



DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS  
STATISTICS DIVISION  
UNITED NATIONS

---

**ESA/STAT/AC.255**  
**UNCEEA/7/5.6**

**Seventh Meeting of the UN Committee of Experts on  
Environmental-Economic Accounting  
Rio de Janeiro, 11-13 June 2012**

**SEEA Experimental Ecosystem Accounts**

**Accounting for ecosystems in monetary terms:**

**Annotated outline of Chapter 6 SEEA Experimental Ecosystem Accounts**

*(for discussion)*

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

**SEEA Experimental Ecosystem Accounts**

**Draft material prepared for the 7<sup>th</sup> Meeting of the Committee of Experts on Environmental-  
Economic Accounting (UNCEEAA)**

**Meeting in Rio di Janeiro, Brazil 11-13 June, 2012**

---

**DRAFT**

**Accounting for ecosystems in monetary terms:**

**Annotated outline of Chapter 6 SEEA Experimental Ecosystem Accounts**

**Material prepared in consultation with the Editorial Board for the SEEA Experimental  
Ecosystem Accounts and following discussions at the Expert Meetings on Ecosystem Accounts.**

The following text has been drafted for discussion among UNCEEAA members as part of the process of developing the SEEA Experimental Ecosystem Accounts. The material should not be considered definitive and should not be quoted.

## **Status of Chapter 6**

The drafting of the SEEA Experimental Ecosystem Accounts commenced in April 2012 and has focused on drafting material to describe the context and purpose for ecosystem accounting (Chapter 1), the general accounting and measurement model for ecosystems and ecosystem services (Chapter 2), the definition and measurement of ecosystem services (Chapter 3), and the measurement of ecosystem capital (Chapter 4), and valuation approaches for ecosystem accounting (Chapter 5). Draft material on all of these chapters (except for Chapter 1) was completed for consideration by the Expert Group on Ecosystem Accounts at their meeting in Melbourne in May 2012.

At this stage material on Chapter 6 covering accounting for ecosystems in monetary terms has not been drafted. The following material provides an overview of the anticipated content such that discussion on this issue may proceed. It is noted that the final content of Chapter 6 will, in part, depend on decisions taken with respect to the valuation of ecosystem capital and ecosystem services.

Although draft material has not yet been prepared, there have been a number of ongoing discussions on the appropriate accounting for ecosystems in monetary terms. These discussions have focused on the appropriate incorporation of measures of stocks and flows of ecosystem capital and ecosystem services into the sequence of economic accounts and balance sheets of the SNA. A number of accounting models have been proposed but further discussion is required, especially within the national accounts community. This discussion will be co-ordinated by the SEEA Editor.

## **Annotated outline**

### **Section 6.1: Uses of estimates in monetary terms**

This section will explain the rationale for compiling aggregate estimates of ecosystem capital and ecosystem services in monetary terms highlighting potential accounting applications such as the measurement of consumption of ecosystem capital (CEC) adjusted aggregates (e.g. CEC adjusted GDP), and the development of wealth accounts. The potential to use valuations of ecosystem capital and ecosystem services to assess the relative merits of expenditure on ecosystem maintenance and restoration will also be discussed.

### **Section 6.2: Integration of ecosystem accounts and economic accounts in monetary terms**

This section aims to explain three areas related to the integration of ecosystem accounts: (i) the compilation of a sequence of economic accounts taking into account ecosystem services and other ecosystem flows, especially consumption of ecosystem capital; (ii) the derivation of aggregate measures of economic activity, such as GDP and Net National Income, that are adjusted for consumption of ecosystem capital; and (iii) the compilation of wealth accounts that compare the values of ecosystems with values of produced assets, financial assets (and liabilities), and other economic assets in an extended balance sheet.

(i) Sequence of accounts. The description of a sequence of accounts builds on the sequence of accounts presented in the SEEA Central Framework (see table below). The aim is to show the series of additional entries that are required in the standard SNA sequence of accounts such that measures of consumption of ecosystem capital can be associated with relevant measures of income and such that expenditures to maintain and restore ecosystems can be appropriately reflected in the set of accounts. The sequence of accounts will also need to incorporate accounting for changes in ecosystems that are due to natural causes.

There are two main issues to consider in developing a sequence of accounts that takes ecosystems into account. The first concerns the appropriate recording of the non-material benefits from ecosystem services that are not within the SNA production boundary. Expanding the SNA production boundary for the purposes of integrating flows related to ecosystems has a range of implications that need to be discussed and evaluated.

Second, when developing a sequence of accounts for institutional sectors in the economy (i.e. corporations, households, government), the issue arises as to whether ecosystems should be considered an asset within the overall balance sheet of an institutional unit or whether ecosystems should be considered as constituting their own (quasi) institutional sector (and hence an additional column must be introduced in the sequence of accounts) with a series of flows recorded between ecosystems and the other sectors. Again there is a range of implications for the accounts of going down either path that need to be discussed and evaluated.

Overall, it remains an open question as to whether a single structure for a sequence of accounts should be recommended or whether both might be discussed, and further, if a choice is made, which structure should be preferred. It is noted that the choice of structure for a sequence of accounts does not invalidate any of the information compiled on ecosystem services or ecosystem capital as described in earlier chapters.

(ii) Consumption of ecosystem services adjusted aggregates. The discussion here is to present some of the main aggregates that might be compiled using a sequence of accounts in monetary terms. This discussion would be related to the measurement of depletion adjusted aggregates which is described in the SEEA Central Framework Chapter 6.

(iii) Compilation of wealth accounts. Wealth accounting and the inclusion of measures of natural capital within a broad national balance sheet has been a focus for many involved in the valuation of ecosystems. This text will discuss how such accounts might be compiled and presented and consider issues of interpretation particularly as regards assumptions concerning sustainability.

