

Statistical Commission
Forty-third session
28 February – 2 March 2012
Item 3 (e) of the provisional agenda
Environmental-economic accounting

Background document
Available in English only

**REVISION OF THE SYSTEM OF ENVIRONMENTAL - ECONOMIC ACCOUNTING
(SEEA)**

SEEA Central Framework

Chapter 1 Introduction to the SEEA Central Framework

Prepared by the Committee of Experts on Environmental Economic Accounting

REVISION OF THE SYSTEM OF ENVIRONMENTAL - ECONOMIC ACCOUNTING (SEEA)

Committee of Experts on Environmental Economic Accounting
Statistics Division / Department of Economic and Social Affairs, United Nations

Chapter 1: Introduction to the SEEA Central Framework

Table of contents

1.1 What is the System of Environmental - Economic Accounting Central Framework	4
1.2 Overview of the SEEA Central Framework	9
1.3 Key features of the SEEA Central Framework	
1.3.1 Relationship of the SEEA Central Framework to the System of National Accounts	11
1.3.2 Combining information in physical and monetary terms	13
1.3.3 Flexibility in implementation	14

1.1 What is the System of Environmental - Economic Accounting Central Framework?

- 1.1 The System of Environmental - Economic Accounting (SEEA) Central Framework is a multi-purpose, conceptual framework that describes the interactions between the economy and the environment, and the stocks and changes in stocks of environmental assets.
- 1.2 Using a wide range of information, The SEEA Central Framework provides a structure to compare and contrast source data and allows the development of aggregates, indicators and trends across a broad spectrum of environmental and economic issues. Particular examples include the assessment of trends in the use and availability of natural resources, the extent of emissions and discharges to the environment resulting from economic activity, and the amount of economic activity undertaken for environmental purposes.
- 1.3 At the heart of the SEEA Central Framework is a systems approach to the organisation of environmental and economic information that covers, as completely as possible, the stocks and flows that are relevant to the analysis of environmental and economic issues. In applying this approach, the SEEA Central Framework applies the accounting concepts, structures, rules and principles of the System of National Accounts. In practice, environmental-economic accounting includes the compilation of physical supply and use tables, functional accounts (such as environmental protection expenditure accounts), and asset accounts for natural resources.
- 1.4 The integration of information concerning the economy and the environment requires an inter-disciplinary approach. The SEEA Central Framework brings together, in a single measurement system, information on water, minerals, energy, timber, fish, soil, land and ecosystems, pollution and waste, production, consumption and accumulation. Each of these areas has specific and detailed measurement approaches that are integrated in the SEEA Central Framework to provide a comprehensive view.
- 1.5 The concepts and definitions that comprise the SEEA Central Framework are designed to be applicable across all countries, regardless of their level of economic and statistical development, their economic structure, or the composition of their environment.
- 1.6 The SEEA Central Framework also provides a foundation for related topic and theme specific statistical publications. There has already been substantial work on the topics of water and fisheries, a publication on energy is under development, and there are future plans for publications covering the topics of agriculture and land.
- 1.7 The SEEA Central Framework will be accompanied by two related parts: SEEA Experimental Ecosystem Accounts, and SEEA Extensions and Applications. The expected content of these parts is outlined later in this section.

Historical background of the SEEA Central Framework

- 1.8 In 1987 the report of the Brundtland Commission, *Our Common Future*, made clear the links between economic and social development and the environment's capacity. Shortly afterwards, in 1992, the recommendations of the UN Conference on Environment and Development "Earth Summit" contained in Agenda 21 (UN 1992) recommended that countries implement environmental-economic accounts at the earliest date.
- 1.9 In response, the United Nations Statistical Division (UNSD) published the handbook of national accounting – *Integrated Environmental and Economic Accounting* (UN 1993), commonly referred to as the SEEA. This handbook was issued as an "interim" version of work in progress since the discussion of relevant concepts and methods had not come to a final conclusion.
- 1.10 As a result of the publication of the SEEA handbook, several developing and developed countries started experimenting on the compilation of SEEA based data. The London Group on Environmental Accounting was created in 1994 under the auspices of the United Nations Statistical Commission (UNSC) to provide a forum for practitioners to share their experiences on developing and implementing environmental-economic accounts. Increased discussion on concepts and methods of environmental-economic accounting, accompanied with country experiences led to an increasing convergence of concepts and methods for various modules of the SEEA.
- 1.11 The publication – *Integrated Environmental and Economic Accounting – An Operational Manual* (UN 2000), was published by UNSD and the United Nations Environment Programme (UNEP) based on material prepared by the Nairobi group (a group of experts established in 1995 from national and international agencies and non-governmental organisations). This publication reflected the on-going discussion following the publication of the SEEA in 1993 and provided step-by-step guidance on the implementation of the more practical modules of the SEEA and elaborated the uses of integrated environmental and economic accounting in policy making.
- 1.12 In parallel with this work, the international agencies in cooperation with the London Group worked on a revision of the 1993 SEEA. The revision process was carried out through a series of expert meetings and was built upon a wide consultation process. The revised SEEA, SEEA-2003, represented a considerable step forward in terms of breadth of material and harmonisation of concepts, definitions and methods in environmental and economic accounting.
- 1.13 However, in a number of places the SEEA-2003 presented a number of different methodological options and also presented a range of country examples showing varying country practices. Thus the SEEA-2003 was never formally adopted as an international statistical standard and the SEEA was not recognised as a statistical system in its own right. Nonetheless, in general the SEEA-2003 has provided a well accepted and robust framework

