



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 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](mailto: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](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 8

**Question 1: Do you have comments on the principles proposed to underpin monetary valuation for the revised SEEA EEA, including the use of exchange values and net present value approaches?**

### **8.1 The purpose and scope of monetary valuation**

1. “Monetary valuation can play a role in signalling the relative scarcity of ecosystem services and assets.” (§8.1)

There is no certainty about the signals that it gives. For instance, a non-exclusive recreation service whose total current value is maximised at a level of usage that destroys the asset that provides it, is not at all unrealistic. Charging an entrance fee would not necessarily signal scarcity or make the usage any more sustainable than without it. On the contrary, it could make overexploitation more desirable than without it (depending on institutional arrangements affecting the duration of the property rights and on the discount rate). The fact is that the ecosystem cannot refuse to supply its services, and sustainable usage requires that those who manage it apply a rationing based on physical sustainability (as expressed by extent and condition), not on prices and business opportunities.

2. “Without market prices or some other form of economic valuation, there is no economic signal for scarcity and quality” (§8.1)

This is not true, because information on physical scarcity and quality provides economic signals. Knowledge of physical scarcity and quality supports not only monetary-economic instruments (taxes, fees, rewards, compensation, fixation of caps for tradable permits, etc.) but also a wider range of measures aimed at limiting the use, or encouraging the production, of ecosystem services, including physical-economic instruments such as rationing or strict conservation constraints.

3. Motivation for monetary accounting (ability “to make consistent comparisons [...] with standard measures from the national accounts”) and related examples (comparing with other asset types, derivation of degradation adjusted measures of national income and extended measures of national wealth, assessment of relative importance of ecosystem contributions to production and in extended measures of economic production and consumption) (§8.2)

All this relies on the idea that services provided by the ecosystem can be measured in monetary terms and are in this sense comparable to SNA aggregates. However, they are intrinsically not measurable in monetary terms (something else is measured, i.e. exchange value, see below). In other terms, the production boundary can be extended only if the newly defined additional output (whether used for intermediate consumption in the production of SNA benefits, or for final consumption of non-SNA benefits) is measured in non-monetary units, i.e. accepting incommensurability of the two kinds of output (produced/man-made and non-produced/ecosystemic).

Accounting of monetary values *connected to* (and not *of*) ecosystem services is, nevertheless, possible. It requires refraining from considering the results of the techniques described in Chapter 9 as expressions of the value of ecosystem services and rather sticking to their specific meanings of potential and actual costs, which are what can be measured using SNA criteria. Although hypothetically, potential costs are values that are included in SNA aggregates and would be lost if the ecosystem was no longer able to

provide the service. Identifying these values would help better understand the connection between ecosystems condition and the functioning of the economy, rather than pretending they are “the value” of the service. In such a framing, different and more practical motivations for monetary accounting would emerge.

4. The idea that ecosystems provide *relative contributions* and have *relative importance* (§§8.2., 8.3 and many more)

This idea of *relativity* is related to the *commensurability* discussed above, and falls with it if measurability of ecosystem services in monetary terms is dismissed.

It should be noted that insisting on this idea of *relativity* of the contribution may be misleading information for decision taking and policy. Indeed, it amounts to implementing a weak sustainability framework, where all quantities of value are the same, exchangeable and fungible with one another irrespective of what they are attached to.

It is important to recall from economic theory what makes *relative* the *contribution* – i.e. the value – of even the most essential ecosystem service, when evaluated in a market perspective. One unit of, say, the air purification service could be traded for a finite price, and thus price times quantity calculation gives a finite value that can be compared to other finite values, i.e. a relative value. Each unit on the market, taken individually, is *marginal* and does not influence the general exchange value. But if all the units of carbon sequestration were to be sold together, their price/value would be infinite, as it would include the consumer surplus, which in this case is no less than the life of all consumers. The crucial element is that air purification is taken in “parcels”, each separated from the ecosystem that provide them and from one another. In this framing, air purification is not different from bread. But bread is actually the object of transactions at observable market prices, so for bread it is not necessary to underpin the measurement with this marginalist construction, and an “objective” interpretation of what the SNA measures is possible. This is not the case with non-marketed ecosystem services. The marginalist construction, indeed, only serves the purpose to provide some connection to welfare theory (see discussion paper 5.1).

