



DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS
STATISTICS DIVISION
UNITED NATIONS

SEEA Revision

**SEEA Experimental
Ecosystem Accounting**

Comment form

Comment form for the Consultation Draft

Deadline for responses: 1 January 2013
Send responses to: seea@un.org

Your name:	Michael Vardon
Your country/organization:	Australia/Australian Bureau of Statistics, Bureau of Meteorology
Contact (e.g. email address):	michael.vardon@abs.gov.au or m.vardon@bom.gov.au

To submit responses please save this document and send it as an attachment to the following e-mail address: seea@un.org.

The comment form has been designed to facilitate the analysis of comments.

In Part I general comments on the structure and content of the draft document are sought. In Part II any other comments, particularly those of a technical nature should be included.

Relevant documents

Before submitting responses you are encouraged to read

Cover Note to the Consultation Draft

SEEA Experimental Ecosystem Accounting – Consultation Draft

Part I: General comments

In the box below please supply any comments on the structure of the document, the balance of material and the coverage of the draft including any thoughts on missing content.

Comments on the style, tone, and readability of the text are also welcome.

Please reference paragraphs numbers or section numbers as appropriate.

Introduction

1. We welcome the opportunity to comment on the draft System of Environmental-Economic Accounting: Experimental Ecosystem Accounting (SEEA - Experimental Ecosystem Accounting).
2. The document provides much needed guidance for the development of ecosystem accounts and all involved in the development of the SEEA – Experimental Ecosystem Accounting to date are to be congratulated.
3. The document is a significant achievement with the concepts outlined providing a clear direction for account construction, and at the same time not hiding the complexity of what is involved conceptually or practically. It will lead to the testing of methods to provide data to match the concepts.
4. Having the ability to experiment within the broad framework of SEEA provides an appropriate balance between the need for theoretical and practical innovation, with the need to keep the approaches as consistent with current international standards of the System of National Accounts (SNA) and the SEEA to allow for effective integration of data to meet real world information requirements.
5. The SEEA – Experimental Ecosystem Accounting reflects significant progress on ecosystem accounting made over the past decade, effectively translating mostly small-scale academic studies into a system that may be regularly implemented at national levels. The course of development within the UN statistical system has been remarkably rapid, given the first Expert Group Meeting on Ecosystem Accounting was held in Copenhagen in May 2011 and reflects the goodwill and willingness of many disciplines and agencies to come together to reach understanding and agreement. Such goodwill has been evident in meetings of the expert group (Copenhagen, May 2011; London, December 2011 and; Melbourne, May 2012) as well as by the discussions in the London Group on Environmental Accounting (Stockholm, September 2011 and; Ottawa, October 2012) and the meetings of the United Nations Committee of Experts on Environmental-Economic Accounting (UNCEEAA).
6. The comments below provide a range of suggestions for improving the document and are based on input from a variety of areas within Australian Bureau of Statistics (ABS) as well as comments submitted to the ABS by other government agencies as well as academics and others. The comments provided also reflect discussions made at workshops held in Canberra Australia in September and November 2012 to discuss the development of this document. The last meeting in November was focused entirely on this draft of the SEEA – Experimental Ecosystem Accounting.

7. While the draft of the SEEA – Experimental Ecosystem Accounting will be a significant milestone in the development of ecosystem accounting and official statistics more generally, we look forward to on-going involvement in the processes being used to develop the SEEA in order to more fully inform decision-making and policy development in government. This will continue to require the involvement of a range of government agencies as well as others in non-government organisations and academia.
8. As noted above, the comments in this document reflect a broad consultation process undertaken by the ABS that has resulted in a range of inputs from people in Australia including from government, scientific and academic organisations, including:
 - Australian Bureau of Statistics (ABS)
 - Bureau of Meteorology, Australian (BoM)
 - Australian Bureau of Agricultural Resources Economics and Sciences
 - Department of Agriculture, Fisheries and Forestry
 - Australian National University
 - Commonwealth Scientific Industrial Research Organisation
 - Catchment Management Authorities of Victoria
 - Department of Sustainability, Environment, Water, Population and Communities
 - Department of Sustainability and Environment, Victoria
 - Department of Treasury and Finance, Victorian
 - Murray-Darling Basin Authority
 - University of Queensland
 - Wentworth Group of Concerned Scientists

Structure of comments

9. We have consolidated the comments of the ABS and those received from others into a single response. In doing so we have removed obvious repetition of points and tried to bring key points to the fore. This has sometimes meant that some specific comments by chapter and paragraph (which are included at the end of this document) are repeated under the general headings in the first part of the document.
10. Comments are arranged under the headings:
 - Terminology and concepts
 - Units
 - Classification of ecosystem services
 - Biodiversity
 - Valuation
 - References

11. Separate to the comments contained in this form we supply five documents as attachments to United Nations Statistics Division. These contain additional detail and background for consideration by the Editor and the Editorial Board in finalising the draft. These documents are:

1. Specific comments by chapter and paragraph
2. Some new text on units, building on the current text on units, as a track-change word document
3. Australian examples of additional physical boundaries for areas that could be used for ecosystem accounting
4. An Australian example of a scientific accreditation process for the data used to construct the accounts
5. A note on valuation prepared by the ABS in September 2012 as part of the SEEA development process

Part II: Other comments

In the box below please supply any additional comments including those of a more technical nature.

Please reference your responses with the relevant paragraph number or section number.

Terminology and concepts

12. Perhaps the hardest thing to achieve will be the adoption and use of a consistent terminology to describe concepts. As the text notes, many different professions are involved. Each profession has its own lexicon and this combined with the variety of meanings for common English words can lead to misunderstandings. It is also the case that some words are pejorative and where possible the use of such words should be avoided.
13. In general there is enough supporting text (i.e. context) to make specific meanings clear, but a few terms central the SEEA needed to be described and used with care. We have noted some specific cases of inconsistent use of terms in the text along with the inconsistent use of examples to support the explanation of the terms (see section 'Comments by Chapter and Paragraph').
14. The addition of a glossary, which we understand is intended, but has not been included with the current draft, will help to reduce inconsistencies and greatly assist in the interpretation of the document.
15. Specific suggestions on particular terms and concepts are identified below.

Degradation and enhancement

16. We understand the concepts behind these terms from the discussion in sections 4.2.3 pp. 56 to 59. However we would prefer that these terms be replaced by other terms. For degradation, we suggest “decreases due to human activity” (as per table 4.3) and for enhancement “increases due to human activity”. This is consistent with paragraph 2.37. The use of these terms would not change the structure of the tables presented (Table 4.3), but would align better with the counterpart terms for “natural” changes (e.g. improvements due to natural regeneration, and here would also suggest the use of the word “increases” rather than “improvements”). This would also make the labels in the tables more intuitive. The choice of terms should also be reflected in chapter 6 (and in particular Table 6.1).

Ecosystems, Ecosystem Assets and Environmental assets

17. Ecosystems and ecosystem assets need to be defined clearly and consistently in the document. In this we suggest that you define ecosystems as early as possible (and probably paragraph 1.1), and note that the definition used is based on definition from the Convention on Biological Diversity (CBD).

18. The definition of ecosystems from the CBD given in paragraph 1.40, p. 10 should be that given in Article 2 (Use of Terms):

"Ecosystem" means a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit" see <http://www.cbd.int/convention/articles/?a=cbd-02>

The year of CBD agreement (2003) should be added wherever it is mentioned.

19. We suggest that after the definition of ecosystems is added to paragraph 1.1, a new sentence be added to note that ecosystems can have varying degrees of human influence on them and the influence can be current or historical (this point is made in paragraph 2.2 but needs to be made clear from the beginning as some people interpret ecosystems as “natural”) and that human influences in one area can have an impact on other areas (e.g. water pollution has a downstream impact). This makes the scope clearer from the very start.

20. We suggest the definitions of ecosystems and ecosystem assets be based on those already in the Central Framework:

- **Ecosystems are areas containing a dynamic complex of biotic communities (for example plants, animals and micro-organisms) and their non-living environment interacting as a functional unit to provide environmental structures, processes and functions.** (This is

text from SEEA-CF 2.21)

- **Ecosystem assets are areas containing a dynamic complex of biotic communities (for example plants, animals and micro-organisms) and their non-living environment interacting as a functional unit to provide environmental structures, processes and functions that may provide benefits to humanity.** (This text is adapted from the definition of an environmental asset in the SEEA-CF (paragraph 2.17) with the definition of ecosystem (paragraph 2.21).

21. There is then a question as to whether there can be individual ecosystem assets (i.e. can some ecosystem characteristics be considered separate assets and if so what should they be called). In the draft, carbon and biodiversity are separately identified, and in relation to Figure 2.1 (p. 17) they would appear to be ecosystem characteristics. Carbon would also seem to align in character with the environmental assets of the Central Framework, along with species, which are part of biodiversity. In this it might be worth noting that at this stage of the development of ecosystem accounting, accounts of high level properties of ecosystem characteristics and their condition (e.g. resilience) are not practical, therefore it is reasonable and more feasible to first develop more basic accounts of ecosystem characteristics.
22. The ability to measure ecosystem assets them from two different perspectives (i.e. from services flows or by condition and extent) is covered in section 2.2.2 and again in Chapter 4 (e.g. 4.1). Section 2.2.2 would benefit from further clarification and the inclusion of some cautions about aggregating the results obtained from each of these approaches would be appropriate in paragraph 2.29.
23. There is also a need to clarify the relationships of environmental assets, ecosystems and the units (BSU, LCEU and EAU). This is addressed in comments on units and the specific suggested modifications to the text on unit which will be sent separately.
24. An issue is that more than one environmental asset can exist in one space, whether the space be a BSU, LCEU or EAU. In general, the chances of more than one type of asset (e.g. wetland and forest) occurring in one unit increase with the size of the unit. The same would be true for ecosystem services.
25. Related to the issue of scale are the characteristics of each of the units (i.e. BSU, LCEU and EAU). Each type of unit can have a range of characteristics but particular characteristics for a specific area could change depending on scale or with it being included within different spatial boundaries. For example, consider a particular area defined by a BSU for a small area (e.g. 1

hectare) that is completely covered in forest now and was also completely covered by forest in the past (i.e. at a particular reference date), and so has a high reference condition. The same area when included in an EAU (e.g. a local government area) could be shown as having a lower score because the other areas that make-up the EAU (which could be an aggregation of BSU) either have no forest cover now or in the past. This scale issue is partially addressed in the updated text in Annex 1, and hence there is room for further text on this matter.

26. One characteristic of ecosystem assets that requires development in measurement terms is resilience. As such it should be included in the research agenda. At present resilience is mentioned but little detail is given but there are initiatives underway in Australia and elsewhere which might.

