

THE EVOLVING SYSTEM OF INTEGRATED ECONOMIC AND ENVIRONMENTAL ACCOUNTS

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Summary

Environmental accounts have been under discussion since as early as the 1970s, but only became widely known in the 1990s. In 1993 the United Nations Statistics Department published an interim handbook on environmental accounting, and in 2003 they produced a greatly revised and much more detailed manual which is being applied in many countries.

This chapter reviews the methodology set out in those handbooks and discusses challenges that arise in its implementation. The accounting work may be organized into five broad components: accounts for physical flows related to the environment; accounts that combine monetary and physical data, referred to as hybrid accounts; environmental protection expenditure accounts; natural resource accounts; and environmentally-adjusted macroeconomic indicators. The broad areas of pollution and environmental protection expenditures fall into the first three components, which have primarily been addressed in developing countries where pollution is a major problem. The resource accounts cover forests, minerals, land, fisheries, and water, tracking how they change over time in both physical and monetary units; this has been more important than the pollution-related in resource-dependent developing countries. The final component encompasses what is popularly referred to as “green GDP.” While this measure is of

considerable interest, it is very difficult to calculate, and is not recommended in the SEEA. This chapter considers the more modest adjusted macroeconomic indicators that have been included in the accounts and are more often used.

The chapter then considers the extent to which these accounts will meet the hopes and expectations of those who have called for their development. Unfortunately, they will do so only partially, primarily because they do not include the economic value of non-marketed goods and services obtained from the environment, do they deduct for losses due to environmental degradation, and do not calculate green GDP. However, they do provide a standard data framework for estimation of all of these values, and can therefore make a significant contribution to analysis of environmental problems despite their limitations.

1. Why Build Environmental Accounts?

Interest in integrating the environment into the national income accounts comes from a range of sources, and is driven by a number of criticisms of the conventional System of National Accounts (SNA). Some of the criticisms are quite sweeping, while others are fairly modest; some are shared by many people, while many others are not. Which criticisms drive the design of environmental accounts matters, because they approach the accounts in radically different ways. Moreover, the different criticisms do not lead to consensus on how the accounts should be changed; a wide range of quite different strategies might be tried, depending on how we view the problems.

One concern shared by all supporters of environmental accounts is that natural assets are treated differently from manufactured assets in the SNA. The conventional accounts subtract the depreciation of manufactured capital from gross domestic product to calculate net domestic product, so the consumption of manufactured capital is not considered part of income. Natural resources like forests should be treated in the same way. If trees are harvested at the rate they grow back (the level of sustainable yield), we could earn income from that forest every year. However, if we cut down the whole forest in two years, it will no longer keep producing; we would have consumed our natural asset. For consistency, this should be treated in the accounts as depreciation of an asset (or depletion, as it is termed for natural resources). However the SNA does not do that. Instead, it treats the sale of all the timber in the forest as income. Thus income would appear to be very high in the two years when we cut down the forest, and would drop precipitously in the third year.

A second criticism of the conventional accounts relates to the treatment of expenditures to protect against environmental harm, so-called defensive expenditures. Critics argue that defensive expenditure should be subtracted out of the calculation of GDP because they do not contribute to our well-being. Rather, they are necessary to prevent us from being worse off because of the harm our economic activity causes us. However, others believe that although GDP is indeed used as a proxy for well-being, it was designed to measure income, and should continue to do so. Thus even if defensive expenditures do not contribute to well-being, they do contribute to income and should therefore not be subtracted out of GDP. Some critics take this argument further, calling for replacement of GDP and other conventional macro-economic indicators with measures of welfare.

This has led to proposals for a Measure of Economic Welfare and an Index of Sustainable Economic Welfare, among other welfare measures. (Some of these historical developments, particularly associated with the work of economists such as William Nordhaus and James Tobin, and others such as Herman Daly and John Cobb, are presented in *The Misalignment of Standard National Accounting Aggregates with Sustainability Objectives*.)

