



DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS  
STATISTICS DIVISION  
UNITED NATIONS



System of  
Environmental  
Economic  
Accounting

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

### **First Global Consultation on:**

**Chapter 6: Ecosystem services concepts for accounting**

**Chapter 7: Accounting for ecosystem services in physical terms**

### *Comments Form*

**Deadline for responses: 20 August 2020**

**Send responses to: [seea@un.org](mailto:seea@un.org)**

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The comment form has been designed to facilitate the analysis of comments. There are six 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](mailto: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>

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## Questions related to Chapter 6

**Question 1: Do you have comments on the concepts and definitions for ecosystem services, benefits and associated components of the ecosystem accounting framework?**

1. The following comments should be read in connection with, and as complementary to, Istat's comments to chapters 8-11, and the proposals put forward there. In order to highlight the connections, at some points it can be useful to refer briefly to the concepts expressed in those chapters.
2. §6.3: *"These contributions extend well beyond marketed goods, such as timber and fish"*. This sentence may create confusion, since it could lead to the assumption that ecosystem assets market those goods (which may be in line with the use of the term "transaction" that we do not endorse). We suggest instead: *"These contributions extend well beyond extracted materials, such as timber and fish, which are transformed into marketed products"*. This wording is also more in line with the SEEA CF.
3. §6.4: *"while much economic production (for example, in agriculture, forestry and fisheries) uses inputs directly taken from ecosystems, those inputs (and any associated costs of capital) are not explicitly recorded in the standard national accounting framework"*. It should be mentioned that these inputs are dealt with in the SEEA CF. The Ew-MFA framework, in particular, takes a "harvest approach" that seems coherent with the conventions put forward later in the chapter. In general, in this chapter the relationship with the SEEA frameworks relevant for biological resources should be discussed. Moreover, the parenthesis: *"... (and any associated costs of capital)..."* is not clear: if it is referred to properly intended capital (i.e., man-made), it is acceptable; if it is referred to natural assets, it is not correct, as these should not be defined as "capital".
4. §6.7: *"ecosystem services are the contributions of ecosystems to benefits used in economic and other human activity"*. Later on, in the chapter, it becomes clear that the framework deals both with intermediate and final ES. Therefore, it would be advisable to add: *"...direct and indirect contributions..."*. In order to avoid confusion, it should be also made clear that benefits are directly connected to final ES, while only indirectly to intermediate ES. In fact, "indirect" could also be intended to point to the fact that, in some cases, final ES (especially biotic materials provisioning) are embodied into SNA products and further transformed before the derived products reach final consumers (in this case the contribution of ES to consumption must be identified in a different way, e.g. using IO techniques).
5. More on §6.7: *"ES are recorded as flows between ecosystem assets and economic units"*. "Economic units", obviously, do not exclude ecosystem assets in the enlarged production boundary framing. If

“SNA economic unit” means “currently included in the production boundary of the SNA”, as specified in §6.12, it should be specified. In this case, the sentence would refer to *final* ES only.

6. In keeping with the above, and with the fundamental distinction between use and exchange values, we suggest the following rewording: “ES are recorded as flows *of use values from* ecosystem assets *to SNA economic units*” (also see 15 and 165 below).
7. Footnote 1: it is not clear whether the reference to ES literature is meant to point to the cited Boyd and Banzhaf (2007) or to other contributions. In addition, it is not clear whether the notion of transactions is used in the literature referenced or is an anticipation of §6.9.
8. §6.9. It would be advisable to deviate from SNA definitions and boundaries only to the extent that this is necessary to support meaningful additional measurements. In this sense, there is no compelling reason for assigning the status of “producer” to ecosystem assets, and there are good reasons not to. The main one is that at the heart of the inclusion or exclusion of units within the production boundary of the SNA lies the power of a unit of making choices and taking decisions (§6.2 “Production is an activity, carried out *under the responsibility, control and management of an institutional unit, ...*”). Decisional power is not a feature of ecosystem assets (at least not in the time scale of accounting). Related to this is the notion, also introduced here for the first time (but for footnote 1), that ecosystem assets engage in *transactions* with economic units. The lack of decisional power of ecosystems is indeed one of the arguments put forward against the use of this notion in Istat’s comments on chapters 8-11.