Moreover, it can be noted that a) bread is the result of a replicable, manmade, disjoint production process; b) it is fungible with other similar produced items; c) it can be, and is meant to be, separated from the baker. None of these conditions applies to ecosystems and their services (if not under exceptional circumstances), and this makes the “relative” approach hardly sustainable. Subdividing ecosystems and their services into marginal parcels – which can be done only in mental abstractions such as the hypothetical markets exercise – amounts to missing the most important point about ecosystems and denying fundamental insights such as that they are deeply interrelated with one another and that the several services that each ecosystem supplies are indivisible from one another: joint production is the rule, with no exception.

5. Title 8.1.2 “The scope of monetary valuation for ecosystem accounting” does not reflect the contents of the section, which includes only a discussion about the difference between exchange and welfare values and the important statement that “there are theoretical connections between exchange and welfare values”, anticipating the contents of annex 8.1.
6. The quotation from the SNA “Exchange values are values at which goods, services, labour or assets are in fact exchanged or else **could be** exchanged for cash (2008 SNA, 3.118)” (emphasis added), must be read together with “In ecosystem

accounting, the monetary valuation concept that is applied is exchange values as defined in the SNA.” (this Chapter, §8.10).

The “could be” deserves much more attention. In the SNA it is subject to restrictions such as the third party criterion, and basically refers to two situations: a) a market for identical or similar products exists, or b) there are production costs (exchange value must cover them). None of the two is the case for ecosystem services. In these Chapters “could be” is given the meaning “if there was a market for services *produced* at no cost for the seller”, which is an innovative meaning going well beyond exchange values as defined in the SNA.

## 8.2 Valuation concepts and principles for accounting

7. Section 8.2.1 “Defining exchange values for ecosystem accounting” simply recaps the exchange value concept of the SNA, and serves the purpose of conveying the idea that it can be straightforwardly applied to ecosystem services. But it is not clear how this relates to the “Monetary valuation of ecosystem services” as put forward in section 8.2.2.

Indeed the latter contradicts the former in several ways. Take for instance “the general interpretation of exchange values in accounting is that they should reflect the current institutional context, i.e. the current market structures and associated legal or regulatory arrangements” (§8.14). The application of this to monetary valuation of ecosystem services would lead to accept an exchange value of zero for the ecosystem services that are not “priced” in the real world. No explanation is provided about how this principle applies to the valuation of ecosystem services, and in particular about what kind of market structure should be assumed when simulating markets for ecosystem services that contribute to non-SNA benefits, following §8.22.

8. “For the vast majority of entries in the national accounts, the concept of exchange values is measured using data from observed transactions involving market prices. Market prices *are defined as amounts of money that willing buyers pay to acquire something from willing sellers* (2008 SNA, 3.119)” (§8.11) and “Consistent with considering ecosystem assets as distinct entities from economic units, the flows of ecosystem services are considered as transactions involving supply by ecosystem assets and use by economic units” (this Chapter §8.20)

It is important to keep in mind that two quite different kinds of “transaction” have to be dealt with in the context of ecosystem accounting.

On the one hand there are physical transactions, in which ecosystem assets supply their services to humans. These services are the use values flows recorded in physical Supply and Use Accounts.

On the other hand, the application of the SNA concept of exchange value requires that transactions be exchange actions between independent willing sellers and willing buyers (SNA §3.119 ss.). This condition is not satisfied in the physical exchange, because the supplier (the ecosystem) has no decisional independence nor expresses a will of its own in the “transactions”. As no monetary flow takes place between the user and the ecosystem, no exchange value (let alone new value added) arises in the transaction with the ecosystem. Exchange value arises only in transactions between human parties, which are at both ends of any SNA-like exchange value. The fact that the *object* of this transaction is supplied by the ecosystem may be highlighted in the accounts, but this does not mean that the ecosystem is the source of the exchange value arising from it as, in the SNA, this value arises from a social relationship and cannot be extended outside social relationships,

even if the physical production boundary is extended as to admit that not all production processes are human-determined.

Indeed, the human entity (institutional unit), to which the ownership of the ecosystem asset or management of the ecosystem service is assigned, may even act as a good ecosystem manager, *but it is not the ecosystem*. It does not behave according to the needs of the ecosystem but according to its own utility function. It only trades in something on which it has property rights without having produced it. It will reap a positive price if market structure or institutional power or differential “productivity” allow it. This price will not correspond to value produced anew, but - according to circumstances – only to a monopolistic rent, or a tax or fee, or a Ricardian rent extracted from those who want to use the service.

In other words: creating the markets, whether hypothetical or real, does not create the exchange value. Where “instigation, control and responsibility” of institutional units that exercise ownership rights (SNA §§1.43-44) are present, the use values embodied in production support the possible realisation of exchange values.