Although the compilation of wealth accounts may seem as simple as adding the value of ecosystems to the value of produced and other economic assets, in practice careful delineation of the boundaries of valuation will be needed since many economic assets, particularly land, are also within the scope of the valuation of ecosystem, albeit that they are valued from a different perspective. For example, the value of an area of land will include an amount relevant to the location value of the land but this aspect of the value of land (the value of its space provisioning service) is not considered part of ecosystem services and hence is not part of the value of ecosystem capital. Also, some natural resources are not part of ecosystem values (e.g. mineral and energy resources) and the boundaries around the inclusion of cultivated biological resources will need to be clarified.

### **Section 6.3 Treatment of taxes, subsidies and other transactions related to the environment**

An important area of environmental accounting is appropriately recording standard economic transactions that are considered environmental. In this context, the SEEA Central Framework Chapter 4 describes at some length the compilation of Environmental Protection Expenditure Accounts (EPEA) and Environmental Goods and Services Sector (EGSS) statistics, and also defines environmental taxes and subsidies.

In the context of ecosystem accounting it is relevant to consider the appropriate accounting for economic transactions related to ecosystems. This text will build on the discussion of the accounting issues in the SEEA Central Framework (Chapter 4) but will extend to consider the appropriate recording of transactions associated with purchases of ecosystem services by governments and the development of markets in ecosystem services. The recording described will be consistent with standard treatments in the SNA and will use the structure of the sequence of accounts as a basis for the description.

It is not proposed to discuss the development of functional accounts (e.g. EPEA) for ecosystem accounting aside from relevant references to Chapter 4 in the SEEA Central Framework. The Classification of Environmental Activities, in particular Part I on Environmental Protection, covers all activities related to the restoration and conservation of ecosystems. While more targeted functional accounts that target these specific activities might be developed (rather than EPEA which have a broader coverage), the same measurement techniques and considerations apply and do not require further elaboration in SEEA Experimental Ecosystem Accounts.

While specific functional accounts will not be discussed, it is relevant to consider ways in which data may be drawn together from the broader ecosystem accounting framework to assess the

effectiveness of expenditure on environmental protection and resource management in terms of ecosystem capital and ecosystem services.

**Table 6.2.3 SEEA Central Framework sequence of economic accounts**

Accounting entry	Institutional sectors				Total Economy
	Corporations	General government	Households	NPIISH*	
<b>Production account</b>					
Output	2954	348	270	32	3604
Taxes less subsidies on products	na	na	na	na	133
<i>Less Intermediate consumption</i>	1529	222	115	17	1883
<i>Gross Value Added*</i>	1425	126	155	15	1854
<i>Less Consumption of fixed capital</i>	189	27	23	3	222
<i>Net Value Added</i>	1236	99	132	12	1632
<i>Less Depletion of natural resources</i>	6	6	6	6	6
<i>Depletion adjusted Net Value Added</i>	1230	99	132	12	1626
<b>Generation of income account</b>					
<i>Gross value added</i>	1425	126	155	15	1854
<i>Less Compensation of employees payable</i>	1030	98	11	11	1152
<i>Less Other taxes less subsidies on production</i>	57	1	-1	1	58
<i>Less Taxes less subsidies on products</i>	na	na	na	na	133
<i>Gross operating surplus</i>	338	27	145	3	513
<i>Less Consumption of fixed capital</i>	169	27	23	3	222
<i>Less Depletion of natural resources</i>	6	6	6	6	6
<i>Depletion adjusted Net Operating surplus</i>	163	0	122	0	285
<b>Allocation of primary income account</b>					
<i>Depletion adjusted Net Operating surplus</i>	163	0	122	0	285
<i>Plus Compensation of employees receivable (Households only)</i>			1154		1154
<i>Plus Taxes less subsidies on production receivable (General government only)</i>		191			191
<i>Plus Property income receivable (interest, dividends, rent)</i>	245	22	123	7	397
<i>Less Property income payable</i>	302	42	41	6	391
<i>Depletion adjusted Balance of primary income</i>	106	171	1,588	1	1656
<b>Distribution of secondary income account</b>					
<i>Depletion adjusted Balance of primary income</i>	106	171	1,588	1	1656
<i>Plus Current transfers receivable</i>	347	367	420	40	1174
<i>Less Current transfers payable</i>	375	248	582	7	1212
<i>Depletion adjusted Net Disposable Income</i>	78	290	1196	34	1598
<b>Use of disposable income account</b>					
<i>Depletion adjusted Net Disposable Income</i>	78	290	1196	34	1598
<i>Less Final consumption expenditure</i>	6	352	1015	32	1399
<i>Depletion adjusted Net Saving</i>	78	-62	181	2	199
<b>Capital account</b>					
<i>Depletion adjusted Net Saving</i>	78	-62	181	2	199
<i>Less Gross fixed capital formation</i>	288	35	-48	5	376
<i>Less Changes in inventories</i>	26	0	2	0	28
<i>Less Acquisitions less disposals of intangibles</i>	2	3	5	6	16
<i>Less Acquisition less disposals of natural resources and land</i>	-7	2	4	1	0
<i>Less Acquisition less disposals of other non-produced, non-financial assets</i>					
<i>Plus Capital transfers receivable</i>	33	6	23	0	62
<i>Less Capital transfers payable</i>	23	34	5	3	65
<i>Add back Consumption of fixed capital</i>	169	27	23	3	222
<i>Add back Depletion of natural resources</i>	6	6	6	6	6
<i>Net Lending/Borrowing</i>	-46	-105	163	-4	10

\* Non-Profit Institutions Serving Households

\*\* GDP equals the gross value added for all institutional sectors plus taxes less subsidies on products.