The application of the notions of production and transaction:

- is not necessary for ecosystem accounting: the characterisation of ES of §6.7 is sufficient, and it allows retaining the SNA principle that ES are non-produced;
- is only instrumental to establish a substantial identity between ES *per se* (use values, recorded in physical SUTs) and value flows, i.e. to record value flows in the monetary SUTs as twins of use values and in some cases as additional (non-SNA benefits) to values already recorded in the SNA.

As to the second point, it is necessary to extend the discussion recalling the alternative framing we propose. We acknowledge, of course, that it is the intrinsic value of what is transacted *between two economic units* that *supports* the exchange value of a transaction<sup>1</sup>. This

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<sup>1</sup> This intrinsic value is reflected by the perceived utility that lies behind exchange value, along with scarcity (which may be natural or “artificial”, as an effect of the market structure, and of the behaviour of the owner or trustee of the ecosystem asset).

is valid in general and the cases where ES are involved are not exceptional. However, exchange value arises in a SNA transaction that takes place *after* the original appropriation of exclusive rights on the ES by the direct user (i.e. the seller)<sup>2</sup>. This appropriation is a different (non-SNA) flow (not a transaction) and consists in nothing more than the flow of the use value. The ecosystem asset *generates* the ES which is appropriated by the direct user. The latter produces and sells a product which is something (slightly or wholly) different from the ES itself, or sells the right to do so or to finally consume the service (in the latter case, there is not a product, but only a market for a non-produced non-financial asset). The main content of this product may be the ecosystem service, but even if the seller only passes on its right to use it to the buyer, the seller has the ES under its management and incurs costs, even only to market it. The value of the transaction includes that of possible inputs, which are costs for the producer-seller. Simultaneously and implicitly, the “contribution” of the ES to its value is determined *in* the transaction, which occurs between a producer-seller *in SNA sense* and a buyer, and it is what residues after all the costs of the seller are subtracted, consisting conceptually in a resource rent extracted by the seller from the buyer (not from the ecosystem asset!).

Since the asset is entitled to an owner (or trustee), it is to this owner that all transactions concerning the asset and its services must be entitled and not to the asset, exactly as for services of man-made capital in the SNA. No “original” exchange value is flowing from the ecosystem to the economy, while the possible exchange value connected to the ES is already included – though not explicitly recorded – in the SNA. If ES is put on the market – whether on a real or hypothetical one – no new exchange value arises, but only a distributional effect takes place. If the current user is expropriated in favour of somebody else, the latter will appropriate the resource rent. As stated above, “monetary values *connected to* ES” is different from “monetary values *of* ES”. Three sets of monetary values connected to ES are the following: *the value of products embodying ES* (related to the notion of *benefits* used in this chapter); *the resource rents embodied in the value of these products* (related to the notion of “contribution” to the benefits); *the value of non-financial non-produced assets having the permission to use ES as an object*. Several other monetary values *connected to* ES can be defined by looking at what the valuation techniques actually estimate.

Noteworthy, in the case of biomass provisioning services, it is not “the

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<sup>2</sup> Even according to the utilitarian economic theory that has been taken as sole theoretical reference in the revision process, the decisional power of economic agents is crucial. As in the, SNA they must be free to decide upon the exchange. Utility and scarcity are constitutive prerequisites of exchange value, and both these elements are prerogatives of economic agents that do not extend to ecosystems.

nature of transactions”, but more fundamentally the law of conservation of matter, that “implies existence of a matching supply and use”. More in general, *flow* of ES could be used in place of *transaction* in ES, and *generation* of ES in place of *production* of ES, without any loss of meaning and coherence.

9. §6.10 is a concentrate recap of the contentious framing. The keyword here is “integration”. The way integration is pursued in the draft chapters seen so far, implies blurring all differences and specificities of ecological and economic systems, as to create an all-encompassing economic (meta)system. However, if ecosystem assets are considered as producers they also are economic units (see below). A sounder integration can be achieved, as shown above, by assuming that there are two different but interrelated systems, which have in common the physical dimension, but not the value dimension (whatever the meaning given to the word value). The fact that the physical dimension is in common allows to define a fully integrated *ecological* (i.e. physical) metasystem, while the fact that the value dimension is exclusive of the socioeconomic system prevents all integration as intended in this § and in the other revised chapters.

The statement “the total output of the extended system is increased” is not granted in a framing of monetary values connected to ES fully consistent with the SNA and with the SEEA CF, such as the one we propose. In this framing, no new distinct transaction is identified; only the resource rent component of SNA transactions is highlighted, or a specific case of AN223 identified, depending on the circumstances; no enlargement of the production boundary and application of the notion of transaction to ecosystem assets are necessary, as well as no forcing of (whatever) value dimensions and metrics upon flows of non-produced use values that stem from outside the economic system.