The lack of correspondence between use values, recorded in the physical SUA, and exchange values, recorded in monetary SUA, highlights a methodological gap, an insurmountable difference of object between the physical accounts of the system on the one hand and the monetary accounts, as they are currently conceived, on the other.

9. “the approach to monetary valuation rests on using valuation techniques to impute appropriate exchange values”

It must be noted that all of the methods available (discussed in Chapter 9), considered *per se* and independently of imputation, estimate quite different values from “the value for which the ecosystem services would be exchanged if a market existed”. Each of the techniques presented leads not just to a different estimate (§9.21) but to a different **concept**. In most cases, the central concept is one of costs or losses that would be incurred if the ecosystem service was not there; in some cases, these represent revenues that are present as long as the ecosystem service is. It is stated that, notwithstanding their variety, “the different techniques are focused on applying the same valuation concept (i.e. exchange values)” (§9.21).

It must be recognised that imputation is not an obviously legitimate operation and that it entails an important logical step, i.e. a transposition of the estimated values to a different meaning. A shortcoming of the Chapters on monetary valuation is that the suitability of imputation in this sense is not discussed if not in general (it may have been discussed in expert fora, but in this case a synthesis of relevant considerations should be provided, if anything in an annex to Chapter 9). Why are those values good proxies of exchange values?

It must be noted that prices observable in emission trading schemes, resource rents, opportunity costs, potential losses, travel costs and the other techniques, provide estimates referred to really existing values and express specific economically relevant concepts, so that, even if often estimates are hypothetical (“what would happen if...?”) in themselves, they are less removed from actual phenomena than the imputed value. The latter also requires a further assumption that the searched exchange value be somewhere near the actually estimated value.

As stated under no. 3, the somewhat arbitrary step of imputation – which assumes that the techniques provide a suitable exchange value - **is not necessary** and does not add meaning to the results; rather, it blurs the specific meaning and information potential of the estimates. Refraining from imputation would open very interesting perspectives upon monetary values connected to ecosystems and their services.

10. “using exchange values to reflect, in monetary terms, the contribution of ecosystems to benefits used in economic and other human activity” (§8.17) and “recognising ecosystem assets as distinct entities from any associated economic units who may own or manage the ecosystem” (§8.18)

This is the point where the real world – in which ecosystem services are non-produced use values (supplied for free by a “producer” that has no costs) – is left for a conceptual, virtual world, where (added) exchange value arises in the exchange between the ecosystems and their services users, rather than in the exchange between human beings (see below).

11. “flows of ecosystem services are considered analogous to flows of capital services supplied by produced assets as described in SNA Chapter 20” and “the output and the gross value added of ecosystem assets is equivalent” (§8.18)

This analogy is very appropriate, and also very telling. Its consequences should be worked out thoroughly. Indeed, according to the SNA “capital services are not produced services” (SNA §20.5), exactly like ecosystem services. Now, the interesting part of the story is that the value of capital services is included in the gross operating surplus [“the value of capital services is implicitly within it so may be noted as an “of which” item relative to gross operating surplus”( SNA §20.29)]; “The alternative to treating capital services as an element of gross operating surplus is to equate gross operating surplus with capital services exactly” (SNA §20.30)]. Ecosystem services should simply be recognised as one component of *existing* gross operating surplus. (The fact that the underlying asset is not owned by the unit using the services does not make any difference, as long as it obtains them for free). This would help correctly frame as rents the “contributions of ecosystem services to SNA benefits”, much more than considering them the value added of an additional fictitious institutional unit and considering them “the value of ecosystem services”.

12. “ecosystem services lie outside the production boundary that defines the scope of measured gross domestic product. In some cases, ecosystem services contribute to the production of SNA benefits, i.e. those goods and services within the production boundary of the SNA. In these cases, the values of ecosystem services are implicitly within exchange values recorded in the national accounts.” (§8.21)

In the case of ecosystem services contributing to SNA benefits, the user of the ecosystem service *generates* the exchange value in exchange relationships with the users of the products it produces also thanks to ecosystem services. However, it does not pass this exchange value on to the ecosystem, even though the ecosystem asset is a separate institutional unit: the user gets the contribution to the SNA benefits for free, exactly as in the real world, and keeps it. The only difference with the SNA is in the conceptualisation of this contribution as a separate input rather than explicit recognition of it being a resource rent component in the users’ revenues.