Reference condition

27. Ecosystem condition is an important concept and it is appropriate that it is included in chapter 2 which introduces the main principles (i.e. ecosystem condition is outlined in paragraphs 2.30 to 2.32). Condition is difficult to measure and some mention of this is needed, perhaps as an addition to paragraph 2.32 but also elsewhere in the document.
28. In paragraphs 2.31 and 4.14, reference condition is defined as a particular point in time. It is appropriate that this is a primary way of defining reference condition as it provides an unequivocal reference. However, it needs to be noted that time is not the only method for determining a reference benchmark and that in different places human influence will be at different levels. As such some conceive the condition of an asset in reference to a state that is without, or with little, human influence which can be measured directly or more likely is modelled. We accept that defining such a state is problematic (and may indeed be given as a time reference) but a paragraph noting this conception of reference condition should be added, noting a few examples of its use. For example, this conception of condition is apparent in Europe in the EU Water Framework Directive which uses ecological status, with a high status is “no, or only very minor, anthropogenic alterations”¹. Similar definitions of reference condition can also be found in Australia (e.g. the Sustainable Rivers Audit²).
29. We also note that the Central Framework includes individual environmental assets (e.g. land, timber, water and energy) and allows for some consideration of condition as a measure of the ‘state’ (see SEEA Central Framework, Table 5.7.1 Soil: changes in soil quality and paragraph 5.341 of

¹ Table 1.2, p. 38 <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2000:327:0001:0072:EN:PDF>

² Page 7, section 2.2.2 <http://www.mdba.gov.au/sustainable-rivers-audit/#>

the SEEA Central Framework).

30. Developing principles of measuring the quality/condition/overall state of environmental assets was not considered in any detail in the Central Framework. As such it could be beneficial to draw attention to the fact that concepts addressed in Chapter 4 of the SEEA Part 2 could assist in providing direction to completing these lines items in the asset physical accounting tables of CF Chapter 5. This may be best addressed through additions to the research agenda.
31. Measurement of condition also raises issues concerning the data quality and data quality assessment frameworks (DQAF). At present DQAF is included as an annex, but it is probably appropriate to mention here (around paragraph 2.32), and add in more material to section 1.4 “Objectives and challenges in ecosystem accounting” and perhaps an extra paragraph after paragraph 1.29, which introduces the concept. References to the DQAF annexes should be made in both places (i.e. in Section 1.2 and in paragraphs 2.30 to 2.32).
32. Some suggested text on ‘Scientific Accreditation of Ecosystem Condition’ will be provided separately.
33. We suggest adding a section for accounting for river condition and can provide some material for this if the suggestion is adopted.

Units

34. The text on units is good but can be improved chiefly by acknowledging that the information for particular areas can come from a range of sources and that this information can be both aggregated to higher levels or disaggregated to lower levels depending on the scale of the accounting contemplated (which in turn depends on the question of analytical interest). A present the focus is on a bottom up approach, which is probably superior, but a top down approach is also valid.
35. Renaming the “units” as “areas” could help particularly those from geographic backgrounds as well as help make the distinction between economic units. That is, Basic Spatial Units (BSU) become Basic Spatial Areas (BSA) and Ecosystem Accounting Units (EAU) become Ecosystem Accounting Areas (EEA)
36. A short paragraph(s) outlining the economic units (establishments, enterprises) and their classification by industry (e.g. agricultural, mining, manufacturing, health, education, etc.) and sector (private, public) is required in the discussion of units. This is needed especially for chapter 5 and for people unfamiliar with the SNA (who are likely to large in number).
37. With this in mind we have suggested some specific edits and additions to the

existing document, done as track changes. This document will be supplied separately to UNSD.

38. For the LCEU these are just one representation of spatial areas, and we suggest that these are simply a special case of EAU. Again we will separately supply this information to UNSD.

Classification of ecosystem services

39. The classification of ecosystems is a difficult area that must be addressed in the SEEA Experimental Ecosystem Services. There are some problems with the classification as it stands in the draft. For example, the rules for establishing each of the divisions in the hierarchy seem to be different for each service and even within a particular service. For example, we note that materials provision (2-digit level) has at the 3-digit splits by both degree of human influence in production (i.e. cultivated and uncultivated) as well as splits by, for want of a better description, product type (i.e. plant and animal fibres, chemicals and genetic material).

40. Reducing the number of levels to two (i.e. deleting the current 3-digit level) would overcome much of the problem.

41. Regards of whether a 2 or 3 level classification is presented, in recognition of the state of development of the classification a more appropriate title would be “Interim Common International Classification of Ecosystem Services (ICICES) or Interim Classification of Ecosystem Services (ICES)

Biodiversity

42. The discussion and placement of text on biodiversity should be refined.

43. At present biodiversity is referred to in many contexts. For example, paragraph 1.23 states biodiversity is central to “understanding the operation of ecosystems” in paragraph 1.40 biodiversity “affects ecosystem function”, in paragraph 2.4 biodiversity is a component of ecosystems, paragraph 2.5 states “biodiversity is a characteristic of ecosystems” and paragraph 2.9 refers to “ecosystem characteristic”. These references would be clearer if in the first or second chapter (probably chapter 2) biodiversity was defined and there was a clear statement about how biodiversity relates to ecosystems/ecosystem assets.

44. Central to this discussion is the definition of biodiversity from the Convention on Biological Diversity (paragraph 4.104), which is appropriate to use in the SEEA – Experimental Ecosystem Accounting. In this definition, ecosystems are one level of biodiversity, with species the next. Genes are not included in the CBD definition but are added as a third level in the current paragraph 4.104.

45. We suggest that the material currently in section 4.5.2 be shortened and moved before the current section of 2.2, probably as a new section or as an addition to current section 2.1. If as a new section then it could be named "The relationship between biodiversity and ecosystems". The inserted text needs to be clear that both ecosystem/land cover accounts and species accounts are biodiversity accounts and that the 3rd level, genes, is not considered in the SEEA Part 2.
46. Some text linking ecosystem assets to biodiversity needs to be added to Section 4.1. In this it should be noted that ecosystems are the highest level of biodiversity, that the extent and configuration of different land covers can be seen as one representation of biodiversity and that the species occurring in particular areas (ecosystem assets) are one of the characteristics of ecosystems assets.
47. The focus of Section 4.5 would then be clearly species accounts, but would retain the name "Biodiversity accounts".
48. Additional consideration could be devoted to how biodiversity contributes beyond ecosystem processes (including inter- and intra-ecosystem flows plus ecosystem characteristics) and ecosystem services beyond provisioning services.

Valuation

49. The estimation of monetary values where there are non-monetary activities is a vexed issue in the SNA and SEEA contexts. It has been discussed for many years with limited progress and no resolution. It is also noted that the challenges faced in putting monetary values on ecosystem services and assets are the same as those faced by other attempts to put monetary values on non-monetary activities. The ABS has previously prepared a note on valuation relating to ecosystems and this will be forwarded separately as part of the additional material mentioned in paragraph 11 of this response.
50. We strongly support the mentions of the complexity and difficulties in valuation as well as the cautions given in the text in Chapters 1, 2 and 5. For the cautions, an additional point to add into the current paragraph 5.2 (which may need to be split into more than one paragraph) is that if different approaches to valuation are used for different services or assets then aggregation is not appropriate. Similarly, if different approaches to a particular service or asset are used in different areas, then aggregation is not appropriate.
51. For paragraph 5.2 it is noted that detailed data are needed. This point could be expanded to make explicit that valuation requires detailed physical data as well as detailed data on economic transactions. It should also be

mentioned, probably in a separate new paragraph, that developing monetary estimates of the value of services and assets should come after physical assessments of these assets and services. The point is made elsewhere in the document (Chapter 2, paragraph but this is not currently apparent if Chapter 5 is read in isolation from the rest of the document).

52. The point about the monetary valuation being reliant on physical assessment could also be made in chapters 3 and 4 (e.g. paragraph 3.4, 4.115).
53. The specific coverage of the SNA is very brief (2 pages, pp. 85-86). While the SNA is referred to other places is other, a long treatment would seem appropriate, particularly since two of the audiences for this document (ecological economist and ecosystem scientists) will have no or very little information on it. The current section could be expanded or an annex (or both) could be added to address this. Further explanation of the principles of the SNA is appropriate as without understanding these, ecosystem accounting is unlikely to produce valuations that can be integrated with the SNA. In the short term we see no alternative to the SNA based approaches but note that valuation is likely to be a substantial part of the research agenda.
54. A key risk in using non-SNA approaches in the SEEA Experimental Ecosystem Accounting is that potential users will focus on the contentious aspects of the valuation methods and debate them endlessly rather than accept the valuations from ecosystem accounting as meaningful statistics for analytical purposes.
55. Ideally, interested parties would work together to agree on a common approach to valuing non-monetary activities, noting the complexities of measurement in both theoretical and practical terms and the need to align with the SNA principles of valuation. This is essential for adjusted measures of income and comparable asset values (issues picked up in some detail in chapter 6).
56. It is accepted that it is appropriate to recognise the broad range of approaches and their conceptual basis in the discussion of chapter 5, with links to the approaches used in the SNA and SEEA clearly articulated. The cautious approach adopted, particularly the absence of recommendations in chapters 5 and 6, is supported, as is the inclusion of the contrary views on these topics (e.g. as is done in paragraph 6.4(i) and the justification for including this chapter (given in paragraph 6.5).

References

57. A greater level of referencing is recommended within the text given the

experimental nature of these accounts. At present a mix of author date and footnotes are used and this needs to be made consistent.

58. We suggest that a bibliography be added. The bibliography could be structured by topic (e.g. ecosystem services, ecosystem condition, valuation, etc.) and would include both cited references and other references which those striving to implement the accounts could find useful, be added. We offer the following examples of additional references for inclusion, if the suggested bibliography is adopted:

Australian Bureau of Statistics (2012). Completing the Picture: Environmental Accounting in Practice. <http://www.abs.gov.au/ausstats/abs@.nsf/mf/4628.0.55.001>

Australian Bureau of Statistics (2012). Land Accounts, Victoria: Experimental Estimates. <http://www.abs.gov.au/ausstats/abs@.nsf/mf/4609.0.55.002>

Australian Bureau of Statistics (2011). Land Accounts, Great Barrier Reef Region: Experimental Estimates. <http://www.abs.gov.au/ausstats/abs@.nsf/mf/4609.0.55.001>

Cosier, P. and Sbrocchi, C. 2012. Trials of Environmental Asset Condition Accounts in Australia. 7th Meeting UN Committee of Experts on Environmental-Economic Accounting, Instituto Brasileiro de Geografia e Estatística, Rio de Janeiro, 11-13 June 2012. <http://www.wentworthgroup.org/uploads/UNCEE%20Rio%202012%20Cosier-Sbrocchi%20paper.pdf>

Gibbons, P., Briggs, S.V., Ayers, D.A., Doyle, S., Seddon, J., McElhinny, C., Jones, N., Sims, R., and Doody, J.S., 2008. Rapidly quantifying reference conditions in modified landscapes. *Biological Conservation* 141: 2483 –2493.

Grafton, Q. 2003, Property and Resource Management in Australia: Rights and Responsibilities. *Australasian Journal of Environmental Management* 10, 70-72

Hein, L., 2010. *Economics and Ecosystems: Efficiency, Sustainability and Equity in Ecosystem Management*. Edward Elgar.

Land and Water Australia, 2002. *Property: Rights and Responsibilities; Current Australian Thinking*. Land and Water Australia, Canberra.