for the compilation of environmental and economic accounts that has been used by many countries around the world.

1.14 Recognising the ever increasing importance of information on the environment and the need to place this information in an economic context understood by central policy makers, the Statistical Commission agreed at its thirty-eighth session in February 2007 to start a second revision process with the aim of adopting the SEEA as an international statistical standard for environmental-economic accounting within five years.

1.15 This process was managed under the auspices of the newly formed United Nations Committee of Experts in Environmental and Economic Accounting (UNCEE). It was recognised that the content of the SEEA-2003 was substantially agreed in terms of both scope and treatment and hence the focus of the revision was to remain largely on those specific areas of the SEEA-2003 in which the level of understanding and agreement needed to be increased and agreed treatments determined. The London Group was given carriage of the 21 issues identified for the revision of the SEEA. The newly formed Oslo Group on Energy Statistics was also involved in the discussion of issues pertaining to energy. The SEEA Central Framework represents the major outcome of the process.

Parts related to the SEEA Central Framework

1.16 During the revision process it became clear that there remained certain aspects of the SEEA-2003 on which it was unlikely that agreement could be found, in particular concerning the measurement of degradation and its valuation. Consequently, the Statistical Commission determined that the revision of the SEEA should proceed to develop a Central Framework covering those issues on which there was general international agreement and, also to develop material to cover those aspects on which agreement was not likely to be reached within the timeframes available and on which ongoing research and discussion would be required.

1.17 The second area of work has become focused on accounting for the environment from the perspective of ecosystems and will be presented in SEEA Experimental Ecosystem Accounts. This part will describe the measurement of the flow of benefits to humanity provided by ecosystems, and measurement of environmental conditions in terms of the capacity of ecosystems to provide benefits. The SEEA Experimental Ecosystem Accounts will not be a statistical standard but will provide a consistent and coherent summary of the state of the art of using a systems approach to the measurement of ecosystems within a broad framework that can be related to the SEEA Central Framework. The SEEA Experimental Ecosystem Accounts will provide the basis for countries to advance the implementation of ecosystem accounts using terms and concepts which facilitate the comparison of statistics and the exchange of experiences.

- 1.18 The SEEA Experimental Ecosystem Accounts will describe both the measurement of ecosystems in physical terms, and the valuation of ecosystems in so far as it is consistent with market valuation principles, noting that only those issues for which broad consensus has emerged will be included. In accounting terms, many of the structures for ecosystem accounting will be drawn from the structures in the SEEA Central Framework and, in this regard, the accounting conventions of the SEEA Central Framework will be applied consistently.
- 1.19 Also during the revision process a need emerged for material covering potential extensions and applications of SEEA based datasets with the aim of promoting and supporting the widespread adoption of the SEEA among official statisticians, researchers and policy makers. To this end, the SEEA Extensions and Applications will be developed. SEEA Extensions and Applications will present various monitoring and analytical approaches that could be adopted, and will describe ways in which SEEA data can be used to inform policy analysis. It will not be a statistical standard.
- 1.20 Topics being considered for inclusion include resource efficiency and productivity indicators, decomposition analysis, analysis of net wealth and depletion, sustainable production and consumption, structural input-output analysis and general equilibrium modelling, consumption based input-output analysis and footprint techniques, analysis using geospatially referenced data, and extensions to link SEEA based information to social and demographic data sets. Summaries of topics will be included together with references to more detailed descriptions of the techniques.