13. “In other cases, ecosystem services contribute to non-SNA benefits, i.e. benefits received by economic units including households and governments that are not within the production boundary of the SNA. [...] In these cases, the relevant exchange values of the contribution of the ecosystem assets are estimated by

estimating the value for which the ecosystem services would be exchanged if a market existed“(§8.22 )

This is the most controversial part of the whole proposed framing. The monetary valuation of non-SNA benefits is the most innovative part of ecosystem accounting and the one more likely to produce effects in terms of quantitative impact on the accounts, as well as of communication and policy. It therefore deserves careful consideration not only of its premises (discussed above) but also of its practical implementation and logical implications.

As for the premises, it should be considered under which conditions the “simulated market” mental exercise can be carried out. In this market, something similar to the case of contribution to SNA benefits must happen, with the only difference that the market for the derived product is imaginary and that the contribution of the ecosystem service to the sold product is 100% (it is the ecosystem service itself). So we have to imagine that the first user/owner, once it has engaged in an exchange with the ecosystem and obtained the ecosystem service as a use value for a hypothetical market to be in place, has to hypothetically pass it on to others [If it does not, a transaction with itself may be hypothesised, but as we know this is a situation where no exchange value arises, by definition (inapplicability of the third party criterion, § 29.146)]. At this stage, the first user/owner reaps a revenue that is 100% a resource rent. These passages should be made clear in the text.

It should also be considered whether the market hypothesis makes any sense at all for ecosystem services that provide non-SNA benefits. The only characterisation given in the Chapters is “especially concerning improvements in human health, e.g. air filtration” (§§8.22, 9.58), which rather suggests a situation of difficulty in applying the third party criterion.

A very important set of considerations concerning the hypothetical market idea is about the parcelling out of ecosystem services, seen under no. 4 above.

As for the practical implementation, all that has been written under no. 9 above is relevant.

As for the logical implications, it must be noted that this kind of ecosystem services are pervasive and essential both for human life and production, and their contribution is considered to be additional to SNA values, their hypothetical monetisation will affect *all* the prices of produced goods and services (putting aside the issue of how it should affect the value of non-produced goods and services: should the value of air filtration “used” as input by pollinators be considered free, or already included in the pollination service, or what?). This is also related to the indivisibility of ecosystems and their services discussed above and has one clear consequence for the enlarged monetary accounting: the partial equilibrium logic that is followed in the valuation does not hold. The SNA part of the monetary SUA of Chapter 11 should itself be completely rearranged in order to accommodate the system-wide repercussions of such an enormous change, in a general equilibrium approach allowing for quantities produced and consumed to adjust to significantly different prices. The exchange values of produced goods and services used for valuation would have to be redefined as to incorporate – via the goods and services that are inputs to other produced goods and services – the exchange values of non-SNA benefits of ecosystem services. The omission of this system-wide recalculation leads to non-additivity and non-comparability of the aggregates, which as we have seen is an essential premise of the motivation for valuation.

14. “The NPV of the EA is equal to the sum of the NPV for each service “ (§8.26) and “This approach assumes that the expected future returns for each ecosystem service are separable” (§8.27).

The parcelling out of the ecosystem asset (EA) is questionable as much from an economic as from a biophysical point of view. Externality effects between different ecosystem services should be considered. It is likely that the compresence of several ecosystem services supply by a single EA – which is the rule – will make summation of NPVs estimated separately a poor way to estimate the NPV of the EA. This is a distinct problem with respect to the fact that “the future supply of one ecosystem service will be linked to the future supply of other ecosystem services” (§8.27), which is acknowledged in the text.

15. “This framing is analogous to recognising that a hotel may provide separable outputs of both accommodation and meal services, each supplied using a common pool of produced assets and labour” (§8.27).

The difference with the joint “production” of ecosystem services is that meals and accommodation *can* actually be acquired separately, and production decisions concerning each of them can be taken separately by producing units. Denying the inseparable nature of flows from EA amounts to denying their complexity, in contrast to system thinking.

## Question 2. Do you have any suggestions for topics to include in Annex 8.1?

This Annex will be based on discussion papers 5.1 and 5.2. A shortened and slightly revised version of the comments provided on those papers is attached to the present comment form, as they remain valid and relevant and are re-proposed for consideration as an input to this annex.

As it appears from the outline, this Annex seems to serve two main purposes: a) providing environmental accountants with a background in neoclassical environmental economics and valuation; b) legitimating a welfare interpretation of the exchange value based valuations discussed in the chapter, on the basis of the discussion papers, going as far as to propose a discussion of GDP as aggregate welfare measure.