Scarborough, H., Bennet, J., 2012. *Cost-benefit Analysis and Distributional Preferences: A Choice Modelling Approach*. Edward Elgar.

Stoneham, G., O’Keefe, A., Eigenraam, M., Bains, D. 2012. Creating physical environmental asset accounts from markets for ecosystem conservation. *Ecological Economics* 82, 114-122

Walker, B., Salt, D. 2012. *Resilience Practice: Building Capacity to Absorb Disturbance and Maintain Function*. Island Press.

Yapp, G., Walker, J., Thackway, R., 2010. Linking vegetation type and condition to ecosystem goods and services. *Ecological Complexity* 7, 292-301.

Attachments 1 to 5 sent separately

**Attachments 1 to 5 to ABS Comments on the
Draft System of Environmental-Economic Accounting:
Experimental Ecosystem Accounting
(November 2012 version)**

These five documents are supplied in support of the ABS response to consultation on the draft SEEA Experimental Ecosystem Accounting.

They provide additional detail and background information for consideration by the Editor and the Editorial Board in finalising the draft of the SEEA Experimental Ecosystem Accounting.

The attachments are:

1. Specific comments by chapter and paragraph
2. Some new text on units, building on the current text on units, as a track-change word document
3. Australian examples of additional physical boundaries for areas that could be used for ecosystem accounting
4. An Australian example of a scientific accreditation process for the data used to construct the accounts
5. An ABS note on valuation prepared for the Valuation sub-group of the SEEA

Attachment 1. Comments by paragraph and chapter

Note: Many of the comments below have been picked up in the overall response provided to the UNSD.

General comment

The table of contents as well as the numbering of paragraphs and section is appreciated, but has not worked in some cases – e.g. there are at two 2.2.2s, one on page 19, and one on page 21.

This will need to be corrected in the final version.

Chapter 1

Paragraph 1.1: Need to include a definition of ecosystems here.

1.42, p. 11. Suggest a rewrite last sentence to: “Resilience indicates the propensity of ecosystems to withstand pressure or to revert back to previous conditions following a disturbance”.

Chapter 2

2.1, p. 15, suggest using ‘for example’ or ‘including’ to imply that the list is not exhaustive of possible processes that may affect change in an ecosystem whether natural or human-caused.

2.3, p. 15, suggest using ‘influenced’ or ‘mediated’ by human action, rather than ‘dominated’.

2.4, p. 15, the reference to ecology here is not correct as ecology is the study of the relationships of living and non-living things, or, to put it another way, the study of ecosystems. Suggest rephrasing here and elsewhere in the document. For example: “Assessment of ecosystems should consider their components and location. Key characteristics of an ecosystem are . . .”.

2.5, p. 15: mix of singular and plural. Biodiversity is not commonly described as a characteristic of ecosystems. Need to clearly define biodiversity and how it relates to ecosystems and their characteristics.

2.6, p. 15, insert a comma between ‘interconnected’ and ‘commonly’.

2.7, p. 15: introduces the idea that an ecosystem should be defined spatially and that area should be considered an ecosystem asset. The second sentence then defines the ecosystem asset as an ecosystem with a spatial area. The description is a little confusing and the use of these terms here is not always consistent with the use of ‘ecosystem asset’ later in the document. This needs to be made clearer.

2.9, p. 16: The term ecosystem asset (now italicised but not previously) is now being used to describe spatial areas of stocks within an ecosystem rather than the spatial extent of the ecosystem as defined in 2.7.

2.11, p. 16: it is incorrect to state that mineral and energy resources do not interact as part of ecosystem processes. Many mineral and energy resources are produced by ecosystems (e.g. fossil fuels, phosphate); most are also used by ecosystems in some way (e.g.: phosphate, potassium) and many others interact (e.g.: radioactivity and heavy metals bioaccumulate in ecosystems; using trace mineral concentrations in ecosystems is a major area of mineral exploration research). This clarification needs to be added. Also the issue of timescale is important (see comment on paragraph 2.105 below)

2.25, p. 19 resource should be plural in “extraction of mineral and energy resources”

2.30, p. 21, sentence should read “The selection of characteristics and indicators should be made on a scientific basis” (insert ‘a’).

2.30, p. 21, in relation to “such that there is assessment of the resilience, vigour and organisation of the ecosystem asset”, resilience has been defined earlier but no definitions are given for vigour or organisation. Is the organisation referring to the same organisation that is a characteristic of an ecosystem as defined in 2.4? If so, this seems to contradict the first part of this sentence which is describing how to choose which characteristics to measure, as does using resilience which has also been described as one of those characteristics. The last part of this point refers to the ‘ecosystem as a whole’. Is this the same thing as the ‘ecosystem asset’ or is some broader scale meant?

2.33, p. 21, ‘Ecosystem extent reflects the area of an ecosystem asset’ – seems self-referencing as the ecosystem asset is defined as the ecosystem in a spatial area.

2.33, pp. 21-22, ‘for an ecosystem as a whole the concept of extent is generally considered in terms of area e.g. hectares for particular types of land cover’. This implies that land cover is an ‘ecosystem as a whole’, but goes on to say that changes in the mix of land covers may be important indicators of changes in ecosystem assets, which then implies land cover is a characteristic (a subset) of ecosystem assets not the ecosystem asset.

2.53, p. 25, ecosystem should be singular.

2.73, p. 28: repetition of ‘also’ in second sentence.

2.78. It is not clear what is meant by the second sentence of this paragraph: “the extension that is likely to be required for ecosystem accounting is the spatial disaggregation of information from asset accounts for these resources with specific recording of inter-ecosystem flows”. Clarify or delete.

2.98, pp. 32-33: the introduction of the idea of ‘hydrological years’ is confusing, so needs to be removed or clarified.

2.105, p. 34: this repeats the view that mineral and energy resources, soil and renewable energy sources do not arise from ecosystem processes. Not considering these as part of the accounting systems may be pragmatic, but the reasoning given needs to be sounder. An argument might be that most of these ecosystem processes involve such long timescales as to be beyond the field of interest. This will not necessarily be true for soil or some renewable energy sources, but it improves the current explanation.

Chapter 3

3.6, p. 37, point (ii), the reference here to ‘other producers’ is not clear in this context, particularly to those without an understanding of the SNA. Also can public benefits accrue to private producers? If not then we need another way to say that benefits accrue to people that do not own or manage the land from which the benefits are generated.

3.6, p. 37, point (iii), ‘there are ecosystem services that are generated from areas that are not privately owned or managed and contribute. .’ This could be made clearer to those without knowledge of the SNA

by stating what the areas are first, rather than what they are not. E.g. 'some ecosystem services are generated from public areas (e.g. national parks)'.

3.7, p. 37, the idea encapsulated here that the public benefits provided by ecosystem services 'are likely to be produced unintentionally by a private producer' is problematic. Rather than produced, which has a specific meaning in the SNA, perhaps we could use generated? This would make more sense given that the 'producer' has little or no involvement in generation of the service in this scenario.

3.11, p. 38, Here the draft states that 'biodiversity is a core characteristic of ecosystems' but 2.4 (p. 15) does not list biodiversity as a key characteristic of an ecosystem but rather considers it under 'composition'. Similarly, as noted above 2.5 (p. 15) describes biodiversity as 'an important broad characteristic' of ecosystems. It is important to develop clear and consistent definitions for terms such as biodiversity, characteristics and attributes and in particular how biodiversity and ecosystems relate (see separate discussion on biodiversity above).

3.12, p. 38, Terminology: is 'final output' an ecosystem service?

The role of a Panda in an ecosystem or generation of an ecosystem service is not necessarily clear to non-specialists. Iconic species are also not listed in an example of the cultural services in CICES (see table 3.1) and could be considered for inclusion.

3.15, p. 39, suggest some explanation of abiotic services be put in this document rather than referring the reader to the SEEA Central Framework. Without it, it is unclear what is meant. For example, physico-chemical processes described in the second sentence here are abiotic processes and are generated as part of ecosystem processes, so it seems like they should be included. The next point, 3.16, has a similar issue where 'natural inputs' are included but abiotic services are not.

3.23, p. 40: the acronyms 'MA' and 'TEEB' should be spelled in full.

3.62, p. 48, last sentence – believe the authors' intend 'than' rather than 'that'.

Chapter 4

4.8 & 4.9, p 54: There is an apparent inconsistency in definitions: 'key characteristics' for ecosystem condition are listed but are different to those previously. 'Qualities' of ecosystems are now listed as 'resilience, vigour and configuration,' previously this was 'organisation' not 'configuration', etc.

4.12, top of p.55 believe the authors' intend 'relatively'.

4.14, p.55 the discussion about relative conditions and a benchmarking point suggests a point in time 'before significant patterns of recent landscape change were in evidence'. This would benefit from more explanation and/or a definition. For example, what is considered 'significant' in patterns of landscape change and what is considered 'recent'? Will this change across continents? Also it should be made clear if landscape change affected, for example, by beaver dam building in North America should be included. Our understanding is that it should not be included, but this should be made clearer.

4.33, p. 58 missing word between enhancements and the – perhaps it is 'are'. This sentence is also confusing in its intent – in what aspect is the 'increase' in an ecosystem asset to be considered an

enhancement: an increase in condition or extent or both? Please refer to the note on terminology where we suggest replacing the words degradation and enhancement with other terms.

4.35, p. 58 in the sentence 'a particular feature of ecosystem assets is that they naturally regenerate' the word 'naturally' is potentially misleading. Ecosystems do not have to be natural – an agricultural landscape is an ecosystem and regeneration may be the result of a mixture of 'natural' and human inputs. The problem would be addressed by deleting the word 'naturally' (i.e. the important thing is the regeneration). Here again the distinction between ecosystems and ecosystem assets remains unclear and confusing.

4.58, p. 62: It appears that biodiversity is sometimes used to refer solely to animals (rather than all life). If this is the case it would be better to say animals. For example, the confusion is apparent in the sentence that explains there may be overlaps between vegetation and biodiversity where vegetation should be a subset of biodiversity.

4.63, p. 63 the first sentence, particularly 'it may be instructive to accounts may be compiled' needs correction.

4.64, p. 63 While mapping is an important tool for presenting accounting and other information, this appears to be the first mention of mapping in the document. Perhaps something about the communication information from accounts, via means other than tables, including maps, can be added earlier in the document (possibly as a new section in chapter 1 on communication)

4.71, p. 65: the concept of 'naturalness' of vegetation is problematic. Suggest using the word 'condition'.

4.71, p. 65: This is an interesting case where it could be explained why an air filtration service would not exist if people were not in the area – the physical processes which produce the service exist but are not used (nor valued). This is similar for flood protection. Impacts on the environment from soil erosion, silt in the water column and other impacts would occur without flood protection in an area whether or not people were living in the area. However, there could also be 'downstream' effects of such flooding that affect people or the drinking water quality. Here the relationship to inter and intra ecosystem need to be made clearer, particularly the point at which they become services to people that are outside of the area (EAU).

4.71, p. 65 end of paragraph – the question mark seems out of place.

