DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS
STATISTICS DIVISION
UNITED NATIONS

System of Environmental Economic Accounting

System of Environmental-Economic Accounting 2012 – Experimental Ecosystem Accounting Revision

First Global Consultation on:

Chapter 8: Principles of valuation for Ecosystem Accounting

Chapter 9: Accounting for ecosystem services in monetary terms

Chapter 10: Accounting for ecosystem assets in monetary terms

Chapter 11: Integrated and extended accounting for ecosystem services and assets

Comments Form

Deadline for responses: 6 July 2020
Send responses to: seea@un.org

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The comment form has been designed to facilitate the analysis of comments. There are twelve guiding questions in the form, please respond to the questions in the indicated boxes below. To submit responses please save this document and send it as an attachment to the following e-mail address: seea@un.org.

All documents can be also found on the SEEA EEA Revision website at: https://seea.un.org/content/seea-experimental-ecosystem-accounting-revision

In case you have any questions or have issues with accessing the documents, please contact us at seea@un.org

Questions related to Chapter 10

Question 6. Do you have comments on the definitions of entries for the ecosystem monetary asset account including ecosystem enhancement, ecosystem degradation and ecosystem conversions?

The definition of what is an ecosystem asset should be clearly and consistently reported across all chapters. It is such a complex issue that transparency in notion and practice is key.

Overall in this chapter, the ecosystem asset is treated the same way environmental assets are defined in the SEEA CF, i.e. opening stock + addition – reduction +/- other changes and revaluation = closing stock. Environmental assets in the SEEA CF are natural resources, such as timber, fisheries, subsoil assets, for which there is one land use type that provides one resource, e.g. woodland and forest provides timber. This one-to-one relationship makes it possible to account in a consistent way for all the additions (including enhancement), the reduction of stock (including degradation) and conversion of cover/use.

In contrast, ecosystem assets provide a more complex mosaic of services. Many types of ecosystems (e.g. woodland) can provide many services in the form of bundles (e.g. recreation, carbon storage, etc). When an ecosystem asset is considered individually, the provision of services can be:

• originated by one ecosystem type (one ecosystem type – one service) like in the case of provisioning services (e.g. timber provision);

• originated by many ecosystem types (many ecosystem types – one service), in the case of most regulating, maintenance and cultural services (from flood control, to habitat maintenance, to nature-based recreation and many others), which commonly are supplied by a combination of ecosystem types in a certain landscape setting.

When moving from the ecosystem service perspective to the ecosystem type perspective, it always happens the case:

• One ecosystem type – many services, whose numbers can vary across space and strongly depends on the presence of ecosystem service demand.

Since all ecosystem assets provide more than one service, the relationship asset-service is many-to-many.

As a matter of fact, the first part of Chapter 10 (section 10.2) is structured in the same way the SEEA CF structures a natural asset accounts and works according to "the stock provides the flow" direction.

In describing each entry, the reference in the text is made exclusively to extent and condition accounts.

In paragraph 10.9 you read:

"Ecosystem enhancement is the improvement in the value of an ecosystem asset over an accounting period that is a result of an increase in the condition of the ecosystem asset. *Ecosystem enhancement will be reflected in a rise in the net present value of expected future returns*."

From the SEEA EEA Forum of Experts that just took place (23-24/06/2020) it is not even clear whether the condition indicators will be linked to ecosystem services (some groups in support, some groups against). Therefore the sentence in italic cannot be included without further investigation and clarity. In general, we would highly appreciate to see in this paragraph the inclusion to the link between ecosystem condition and ES in order to make explicit the dependence of ES supply on good ecosystem condition (according to the ES cascade concept model).

In paragraph 10.14 you read:
"Ecosystem degradation is the decline in the value of an ecosystem asset over an accounting period that is the result of a decrease in the condition of an ecosystem asset. *Ecosystem degradation will be reflected in a fall in the net present value of expected future returns*."
Again, From the SEEA EEA Forum of Experts that just took place (23-24/06/2020) it is not even clear whether the condition indicators will be linked to ecosystem services (some groups in support, some groups against). The sentence in italic cannot be included without further investigation and clarity as the opinion of experts is still highly debated.

When the chapter deals with degradation, it does not explain what is meant by degradation. In 10.16: "Declines may arise from a range of sources including the overexploitation of natural resources and the short and long-term effects of pollution and emissions" but **this is something that can be assessed per ecosystem service by setting a (sustainable use/flow) threshold**. Such thresholds really depend on the kind of service as well as ecosystem type/asset and they would be different for timber (e.g. harvest cannot exceed growth), air pollution removal (e.g. point when removal becomes a pressure for soils and vulnerable ecosystems), or pollination (the more pollination the better).