A third hope is that the environmental accounts will provide systematic data on the value of environmental goods and services that are not bought and sold in markets and therefore are not included in the conventional SNA. These include goods such as water and gathered foods and services such as watershed protection by forests and absorption of pollutants by water and air. A corresponding hope is that the accounts will let us distinguish the harm done by pollution, much of which entails the loss of these non-marketed goods and services. This would make it possible to put economic growth in a cost-benefit framework, as we would be able to identify not only the resulting income gains, but also the loss of valued goods and services that have no market price.

A fourth, more diffuse aim for the environmental accounts is that they should let us know whether our income is sustainable, or provide an environmentally-adjusted "green GDP." This aim comes in part from people who believe that conventional GDP and other macroeconomic measures send incorrect economic signals, because they do not take into account the economic contribution of the environment or the impacts of economic decisions on the environment. The hope is that a green GDP significantly different from the conventional one would be followed by significantly different economic decisions, as the importance of the environment to income became clear.

Among the less ambitious hopes from the environmental accounts is that they will make it easier to disaggregate environment-related expenditures within the national income accounts. Thus they would identify (though not subtract) expenditures by industry and households to prevent environmental harm, expenditures to clean up the environment once it has been harmed, and so on. Since these are marketed expenditures, they are already in the accounts, and identifying them will not have any implications for the bottom line. However it would make it easier to determine the cost of protecting the environment and cleaning up the degradation we have already have.

Some advocates of environmental accounting are interested primarily in data expressed in physical rather than monetary terms. Thus they want environmental accounts to be parallel or satellite accounts providing data on the quantity of resources consumed, the quantity of pollution emitted, and other physical measures. While they would not lead to new monetary measures, such systems could be very useful in understanding relationships between the economy and the physical environment.

Environmental accounts are likely to meet some of these hopes, but not all of them. This chapter provides background on the movement to revise the accounts, followed by an overview of the System of Economic and Environmental Accounts (SEEA) presented to the UN Statistical Commission in 2002 for approval. Finally, we consider how fully the SEEA responds to the different criticisms of the conventional accounts.

2. History of the Development of Environmental Accounts

2.1. Early Adopters

Efforts to build environmental accounts began in several European countries working independently of each other. Norway began work in the 1970s. Influenced by the Club of Rome's publication of *Limits to Growth* and a growing environmental movement, the Norwegians were concerned that their natural resources, on which their economy is relatively dependent compared to other European countries, would run out. They therefore developed accounts to track use of their forests, fisheries, energy, and land. In the 1980s they developed accounts for air pollutant emissions, which were closely tied to the energy accounts. These accounts were integrated into models used for macroeconomic planning, taking into account the roles of resource-based sectors in economic growth.

The Netherlands was also a leader in the development and adoption of environmental accounting. Dutch interest in this area originated with the work of economist Roefie Hueting in the Central Bureau of Statistics, who sought to implement a measure of sustainable national income that would take into account the degradation and depletion of environmental assets resulting from economic activity. His proposals initially met with considerable opposition, because his approach was perceived as model building and therefore outside the purview of statisticians focused on tracking historical data. However, his strong advocacy for environmental accounting led the national income accountants to consider other ways to link environmental and economic data, ones that were more consistent with their view of the scope of statistics and national accounting. The result was the development of the so-called NAMEA, the National Accounts Matrix including Environmental Accounts, which builds on the input/output framework of the national income accounts by adding physical data on air pollutant emissions by sector. The NAMEA approach has been adopted by Eurostat, implemented in many other European countries, and integrated into the revised SEEA. The Hueting approach has since also been tested in the Netherlands.

France was a third early adopter of environmental accounting. In the 1980s the country began developing its own approach to the design of environmental accounts, referred to as the Comptes du patrimoine, or patrimony accounts. These involved an integrated system structured around three distinct but linked units of analysis. Resources - including cultural and historical assets as well as natural ones - were measured in physical terms, and their stocks and flows quantified. Places were to be organized into geographical accounts, giving physical data about assets organized by location and by ecological and land characteristics. People and institutions were to be described in both physical and monetary terms in so-called agent accounts, which in turn were to be linked to data about how and where the agents used resources. All data in the system would be integrated within this broad framework of resource, place, and agent accounts. Portions of this system were constructed, particularly those focused on forests and water; however its complexity made it difficult to implement fully.

