

Mexico's environmental accounts and derived indicators

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Abstract

For just over 20 years, INEGI has taken on the task of displaying through the Economic and Ecological Accounts of Mexico (SCEEM or SEEA-Mexico) negative impacts caused by the interaction of the economy and consumer behavior with the natural resources and the environment, measured in physical and monetary units. This is quantified identifying the processes of natural capital depletion and the loss of quality of the environment. Simultaneously, work has been done in the collection of data regarding monetary expenditures made by the public sector and households, with the aim of highlighting the efforts to reduce such negative impact.

Notably, the primary indicator that results of discounting total costs of depletion and environmental degradation from GDP, is called Environmentally adjusted GDP (better known as ecological GDP).

In this sense, the SEEA-Mexico provides information properly arranged to characterize the economic dynamics of the country beyond the GDP, which provides decision makers at different levels (government, households, businesses, etc.) additional variables related to emissions to air, water and soil, as well as those related to the loss of forests and oil, to name a few.

It also generates information for the implementation of other initiatives such as green growth, measurement of clean production and green jobs, and certainly an important basis for the quantification of wellbeing.

Keywords: Depletion, degradation, protection expenditures, green economy.

1. SEEA Implementation in Mexico

For over 20 years, INEGI has devoted efforts to quantify in economic terms the damage to the environment and natural resources caused by human activities of production, distribution and consumption. At the same time, and in order to present an accounting balance of the environmental border, established an information gathering process for measuring the activities of control, abatement, remediation and pollution abatement, as well as management, promotion and care of the environment. This process has been permeated by the recommendations listed on the two most recent versions of the System of National Accounts: 1993 SNA Chapter XXI regarding the analysis and satellite

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accounts², and the 2008 SNA, Chapter 29, satellite accounts and other extensions³. Specifically, it can be mentioned the direct relevance of the various drafts of the System of Environmental Economic Accounting (SEEA) to develop environmental accounting, from the SEEA 1993, SEEA 2003 and SEEA Central Framework 2012, with its different shades in the measurement, classification and order, to the economic valuation scenarios.

The ongoing process of consolidation of environmental accounting in the country had to go through different stages of work and organization, which forced to maintain a close relationship international organizations such as the United Nations and the World Bank, which in addition to the capabilities provided by its experts, provided the financial support of the project, and of course, the dissemination of the Mexico case study, published in December 1991.

Once the mission of international experts was concluded, it was necessary to use and recycle inherited capacities so as to continue with the project of implementation of the environmental accounts of Mexico, in order to consolidate its position as a leader in research and generation of information on the economy and the environment.

It was also necessary to have qualified human capital to venture into the task of adapting the Mexican initiative case study, on the more formal recommendations explicit in the first draft of the SEEA 1993 and 2003.

On the other hand, one can mention the importance of the exchange of experiences on issues related to the environmental and economic frontier, as it allowed among other things to establish processes of analysis and discussion for landing different ideas and drafts recommendations preceding the SEEA 2003.

In this way we worked with experts from the Ministry of Environment and Natural Resources, the National Water Commission, the National Forestry Commission, the National Fisheries Institute, the Federal Attorney for Environmental Protection, the National Institute of Ecology, the National Commission for the Knowledge and Use of Biodiversity, the local government environmental agencies, academics specializing in this field, among others.

Table 1. SEEA Implementation: The of Experience Mexico

Condition / Stage	Start	Adjustment	Consolidation
a. International Collaboration	It depended on the advice of international experts from the UN and the World Bank.	Resumption of work considering national technical capacities.	It is given support to the implementation of the SEEA and SEEA theme of countries in the region.
b. Budget	Financing from international organizations like the UN and the World Bank.	Economic Funding was allocated through fixed budget from Mexico.	Resources have been allocated to support environmental accounts in other countries, with workshops and technical commissions.
c. Availability of information	The available information was limited, and often corresponded to academic data.	The first drafts of the SEEA promoted rapprochement with the information providers.	Additional to the flow of information available, It's taken advantage of the uptake mechanisms, such as censuses and surveys.

² UN (1993) “Sistema de Cuentas Nacionales 1993”, chapter XXI, section D “Sistema satélite de contabilidad ambiental y económica integrada”.