Note also that the link between **ecosystem condition and ecosystem assets passes through services.** See figure 2.3 of the discussion paper 2.1 on purpose of condition accounts which outlines the relations between ecosystem condition and ecosystem services. Some, but not all, ecosystem condition variables are important to quantify ecosystem services and different services are modelled using different combinations of condition variables.

The second part of Chapter 10 (section 10.3) suggests to calculate the stock as the NPV of many ecosystem services provided by many ecosystem types (being each ET a separate EA). Ecosystem Services are accounted in SUT, which are not mentioned at all in 10.2.
This definition is based on the many-to-many relationship between ecosystems and services (as reported in INCA applications) and the direction becomes "from flows we calculate the stock". However this contradicts the definition of asset provided in the chapter. We highly prefer this definition and it could probably help if for each ecosystem service the many-to-many (or one-to-many) relationship is specified. This could be done in this chapter or in the chapter dedicated to ecosystem services, or even better by linking both chapters to each other.
There is no consistency between 10.2 and 10.3; the statements inserted in the text to justify the likely occurring issues and contradictions (e.g. 10.38, 10.39 and 10.40) remain vague.

Question 7. Do you have comments on the recommendations concerning the selection of discount rates for use in NPV calculations in ecosystem accounting?

The definition of the discount rates seems simplistic. For the sake of consistency between the ecosystem asset (calculated per ET) and (what will become) the capacity account (calculated per ES) it would be better to consider discount rate and life time horizon separated service by service (and then summing up) rather than using a unique discount rate and a unique life time horizon.

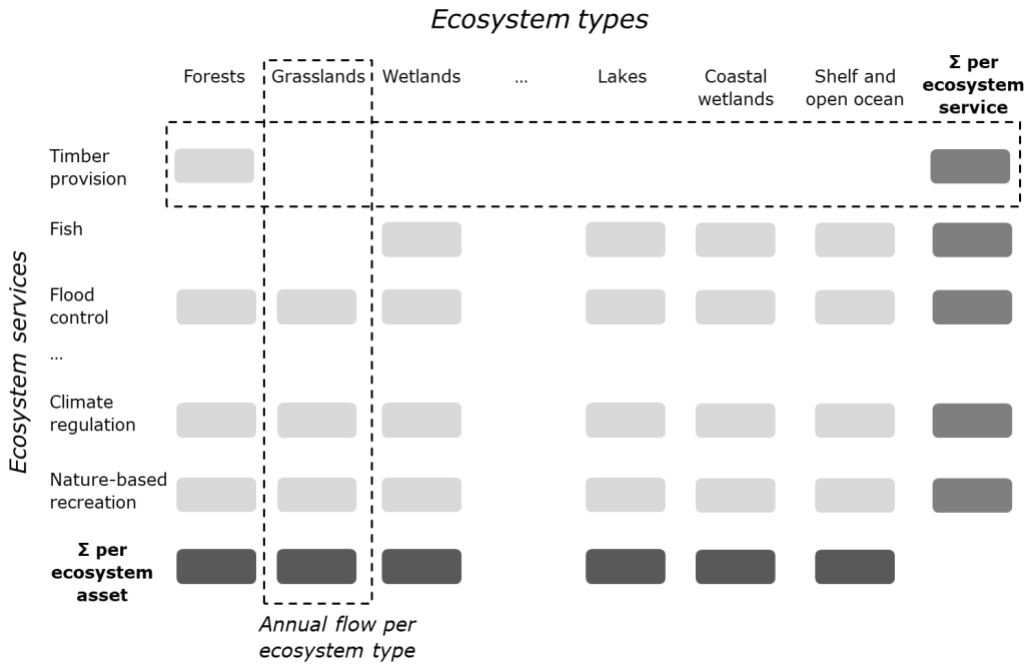
Question 8. Do you have comments on Annex 10.1 describing the derivation and decomposition of NPV?

Annex 10.1 was never presented and discussed during the Expert Meetings (the last one in March 2020).
Although the decomposition analysis could work for "fast track" accounts where you multiply price * quantity (that works almost exclusively for some provisioning services), its correctness for regulating, maintenance and cultural services (where you likely apply more sophisticated valuation techniques [that goes beyond p*q]) has to be tested and proved.
At the moment, the proposal does not seem mature enough to be presented as a standard.
In general, the practice to employ fictional numbers for testing and presenting examples seems simplistic and it would be ideal to portray concrete applications.