One other accounting effort that has had considerable influence on growth of the field was a study of Indonesia undertaken by the Robert Repetto and staff of the World

Resources Institute. The authors used data on Indonesian natural assets to estimate what GDP might have been in that country had natural resources been depreciated in the same way as manufactured ones, and compared trends in conventional GDP with their environmentally adjusted measure over a period of fifteen years. Their results show that Indonesian growth rates would have been considerably lower than they were estimated to be using the conventional accounts. While experts in the field criticized the methods and the Indonesian government objected that a Washington-based research was not authorized to publish their national income accounts, this study has been very influential. It reached a very wide audience of people, would never see more technical publications on environmental accounts, and did much to stimulate interest in the field.

2.2. The 1993 System of Integrated Environmental and Economic Accounts

Organized international efforts to share knowledge of environmental accounting and develop rules analogous to the SNA began in the 1980s. The United Nations Environment Program and the World Bank organized a series of workshops at which basic ideas on environmental accounting were discussed. These led to publication of two collections of papers, which became reference works in the field of environmental accounting. They show the wide diversity of approaches that characterized the field at the beginning of the 1990s. Public pressure to move ahead in environmental accounting received a boost from Agenda 21, the declaration of the 1992 World Conference on Environment and Development, which called on all countries to build environmental accounts. In 1994, the European Commission launched a program to develop environmental accounting methods and help its member countries implement them, which has provided a major impetus in the field as well.

The 1993 System of Integrated Economic and Environmental Accounts (SEEA), published by the United Nations as an appendix to the 1993 SNA, was a first effort to develop standards. Rather than attempting to make choices among the many different approaches, it offered five versions, suggesting that countries might choose whichever components responded to their priorities or needs. Versions I, II, III, and much of IV had already been the subject of much international discussion and some consensus. Version V was a concession to economists advocating other approaches that were considered more controversial and were not the subject of consensus in the field.

Version I: Same data as the conventional SNA, reformatted to highlight issues of importance in the SEEA.

Version II: Disaggregation of environment-related monetary flows and assets within the conventional SNA.

Version III: Physical accounts that track the movement of materials between the environment and the economy. This includes natural resource flows into the economy, discharge of residuals (pollution) into the environment, and physical asset accounts that track stocks of natural resources over the course of the year.

Version IV: Costs of environmental protection and harm. IV.1 identifies changes in the value of natural assets due to depletion and degradation. IV.2 values the

expenditures that would be required this year to prevent additional environmental degradation over the course of the year (termed maintenance cost). IV.3 identifies the marketed and non-marketed costs borne by households or industry due to environmental externalities. The various parts of Version IV lead to the calculation of several versions of environmentally-adjusted domestic product, or EDP.

Version V: Elements considered more experimental, among them the value of unpaid household activities, the value of non-marketed environmental services such as watershed protection, and the integration of input-output and the environmental accounts.

Work began in a number of countries to implement the new SEEA. The World Bank and United Nations funded such efforts in Mexico, South Africa, Papua New Guinea, and the Philippines, while other aid donors supported work elsewhere in the world. The Philippines was an interesting case because two separate accounting efforts ran in parallel, using different conceptual approaches. The US government funded a project with the Department of Environment and Natural Resources that used an economics-based approach developed by Henry Peskin. A few years later the United Nations began funding a separate effort to implement the SEEA, working with the National Statistical Coordination Board, which is responsible for the country's national accounts. The Peskin approach is only partially compatible with Versions I-IV of the SEEA, and more closely tied to several components of Version V. In some respects, notably how they calculate green NNP, the two approaches are in direct contradiction to each other. The existence of two independent projects taking different approaches was a source of confusion at times, but made the country a very interesting case for study.

