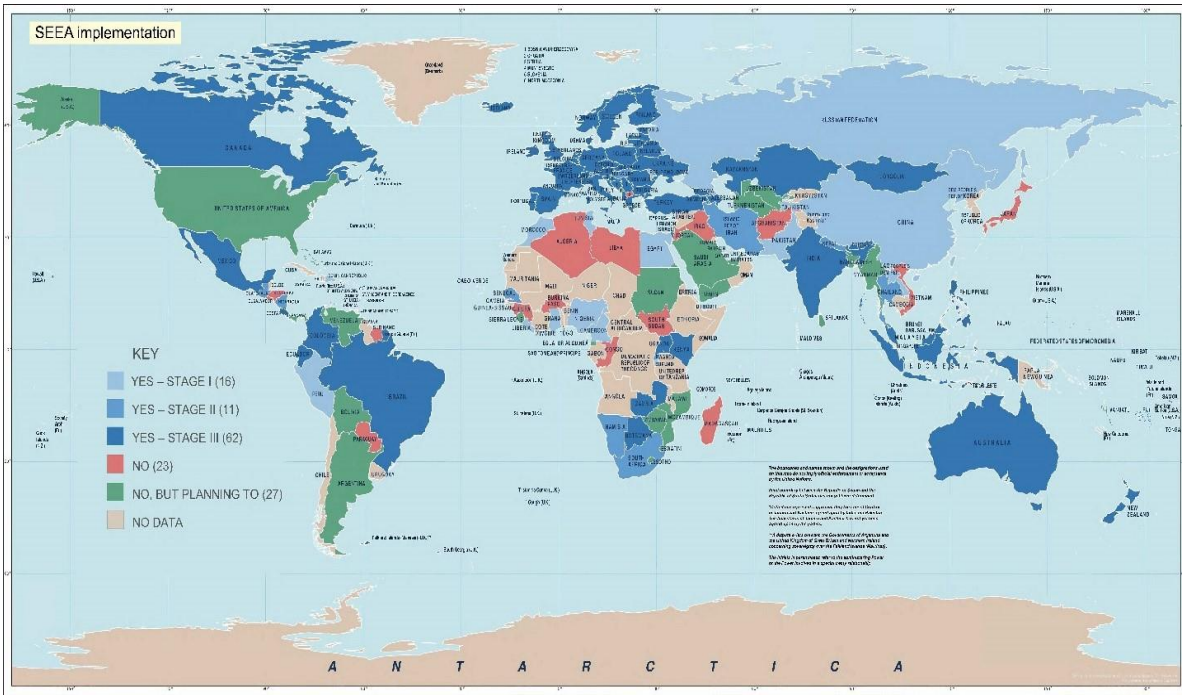
- Environmental and economic account of forest flows (CAE – FB) in physical and monetary units, for the provisional 2005-2019 series
- Environmental and economic account of water flows (CAE – FA) in physical units, for the provisional 2010-2019 series
- Environmental and economic account of energy flows (CAE – FE) in physical units, for the 2005 - 2019 provisional series
- Environmental and economic account of material flows: solid waste (CAEFM-RS) in physical units, for the provisional 2012-2019 series
- Environmental and economic account of material flows: air emissions (CAEFM-EA) in physical units, for the provisional 2005 - 2019 series

Environmental activities and associated transactions:

- Environmental account of environmental activities and associated transactions in monetary units, for the provisional 2009-2020 series

In fact, according to the latest Global Assessment of Environmental-Economic Accounting and Supporting Statistics carried out by UNSD in 2020, Colombia is one of the 62 countries worldwide that does a regular compilation and dissemination of the SEEA by publishing at least one of its accounts at the time of the assessment (United Nations Committee of Experts on Environmental-Economic Accounting, 2021, pág. 2).

Figure 1 Implementation of the SEEA Worldwide



Source: SEEA Webpage, 2021.