4.73, p. 65 the statement that the required resolution depends on data availability is incorrect – data availability will impact the achievable resolution but not the required or desirable resolution.

4.75, p. 66 the separation of biodiversity from ecosystem quality is problematic here, particularly given the numerous preceding definitions of biodiversity which place it as a descriptor of ecosystem quality.

It's not clear what point is being made in the last sentence here, which appears to separate a beach vista from an ecosystem characteristic. A beach may be considered an ecosystem of its own or an ecotone (the gradational point between two ecosystems). Previous discussions have said that the enjoyment of scenery would come under a cultural value attached to the ecosystem, which could also be an ecosystem characteristic.

Table 4.5.1 (p. 70) replace "Rocks" with "Limestone".

4.89, p. 69 CO₂ needs a subscript 2.

4.99, p. 72 Biodiversity is defined again, this time as a 'fundamental component' of ecosystems. Later, it is something that can have a relationship with ecosystems rather than being part of them.

4.98, p. 71: There is a double nested parenthetical clause here that is missing an end parenthesis. Suggest rewriting to remove the double-nesting for clarity.

4.101 p. 72 the sentence 'by making biodiversity accounts for particular spatially defined areas..' is very dense and could be made clearer.

4.102 p. 72 seems to be another case where biodiversity is used where 'animals' are meant – many land cover measures are, after all, a relatively direct measure of vascular plant diversity.

4.104, p. 73 is another definition of biodiversity. This time, biodiversity contains ecosystems rather than ecosystems containing biodiversity.

4.105, p. 73 the taxonomic system most commonly used (and not the only one, see also the phylocode) is properly referred to as Linnean taxonomy rather than 'binomial nomenclature'. The explanation (i.e.: genus and species) could be deleted.

4.108, p. 73 is an example of the definition problems. This argument is circular given the difficulty of placing biodiversity either within or containing ecosystems. E.g. biodiversity loss is discovered through degradation of ecosystems which you measure using biodiversity loss.

4.109, p. 73 the clarification (e.g. plague proportions) is not useful as 'plagues' can be naturally mediated events.

The discussion of homogenisation could be read as an oversimplification. Adding an 'in general' to this statement will address this.

4.110, p. 74 the last sentence needs some clarification of expression ('than accounting of all aspects..')

4.115, p. 74 the second sentence needs to be corrected – suggest 'to' is inserted before 'combine'.

4.119, p. 75 last sentence should be 'threatened species'. Second last sentence is confusing and needs to be rephrased.

4.120, p. 75 second last sentence, delete 'then', last sentence (p. 76), insert 'and' between 'elephants' and 'other'.

4.112, p. 74 previous discussion has discounted the possibility of measuring genetic diversity but it is now listed as one of the indicators of the state of biodiversity.

4.121, p. 76 iconic values and charismatic megafauna are not the same concept. Suggest that these be separated and explained.

4.122 and Table 4.5.1, p. 76. Monera is missing from the 5 Kingdoms (only 4 are shown).

4.123: the comment that comparisons between countries should have some caveats. Comparing entire countries of different sizes or climatic zones (e.g. Brazil with Luxembourg) may not be particularly informative.

4.124, p. 77 discusses the importance of including all kingdoms while leaving one out (Monera).

4.125, p. 77 last sentence, delete second 'into account'

Chapter 5

Para 5.1., p. 79: "Valuation ~~is~~ therefore involves the estimation of missing prices". Here it is explicit that the current scope of valuation in the SEEA Part is about pricing. However, this scope could be broadened to include other techniques, such as choice modelling, which do not convert individual preferences to prices. If it remains excluded from the scope, then at least a mention of these approaches would be appropriate.

Also to make the scope of valuation clearer in the text, most of the time it would be better to say "monetary valuation" rather than just "valuation". This is done in some cases (e.g. in last sentence of paragraph 5.3) but should be done consistently (e.g.: in para 5.11, 2nd sentence; 5.9 1st sentence "value *in monetary terms*").

Para 5.4, p. 79: This is a good paragraph but a third point could be that different benefits occur depending on whether you are a final user or producer of ecosystem services. Also in first sentence refer to both ecosystem assets and ecosystem services (currently just the latter).

Para 5.8: A third point could be that this is to guide public and private investment decisions. To some extent this may be covered for government in point 1

Government units is used in para 5.6 but this may confuse some people. Suggest using government sector, or just government. Similarly economic units as used in para 5.21 could be confusing and perhaps using establishments would be better. Need a discussion of these types of statistical units in chapter 2 to help those unfamiliar with SNA.

Para 5.14. A extra point is that valuations made using different approaches cannot be aggregated. An extra paragraph could be added, saying that while no recommendations are made, starting with SNA is likely to more acceptable than other approaches.

Paras 5.17 and 5.18, p 82: A related issue is the unused capacity of ecosystem assets. Since ecosystem services only exist if they are used by people, the physical production which would be ecosystem services if they were used by people are not counted. These unused potential services remain outside the system of accounting (as inter and intra ecosystem flows).

Figure 5.1 p. 83. This should be redrawn with different line types (i.e. use solid lines, dotted lines and dashed lines). This will make it easier it to understand in black and white reproductions

Para 5.48, p. 88: replace 'fully natural' with ecosystem assets largely unaffected by humans (or similar).

P.5.47, p. 88: It may be worth adding a sentence: "If these ecosystem services were not available for use in production, either they would have to be replaced with other factors of production or production would be diminished or cease".

Para 5.49, p. 88: replace "ecosystem" on 5.49 with "ecosystem asset".

Para 5.51, p. 89: Re use of he and his. An editorial choice but should the document be gender neutral?

Para 5.57, p. 90: Use of the ampersand?

Chapter 6

Section 6.2. Perhaps some examples of combined presentations could be added to this section

Paragraph 6.10: this is part of the justification and perhaps should be part of the introduction (i.e. after paragraph 6.5). It would then make a nice lead in for Section 6.2.

Paragraph 6.29 and Table 6.1: The table and explanation are good. The presentation in the table does not, however, show degradation. "Extraction and harvest" should be shown as reductions caused by human activity (as per suggestion for table 4.3) to avoid the use of the term "degradation". Whichever terms are used, the terminology should be consistent.

Paragraph 6.44 repeats a substantial part of paragraph 6.4. Reduce duplication in the later paragraph and refer back if necessary.

Attachment 2. Suggested update to text on Units

Units for ecosystem accounting

2.3.1 Introduction

- 2.40 In order to undertake measurement of ecosystems in a co-ordinated way and to subsequently compare and analyse information across time and between ecosystems, there must be a clear focus for measurement. Boundaries for specific ecosystems are generally drawn on the basis of relative homogeneity of ecosystem characteristics, and in terms of having stronger internal functional relations than external ones. However, these boundaries are often gradual and diffuse and a definitive boundary between two ecosystems may be difficult to establish. Further, ecosystems may be very small or very large and operate at different spatial scales.
- 2.41 Statistical units are the entities about which information is sought and about which statistics are ultimately compiled. It is the unit that provides the basis for statistical aggregates and to which tabulated data refer.

[Insert paragraphs on economic units from SEEA CF about here]

2.42 The statistical units of ecosystem accounting are spatial areas about which information is collected and statistics are compiled. Such information is collected at a variety scales using a number of different methods. For example, remote sensing, on ground assessments, surveys of land owners or administrative data (e.g. zoning laws or for the purpose of levying land taxes). The variety of methods and the different scales at which data sources are collected mean that unlike other areas of statistics, a single all-encompassing statistical unit cannot be identified for ecosystem accounting at this stage.

2.42.2.43 To account for the different scales and methods used to collect, integrate and analyse data the units model consists of three different types of units are identified: basic spatial units (BSU), land cover/ecosystem functional units (LCEU) and ecosystem accounting units (EAU). The following sub-sections describe each type of unit. The BSU, LCEU and EAU do not delineate an ecosystem per se although the LCEU may fit most closely with common conceptions of an ecosystem. However, ecosystems are multi-faceted and depending on the purpose of analysis may be delineated spatially in different ways.

2.44 In this the accounting units model can be viewed as either bottom-up (i.e. starting with BSU) or a top-down (i.e. starting with LCEU or EAU). That is, the BSU may be aggregated to form LCEU or EAU, while LCEU or EAU can be disaggregated to form BSU. Direct measurements may be made of each of these types of units and the use of one type of unit for measurement of a particular aspect of an ecosystem does not preclude the use of other spatial units for measurement of other aspects.

2.43.2.45 The statistics for each spatial unit pertain to the characteristics and location of an ecosystem (see para 2.4) and its services. In compiling accounts, it may be necessary to also collect information about biological—the biotic components (e.g. trees, animals, etc.), but statistical units for the measurement of these characteristics are not articulated here. For a country or region the total area is generally subject to little change and the main interest of ecosystem accounting lies in assessing changes within a total area.

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~~2.44 The units model consists of three different types of units: basic spatial units (BSU), land cover/ecosystem functional units (LCEU) and ecosystem accounting units (EAU). The following sub-sections describe each type of unit. The BSU, LCEU and EAU do not delineate an ecosystem per se although the LCEU may fit most closely with common conceptions of an ecosystem. However, ecosystems are multi faceted and depending on the purpose of analysis may be delineated spatially in different ways.~~

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2.3.2 Basic spatial units

2.452.46 A basic spatial unit (BSU) is a small spatial area. Ideally, BSU should be formed by delineating tessellations (small areas e.g. 1 km²), typically by overlaying a grid on a map of the relevant territory, but they may also be land parcels delineated by the cadastre. Grid squares, ideally each one being a BSU, are delineated to be as small as possible given available information and landscape diversity. The model can also accommodate different scale grids through spatial nesting (e.g. a 1 m² grid aligned within 10 m² and 100 m² grids)

2.462.47 The delineation of BSU is made purely on a spatial basis and before any other information on these areas is available. After delineation Each BSU ~~should~~ can be attributed with a basic set of available information ~~that is available~~. The most common starting point for this attribution process will be information on the location of the unit and land cover. This basic information is then extended with information relevant to the purpose of the account being compiled. For example, relevant information may include ecosystem characteristics such as soil type, groundwater resources, elevation and topography, climate and rainfall, biodiversity species present and their abundance, the degree of connection to related areas, current or past land uses, land ownership, location relative to human settlement, and the degree of accessibility to the area by people.

2.472.48 This ~~set of~~ information may be extended to also include information on the generation of different ecosystem services from the BSU such that the BSU can represent the level at which all relevant information for ecosystem accounting is assimilated and organised. Since ecosystem services are often generated over areas larger than a single BSU a method is required to attribute information to the BSU level. This issue is discussed in Chapter 3.

2.49 If possible, information on any associated economic units, e.g. for example land owners, should be attributed to each BSU. (which may be straightforward when using land parcels and the cadastre). This range of information recognises that while each BSU is a mutually exclusive area, it can be placed into a number of spatial defined areas (e.g. EAUs) and that exists within a number of systems ecosystem assets and ecosystem services may that operate at varying spatial scales and relate to more than one economic unit. The link to economic units is discussed further in sub-section 2.3.6.