The 1993 SEEA was a ground-breaking first step towards international consensus on how environmental accounts should be built. However, it was widely regarded as too conceptual for countries actually to implement with ease. Consequently, the United Nations undertook to prepare an operational manual that offered step-by-step assistance in implementing some portions of the system. This volume, sometimes called the Nairobi Group Manual after the city where its authors held their first meeting, was published in 2000 along with a software package that could be used to automate the accounts. It covers much of Versions I through IV of the accounts (though by the time it was published, the system had evolved and was no longer organized in versions).

The 1993 SEEA was entitled an "interim version." Unlike the revision of the conventional SNA issued in the same year, it did not have the official approval of the United Nations Statistical Commission. It was offered to UN members as a basis for discussion and experimental implementation, but was not considered a part of the national income accounting framework recommended for all countries' use.

2.3 Revision of the 1993 SEEA

Discussions of a revised SEEA, informed by experiences using the 1993 version and other ongoing accounting work, were underway by the middle of the decade. Many of these discussions occurred within the London Group, a technical body comprised of national statisticians and income accountants in the developed world who were building

environmental accounts in their own countries. (The first meeting of this group was held in London, hence its name.) In 1997 the UN Statistical Commission asked them to take on the task of drafting the second version of the SEEA. As this work progressed, participation was broadened to include national income accountants from a number of developing countries and several invited experts in the field.

The composition of the London Group has influenced the nature and design of the revised SEEA. The group is composed largely of technical experts on environmental accounting and statistics. It does not include most of the economists who have done conceptual work on environmental accounting. Nor does it include the environmentalists who have lobbied for environmental accounting in international fora or who look to the accounts to provide a basis for stronger environmental protection.

Consequently, conceptual issues regarding what to include in the accounts and how far they might differ from the conventional SNA have typically been resolved in a fairly conservative manner, emphasizing compatibility with the SNA over economic theory or environmental objectives. The resulting framework stays close to what is compatible with the SNA and what has a realistic hope of being built with existing data, rather than straying towards what either economists or environmentalists might want from it.

3. The Revised SEEA

The structure and presentation of the revised SEEA are based on the structure of the SNA, rather than on the problems to be solved by creating environmental accounts. Consequently, a basic familiarity with the conventional SNA is useful in order to fully understand the SEEA. The system has a number of components, which can often be constructed independently of each other or can be integrated selectively to respond to particular information needs or policy problems:

- Physical flow accounts, which include data quantified in physical rather than monetary terms.
- Accounts that link physical and economic data, and are referred to in the SEEA as hybrid accounts.
- Disaggregation of data from the conventional accounts on environmental protection expenditures.
- Natural resource asset accounts, in both physical and monetary terms.
- Environmentally-adjusted macroeconomic indicators.

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Biographical Sketch

Joy Hecht was born in New York City. She obtained her B.A. in economics from Harvard University in 1980 and her PhD in urban and regional planning from the Massachusetts Institute of Technology in 1988. She has devoted her career to work on environmental economics and policy in the developing world. She has worked on environmental accounts in the Philippines, Taiwan, Egypt, and Vietnam, and on tourism accounts in Mongolia. She spent four years with IUCN/The World Conservation Union as the global coordinator of its Green Accounting Initiative, in which connection she contributed to the UN operational manual on environmental accounting, and participated in the London Group revisions of the System of Economic and Environmental Accounting. Those experiences convinced her of the need for a book on environmental accounting for a non-technical audience. The result, *National Environmental Accounting: Bridging the Gap Between Ecology and Economy*, was published by Resources for the Future in 2005.

In 2002, Dr. Hecht became the founding executive director of the New Jersey Sustainable State Institute, a non-profit research and policy organization working for sustainable development in the U.S. state of New Jersey. NJSSI is the custodian of a set of sustainability indicators the state of New Jersey; Dr. Hecht oversaw the third update of those indicators, available on the web at <http://www.njssi.net>.

Early in 2004, Dr. Hecht left NJSSI to return to international consulting. Since then, she has worked in Mozambique, Egypt, Vietnam, Malawi and Mongolia on environmental statistics, accounting, and

tourism, and has been working with USAID on an assessment of twenty years of experience on biodiversity conservation in Africa.

When not overseas, she spends much of her time exploring North America; more on that as well as her professional work may be found on her website, www.joyhecht.net.

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