10. §6.13 “economic inputs involved [...] in accessing or using ecosystem services”: we understand that it is intended - but it should be made clear - that these are not inputs to the production of *products embodying ES*, but only complementary expenses that the ES “consumers” incur to enable themselves to consumption, such as driving to supermarkets is necessary for shopping. “the aim in ecosystem accounting is to isolate and record the ecosystem’s contribution to the benefits received”: i.e., in our interpretation, use value flows in physical terms and resource rents in monetary terms. An ES that is a public good supports resource rents that are not easily identifiable but are nonetheless present, spread over the transactions in all products embodying that ES, and, in particular, transactions of produced assets and their services, e.g. good air quality influences the value of the assets that allow benefiting from it, such as dwellings near forests, and of their services

11. §6.14 “Non-SNA benefits are benefits that accrue to individuals, or society generally, that are not produced by economic units”. The words “that accrue to individuals” in this definition exclude the ES having nature of public goods, discussed in §6.15 iii.

12. §6.15 provides a very important classification of benefits to which ES contribute. Further elaboration is encouraged.

How does recreation fit in these three categories? It seems to depend on circumstances, i.e. the recreation service that may be provided by a particular ecosystem asset may be exclusively kept by its owner or sold against an entry fee or be free for all as for most ecosystem assets of which governments are considered trustees.

The private or public nature of the benefits is also relevant for the possible hypothetical market forms to be considered in simulating markets for specific ES that currently are not traded.

Another relevant and somehow related classification would be one based on *how different or “far” is the benefit from the ES itself*. One limit case is the non-financial non-produced assets (AN222 and AN223) case anticipated above, in which the ES is just sold “as is” by the (hypothetical) seller, i.e. the *right* to use the ES is sold. At the other end we have impalpable and widespread contributions of ES to each and every human activity such as that of climate regulation. In the middle, the results of joint production processes, like those of agricultural production. The concept of supply and beneficiaries’ chains of §6.20 is relevant here, as ES are embodied in products directly, and then indirectly, through production chains.

Applying these concepts in the descriptions in the ES list of section 6.3 may help characterise them and clarify links to the estimation methods that through (the contentious step of) imputation become “valuation” techniques.

13. §6.17 The measurement of ES should be linked to sustainability besides well-being.

14. §6.19 “inferences about changes in well-being” are surely important, but inferences about sustainability seem to be even more important. The links and trade-offs between sustainability and well-being (understood as the benefits enjoyed in the time horizon of the accounting), should be discussed as well, to the extent that they are connected or revealed by ES availability and use.

15. §6.20: It is intended that beneficiaries are identified here as SNA economic units only. However, in the current framing, where ecosystem assets are substantially recognised as economic units (though non-SNA ones), it would be coherent to also consider ecosystem assets as beneficiaries, as for intermediate ES.

16. §6.22 “Final ES are those ES in which the user of the service is an economic unit”. Besides the need to specify “SNA economic unit”, this

definition requires refinement, as also the beneficiary matters when assessing whether an ES is final or not. It would be coherent with the current framing not to consider the service as final, even if the user is an SNA economic unit, when the beneficiary is an ecosystem asset<sup>3</sup>. In our framing we do not recognise ecosystem assets as economic units of their own but as assets in somebody's hands; the beneficiary would be the SNA economic unit which owns the ecosystem asset positively affected by the intermediate ES. Indeed, he will get additional benefits from other, final, ES, i.e. those that depend on the intermediate one.

17. §6.23 "In ecosystem accounting, ecosystem services are recorded as additions to the SNA production boundary". This is ok only in physical terms, for the reasons explained above.
18. §6.24 "The focus on accounting for final ecosystem services is sufficient for recording, in a comprehensive manner, the connection between people and ecosystems". It should be specified: "... the *positive* connections ...". SEEA-CF physical and monetary flow accounts and SEEA EEA condition accounts are two fundamental components of any comprehensive recording of the connections.
19. §6.24 "the contribution of the seagrass meadows" (to the provision of wild fish): "contribution", meant as a separable (e.g. additive, or marginal) relevance of an input, is a concept of economic theory that can be applied to a very limited extent to natural processes such as trophic chains. Without seagrass meadows there is no fish production; in terms of economic theory one can argue that production functions are Leontiev-type with L-shaped isoquants.
20. §6.25 "intermediate services are [...] recorded as transactions between and within ecosystems". Here the concept of transaction is stretched to the maximum, as neither of the two parties between which it takes has the defining features of an SNA economic unit. The text gives no hint on whether also to this very special kind of transaction a monetary value can be attached according to the framing.
21. §6.26 "intermediate services are those ecosystem services in which the user of the ecosystem services is an ecosystem that is connected to the supply of final ecosystem services". Why the user and not the beneficiary?
22. §6.27 "a complete mapping of intra- and inter ecosystem flows is beyond the scope of ecosystem accounting". Highlighting the most important connections would however be remarkably worthy.
23. §6.28 Abiotic flows are connected to disservices provided by SNA economic units to ecosystems.
24. Section 6.2.7 The logic chaining is not evident. It is clear that there are