2.3.3 Land cover/ecosystem functional units

2.482.50 The second type of unit is the land cover/ecosystem functional unit (LCEU). For most terrestrial areas an LCEU is defined as the set of contiguous BSU by satisfying a pre-determined

set of factors relating to the characteristics and ~~operation-function~~ of an ecosystem, ~~generally represented by~~. ~~Examples of these factors include including~~ land cover type, water resources and soil type. A particular feature is that the ~~set of BSU that comprise an~~ LCEU should be seen as operating ~~in a relatively joint manner and~~ independently from neighbouring LCEU.

~~2.51~~ The resulting LCEU would commonly be considered an ecosystem or biome noting that these concepts are not strictly able to be defined purely in spatial terms. ~~LCEU can be disaggregated into BSU (e.g. by overlaying a grid) or conversely BSU may be aggregated to form a LCEU.~~ Following standard approaches to statistical classification, BSU would be classified to particular LCEU on the basis of a pre-dominance of characteristics within the BSU. This is akin to classifying an enterprise to a particular industry based on the pre-dominance of a particular economic activity in that enterprise.

~~2.492.52~~ A provisional land cover/ecosystem functional unit classification showing 15 classes is shown in table 2.5. The classification is based on the FAO Land Cover Classification System, version 3 (LCCS 3) (FAO, 2009). This approach uses as its starting point the Land Cover Classification presented in the SEEA Central Framework Chapter 5 (which is also based on LCCS 3) and combines these into classes that are optimised for the analysis of changes in land cover and land use. The cover classes can be augmented by other characteristics, for example, relating to broad climatic zone (e.g. tropical, sub-tropical and temperate), elevation (e.g. lowlands, highlands) and topography (e.g. plains and mountains).

~~2.50~~ LCEU will vary in size depending on the situation in a given country. Also, not all countries will have all types of LCEU ~~described in table 2.5. For the purposes of national level ecosystem accounting it is appropriate to consider only a limited set of LCEU classes.~~ Various studies and reports (e.g. CBD, MA, UK NEA) have used different classifications but all using terms that may be considered commonly understood (e.g. forests, wetlands, grasslands, coastal areas).

~~2.51~~ ~~A more rigorous approach that may better suit the purposes of international comparison for ecosystem accounting has been developed based on the FAO Land Cover Classification System, version 3 (LCCS 3) (FAO, 2009). This approach uses as its starting point the Land Cover Classification presented in the SEEA Central Framework Chapter 5 (which is also based on LCCS 3) and combines these into classes that are optimised for the analysis of changes in land cover and land use. A provisional set of 15 classes is shown in Table 2.5.~~

~~2.522.53~~ At any point in time, all LCEU should be mutually exclusive, ~~i.e. all BSU should be within only one LCEU.~~ However, over time as changes in land cover and land use occur, some BSU will need to be re-classified to different LCEU – for example from Agriculture associations and mosaics to Urban and associated developed areas.

~~2.532.54~~ For smaller scale analysis, it may be relevant to undertake accounting for a single LCEU. There may also be interest in aggregation of information about specific types of LCEU, ~~where ever they are located~~ e.g. concerning all open woodlands or wetlands in a country or region.

Comment [RM1]: Should be spelled out, footnoted or listed in the glossary or Abbreviations listing

Table 2.5 Provisional Land Cover/Ecosystem Functional Unit Classes

Description of classes
Urban and associated developed areas
Medium to large fields rainfed herbaceous cropland
Medium to large fields irrigated herbaceous cropland
Permanent crops, agriculture plantations
Agriculture associations and mosaics
Pastures and natural grassland
Forest tree cover
Shrubland, bushland, heathland
Sparsely vegetated areas
Natural vegetation associations and mosaics
Barren land
Permanent snow and glaciers
Open wetlands
Inland water bodies
Coastal water bodies
Sea

2.542.55 It is likely that LCEU represent the closest approximation to ecosystems in spatial terms in the way that [large scale](#) ecosystems are commonly envisaged. However, in order to more fully adapt LCEU to ecosystems types it is likely to be necessary to allow for variations in climatic conditions, geophysical conditions, and land use. In relation to land use, for some purposes it may be relevant to cross-classify LCEU by the extent to which the area is considered influenced by human activity. Thus types of LCEU (e.g. forest [tree cover](#)) may be considered as reflecting natural, semi-natural, agricultural or other types of ecosystems.

2.552.56 [While table 2.5 presents a provisional list of land cover/ecosystem functional unit classes,](#) No definitive classification of ecosystems is provided in the SEEA Experimental Ecosystem Accounting. Progressive experimentation in the development of ecosystem accounts in various countries may reveal a consistent core set of classes that can be developed into an ecosystem classification in the future.

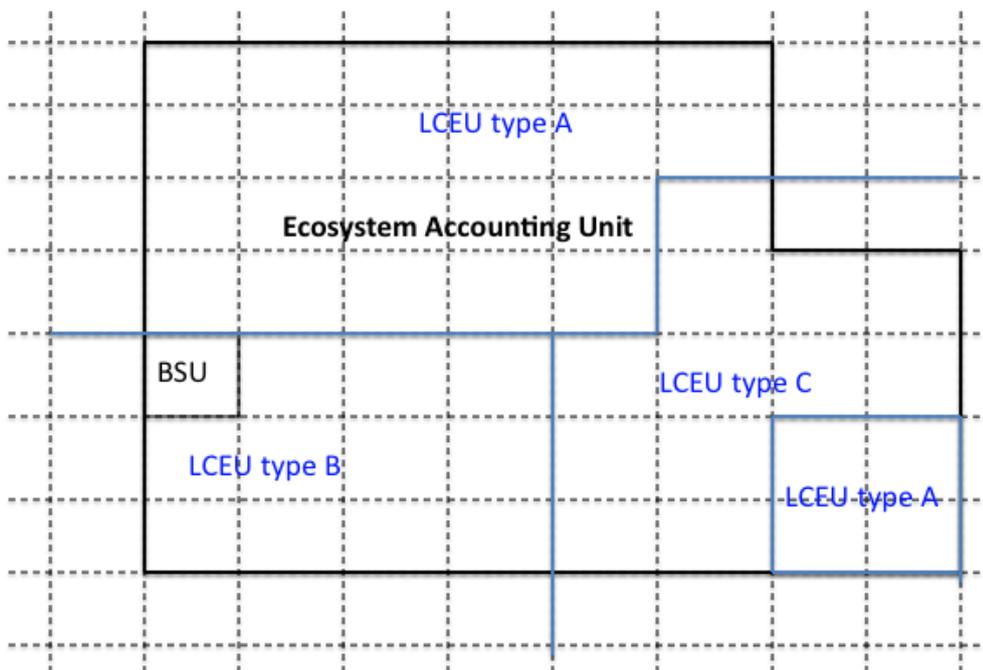
2.3.4 Ecosystem accounting units

2.562.57 The delineation of an EAU is based on the purpose of analysis and should therefore take into consideration administrative boundaries, environmental management areas, large scale natural features (e.g. river basins) and other factors relevant to defining areas relevant for reporting purposes. [This is different from the LCEU which are based on physical land cover.](#) Overall, EAU should be relatively large areas about which there is interest in understanding and managing change over time. Consequently, EAU should be fixed or largely stable spatial areas over time.

2.572.58 Depending on the size of the country there may be a hierarchy of EAU building from smaller reporting units to the national level. For example, starting from a local administrative unit a hierarchy of EAU may build to provincial and then national level. In all cases, a country's total area will represent a single level in a hierarchical EAU structure.

- | 2.582.59 A specific concept that has been developed that may be useful in the delineation of EAU is socio-ecological systems. Areas defined as socio-ecological systems integrate ecosystem functions and dynamics as well as human activities and the range of interactions of these components.
- | 2.592.60 For the purposes of national scale ecosystem accounting it is recognised that EAU are likely to contain a range of ecosystem types (reflected in different types of LCEU) and generate a range of ecosystem services.
- | 2.602.61 For a single country it may be relevant to recognise different hierarchies of EAU. For example, a set of EAU may be delineated based on administrative regions, a second set may be based on catchment management areas, and a third set may be based on soil types. All EAU within each set may be aggregated to form national totals but there should not be aggregation of EAU across different sets (e.g. adding some administrative regions with some catchment areas) since this would imply the aggregation of “non-matching units”.
- | 2.612.62 Figure 2.4 provides a stylised depiction of the relationships between EAU, BSU and LCEU where, in this case the BSU are defined by grid squares. Attribution of BSU to EAU and to LCEU should be based on predominance. Note that it is possible for a number of LCEU types to be present within a single EAU and for a single LCEU type to appear in various locations within an EAU.

Figure 2.4 Stylised depiction of relationships between EAU, BSU and LCEU



2.3.5 Units in relation to ecosystem services

2.622.63 It should be recognised that since any given spatial area may generate a number of types of ecosystem services it is likely that a single BSU will be involved in the generation of a range of ecosystem services. In this sense there is no direct analogy between the BSU and an establishment in economic statistics that undertakes a single kind of activity.

2.632.64 In addition, it is likely that many ecosystem services are generated over a larger spatial area than a single BSU or, at least, are measured over areas larger than a single BSU. Given this, it may be useful to map sets of BSU that are relevant to the generation of particular ecosystem services. Often these maps will reflect a contiguous set of BSU (for example, in the case of provisioning services from a forest), but this need not be the case. It is possible that some ecosystem services are generated in a single BSU (e.g. cultural services from a local fishing spot).

2.642.65 Although the generation of ecosystem services may take place over varying spatial areas depending on the ecosystem service, a useful measurement starting point may be to consider the ecosystem services generated within an LCEU. Particularly for provisioning and cultural services, an LCEU is likely to provide a useful spatial boundary for the measurement of ecosystem services. Maps of ecosystem service generation may be useful tools in delineating LCEU by providing an understanding of concentrations of related ecosystem services.

2.3.6 Relationship to economic classifications

2.652.66 The cross-classification of BSU information with economic units is central to assessment of the relationship between ecosystem services, ecosystem assets and economic activity. The application of ecosystem related information to questions of land management and ecosystem degradation requires such connections to be made.

2.662.67 Ideally, the linking of BSU to economic units would be undertaken in the process of attributing BSU with basic information on, for example, land use or ownership (via cadastres). If this detailed linking is not possible then broader assumptions may be used for example by linking information on land cover and land use to BSU.

2.672.68 For certain ecosystem services it may be relevant to use economic units as a basis for collecting relevant data. This may most relevant in respect of provisioning services.

2.682.69 It is noted that the beneficiaries of the ecosystem services may be the land user or owner, or, it may be people living nearby (as in the case of air filtration) or populations at large (as in the case of carbon sequestration). Further, in specific cases the beneficiaries may be spatially delineated, such as in the case of people living downstream in the flood zone of an upper catchment that is managed with the aim of protecting its hydrological services.

2.3.7 Issues in the delineation of units

2.692.70 The delineation of units should be undertaken in concert with the development of spatial databases in Geographic Information Systems (GIS). These databases should contain information such as soil type and status, water tables, rainfall amount and pattern, temperatures, vegetation, biodiversity, slopes, altitude, etc., as well as, potentially, information

on land management and use, population, and social and economic variables. This information may also be used to assess flows of ecosystem services from given spatial areas.