The first purpose cannot be endorsed **unless** a similar background is provided in other economic theories relevant for the framing of economic values and the role of ecosystems and their services in the economic system. Most notably, the consequences in terms of accounting and of monetary values to be considered, of the theories of the Physiocrats through the Classical economists up to Institutional Economics (e.g. K. William Kapp) and Nicholas Georgescu Roegen should be worked out, including reference to planetary boundaries and socio-economic metabolism as scientific background for a sound and policy relevant description of the economic relevance of nature. Unilateral adoption of a specific theory seems well beyond the principles of official statistics, and in particular of impartiality.

The second purpose represents a further step in a direction contrary to multidimensional beyond-GDP and SDG-like thinking. The discussion of GDP as aggregate welfare measure should be strictly linked to and draw upon beyond GDP thinking and initiatives (from Stiglitz-Sen-Fitoussi onwards, including the Italian Equitable and Sustainable Well-Being Measurement framework) and of course take the intrinsically multidimensional framing of the SDGs as a reference.



Moreover, a welfare interpretation of the exchange values estimated by using the techniques is a further step away from their *real* meaning: e.g. a measure of avoided damage would not just be the exchange value of flood protection, but even a (proxy of) the welfare value of the fact that people are not drowned.

### Question 3. Do you have any other comments on Chapter 8?

#### Comments on the opening note

1. The opening note (currently under chapter 8 heading) seems to anticipate some introductory text to the following chapters, concerning the overall framing of monetary valuation. Since Chapters 3-5 are valid independently of monetary valuation, and hopefully also Chapters 6 and 7 will be, it is appropriate for this introductory text to be placed just before these chapters, but not be included under a specific chapter heading.
2. Some of the principles set out in Chapter 8 and applied in the other chapters are not granted, as discussed above. We suggest a revision of the chapters especially with respect to the meaning assigned to the monetary values obtained through the procedures described. In case such a revision is not carried out, the framing introductory text should inform the reader that in Chapters 8-11 the approach to the meaning of the monetary values discussed and their “integration” in the SNA is one specific approach, and not the only possible one.
3. The sentence “the concept of value can be extended beyond those expressed in monetary terms” is an example of a very specific perspective on value, that put values expressed in monetary terms at the centre and deals with other values as “an extension”. Values are intrinsically non-monetary (as they belong to human psychology and social life), and the expression of some values in monetary terms is a selection and reduction of them. The limitations of monetary measures *vis-a-vis* the general concept of value are even greater than *vis-a-vis* welfare measurement.
4. The contents of the planned Chapter 2, anticipated in the opening note, make reference to the discussion of the connection between national accounts and the measurement of welfare in the 2008 SNA (Chapter 1). In this regard we suggest that SNA §§ 1.78 and 1.82 and 1.84 are the most relevant and that their implications should be worked out. §1.78 states that the inclusion of certain services in the production boundary, far from denying their welfare properties, serves the purpose of usefulness of the aggregates in the accounts. This calls for a thorough discussion of why the extension of the production boundary as to consider the ecosystem services as “output” will not “detract from rather than add to the usefulness” of the SEEA EEA “for the primary purposes for which it is designed, that is economic analysis, decision-taking and policymaking”. §1.82 clearly points to the SEEA as the “satellite account of the SNA [that] has been developed and is being refined to try to answer” questions related to environmental externalities. The latter are defined in the SNA as “changes in the condition or circumstances of institutional units caused by the economic actions of other units without the consent of the former” (SNA, § 3.92 and subsequent). It is important to note that these changes are not monetary by definition, and that although monetary estimates may help describe some of their effects, they will always fall short of capturing the foregone (or additional, in case of positive externalities) intrinsic values. §1.84 is strictly related to this, and comes under the title “Non-

**economic** impacts on welfare” (emphasis added). It plainly states that, even if some facets of welfare may be captured by “expanding [the SNA] in certain directions, perhaps by including unpaid services and the effects of environmental damage, for example. Yet other aspects are likely to remain forever outside the reach of a system not defined to with the measurement of welfare as a prime consideration” and “it would be **foolish** to deny this...” (emphasis added). We deem that monetary measures related to Ecosystem Services, as dealt with in these Chapters conveys an inadequate understanding of externalities and welfare.

5. The contents of the planned Chapter 2, anticipated in the opening note, also make reference to discussion paper 5.1. Chapter 6 of that paper seems to be particularly relevant for Chapter 2 and for the introductory text to Chapters 8-11. It is also suggested that the present comments and those in the attachment (a slightly revised and shortened version of the comments to papers 5.1 and 5.2 provided in September 2019) are taken into consideration for a re-framing of monetary estimates, their interpretation, their relationship to physical ecosystem services (use values vs. exchange values) and their integration with SNA aggregates.