³ UN (2009) “System of National Accounts 2008”, chapter 29, section F-2 “Environmental accounting”. New York.

d. Human resources	It required the participation of officials from international organizations and national experts who played additional functions.	Work places were allocated according to the needs of the functional themes of the environmental accounts.	It has permanent human resources, exclusively for the different processes related to updating the SEEA-Mexico.
e. Inter-institutional work	The development of the project required the support of institutions and organizations close to the environmental sector to discuss methods of calculation.	Collaboration mechanisms were established with various areas related to the environmental sector, in order to strengthen the process.	The implementation the National System of Statistical and Geographical Information allows generating data through Specialized Technical Committees, which review the quality and timeliness of information.
f. Methodological support	There was no environmental accounting manual.	The first drafts of the SEEA and its specific manuals were used.	It works with the SEEA Central Framework.
g. Diffusion	With support from World Bank the first document was published in 1991.	The results are published annually in print and electronic versions.	It works in the publication design according to the new architecture of statistics. Articles have been published for the international statistical community.
h. Users	Specialized researchers.	Policy makers, academics, researchers and the general public.	Policy makers, academics, researchers, private studies, academic books, general users.
i. Technological level	Calculators, paper, pencil.	Computers and the use of programming languages	Systematization: using specialized software and database administrators.

The challenge offered by the adoption of the SEEA 2012 can be attractive when you consider the current process in our country in terms of statistical development.

First, highlights the implementation of the National Statistical and Geographic Information, which allows generating information of national interest necessary for the design of public policies. To ensure the quality of information generated, legal instruments related to the establishment of Specialized Technical Committees have been created, which with technical recommendations, agreements and specific rules collegially analyze, review, and strengthen the methodological development of the information relating to the environment, health, culture, education, tourism, among others. In this regard, we develop information concerning water, energy, air emissions, solid waste, land use and vegetation, biodiversity, climate change, etcetera.

Another important aspect to highlight, that offers important elements for the implementation of the manual, is the preparation for the census of 2014, in which we are working to incorporate an environmental module to obtain information on production and green jobs and the use of clean technologies, that enables the development of relevant data tables on specialized producers of environmental services, as well as non specialized producers, which can certainly be an input for environmental accounts of Mexico.

Two additional aspects that coincide with the spread of SEEA 2012, and will significantly contribute to the process of adoption of the manual, are the base year update of national accounts of Mexico and its systematization process.

2. Coverage of SEEA Mexico

According to the availability of information on the economy and the environment, as well as international recommendations related to national and environmental accounts registered in the SCN (1993 and 2008) and the SEEA (1993, 2003 and 2012), the SEEA -Mexico offers a

set of data that make up an economic environmental information system, in which the state can be seen guarding the country's natural resources.

Thus, the natural resource catalog that covers the SEEA Mexico for the adjustment of the GDP by measuring the depletion and degradation of the environment includes: oil, forest and groundwater depletion, as well as soil degradation, pollution of water, air, and solid waste generation.

The first three issues are related to registration of natural resources on which it is possible to identify quantitative changes that occur in them, i.e. both stocks and flows are estimated. This depletion is determined by the same annual physical balances for each of the first two, and one count of flows for water resources.

The following four issues are related to environmental degradation and are recorded as flows, because they measure part of the qualitative changes of nature. In this sense, the treatment is to calculate the flows that affect the environment and alter its natural quality, as a result of the activities of production and distribution of goods and services as well as human consumption.

Additionally, two economic issues are developed, implicitly included in the national accounts: produced economic assets balances and environmental protection expenditures (EPE).

With this same logic, the SEEA-Mexico incorporates the latest international recommendations on specific natural resource accounting, such as the "System of Environmental-Economic Accounting for Water", for the measurement of physical and monetary flows of water, the "Integrated Environmental and Economic Accounting for fisheries" for the measurement of overfishing, the "Manual for Environmental and Economic Accounts for Forestry" for ordering information on forests and their resources and environmental services, and the "economy-wide material flow Accounts ", to quantify the flow of materials entering the economy, measured in terms of biomass.

3. Main derived indicators

It is noteworthy that the application of SEEA 2012 generates a significant flow of information from the economic and environmental sectors of the countries, providing technical elements for analysis and reflection on important issues such as the scarcity of water resources, the harmful effects of climate change, high levels of air pollution, or the coupling of economic growth from energy use and generation of air emissions, among others.

In this line of thought, the SEEA-Mexico disseminates recurrent and updated information on the impact of the economic activities on the surrounding environment and the effect on the quality of life of human beings. Using selected indicators is intended that the general public have a clear idea of the size of the impact, of the efforts we make to remedy or avoid environmental damage and additional expenditures that are required to resolve it. Among the synthesis indicators of Mexico study the following can be highlighted:

- Ecological Gross Domestic Product (EGDP). It measures economic production, discounting the negative environmental effects arising from activities of production, consumption and distribution of goods and services.
- Ratio of EGDP and Gross Domestic Product (GDP). As the indicator approaches the unit, it will reflect progress in sustainability.