Policy relevance and uses of the SEEA Central Framework

- 1.21 The effect of human activity on the environment has emerged as one of the most significant policy issues. On the one hand, there has been growing concern about the effect of each country's economic activity upon the global and local environment. On the other hand, there has been increasing recognition that continuing economic growth and human welfare are dependent upon the benefits obtained from the environment.
- 1.22 Questions regarding how environmental endowments are being used can then result in the development of a variety of different policies. For example, are resources being extracted too quickly with no prospect of replacement, or is economic activity generating a level of pollution that exceeds the absorptive capacity of the environment or affects human health and well-being? If these types of conditions are occurring then there could be a threat to current or future economic development.
- 1.23 The SEEA is a multi-purpose system and is relevant in a number of ways for policy development and evaluation as well as decision making. First, the summary information (provided in the form of aggregates and indicators) can be used to give broad guidance on issues and areas of the environment that should be the focus of decision makers. Second, the

detailed information, which covers some of the key drivers of change in the environment, can be used to provide a richer understanding of the policy issues. Third, the SEEA permits the development of models and scenarios that can be used to assess the national and international economic and environmental effects of different policy scenarios both within a country, between countries and at a global level.

- 1.24 The benefits of the SEEA to policy and decision making processes can be seen in specific areas such as energy and water resource management; patterns of consumption and production and their effect on the environment; and the so called “green economy” and economic activity related to adoption of environmental policies. The benefits are most broadly captured in relation to policies concerning sustainable development – one of the most pressing policy issues for current and future generations.

1.2 Overview of the SEEA Central Framework

- 1.25 The SEEA Central Framework comprises five chapters – Chapters 2 – 6 of this document. Chapter 2, “Accounting structure”, outlines in some depth the key parts of the SEEA Central Framework and the accounting approach that is used. It uses as its base the accounting approach of the SNA. It aims to explain in a clear fashion the types of accounts and tables that are contained in the SEEA Central Framework and the basic principles of accounting for stocks and flows, the definition of economic units, and the principles of recording and valuation.
- 1.26 An important aspect of Chapter 2 is that it highlights the integrated nature of the SEEA Central Framework with all of the different components being based within a common accounting structure. The content of this chapter is also applicable in parts related to the SEEA Central Framework such as the SEEA Experimental Ecosystem Accounts.
- 1.27 Chapter 3, “Physical flow accounts”, explains in detail the recording of physical flows. The different physical flows - natural inputs, products and residuals - are placed in the structure of a physical supply and use table and, from this starting point, measurement of the physical flows can be expanded and reduced to focus on a range of different materials or on specific flows.
- 1.28 The second half of Chapter 3 describes in detail the structure of physical supply and use tables for energy (Section 3.4), water (Section 3.5) and various material flows, including tables for air emissions, water emissions and solid waste (Section 3.6).
- 1.29 Chapter 4, “Environmental activity accounts and related flows”, focuses on the identification of economic transactions within the SNA that may be considered environmental. Of particular interest are those transactions that relate to environmental activities, i.e. those economic activities whose primary purpose is to reduce or eliminate pressures on the environment or to make more efficient use of natural resources. These types of transactions are summarised in Environmental Protection Expenditure Accounts (EPEA), and in statistics on the Environmental Goods and Services Sector (EGSS).
- 1.30 This chapter also covers the topics of environmental taxes, environmental subsidies and similar transfers, and a range of other payments and transactions related to the environment. These transactions are all recorded in the SNA but are often not explicitly identified as related to the environment.
- 1.31 Chapter 5, “Asset accounts”, focuses on the recording of stocks and flows associated with environmental assets. The environmental assets covered in the SEEA Central Framework comprise mineral and energy resources, land, soil resources, timber resources, aquatic resources, other biological resources, and water resources. In Sections 5.1-5.4, the chapter discusses asset accounting in general terms with a particular focus on the measurement of the depletion of natural resources and the valuation of environmental assets.

- 1.32 Sections 5.5 – 5.11 of the chapter describe the measurement of stocks and flows for each of the individual environmental assets. For each asset type the measurement scope is defined and the accounting in physical and monetary terms is described.
- 1.33 There are a number of annexes to Chapter 5 including a detailed explanation of the net present value (NPV) approach to the valuation of environmental assets, and a discussion on discount rates which are an important component of the NPV formulation.
- 1.34 Chapter 6, “Integrating and presenting the accounts”, highlights the integrated nature of the SEEA Central Framework and links the detailed measurement guidelines of Chapters 3-5 with the presentation of information for users. Of particular focus in Chapter 6 is the explanation of combined presentations of physical and monetary data and a range of examples of such presentations are described. The chapter also introduces the various types of indicators that may be compiled from SEEA Central Framework based data sets.