6. In addition to the attached comments to discussion paper 5.1., it is important to acknowledge that value theory **is** still a most controversial area in economic thinking (i.e. the debate is not closed) and that:

- a. different theories of value have different policy implications, and this calls for the adoption of a plurality of approaches;
- b. the theory supporting the whole construct of chapters 8-11 is one specific value theory, namely the “neoclassical” theory;
- c. since the SNA does not confine itself to a specific theory of value, there is no reason why a satellite account should. In particular, “the SNA does not attempt to determine the utility of the flows and stocks that come within its scope. Rather, it measures the current exchange value of the entries in the accounts in money terms, that is, the values at which goods, services, labour or assets are in fact exchanged or else could be exchanged for cash (currency or transferable deposits)” (SNA §3.118). In the SNA, transactions must have “objective” characteristics (third party criterion, mutual agreement of willing parties, existence of human-determined production processes and real-world institutional arrangements) that make what is measured strictly connected to real-world observable phenomena and therefore make the SNA compatible with several economic theories. This is not the case with the application of exchange value concept to non-traded non-produced services such as those provided by ecosystems. It can be argued that different approaches to ecosystem-related monetary values should be taken, able to support – just as the SNA – different kinds of economic analysis, decision-taking and policymaking. This can be done by dropping the interpretation of ecosystem services related actual and potential costs and benefits – which are what is actually estimated through the proposed methods – as their *value*.

The possibility of an “application of the national accounting concept of exchange value” (bullet point on Chapter 8) to ecosystem services is not granted. Unlike other contexts – such as e.g. that of unpaid household work – where the mutual agreement of willing parties may be present and human-determined production processes may be identifiable, the case of ecosystem services is one of non-applicability of the national accounting concept of exchange value, similarly to the case of leisure (SNA §29.146). Just like

“activities such as eating, drinking or sleeping”, ecosystem services “cannot be produced by one person for the benefit of another” (SNA §1.39). They may only be considered as “carried out under the instigation, control and responsibility of some institutional unit that exercises ownership rights over whatever is produced” (§1.43), by “making up” ownership rights where there is none. In brief: the concept of exchange value applied is different from the national accounting concept, and is strictly connected to the hypothetical market/hypothetical enforcement of property rights (framing of the whole discussion on monetary values). This is a weak basis for official statistics, which should rather stick to actual, given, institutional arrangements.

### **Questions related to Chapter 9**

#### **Question 4. Do you have comments on the range of valuation methods proposed for use in estimating exchange values of ecosystem services?**

Several points relevant for Chapter 9 were already discussed above. In particular, as to the following statement:

“As noted in Chapter 8, the monetary valuation of ecosystem services requires the use of imputation in many cases where unit prices for ecosystem services cannot be observed on markets“

The lack of sufficient reasons for the imputation, and what this implies, was discussed with reference to the principles laid out in Chapter 8. The consequences of rejecting the imputation step should be worked out in this and in the following Chapters in terms of meaning and position in a revised monetary ecosystem accounting framework of the estimates that can be obtained for the different ecosystem services with different methods. We are confident in a satellite accounting context, where a much more articulated and reality connected set of value concepts (rents, actual and potential mitigation/restoration/adaptation costs and losses, as well as opportunity costs, taxes, fees, distributional effects, etc.) can be managed in a much more flexible way and with much stronger connections to the SEEA CF monetary aggregates and, above all, with the core SNA aggregates, as well as with physical flow and ecosystem accounts.

Below we add a few further reflections, intended as exemplifications rather than as a thorough analysis of the text.

1. “The SNA does not require exchange values to come from competitive markets, for example exchange values from monopoly or oligopoly conditions are recorded in the national accounts without adjustment. However, where directly observed prices are considered not economically significant (such cases may arise in the context of fees paid to enter a national park, for example), the observed price should not be used and alternative valuation techniques should be applied.” (§9.25)

It should be acknowledged that not economically significant prices (e.g. a price equal to zero) would in many cases emerge even if property rights were enforced and a market was allowed to be formed. This could be the case when an ecosystem service can be produced (at zero cost, obviously) in greater quantities than those demanded at zero price (the ecosystem cannot refuse to supply a service it is able to produce if it is demanded) and the market is designed as a competitive one. In this sense, it would be important for the own sake of valuation, to know what kind of market structure should be hypothesised for not limited ecosystem services.