Under DANE's leadership, the construction of the country's environmental accounts requires the provision of information produced by other stakeholders, in response to the multidimensional nature of the measurement. As an example, the following tables show the sources of information and entities that provide information for the Environmental and Economic Account of Forest Flows (CAE-FB, for its acronym in Spanish), as well as for the Environmental and Economic Account Assets of Mining-Energy Resources (CAE-ARME, for its acronym in Spanish):

Table 1 Sources for the Environmental and Economic Account of Forest Flows (CAE-FB)

Source / Entity	Nature of the Entity	Variables
National Administrative Department of Statistics (DANE)	Public	– Results of the central framework of national accounts - supply-use balances by product and economic aggregates – Annual Manufacturing Survey (EAM) – Producer Price Index (PPI) – Population projections and back-projections by area – Projections and rear projections of homes by area – International trade (declaration of imports and exports by product)
National Association of Industrialists of Colombia (ANDI)	Private	– Wood pulp production in tons from the annual statistical report
Mining and Energy Planning Unit (UPME)	Public	– Final residential firewood consumption in tons of the Colombian energy balance (BECO)
Institute of Hydrology, Meteorology and Environmental Studies (IDEAM) *	Public	– Wood granted, mobilized and confiscated from the National Forest Information System (SNIF)
Ministry of Agriculture and Rural Development (MADR) *	Public	– Wood mobilized from forest plantations of the forestry statistical bulletin

* contrast statistics

Source: DANE, 2021.

Table 2 Sources for the Environmental and Economic Account Assets of Mining-Energy Resources (CAE-ARME)

Source / Entity	Nature of the Entity	Variables
National Hydrocarbons Agency (ANH)	Public	– Opening stock – Discoveries – Increase or decrease in revaluations – Extraction

National Mining Agency (ANM)	Public	– Opening stock – Discoveries – Increase or decrease in revaluations – Extraction
Companies of the sector	Private	– Opening stock – Discoveries – Increase or decrease in revaluations – Extraction – Catastrophic losses

Source: DANE, 2021.

The multiple sources of information that covers the environmental accounts imply an enormous challenge to Colombia, as well as to other countries. In this way, it is needed to articulate among multiple stakeholders through governance structures with institutional frameworks, rules, procedures and constant collaboration to meet the data requirements that policymakers and the general society have. Here, counting an international standard that allows different actors to understand the concepts and "speak the same language" ease building these frameworks.

It is important to note that the highest national planning authority, which serves as an advisory body to the Government in all aspects related to the economic and social development of the country, is the National Council for Economic and Social Policy (CONPES, for its acronym in Spanish). It formulated and approved the CONPES document No. 3934 of 2018 which establishes the "Green Growth Policy of Colombia" (National Council for Economic and Social Policy of Colombia, 2018). It conceptualizes all the challenges faced by the country and establishes roadmaps allowing to address them integrally.

The CONPES also includes institutional arrangements for coordination between all State entities involved in this policy and incorporates actions regarding the formulation of the methodological proposal of the material flow account within the framework of DANE's environmental accounts, in order to strengthen the mechanisms and instruments to optimize the use of natural resources and energy in production and consumption. Similarly, it considers the strengthening of administrative records and / or the generation of statistical operations that serve as input in the implementation of the SEEA within the Environmental Satellite Account, aimed to strengthening governance for the coordination of actions in green growth and information management for decision making.

Colombia has also used the National Environmental Accounts to support other processes highly relevant for climate change. After multiple studies, the National Government proposed two essential instruments for the country related to the Circular Economy: i) The Circular Economy

Information System (SIEC, for its acronym in Spanish), led by DANE, and ii) The National Circular Economy Strategy (ENEC, for its acronym in Spanish), in charge of the Ministry of Environment and Sustainable Development (MADS, for its acronym in Spanish).

Particularly talking about the SIEC, it was conceived as an articulated set of elements that interact with each other to collect, consolidate and disseminate statistical information related to the Circular Economy and is composed by public and private entities that are producers or users of such information, policies and related standards, technical processes, infrastructure and technology related to the management of this information. Therefore, its main objective is the dissemination of statistical information on the circular economy for the design, formulation, and evaluation of public policies on related issue, while allowing to respond to the multiple information requirements at the national and international level.

The increase on the articulation among State entities has also impacted into the dissemination of official data and statistics it to a wide range of actors in the public, private and third sectors, through the generation of reports, presentations, webinars, and inter-sectorial dialogues.

In October 2017, DANE spearheaded the creation of the "National Statistics Council" as part of Colombia's National Statistics Plan (PEN, for its acronym in Spanish). This council aims to create coordinating bodies to produce statistical information among the members of the National Statistical System (SEN, for its acronym in Spanish). Likewise, in 2019 the Circular Economy Information Table (MIEC, for its acronym in Spanish) was created with the purpose to articulate the entities of the SEN to identify, strengthen and generate relevant and timely statistical information required in decision-making and for the evaluation of public policies associated with the Circular Economy. Additionally, specific related bodies were created to analyze the supply and information requirements related to each of the six (6) priority lines defined in the ENEC.