1.3 Key features of the SEEA Central Framework

1.3.1 Relationship of the SEEA Central Framework to the System of National Accounts

- 1.35 The System of National Accounts (SNA) is a measurement framework that has developed since the 1950s to be the pre-eminent approach to the measurement of economic activity, economic wealth and the general structure of the economy. The SEEA Central Framework applies the accounting concepts, structures, rules and principles of the SNA to environmental information. Consequently, the SEEA Central Framework allows for the integration of environmental information (often measured in physical terms) with economic information (often measured in monetary terms) in a single framework. The power of the SEEA Central Framework comes from its capacity to present information in both physical and monetary terms in a coherent manner.
- 1.36 Because it uses the same accounting conventions, the SEEA Central Framework is, in general, consistent with the SNA. However, given the specific analytical focus of the SEEA Central Framework on the environment and its linkages with the economy, as well as its focus on the measurement of stocks and flows in physical and monetary terms, there are some limited differences between the SEEA Central Framework and the SNA. These differences are outlined below.

Physical flows and monetary flows

- 1.37 Core to the measurement of physical flows in the SEEA Central Framework are the flows of natural inputs, products and residuals. The measurement boundary that is used to distinguish between these flows is defined by the production boundary as described in the SNA. As a corollary, the definition of products aligns to the SNA definition of products being those goods and services created through a production process and having economic value.
- 1.38 Also, from a geographical perspective, the measurement boundary for physical and monetary flows aligns to the economic territory of a country as defined in SNA, and economic activity is attributed based on the residence of economic units rather than based on the location of the economic units at the time of their production, consumption or accumulation.
- 1.39 The SEEA Central Framework applies two variations in the recording of product flows compared to the SNA. First, depending on the analytical scope of the account being compiled, all intra-enterprise flows are recorded, i.e. the production and use of goods and services on own-account within enterprises. In the SNA the recording of these types of flows is limited to the recording of the production of goods for own final use (e.g. own account capital formation) and intra-enterprise flows related to ancillary activities and.

- 1.40 Thus, for example, the recording of the production of energy (e.g. through the incineration of waste) and the abstraction of water by an establishment for own intermediate consumption is recommended. Similarly, in the functional accounts of the SEEA Central Framework, it is recommended to record all production of environmental goods and services by an establishment (both for environmental protection and resource management depending on the scope of the account) for own intermediate consumption.
- 1.41 The SEEA Central Framework also encourages the recording of own-account production and final consumption by households – for example in relation to the abstraction of water or the production of energy. For such household own-account production, the production boundary used is the same as that described in the SNA.
- 1.42 In all cases of own-account and intra-establishment production recorded in the SEEA Central Framework, the valuation of flows is consistent with the SNA valuation of own-account and ancillary production.
- 1.43 Second, in situations of goods sent to other countries for processing or repair, or in cases of merchanting, the SEEA Central Framework recommends recording the actual physical flows of goods in those cases where the ownership of those goods does not change but remains with a resident of the originating country. No change to the monetary recording of these flows is recommended. This variation is particularly applicable in recording physical flows associated with the processing of raw materials (e.g. oil refining) where the physical flows may be largely invariant to the nature of the contractual relationships which are the focus of the recording of monetary flows in the SNA and the Balance of Payments.

Stocks and flows of assets

- 1.44 In monetary terms, the asset boundaries of the SEEA Central Framework and the SNA are the same. Thus, only those assets – including natural resources and land – that have an economic value following the valuation principles of the SNA are included in the SEEA Central Framework.
- 1.45 In physical terms, the asset boundary of the SEEA Central Framework is broader and includes all natural resources and areas of land of an economic territory that may provide resources and space for use in economic activity. Thus the scope in physical terms is not limited to those assets with economic value. It is recommended that those environmental assets that have no economic value are clearly distinguished.
- 1.46 The SEEA Central Framework adopts slightly different terminology in relation to environmental assets compared to the SNA. In the SNA the term “natural resources” is used to cover natural biological resources (e.g. timber and aquatic resources), mineral and energy resources, water resources and land, whereas in the SEEA Central Framework, land is separated from natural resources recognising its distinct role in the provision of space. Further, in the SNA, land and soil resources are considered as a single asset type. In the

SEEA Central Framework, two separate assets are recognised again highlighting the role of land in the provision of space. Soil resources are included as part of natural resources.