## 2. Resource rent (§9.29)

This is a particularly interesting case. As we have argued above, all monetised contributions of ecosystems to exchange values (whether inside or outside the SNA boundary) are nothing more than resources rents (which may take the form of taxes or fees). Please note that since all methods are intended to measure the same concept, a-priori deductions on the possible results of this method must be true for all the other methods as well. Now, unless differential productivities of ecosystems exist (giving rise to Ricardian rents) and whether a perfect competition market is assumed (why not?), as long as the ecosystem can provide the service without any restriction, its value will be equal to its production costs, i.e. zero. Only if the ecosystem service cannot be supplied in the quantities demanded at zero price, the price, the resource rent and the value of the ecosystem service will be positive (imagine a vertical Supply curve). If the quantity at which the price starts rising is beyond sustainability thresholds, no scarcity signal is provided in time to avoid overexploitation.

## 3. Defensive expenditure

This one seems to be an unsuitable method, as it implies that the more it is spent in ecosystem protection, the more the ecosystem is valuable or, equally, that the underlying social preference function is valid when the amount spent on protection implies an estimate of price that is economically significant, while it seems that *by definition* a price equal to zero (access to the ecosystem service free of charge granted by current institutional arrangements) is not a suitable price for valuation.

### Question 5. Do you have any other comments on Chapter 9?

A thorough discussion about the very existence of non-SNA benefits (especially those related to regulation and maintenance services) should be carried out. It can be argued that, for example, a house located where a good air quality is supplied by abundant air filtration ecosystem services has a higher value – *ceteris paribus* – than the one located in a polluted area. In this case it seems that the existing markets assign a value (a resource rent) to that service. The creation of a market for that service would not make any new value added (= additional final consumption expenditure) emerge, but rather shift the benefit (according to whom is newly entitled) to the property rights on the service. A similar straightforward case would be that of an industrial plant needing cooling water placed closer to a river (or at the same distance of a colder river) than another similar plant for which water has to be purchased from the aqueduct. A third one might be that of a building placed in a safe area with respect to another placed in a flood-risky area.

### **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?**

Ecosystem enhancement, ecosystem degradation and ecosystem conversions are defined as monetary values (§§10.9, 10.14, 10.20; glossary). These terms however seem to be suited also - or even better – for the corresponding physical changes, which are referred to as “increase in the condition”, “decrease in the condition”, “change in ecosystem type...”. In line with our view that monetary values should never be defined ambiguously (as if they reflect inherent characteristics of ecosystems), we advise that physical changes are defined with the specific terms above and that monetary entries are specified as “monetary value change connected to...”.

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

“For individual ecosystem assets [...] it is necessary to use marginal, private, market-based discount rates [...] for other types of ecosystem services, particularly those with strong public good characteristics (e.g., water regulation of extreme events), the use of social discount rates may be considered more appropriate, i.e., taking into account the time and risk preferences of society as a whole.”

This is not consistent with the idea that, in order to determine non-SNA benefits of ecosystem services, a market should be simulated. Why should the price of the ecosystem services be determined on the basis of an individual/private calculation, and the price of time and risk preference be a social one?

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

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

Several points relevant for Chapter 10 were discussed above. In particular, the consequences of rejecting the imputation step should be worked out in this and the following Chapter.

Here we add a further reflection, to be intended as an exemplification rather than a thorough analysis of the text.

#### **1. 10.3.1 General approach to valuing ecosystem assets**

The discussion begins directly with the NPV approach. This seems to imply that in the case of assets, differently from services, directly observed prices, when existing, are not suited for valuation of assets. This may be agreed if the idea is that directly observed prices do not reflect the value of all present and future ecosystem services because some of these services are not likely to be on the market or not expected to be. Whatever the reason, a discussion of why directly observed prices would in this case not be appropriate is necessary.

### **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?**

This chapter is of the uttermost importance, as it is where the coherence with the core SNA is at stake. Several points of great relevance for this Chapter were discussed above. The rejection of imputation alone is full of consequences which should be discussed and worked out, as well as the interpretation of non-SNA benefits and the characterisation of ecosystems “contributions” as resource rents (i.e.: the effects of existence or non-existence of markets are purely distributional).

Here we add a further reflection, intended to be as an exemplification rather than as a thorough analysis of the text.

1. “[...] for example, the treatment of payments for tradable emission permits is an important issue for the SNA as there are actual transactions that must be recorded.

To the extent that ecosystem services are “internalized” in the SNA, there is need to understand the changing measurement boundary. “(§11.2)

Indeed, it is necessary to understand the measurement boundary. The example taken is not an optimal one, as it is clear that payments for tradable emission permits are not an internalisation of ecosystem services: at the first emission of the permit they are a tax or fee that is paid to acquire a right to do something (rationed “artificially” by the General Government), during the subsequent exchanges, they are a transaction quite similar to the financial assets.