2.702.71 In presenting accounts for ecosystems at a national level, the geographic scope of the accounts should be clearly stated. Often, the scope may be limited to terrestrial areas but there may be good reasons to extend coverage to incorporate marine areas under the control of a national administration. In the context of the SEEA this is deemed to extend to the country's Exclusive Economic Zone (EEZ). Particular care should be taken in defining the treatment of coastal ecosystems that straddle terrestrial and marine areas. Additional considerations in the delineation of statistical units for coastal areas, marine environments and rivers are discussed in an annex.

2.712.72 The delineation of units for the atmosphere should be considered in the context of delineating BSU. It is suggested that each space above a BSU be considered a unit of atmosphere with this space constituting an "air volume". Depending on the purpose of the account any information about the quality of the air or its form (e.g. presence of greenhouse gases) may then be attributed to the terrestrial BSU below. Recognising atmospheric characteristics of BSU may be useful in, for example, the organisation of information on topics such as air pollution.

2.722.73 The boundaries of a country's atmosphere should align with the terrestrial and marine boundaries used in the ecosystem accounts. Thus, it would consist of all air volumes directly above that stated scope of the accounts, potentially out to the limit of the EEZ.

1. **Attachment 3. Different boundaries for ecosystem accounting (i.e. EAU). To show land cover, and in particular LCEU, are not the only boundary needed for ecosystems accounting.**

Land cover is not the only way to describe the physical environment and is not the only set of units needed for describing ecosystems.

There are dozens upon dozens of other ways to segment the physical world, and the choice of method should be determined entirely by the purpose. We suggest that the focus on the LCEU could be misleading and that by giving other examples of units for accounting will avoid confusion.

Australia for example, can be described by bioregion, catchment, vegetation or soil types (Fig 1).

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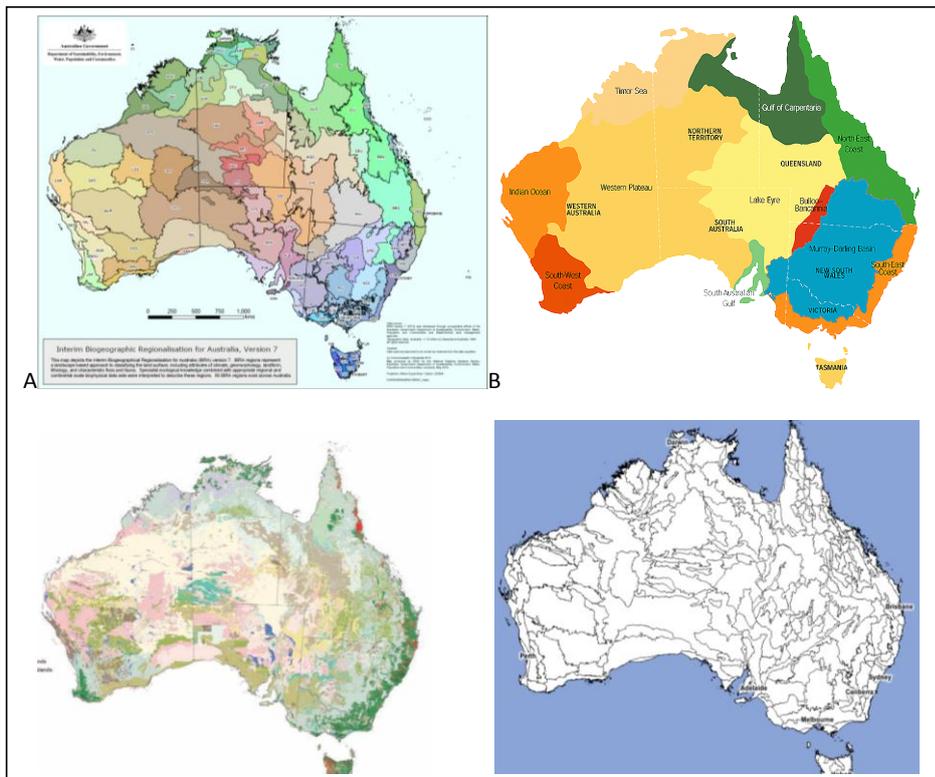


Figure 1: Examples of potential units to divide Australia into for accounting purposes: A. IBRA Bioregions, B. Catchments, C. Major Vegetation Groups, and D. Soil Classes.

Annex 4: Scientific Accreditation of Ecosystem Condition in Australia

Prepared by the Wentworth Group of Concerned Scientist.

Scientific Accreditation of Ecosystem Condition

1. Ecosystem Condition Indicators

Measuring the condition of ecosystem assets enables the accounting of ecosystem degradation.

Indicators of ecosystem condition should therefore provide quantifiable and transparent measures of both the state (quality) of the asset, and be able to detect change over time.

Measuring the condition of ecosystems is complex because of the many biophysical interactions within individual ecosystems, the many interactions between ecosystems, because ecosystems operate across multiple scales, and because ecosystems exhibit a high degree of natural variation over differing time scales.

Because of this, different indicators are often needed to measure the same asset in different locations, as the pressures causing degradation vary.

Indicators need to reflect an ecosystem's vigour (level of ecological productivity), its organisation (structure and interactions), and its resilience (ability to respond to a disturbance by resisting damage and recovering quickly).¹ As a consequence, a number of indicators usually need to be combined into an index to provide a valid measure of ecosystem condition.² A scientifically valid measure of freshwater river ecosystem condition, for example, might require the combination of up to 20 separate condition scores.³

An index of ecosystem condition can be generated by:

- using a single indicator; or
- combining two or more indicators; or
- combining scientifically valid weighted indicators; or
- using a scientific model that incorporates various indicators and weightings to reflect a holistic view of the ecosystem.^{4,5}

2. A Common Unit of Measure of Ecosystem Condition

Central to the ability to aggregate scientific information to construct ecosystem asset accounts is the ability to construct a common, non-monetary, unit of measure of ecosystem asset condition - enabling apples to be compared with oranges.

A common unit of measure is constructed by comparing current condition with reference condition. It compares the current condition against the reference benchmark, giving a score out of 100.^{6,7,8,9,10,11,12,13}

Reference benchmarking is a method used extensively in the ecological scientific literature to create a relative measure of condition. The reference benchmark is a scientific estimate of an asset in an undegraded condition.

It can be a direct measure of an indicator at a site that is in an undegraded condition,¹⁴ it can use scientific modelling that estimates the condition of an asset in an undegraded condition,¹⁵ or it can be an estimate at fixed point in time (for example, an estimate of an asset's condition prior to industrial development).¹⁶

The reference benchmark enables the description of the condition of an asset in relative terms. It acts as a common denominator, a normalising factor. It sets the upper bounds for the measurement of the asset in the ecosystem condition account.

For example, somewhere within the national boundary there is likely to be site where an asset (for example, a river or a forest) that is in an undegraded condition. The condition of the river or forest in that location may provide the reference benchmark measure for that asset.

The benefit of the reference condition benchmark concept to ecosystem accounting is that it enables complex scientific information to be placed in an accounting framework, creating a standardised *common unit of measure* that is capable of addition and comparison. This allows for the comparison of the condition of different assets, and the use of different indicators to compare the condition of the same asset in different location: the comparison of a river with a forest, or one forest with another.¹⁷

3. Scientific Accreditation of Ecosystem Condition Accounts

Measurement standards are fundamentally important to the integrity of any accounting system. Markets and decision-makers must have confidence that the measured indicators properly reflect the condition of the assets being measured.¹⁸

Measurement standards are not in the Central Framework, nor are they in the System of National Accounts, because there are already agreed standards for the measures in these accounts, whether they are national currencies or international standards for weights and measures. For example, the SNA requires that: *“All entries in the accounts have to be measured in terms of money, and therefore the elements from which the entries are built up must be measured in terms of money... Money is thus the unit of account in which all stocks and flows are recorded”*.¹⁹

The acceptance of ecosystem condition accounting is therefore dependent on the establishment of a formal process by which scientists accredit the quality of the indicators, indices and reference benchmarks that underpin an ecosystem condition account.

The purpose of accreditation is to ensure that the information contained within an asset condition account is fit-for-purpose, scientifically robust, based on quality data, that it contains appropriate measures of ecosystem condition, and that it can be aggregated.

Scientific accreditation requires independent scientific experts formally assessing the account against a set of criteria or standards, and then making a judgment as to whether it meets those criteria to an acceptable level:

1. It contains an appropriate set of assets;
2. It is based on indicators that are suitable measures of those assets (Box 1);
3. It is based on quality data (Box 2);
4. It contains reference benchmarks that are scientifically valid;
5. It contains common units of measure that are scientifically valid; and
6. It is able to be aggregated with environmental accounts from other regions.

BOX 1: Indicator Selection Principles²⁰

1. **Relevant** – the indicator is a measure or surrogate of the condition of an environmental asset or system
2. **Simple** – the indicator is easily interpreted, monitored, and appropriate for community use.
3. **Sensitive** – the indicator is able to detect change in the condition of the environmental asset.
4. **Measurable** – the indicator can be statistically verified, reproduced and compared.

5. **Timely** – the indicator shows trends over time, provides early warning of potential problems and highlights future needs or issues.
6. **Aggregative** – the indicator is amenable to combination with other indicators to produce more general information about environmental conditions.

BOX 2: Data quality standards

The standards of data quality include:

1. Field data should be collected under appropriately designed sampling programs that are: fit for the issue, question or hypothesis of interest; are of an acceptable spatial and temporal resolution; and detect change and do not pick up change that is not there.
2. Data sets should be suitably accurate and precise, statistically verifiable and reproducible.
3. Data sets should be treated and analysed to accepted standards (if available).

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- ¹⁶ North America uses a 'pre-Columbian' benchmark (Hughes, R. M., P. R. Kaufmann, A. T. Herlihy, T. M. Kincaid, L. Reynolds, and D. P. Larsen (1998) A process for developing and evaluating indices of fish assemblage integrity. *Canadian Journal of Fisheries and Aquatic Sciences*, 55: 1618–1631) and Europe uses a 'pre-intensive agriculture' date. For Great Britain this has been defined as approx. 1850 (Wallin, M., T. Wiederholm, and R.K. Johnson, 2003. Final guidance on establishing reference conditions and ecological status class boundaries for inland surface waters. EU Common Implementation Strategy (CIS) for the Water Framework Directive.
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Attachment 5: ABS Paper contributed to the SEEA Valuation Discussion Group

Michael Davies

September 2012

I have been asked to be part of the SEEA Valuation Discussion Group as a national accounts expert to bring an SNA perspective to the group.

The core issue under discussion is the valuation, using monetary units, of environmental stocks and flows which are not subject to market transactions and therefore do not have observable values. My understanding of the objectives of the exercise is to come up with methods of valuation which result in credible valuations which can be used to combine and compare with valuations based on SNA principles.