Taking into account the scope of the SIEC, the MIEC and its specific-related bodies, DANE has prepared and presented between 2020 and 2021 three circular economy reports, including relevant indicators to understand and evidence Colombia's advancements towards a Circular Economy. These reports provided timely information for decision-making and the strengthening of public policy in this matter.

The first Report was published on August 5, 2020, presenting a battery of 44 indicators. The Second Report, published in December 2020, presented 23 indicators and 6 Sankey diagrams that represent the flows of the Environmental Satellite Account (CSA, for its acronym in Spanish). Additionally, the third report, published in July 2021, presented 24 indicators and 2 Sankey diagrams. It is highlighted that within the aforementioned report a total of 33 indicators and 6

Sankey diagrams were incorporated, derived from the results of the ESA in the framework of the implementation of the SEEA.

In addition to the benefits of advancing in the implementation of the SEEA-CF in terms of the country's environmental management, as the SEEA is an internationally accepted system, it allows the State to evidence its progress on international commitments. DANE is currently reporting some of the advancements of Colombia on the post-accession commitments within OECD's Environmental Policy Committee (EPOC) after officially becoming a member-State of the Organization in April 2020, specifically regarding the recommendations of the Council of the OECD on Resource Productivity and on Council on Material Flows and Resource Productivity. This is also a source to report on the Sustainable Development Goals and it has recently been identified the potentiality to respond to the information needs identified in the global consultation on the draft of the set of statistics and indicators on climate change carried out by the United Nations Statistics Division in July 2021.

As a matter of fact, while addressing the national position for Post-2020 Global Biodiversity Framework, which aims to halt biodiversity loss by 2030 and achieve recovery by 2050 and which is currently being negotiated under the Convention on Biological Diversity (CBD), a part of the indicators that are being discussed could be taken from the SEEA framework.

For all the arguments presented through this paper, including the conceptual framework as well as the institutional arrangements that are behind the SEEA-CF, it can be argued that it is the core statistical framework of a medium to long-term strategy for sound and sufficiently detailed data to support policymaking. Its opportunities to continue developing this framework would not only benefit national accountings, but also international environmental commitments, including the Sustainable Development Goals, as well as the statistics and indicators of Climate Change included in UNSD's recent Global Consultation.

After having stressed which would be the preferable statistical framework for the medium-long term, DANE would like to provide some inputs related on the challenges that countries, especially developing ones, could face, as well as some recommendations that have worked in Colombia. We would therefore like to mention two main challenges:

1. It is necessary to improve communication between different stakeholders and users of environmental accounts to raise awareness of the need to count with data for policy monitoring and implementation. There is an important difference between the progress in the implementation of the SEEA and the requirements of public policies and international commitments. The timeline of environmental accounting lags behind.

2. Even in spite the enormous progress of Colombia in terms of the implementation of the SEEA-CF, as a developing country it realizes on the great amount of resources needed to continue developing the environmental accounts and the need to include them as a priority of the international agenda. This would bring together different stakeholders to promote additional mobilization of financial and technical resources from international cooperation. It must be considered that in the 2020 Global Assessment of Environmental-Economic Accounting and Supporting Statistics is stated that only 52% of the developing countries that responded to the assessment was being implemented. A wider challenge arises, which can be assumed by NSO's and is to advocate for the mobilization of resources for smarter data, within more complex political contexts, under which direct actions that target specific solutions (e.g., mitigation or adaptation) might be preferred by members of the development community.

Despite the challenges, some opportunities have raised from the current Covid-19 pandemic. For example, the need to build back better in a sustainable manner provides the common ground to incorporate environmental issues into public policy. For this reason, some of the recommendations identified based on DANE's experience would be:

1. Position environmental data and statistics as a top priority on the international agenda by showing its relevance on monitoring global agreements.
2. Bringing policymakers closer to technical construction exercises by creating scenarios that allow this articulation.
3. Create institutional frameworks that allow a multidisciplinary and multi-stakeholder approaches. An example could be the Green Growth CONPES formulated by Colombia.
4. Initiate training processes to generate technical capacities among the different sources of information needed.
5. Strengthen communication between the different interest groups and users of environmental accounts to raise awareness about the need to have data for the monitoring and implementation of policies.
6. Reduce the backlog of environmental accounting in order to respond with greater opportunity to the requirements of public policies and international commitments.

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