Question 9. Do you have any other comments on Chapter 10?

The main point to stress again is the definition of ecosystem asset. Here we add another Figure (based on the Ecosystem Services supply table) to clarify the many-to-many relationship.
Another pressing point to raise it is the necessity to provide examples that represent more comprehensive ecosystem services (e.g. flood control). Timber is a very simplistic example and we **would be highly appreciated if you could make an effort to use services** that are more representative of typical issues and complexity underpinning ecosystem services.

Here attached a proposal to reconsider the definition of ecosystem assets, where many ecosystem services (ref. rows) can be provided by many ecosystem types (ref. columns), a way to visualize the many-to-many relationship



There is the opportunity to use a concrete (published) example to raise some issues in accounting. From the JRC Report for INCA (2019) in the follow we report only the supply table. In the use table, the actual flows are allocated to users (i.e. economic sectors and households).

Table 1 – Supply table of six ecosystem services in EU, year 2012 (million EUR)

Ecosystem service	Ecosystem type									Total
	Urban	Cropland	Grassland	Heathland and shrub	Woodland and forest	Sparsely vegetated	Wetlands	Rivers and lakes	Coastal and intertidal	
Crop provision		20,560								20,560
Timber provision					14,540					14,540
Regulation of GHG	20	150	850	20	13,330	20	0	Not available		14,390
Flood control	90	1,020	3,130	360	11,390	0	330	Not available		16,320
Crop pollination		9,720								9,720
Nature-based recreation	80	4,070	7,480	3,100	30,720	1,350	2,300	1,020	280	50,400
Total	190	35,520	11,460	3,480	69,980	1,370	2,630	1,020	280	125,930

Source: JRC Report for INCA (2019)

The table shows that there are services such as crop and timber provision, and crop pollination that are provided by (or assigned to) a single ecosystem type; other services are provided by (the joint action of) many ecosystem types (i.e. flood control, regulation of GHG, nature-based recreation). The total flow of services provided by individual ecosystem assets is the sum over the services. Using this sum, NPV can be calculated as well.

Note that:

• There are no one-to-one asset-service relationships: each asset provides typically more than one service (ref. Table 1: cropland results from the sum of 5 services, woodland and forest results from the sum of 4 services, etc.); even for rivers and lakes or for coastal

ecosystems, the table will be complemented with specific services such as water purification.

• the NPV for services by asset is not the NPV of all the service flow, but only for the amount of service provided by the asset (e.g. in the case of flood, what is counted for cropland is not the whole flow of service [that is 16,320 million euro] but only 1,020 million euro).

If we assume that an ecosystem restoration program is implemented to expand forests (i.e. an enhancement action), the change in extent and condition of forest and woodland would affect:

• timber provision, only if part of the restored forest is available for wood supply (to be based on forest accounts). This would affect only woodland and forest;

• regulation of GHG, depending on the land converted to forest (to be appropriately extracted from LULUCF). This would mainly affect woodland and forests;

• flood control, by entering the flood control model as additional service providing areas and thus increasing the ecosystem service potential: it will affect the actual flow differently according to where service benefiting area are spatially located (model to be processed to obtain the change). This would NOT affect woodland and forest but other ecosystem types, such as urban, cropland, grassland, etc.;

• pollination, by entering the pollination model through the variable "distance to natural and semi-natural areas" (model to be processed to obtain the change). This would NOT affect woodland and forest but cropland;

• nature-based recreation, by entering the recreation model through the variables (1) land cover and (2) inland natural elements (model to be processed to obtain the change). This would affect ALL terrestrial ecosystem types.

The economic valuation is always a translation of the biophysical assessment in monetary units: **the occurrence and entity of change takes place in physical terms, and are in turn translated into monetary terms**. This approach guarantees full consistency between ecosystem condition, ecosystem services and ecosystem asset.

Questions related to Chapter 11

Question 10. Do you have comments on the proposed structure of the extended balance sheet that integrates the monetary values of ecosystem and economic assets?

The model proposed in chapter 11 (Model C as reported in previous discussion papers) considers some ecosystem services as a co-output rather than an input. In the example of the farmer and ecosystem service the accounting practice of model C signals that the farmer produce crops and part of the ecosystem service. Contrary in Model A the farmer use the ecosystem service as an input in production. Therefore, the model C seems to contradict the logic of the production function (very popular for many provisioning services) and introduces farmers that co-produce ecosystem services.