In this contribution, I will attempt to describe the basis of valuation in the SNA and the status of non-market transactions in the SNA. From these, it is possible to derive a range of characteristics necessary for valuations to be credible and robust for analysis. The SEEA EEA proposals for valuation can be tested against these characteristics.

I realise that this overlaps with some of the material in the draft SEEA EEA chapter and it will all be self-evident to those familiar with the SNA. Nevertheless, I think it is worth spelling out the SNA position in simple terms.

The views expressed are those of the author and not of the Australian Bureau of Statistics.

SNA Valuation

The SNA is a conceptual framework for the organisation of observed data. The framework is consistent with economic theory, but the valuation of stocks and flows does not depend on economic theory. The values are observed.

The SNA framework defines a transaction as an exchange of value. It requires that stocks and flows be valued at market prices. When goods and services are bought and sold on markets, monetary transactions take place and the values of the purchases and sales can be observed and recorded in accounts. A description of the characteristics of SNA valuations is included in Appendix 1.

There are ongoing debates about the finer points of the SNA, including valuation methods, but generally SNA based data are widely used and accepted as credible estimates. Users focus on the numbers and not the methods used to estimate them.

The inclusion of both real and financial stocks and flows in the SNA and the articulation of the relationships between these makes SNA based statistics extremely useful, for example in analysing the recent financial crisis which has had significant impacts on real activity. The inclusion of non-monetary stocks and flows in the SNA has always been a contentious issue as it decreases the usefulness of the statistics for these purposes. Non-monetary activities have been included somewhat arbitrarily as an uncomfortable compromise. The discussion of the identification of non-market activities to be included in the SNA accounts and their valuation parallels the issues discussed in the SEEA context.

The decrease in usefulness of SNA statistics as non-monetary activities are added is because non-market activities are intrinsically different from market activities and their movements may

be different. They have no direct financial implications and are not subject to the same fluctuations as market activities. This complicates analysis.

For those non-monetary activities which are included, no value can be observed. The SNA recommends several methods to value these transactions. The methods are all aimed at approximating the value which the stock or flow would have if it was transacted. They are not theoretical models of the determination of value.

Exceptions in the SNA

At times, an economic unit in its capacity as producer provides a good or services to itself in its capacity as a consumer. These are similar to barter transactions, where goods and services are exchanged without money changing hands.

In this case, both the transaction and the quantities transacted are observed. Only the price is estimated. There are no financial entries for these transactions. However, they usually have close counterparts transacted on markets (that is the same goods and services have observable prices) and they usually interact with market activities, for example they are internal transactions in an economic unit which buys inputs in the market and sells outputs in the market.

The SNA recommends that internal non-monetary transactions be valued at the sum of costs of production. This is aimed at approximating the market value. It is not put forward as a theory of the determination of value.

The SNA recognises that not all transactions represent an obvious exchange of value. The payment of tax to the government is an example. It could be argued that this is payment for a range of services, but as there is no directly identifiable value provided by the government in exchange for the tax payment, it is treated as a one-sided transaction called a transfer.

The SNA recommends the imputation of some transactions. An example is the imputation of rent of owner occupied dwellings. The dwelling owner is recorded as running a business which produces housing services. The owner both produces and consumes the services. The treatment is similar to that for an economic unit consuming its own production described above. In this case, producing a credible valuation is easy. If a house is rented and an identical house is owner occupied, the value of the service equals the observed rent.

SEEA EEA

The draft SEEA Experimental Ecosystem Accounts (SEEA EEA) proposes methods for placing a monetary valuation on ecosystems and ecosystem services.

The challenges of doing this are the same as those faced by all attempts to place monetary values on non-monetary transactions. For example, these problems arose recently in the ABS in attempts to value work of volunteers.

The draft chapter contains what is effectively a survey of possible methods. Some of the methods are based on the methods recommended in the SNA to approximate valuations in the exceptional cases where there are no observed values. Others are based on economic and welfare theory.

To achieve the level of credibility and robustness of SNA valuations, the identification of which services and assets to value should be based on clearly articulated principles. The principles need to be agreed, then services and assets tested against these case by case.

Secondly, to gain acceptance as credible, coherent valuations which can be combined and compared with SNA based valuations, SEEA valuations need to be firmly and clearly based on the simple basic principles of SNA valuation rather than based on exceptions. Such a principle based approach will provide values for both stocks and flows.

With reference to the above and Appendix 1, some of the problems from an SNA point of view with the suggestions in the draft chapter are, to varying degrees:

- the nature of the services is vague and their identification is not principles based
- the production of the services is not visible - are other goods and services used in the production of the services? if so, where are these recorded?
- the delivery of the services are not exchanges of value - while it is postulated that one party benefits from the delivery of the service, the party who benefits does not surrender anything of value in exchange - the core issue here is that there are no ownership rights over the assets or the services
- because of the above, there are no observable values
- in most cases, there are not readily understandable parallels to services or assets with observable prices
- the values derived do not seem to have price and volume dimensions

Conclusion and Way Forward

The estimation of monetary values for non-monetary activities is a vexed issue in the SNA context. It has been discussed for many years with no resolution. The challenges faced in putting monetary values on ecosystem services and assets are the same as those faced by other attempts to put monetary values on non-monetary activities.

The principles based approach of the SNA requires that the identification of activities to which values can be applied and their valuation need to be firmly and clearly based on the simple basic principles of the SNA. Using tenuous analogies to SNA exceptions and contentious theoretical constructs as the basis of valuation is unlikely to produce credible valuations. The likely outcome of this approach is that potential users will focus on the contentious aspects of the valuation methods and debate them endlessly rather than accept the valuations as meaningful statistics for analytical purposes.

An SNA style approach would involve:

- deriving principles for the identification of services and assets to be recorded and valued
- identifying the transactions - this needs to be an exchange of value between two parties
- valuing the transactions using methods that are based on observed values

The biggest impediment to this approach is the lack of property rights over the services and assets. This makes the identification of an exchange of value difficult.

The key to credible valuation appears to be to address this stumbling block. This may mean imputing ownership. Once this is done, transactions which represent an exchange of value can be imputed.

As mentioned above, the challenges of doing this are the same as those faced by all attempts to place monetary values on non-monetary transactions. This means that there is a variety of people coming at what is essentially the same problem from different angles. For example, these problems arose recently in the ABS in attempts to value the work of volunteers. Similar issues are addressed in World Bank work on calculating an Adjusted Net Saving measure.

It would make sense for the interested parties to work together on a common approach to valuing non-monetary activities.

Appendix 1:

Valuation in the System of National Accounts

In the SNA, flows are valued at the volumes multiplied by the price per unit of volume agreed upon by the transactors. This is the market value. Stocks are valued at the volume multiplied by the price per unit of volume realisable in the market. In the simplest case, this is the volume multiplied by a price observed in a transaction at the time of valuation. There are methods of approximating this value, for example in the case of a lack of observable transactions, but they are all attempts to estimate the fundamental concept described here.

SNA example

The simplest case to illustrate basic SNA valuation principles is the sale and purchase of goods.

An example is the purchase of three bottles of wine for \$99.

The characteristics of this transaction are:

- There is a flow of three bottles of wine from the seller to the buyer.
-
- There is a flow of \$99 from the buyer to the seller.
-
- The buyer has three more bottles of wine after the transaction.
-
- The seller has three less bottles of wine after the transaction.
-
- The buyer has \$99 less cash after the transaction.
-
- The seller has \$99 more cash after the transaction.

All of these are inextricably related. There is a set of identities. For example:

- The \$99 flow is a volume of three bottles of wine multiplied by a price of \$33 per bottle.
-
- The changes in the values of stocks equal the values of the flows.
-
- The value received by the buyer is equal to the value surrendered by the seller.
-
- The value received by the seller is equal to the value surrendered by the buyer.

These identities form the basis of the construction of a set of accounts.

There are some other characteristics which form the basis of a set of coherent, credible accounts.

- The stocks and flows to be included are clearly defined using a set of principles.
-
- The identification and valuation of the stocks and flows is based on ownership. In the example above, the seller owns the three bottles of wine before the transaction and owns the cash after the transaction. The basis of the flows is changes of ownership of wine and cash. The basis of the stock changes is the ownership of the stocks at a point in time.

The characteristics described above result in the recording of credible, coherent values for stocks and flows for the sale and purchase of a good. These allow the comparison of diverse stocks and flows at a point in time and across time.

The recording of the sale and purchase of a service is somewhat more complex, but can be described by building on the goods example. In the case of goods, the good is produced and goes into inventories (an asset). A service is consumed as it is produced, so there are no inventories of services. However, the producer of a service transforms goods and services (including capital services) into a service. They use up the goods and services in the production of services just as producers of goods do. If we look at it as if the services are produced, go into inventories and are instantly sold from inventories, the goods model above can be applied. There is not as clear a connection between flows and stocks.

A special type of service is a capital service. In the production of goods and services described above, capital assets provide a flow of services into the production activity. The full details of the production and consumption of these services are not recorded in the accounts as they are within the producing unit. Nevertheless, they are similar to the production of other services.

Michael Davies
September 2012

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World Bank: Adjusted net saving – a proxy for sustainability

<<http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/ENVIRONMENT/EXTEEI/0,,contentMDK:20502388~menuPK:1187778~pagePK:148956~piPK:216618~theSitePK:408050,00.html>>



DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS
STATISTICS DIVISION
UNITED NATIONS

SEEA Revision

**SEEA Experimental
Ecosystem Accounting**

Comment form

Comment form for the Consultation Draft

Deadline for responses: 15 January, 2013
Send responses to: seea@un.org

Your name:	Laure Ledoux
Your country/organization:	European Commission, Directorate General Environment
Contact (e.g. email address):	Laure.Ledoux@ec.europa.eu

To submit responses please save this document and send it as an attachment to the following e-mail address: seea@un.org.

The comment form has been designed to facilitate the analysis of comments.

In Part I general comments on the structure and content of the draft document are sought. In Part II any other comments, particularly those of a technical nature should be included.

Relevant documents

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Part I: General comments

In the box below please supply any comments on the structure of the document, the balance of material and the coverage of the draft including any thoughts on missing content.

Comments on the style, tone, and readability of the text are also welcome.

Please reference paragraphs numbers or section numbers as appropriate.

Click here and start typing (The length of your response is not limited by this text box.)

These comments are from the Directorate General Environment of the European Commission, and are therefore provided from a policy perspective. This complements the comments already sent by Eurostat, which were provided from an official statistics perspective.

The overall document is well written and of high quality, and provides a wealth

of useful information on ecosystem accounting, whilst also highlighting the challenges. The document would however gain in clarifying/further developing the issues below.

Para 1.3 usefully points out that ecosystem accounting complements the SEEA Central Framework by taking into account unpriced ecosystem services, and allowing to evaluate trade-offs between different types of ecosystem services. However, the emphasis of the description of the objectives of ecosystem accounting in section 1.4 seems to focus on better environmental management. The wider implications in terms of better measuring national wealth and contributions to human wellbeing could be more prominent and highlighted perhaps already in section 1.1.