2. “A complete integration of ecosystem data with economic data [...] provides a purpose and rationale for the selection and structuring of the ecosystem information.” (§ 11.4)

We have a quite different view about what “complete integration” should mean. Removing the imputation step would open a long series of issues about where to find, within core SNA aggregates, the monetary aggregates referred to ecosystems and their services, i.e. identifying a precise and specific meaning for each of these aggregates.

Basing the selection and structuring of ecosystem information on the kind of complete integration that is pursued with monetary valuation (which culminates with this Chapter) is not necessarily a good approach, as in organising this information the economic dimension would be privileged with respect to the dimensions intrinsically relevant in terms of ecosystems conditions. In general, the measurement of the relationships between economy and the ecosystems could be improved by implementing the accounting: further measures of human-determined matter and energy flows; more detailed and significant classifications of economic activities, products and residuals; societal physical stock accounts at several territorial scales and, as for monetary values, using the SNA categories more straightforwardly, as discussed above.

3. “For the institutional sector accounts the question of ownership of ecosystem assets is a key area of focus since it affects the ways in which ecosystem related transactions are recorded” (§ 11.5)

Ownership is also a key determinant of the prices (or similar unit charges, possibly hypothetical) at which ecosystem services are (hypothetically) exchanged. In this sense, it is likely that the value recorded changes depending on who is the assigned ownership. This should be considered together with the kind of market structure (would the “trustee” act as a monopolist? Would private sector ownership be diffused or concentrated?). It is important that these elements are defined in a way that makes them neutral with respect to policy options, as some of them are likely to lead to higher values for ecosystem services than others. For instance, a rational private monopolist would maximise ecosystem services value and – assuming equal discount rates in alternative institutional settings – ecosystem assets’ NPV.

4. “extended SUA embody a nested systems perspective in which the economic system is shown as seamlessly connected with the underpinning ecosystems.” (§11.15)

This rhetoric is not valid, as it is a consequence of the fundamental difference between use and exchange values, the latter being the expression of social relationships and not of relationships with ecosystems. Rather, monetary values are seamlessly connected with the underpinning property rights and preferences (the ecosystem does not play an active role, although it may be taken into account by human actors).

5. “Extended balance sheets encompassing monetary values of ecosystem assets can be applied in a number of contexts. These include [...] providing a basis for assessing sustainability of flows from particular asset classes”

How sustainability could be assessed on the basis of monetary values is a very important issue not properly addressed in this context. Since physical data are needed to determine monetary data, using monetary data would entail a loss or – worse – a “pollution” of the information about the ecosystem and its sustainability.

6. “estimates of all asset prices should take into account the extent to which there are developing shortages in the availability of certain “critical” resources, where the effect should be that asset prices reflected in the accounts rise over time, and the relative value of these assets becomes much higher. In this sense, an extended balance sheet framing is also able to support discussion and identification of those assets, particularly environmental ones, that are essential and hence are not substitutable, i.e. in the framing of the concepts of strong sustainability and critical natural capital.”

This rhetoric also is not acceptable. The framing is evidently of weak sustainability and, of course, economic signals such as rising prices may come too late even if the value of the ecosystem services is included in the ecosystem assets’ NPV. The benefits of framing sustainability on the basis of monetary values, when physical data and interpretation frameworks are available and provide well defined signals, have to be furtherly discussed.

**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?**

..“where an ecosystem asset supplies ecosystem services that contribute to non-SNA benefits (i.e. primarily regulating and maintenance services and cultural services), that part of the value of the asset will be considered to be owned by a new sub-sector of general government titled the “ecosystem trustee”. In this treatment, the ecosystem trustee is considered the supplier of those ecosystem services.”

There is at least a viable alternative, i.e. that these are dealt with as common goods.

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

1. The proposed integration of the monetary values discussed in Chapters 8-10 with the sequence of institutional sector accounts, the balance sheets and the supply and use accounts of the System of National Accounts is not complementary but alternative to a different satellite accounting approach, more coherent with beyond-GDP thinking and with SDGs, based on the acknowledgment of ecosystems’ extent and condition as important in themselves and on the use values supplied by ecosystems as vital to production and life and not as (relative, substitutable, divisible) “contributions”.
2. The relations between the aggregates to be included in the integrated framework for monetary environmental accounts (environmental protection expenditure, taxation, goods and services supply and use...) should be discussed in this chapter.