Model C attributes a major role to standard economic agents, and only a marginal role to "ecosystem trustees", where model A (i.e. ecosystems as the sector that owns all the services it provides) maintains a major role for ecosystems. While it is understandable that in accounting economic agents are the key players, it is not very clear in how many situations we can attribute to an economic agent the production of ecosystem services. Model C seems an accounting system quite different from reality where economic agents just benefit and deteriorate ecosystem services that are produced by nature with or without humans.

In the extended balance sheet there are two important items:

- Degradation-adjusted Net value added
- Degradation-adjusted disposable income

It is important to understand what is the message delivered to policy analysts/policy makers and for what purpose. This must be clearly explained in the text.

In fact, when comparing the examples (not reported here) from Model A and Model C:
-For degradation adjusted Net value added, Model A shows a high contribution from "Ecosystem", and Model C shows a poor contribution from "Ecosystem" (because part of the ecosystem contribution is attributed to "farmer")
-For degradation adjusted disposable income Model C shows a lower income for "farmer" if compared to Model A, but the -10 for the farmer in disposable income weight differently from the -80 for the ecosystem in net value added.

In the previous discussion paper (please check the numerical example) there was the item called "degradation transfer": if Model A is adopted, why is this item not used to transfer the -10 to "farmer" without misallocating 80 from "ecosystem" to "farmer"?
That would in fact serve the purpose to allocate over-extraction of the resource (because this is at the end of the day what is all about) to the farmer, without reducing to a "miserable" number the role of the ecosystem.

Question 11. Do you have comments on the approaches to assigning the ownership of ecosystem assets that underpins the structure of the extended sequence of institutional sector accounts?

First of all, if model A was selected the ownership issue would be clearly defined as the ecosystem is a sector on its own. In fact, once the actual flow is spatially mapped (**based on the supply side**), to understand ownership of specific geographical areas is an additional information layer that can be added by inserting sub-group categories (such as "private" and "public" in the accounting tables (as it is already done in the SEEA CF). This is the information that matters in terms of identifying those who could be entitled for PES or for Polluter-Pays-principles.
The question "who owns the ecosystem?" is different from the question "who owns the land?"

On the use side it is not a matter of ownership, but a matter of management practices. This is of course a crucial element to be measured and reported, but its assessment takes place in the interaction potential supply -> actual use (i.e. when you assess the -10 and -5 of the example): there you allocate responsibilities.
The question "who owns the ecosystem?" is different from the question "who is responsible for ecosystem degradation?"

The approach proposed in Chapter 11 using the accounting Model C can be dangerous and potentially misleading because:
- A wrong message on the **role of ecosystem contribution (that becomes marginal compared to economic agents)** is provided to policy makers;
- This approach (proposed with fake numbers) seems to be **not applicable in practice** (it does not work for all ecosystem services) e.g. consider ecosystem services (ES) that have a providing area different from the benefiting area, consider ES provided by many ecosystem types that benefit many users (many-to-many relationship);
- The purpose of allocating responsibilities does not work (due to its intrinsic features) in this extended balance sheet for polluting sectors (i.e. sink services), thus **a partial allocation of responsibilities could actually serve opposite purposes**;
- The role of the ecosystem needs to be consistent and clear: does it «own» what it offers? In some cases is an «owner» in other cases is not…this creates confusion and opens **room for manipulation.**

Finally, there is an underpinning misunderstanding: ecosystem asset «**cropland**» which is a sum of services differs from the economic asset «**agricultural land**» owned by the farmer and mostly used for yield production; the same applied for the ecosystem asset «**woodland and forest**» and «**forest land**», etc..

Question 12. Do you have any other comments on Chapter 11?

It seems that this chapter is dis-jointed from all the other chapters in terms of definitions especially when it comes to Table 11.2 and 11.3.3 that is tailored on SNA and SEEA CF. The chapter does not provide any reference to ecosystem services (as contribution of ecosystem to human activities) and considering that ecosystem asset is the NPV of ecosystem services (check Chapter 10), the table 11.2 and the section 11.3.3. leave the readers puzzled.

Most of all: **the transfers from ecosystems to economic activities and the resulting responsibilities can and should be un-hidden**, but this should happen when confronting the supply (where the flow comes from [and belong to]) and use (where the flow is allocated), and especially by confronting the potential flow (that is considered as complementary information) with the actual flow. An attempt wwas made in the following paper https://www.tandfonline.com/doi/full/10.1080/20964129.2019.1634979
(apologies if in this illustrative example fake numbers are used).