- Total Costs of Depletion and Environmental Degradation (TCDED). Reflects the environmental damage measured in monetary terms and represents the minimum amount necessary to remedy or restore the depletion and degradation of natural resources and the environment.
- Ratio of TCDED and GDP. Displays the environmental impact of depletion and degradation in GDP. As the indicator tends to decrease, represent progress towards environmental sustainability.
- Environmental Protection Expenditure (EPE). Monetary expenditures in benefit of the environment, as current expenditure and investment.
- Ratio of EPE and GDP. Allows dimensioning economic efforts in favor of the environment in relation to the country's production.

In the logic of the green growth initiative, and particularly the indicators suggested by the Organization for Economic Cooperation and Development (OECD), it is necessary to consider that the implementation of SEEA 2012 offers a significant database related to variables that are an input for the construction of these indicators. At the same time provides information to generate other indicators of alternative character or complementary to those selected for green growth.

4. Using the SEEA Mexico in planning and decision making

As mentioned earlier, the National Statistical and Geographical Information System of Mexico promotes the use of information of national interest in public policy design, planning and strategies in state units, since this information is linked with emerging issues such as health, housing, education, culture, or the environment.

In this sense, the main results and indicators derived from the SEEA Mexico are recurrently used as a basis for further research related to the economy and the environment, as well as strategic development plans, public policy and international assessments of the environmental condition the country.

Therefore, information such as the Ecological Net Domestic Product is incorporated into the statements of Article 15 of the General Law of Ecological Equilibrium and Environmental Protection in Mexico. National Development Plans 2001-2006 and 2007-2012 considered green GDP as an indicator of sustainable development.

The *National Program of Environment and Natural Resources 2007-2012*, considers the results of environmental accounts for the analysis of the environmental situation of the country, because "... environmental-economic accounts made in our country by the INEGI shed firm conclusions "(pag.119).

The *Environmental Performance Evaluation of Mexico*⁴ highlights the country's initiative on environmental indicators such as ENDP, which support the analysis of environmental information system of the country.

⁴ OECD (2003) "Evaluación del desempeño ambiental: México". Paris.

Also, the *Global Environmental Outlook of Mexico*⁵ exemplifies "the relevance of national accounts to include the ecological approach, allowing to reconsider the importance of economic activities in the generation of national wealth"⁶.

On the issue of climate change in Mexico, stands out in the Climate Change Act (2012) the need to generate a set of key indicators that will address, among other issues, the estimation of the costs attributable to climate change and incorporate them to the calculation of the Ecological Net Domestic Product, in addition to the costs associated with the depletion and environmental degradation in the report *Estimates of the impact of climate change, from the System of Environmental and Economic Accounts of Mexico 2010-2100*⁷.

5. New lines of study

As a conclusion of this article, it is said that Mexico's progress in the field of environmental accounting are complemented by two important aspects in which we now find ourselves immersed, with a dynamic that is paying off in recent years, this is, the process of linking the SEEA Mexico with other aspects relating to the economic and environmental information, and the process of international collaboration for the dissemination of the SEEA 2012.

In the first one, it is important to pinpoint the methodological bridges and information flow between the SEEA Mexico and the green growth initiative, including the indicators defined for this purpose, clean production, environmental goods and services, and certainly green jobs.

The second process mentioned includes the collaboration of INEGI with the Economic Commission for Latin America and the Caribbean (ECLAC) for the development of a methodological guide, on the measurement of environmental protection expenditure in the public sector and its pilot implementation in a set of selected countries. Additionally, it plans to work with the United Nations on the actions needed to bring the level of the methodological guide to an international process, beyond the Latin American Region. Regarding the central framework of the SEEA 2012, it's been studied the support of the dissemination process of the manual in Latin America, and collaborate with the design of a methodological guide for the application of the environmentally accounting framework.

⁵ United Nations Environment Programme (UNEP), Ministry of Environment and Natural Resources (SEMARNAT) (2004) "GEO 4 Perspectivas del medio ambiente. México".

⁶ *Op cit ibidem*.

⁷ Ministry of Environment and Natural Resources (2009) "Estimaciones del impacto del cambio climático, desde el Sistema de Cuentas Económicas y Ecológicas de México. 2010-2100". Mexico.