- 1.47 This treatment of land permits a clearer articulation of the use of environmental assets since the area of land does not generally change significantly over time (even if its use or cover changes), whereas the capacity of soil resources, and all other natural resources, to deliver benefits can diminish over time.
- 1.48 The valuation of environmental assets is a complex measurement task. The SEEA Central Framework adopts the same market price valuation principles as the SNA. However, since observable market prices are usually not available for environmental assets, the SEEA Central Framework provides an extensive discussion of the techniques that may be applied in the valuation of these assets. This is particularly the case in relation to the description of the net present value approach to valuation and in the discussion of discount rates.
- 1.49 Both the SEEA Central Framework and the SNA recognise the change in the value of natural resources that can be attributed to depletion. Depletion, in physical terms, is the decrease in the quantity of the stock of a natural resource over an accounting period that is due to the extraction of the natural resource by economic units occurring at a level greater than that of regeneration (thus the natural growth of biological resources such as timber and fish is taken into account). Measures of depletion in physical terms can be valued to estimate the cost of using up natural resources due to economic activity. In the SNA, the value of depletion is shown in the other changes in the volume of assets account alongside flows such as catastrophic losses and uncompensated seizures. Thus, it is not recognised as a cost against the income earned by enterprises extracting natural resources.
- 1.50 In the SEEA Central Framework, the value of depletion is considered to be a cost against income and hence, in the sequence of economic accounts, depletion adjusted balancing items and aggregates are defined which deduct depletion from the measures of value added, income and saving. The depletion deduction is made in addition to the deduction of consumption of fixed capital for the cost of using fixed assets which is already deducted from measures of value added, income and saving in the SNA. Depending on the arrangements underpinning the ownership of specific natural resources, this differing treatment of depletion in the SEEA Central Framework may require additional entries in the sequence of economic accounts at an institutional sector level.

1.3.2 Combining information in physical and monetary terms

- 1.51 One of the most powerful features of the SEEA Central Framework is its organisation of physical and monetary data into combined presentations that have common scope, definitions and classifications. The structure of combined presentations depends on the topic of measurement (e.g. water, energy, air emissions, forest products), the questions of interest, and the availability of data. Nonetheless there are certain common features and benefits.

- First, combined presentations allow users to find relevant information in a single location with statistical coherence and consistency already achieved through the confrontation of the source data in the SEEA Central Framework.
- Second, combined presentations promote a discussion between those familiar with data organised following economic accounting structures and those familiar with information organised with reference to specific physical flows.
- Third, combined presentations structure information in a manner that supports the derivation of combined indicators – for example, decoupling indicators that track the relationship between the use of resources and growth in production and consumption.
- Fourth, combined presentations provide an information base for the development of models and for detailed analysis of interactions between the economy and the environment.

1.3.3 Flexibility in implementation

- 1.52 The SEEA Central Framework as a system is 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. Depending upon the specific environmental issues faced, a country may choose to implement only a selection of the accounts included in the SEEA Central Framework. Even if a country desires eventually to implement the full system, it may decide to focus its initial efforts on those accounts that are most relevant to current issues.
- 1.53 Resource rich resource countries might develop asset accounts first as part of their overall management of these natural endowments. Focusing on resource depletion in relation to economic and environmental sustainability can provide a framework for policy development and asset accounts can also provide information regarding the way in which government appropriates revenue from the extraction of natural resources.
- 1.54 Countries with high levels of material throughput may find it useful to build physical flow accounts for materials but, again, this may be done on a selective basis, for example, by working first on accounts for specific materials.
- 1.55 If a country imposes strict environmental standards, with significant cost to producers and consumers, then environmental protection expenditure accounts may be an early priority. Those where there is as yet little active environmental protection may prefer instead to concentrate on the measurement of flows of residuals in order to determine the urgency of environmental protection regulation.
- 1.56 These examples illustrate the flexibility in implementation of the SEEA Central Framework, which its structure is intended to permit. It is important to bear in mind, however, that no matter which parts of the system are implemented, these parts should be implemented in such a way as to be internally consistent and complementary.

1.57 While there is flexibility in the implementation of the system, much benefit of the SEEA Central Framework comes from its international adoption as a statistical standard. Consequently, the ability to compare and contrast relevant information from a range of countries is a significant advantage supported by the wide-spread adoption of the SEEA Central Framework for specific modules, particularly with regard to environmental issues that are multi-national or global in nature.