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<sup>3</sup> We are intending that the owner or trustee of an ecosystem asset *uses* the ES (which is therefore final) also when it manages it in a way that allows it to flow towards the same or other ecosystem assets rather than undertaking activities that reduce the ES.

relations between the elements included in Table 6.1. but their sequence (or order) should be better highlighted.

25. §6.30 “factors determining supply” may be better named “need for ES” or “demands activating supply”; the fact that “a single ES [...] may be supplied by a combination of ecosystem assets” is a problem if the need to attribute it to individual ecosystem assets arises.
26. §6.32, since this part deals with diversity we suggest: “...and a variety of ecosystems within reach of a given place, such as forests and beaches, can provide those who are in that place with a wider range of opportunities for recreation with respect to a single type of ecosystems”.
27. §§6.35-6.38 The implications for accounting are not clear.
28. §3.37 “...encourage a precautionary approach...”. Putting benefits derivable from ES does not necessarily favour precautionary policies. Uses of ES that destroys ecosystems have a sure and current value, while resilience and option values are uncertain and future. The use of expected values and discount rates penalised the latter.

**Question 2. Do you have comments on the content and descriptions in the reference list of selected ecosystem services?**

1. Terminology should be revised as appropriate according to proposals outlined in previous comments.
2. The list reflects the variety of fields where human action has jeopardised ecosystem’s functioning and its ability to provide ES, making them *scarce*. However, it is not complete as humans have not yet put in danger some of the fundamental functions of ecosystems to a sufficient extent for them to be perceived at all as ES. One example is oxygen provision. Scarcity as a selection criterion of ES may be justified in a system finalised to valuation of (marginal) contributions to benefits; less so in one aiming at fairly representing how mankind depends on ES.
3. An explicit discussion of the relationships between the ES in the reference list and the goods and services whose values are to be imputed according to the valuation techniques of chapter 9 is necessary. This discussion however would be better placed in the latter chapter, where the suitability of the different techniques by kind of ES is discussed.
4. “crop provisioning services” are a doubtful boundary case. Coherently with the SEEA CF, it should be maintained that the ecosystem contribution consists of the nutrients and water, and identifying these provision services as final ES of which farmers are the users. Besides these provisioning services, the ability of Nature to combine them with solar energy and to transform the whole into living beings should be



recognised as an additional “regulating service”. This would make evident that the contribution of the ecosystem is not separable and cannot be conceptualised as providing a share of the crops.

5. §6.43 What difference is there between “satisfying the definition of ES” and “being within the scope of the ES production boundary”?
6. Table 6.2 “soil erosion control” is described so that it includes “prevention of mass movement of soil” (soil retention). The latter probably deserves an entry of its own in the list, possibly in the second column.  
“Solid waste remediation” is very similar to “soil quality regulation”. The two could be grouped together by using the second column.

**Question 3. Do you agree with the proposed treatments for selected ecosystem services described in Section 6.4 for biomass provisioning services, global climate regulation services, cultural services, water supply and abiotic flows?**

1. As for biomass provisioning, water supply and abiotic flows, the proposed treatments are to some extent the transposition in ecosystem accounting language of conventions laid down in the SEEA CF. To this extent we agree, but we would like to highlight that there is no real need for some of this additional guidance and that reference should be made, whenever possible, to existing manuals. E.g. in §6.49 the relevant §§ of the SNA and of SEEA CF and AFF should be recalled, and as for biomass it should be clarified whether reference is made to the “harvest approach” that characterises Ew-MFA with respect to SEEA CF PSUTs.
2. §6.51 provides a clear example for our proposed re-framing. Our preferred definition would read: “In the case of non-produced biological resources, the ecosystem contribution coincides with the harvested biomass” while there is no need for the “Natural production processes” concept.
3. In §§6.52 and subsequent, the advantages of the “joint production” approach are not evident. See no.3 in the previous question for a more precise identification of this contribution.

The need to turn to a proxy for the measurement of the ecosystem contribution reveals an internal limit of the chosen approach. In theory, the contribution of ecosystems should be identifiable as the difference between the output of the joint production process and the contribution of human inputs, whose relation to agricultural productivity is well known (for instance, via production functions modelling). But this would lead to very little ecosystems contributions, in physical as well as in exchange value terms, where only a Ricardian scarcity rent connected to varying land quality would remain. The conceptualisation of “contributions of ES” as *parts* of benefits that can be separately measured leads to undervaluing these contributions

with respect to recognising them as essential and not separately quantifiable.

4. §6.60, bullet point “*losses in biomass production*”, “quantity of biomass provisioning services should be equal to the harvest in gross terms, i.e. before harvest losses...” may be in contradiction with the accounting for “benefits”, as these are attached to net harvest.
5. 6.74 “people working outdoors [...] will likely derive some benefit from being outdoors that is similar to a recreation-related service”. They will likely derive a lot of nuisance, too...
6. §6.75 Connection to entries in the SNA should be the rule as for all monetary values connected to ES.
7. §6.77 “Regulation of base flows of water” is a good reminder of a broader view that could have been taken in developing accounts for ecosystem functions. See e.g. JEAN-LOUIS WEBER, *Écologie et statistique: les comptes du patrimoine naturel*, Journal de la société statistique de Paris, tome 128 (1987), p. 137-162, [http://www.numdam.org/article/ISFS\\_1987\\_128\\_137\\_0.pdf](http://www.numdam.org/article/ISFS_1987_128_137_0.pdf) and the way the example of water is dealt with in there.

#### Question 4. Do you have any other comments on Chapter 6?

1. Cover note: “The central framing of the SEEA EEA, referred here as “ecosystem accounting”, is to use national accounting principles to integrate ecosystem and economic data”  
It would be good to use ecological science principles as well.
2. No distinction is made in this chapter between accounting for ecosystem services (ES) in physical terms (i.e. for use values) and accounting for the monetary values connected to ecosystem services<sup>4</sup>. Common principles across these two very different objects (beyond general accounting principles) can be defined only to a limited extent, because use values stemming from outside the SNA production boundary are inherently irreducible to exchange values and the latter require a thoroughly different framing. A key objective of this chapter should be to clarify analogies and differences between what holds for ES (physical terms) and what holds for monetary transactions connected to them.  
In the above, we provided some elements on how this missing distinction can be articulated, at least as far as the transactions more strictly connected to ES flows are concerned (transactions in products directly embodying ES and in permissions to use ES or similar non-produced non-financial financial assets (AN222 and AN223 in the SNA

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<sup>4</sup> It is necessary to recall here that we use the expression “monetary values connected to ES” to mark the difference with “monetary values of ES” (whatever sense is given to “value”). Monetary transactions connected to ES include, but are not limited to, transactions of products *embodying* ES.

classification of assets).

### **Questions related to Chapter 7**

**Question 5. Do you have comments on the proposed recording approaches for ecosystem services supply and use tables described in section 7.2?**

Of course. in several points text and terminology should be revised in the light of our comments to other chapters. We will not repeat here the concepts nor point out the specific points where changes are necessary.

**Question 6. Do you have any other comments on Chapter 7?**

1. §7.52 “allocation of total supply to specific ecosystem types” means that the total supply is apportioned, or that it is assigned in block to one ecosystem type even if the ES is supplied jointly by a multiplicity of ecosystem types?
2. §§7.55 and 7.56 present rather peculiar cases. In ES case even more than in man-made services, supply is not independent from use. The so-called transaction occurs where there is a beneficiary. Admitting that the so-called production happens somewhere else amounts to saying that the ES is there whether there is a beneficiary or not. This conundrum needs to be addressed and clarified.
3. Section 7.3.2 The discussion should comprise considerations on the relevant spatial dimensions and on spatial additivity.
4. §6.3 does not provide a workable definition of baseline but is rather tautological. A general characterisation of baselines should be provided instead.
5. §7.75 The inability of the devised system to represent all flows that are relevant for an ecosystem is a serious shortcoming. Work should be done to improve the connection of SEEA-CF and ecosystem accounts.