Some additional elements of policy context would also be useful. In particular, the existence of a global target under the Convention on Biological Diversity should be mentioned, i.e. Aichi Target 2: 'By 2020, at the latest, biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems'. This global target has been translated into many national biodiversity plans (e.g. EU Biodiversity Strategy to 2020). Obvious places to refer to this would be para 1.23 and 4.100/4.101.

Given that ecosystems are often defined as a component of biodiversity in particular under the CBD definition, the introduction of 'biodiversity accounts' at a late stage of the report, after carbon accounts, is confusing. The link between biodiversity, ecosystems and ecosystem services, and how ecosystem accounting relates to these elements should be explained upfront in the report. It could also be argued that the whole concept of ecosystem accounting is about integrating biodiversity and ecosystem values in accounting systems, and that biodiversity accounts, which focus on the diversity of species, are a specific component of the overall approach.

The recognition in para 2.26 and 2.29 that adequate accounting of ecosystem assets is also important is essential. This could also be related to scientific uncertainty, and imperfect knowledge of the link between biodiversity, ecosystem condition, and ecosystem services, which implies that a pure focus on ecosystem services would not be sufficient. Similarly, in 3.9, it is important to recognise that although the definition of ecosystem services excludes the set of flows commonly referred to as supporting services, mapping the chains of ecosystem flows may be important in certain situations. These 'situations' could usefully be further elaborated upon.

Another important issue which would gain in being further explained/elaborated upon is the indication in para 2.37 that 'often, there is a greater interest in measuring changes in ecosystem assets' (see also 4.17).

Para 2.105, and para 3.14 to 3.17: it should be more explicit that the main reason for excluding abiotic services is that they are already taken into account

in the central SEEA framework, and that this is an accounting method more than an assessment as to whether they should be considered as ecosystem services. Para 3.17 could be more definitive about the need to use the two frameworks in conjunction for adequate policy making.

Para 3.73: the list of prioritisation criteria should indeed be indicative as criteria will vary depending on national policy priorities.

In para 3.74, it seems to be suggested that the focus on ecosystem services should be on provisioning services, because they are easier to measure. However, they are also the ones that are most often marketed, and therefore captured in SEEA Vol 1. It should be underlined that most of the added value of SEEA Vol 2 would be in measuring other types of services, e.g. regulating services, even if more challenging to measure, in order to enable the analysis of trade-offs across the whole range of ecosystem services.

In para 5.8, the presentation of two primary motivations for valuation seems to be fairly restrictive. There should at least be a brief reference to other uses (project evaluation and appraisal, awareness raising,...).

Para 5.12: whilst the benefits of monetary valuation are well described, it should also be underlined that monetary valuation provides a common unit of measurement and therefore implies perfect substitutability, whilst there are many cases where this assumption is not valid. Monetary valuation should therefore always be used alongside physical ecosystem accounts, and does not aim to replace them.

The whole section on adjusted income aggregates (para 6.4.4) is very brief. If not feasible to extend it, there should at least be further references for the interested reader.

Part II: Other comments

In the box below please supply any additional comments including those of a more technical nature.

Please reference your responses with the relevant paragraph number or section number.

Click here and start typing (The length of your response is not limited by this text box.)

Para 1.5: in theory, a single agency with the different types of expertise needed could carry out the work. It would be more correct to highlight the need for multiple disciplines, and that therefore it is highly likely that multiple agencies need to be involved (as better described in 1.28).

Para 1.17. why are only alternative uses of energy highlighted as an issue, and not alternative uses of other resources?

Para 1.23. The statement that 'the measurement of ecosystems requires data on biodiversity and carbon' seems to be very restrictive – there are other dimensions to measure.

Para 1.42. This paragraph could also highlight that the existence of thresholds that are unknown are an additional challenge in the management of ecosystems.

In several places, ecosystem services are defined as unpriced (e.g. 1.46). As several provisional services are in fact priced, it would be more correct to refer to 'often unpriced services'.

Para 4.99. other examples of indirect drivers of biodiversity loss may be useful, e.g. pollution.

Para 4.101 and 4.102. The explicit reference to ecosystem restoration would be useful in these paragraphs.

In Para 4.109, it should also be highlighted that intermediate disturbance (including through human intervention) can lead to increases of biodiversity, and Para 4.108 should therefore be nuanced somewhat. In this and the following paragraphs (in particular para 4.113), it should be underlined that in some regions of the world like Europe, a lot of the remaining biodiversity is linked to human intervention (e.g. extensive agricultural ecosystems), and therefore indicators such as mean species abundance, which compare ecosystems to a reference condition, are not so relevant.



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Comments on the style, tone, and readability of the text are also welcome.

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The SEEA Part 2 draft fulfils rather well the mandate given by the UNCEEA to the Secretariat, the World Bank and the European Environment Agency and now allows for further steps to be taken across the world on further experimentation. This achievement is the result of a genuine collective effort of the three above mentioned organisations, supported by a group of experts which met in Copenhagen, London and Melbourne and also contributed through drafting inputs on several issues, as well as steering by the Editorial Board put in place by the UNCEEA.

The European Environment Agency supports the presentation in paragraph 13 of the SEEA Experimental Ecosystem Accounting not as a statistical standard to be implemented by statistical offices jointly with partner agencies, but rather as a synthesis of the current state of knowledge on ecosystem accounting. The EEA agrees with the essential premise that the "SEEA Experimental Ecosystem Accounting is intended to provide a conceptual framework for a multi-disciplinary research programme for those countries and regions that wish to experiment with the compilation of ecosystem accounts".

At this stage, the SEEA Part 2 on experimental ecosystem accounts is a work in progress that should aim at being upgraded in the coming years on the basis of further scientific discussions and the findings of pilot applications in voluntary countries. It is therefore more important to acknowledge the overall quality of the document and its capacity to inspire reflections and applications than to discuss this or that detail.

So considering the whole draft document, the EEA is satisfied overall. In particular, the EEA feels particularly encouraged by the full compatibility of its European accounting programme with the SEEA principles. The accounts produced and developed by the EEA are the Land Cover accounts for Europe, covering the 1990-2006 period and updated this year up to year 2012, and the experimental simplified ecosystem capital accounts 2000-2010 where accounts for biomass/carbon, fresh water, landscape and biodiversity change are being developed and will be made available in 2013. It is our expectation that these applications for Europe will benefit from the SEEA as well as contribute to the further development of the SEEA Part 2 in coming years.

The SEEA Part2 is also broadly in line with the Mapping and Assessment of Ecosystems and their Services (MAES) programme in Europe which is an analytical framework for ecosystem assessments under Action 5 of the EU Biodiversity Strategy to 2020. This assessment programme which is steered by the Joint Research Centre of the European Community has acknowledged the SEEA drafting by referring for example to the CICES draft classification of ecosystem services and contributed to its discussion. Other dimensions of the SEEA will support MAES, and MAES is likely benefit to the future research agenda regarding in particular ecosystem service valuation.

The strict articulation of the SEEA Part 2 to the SNA via the SEEA Central Framework is important guidance to the progress expected in the domain of socio-economic and environmental statistics, in particular the need of spatially referenced data, regional statistics and micro-data. In this area, the SEEA Part2 will stimulate the cooperation between the EEA and Eurostat, and again, the European experience gained will contribute to the SEEA future progress. At this point, the EEA notes that the UNCEEA has taken great care of the coordination between the SEEA and FDES revision processes and asks for its continuation.

In this respect, there would be substantial value in providing a simple picture in the first section of Chapter 1 on the links between the SNA, SEEA CF, SEEA Part 2 and

different statistical domains with explanatory text that can be readily understood by UNSC members. There are of course currently unknowns in our understanding of these links and it would therefore in addition be useful to distinguish between these areas and areas we have more knowledge/confidence around.

Last but not least, the issue of relations between ecosystem capital, ecosystem services and human well-being deserves not only scientific and methodological attention, but also political attention. There are gaps that need bridging between political expectations and scientific/methodological feasibility of measuring ecosystem services. The EEA and Nottingham University with the support of experts has focused its efforts on ecosystem services over many years on a common international classification CICES and the latest information and updates for this process can be found at www.cices.eu.

Part II: Other comments

In the box below please supply any additional comments including those of a more technical nature.

Please reference your responses with the relevant paragraph number or section number.

As already stated, the SEEA Part 2 is a work in progress, a first step calling for further steps. On the one hand, experiments will help to better focus the accounting framework with regard to policy priorities as well as issues around the feasibility of implementation. On the other hand, a research agenda should be put in place by UNCEEA in order to clarify further on theoretical questions as well as scientific issues related to data monitoring and modelling.

For the EEA, this research agenda should prioritise the following points which are either not addressed or need further development:

- SEEA policy objectives regarding the production of indicators and aggregates of weak sustainability (mostly Part 1) vs. strong sustainability (mostly Part 2).
- Common measurement unit to be used in physical ecosystem accounts (beyond the various specific basic units of mass, energy, volume, ...) and aggregation principles.
- SEEA Part 2 aggregates: ecosystem capacity and degradation, ecological debts in physical and monetary units, adjusted final demand...
- Principles of quadruple entry accounting within the SEEA Part 2 and between Part 2 and Part 1
- Measurement of ecosystem remediation costs (restoration, avoidance...), in line with the emerging mitigation and compensation policies.
- Adequacy of SNA pricing conventions regarding ecosystem services and assets, in particular in the case of production for self-account (family gardens, housing...).
- Measurement of the sustainability of commodities production, in particular agriculture, forestry and fisheries.
- Development of accounts for specific ecosystems: urban ecosystems, seas and oceans, atmosphere/climate.

- Use of the outcome of international research and monitoring programmes and databases, in particular GEO/GEOSS, IUCN, WWF. Cooperation with such programmes.
- Harmonisation with monitoring programmes of international conventions.
- The human and social dimensions of ecosystem accounting (the demand side of ecosystem services, access to public goods, distributional effects, quality of life etc...)



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**SEEA Experimental
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Please reference paragraphs numbers or section numbers as appropriate.

When explaining the “two perspectives” of SEEA Central Framework and SEEA EEA (paras. 2.10, 2.107) it should be clear that these perspectives complement each other; they are not alternatives to one another and taking both perspectives does not result in double-counting. Users of this manual should not have the impression that they need to choose between the Central Framework and EEA. While the two perspectives may have different priorities, it’s a false choice between one or the other because almost inevitably both are relevant.

The term “sustainability” shouldn't use quotation marks. It's not clear why quotation marks are needed or what is the source of the quotation (if any). This term has a clear and distinct meaning in an accounting because of how assets are defined. Perhaps this requires some explanation (I didn't find a definition anywhere) but simply putting “sustainability” in quotation marks could be easily misinterpreted.

The discussion that distinguishes “SNA benefits” and “non-SNA benefits” in section 2.2.1 is technically well formulated but may still be misleading to some readers. It is well known, for example, that unpaid housework is not part of the SNA production boundary, but point (i) in **para 2.19** seems to suggest that it may be part of “SNA benefits”. So the distinction remains unclear. Moreover, related to this section is the concept of an exchange value and the use of transactions or whether it “can be bought and sold on markets” to help determine boundaries for valuation. These issues should be given further description (or references), perhaps in Chapter 5.

The proposed accounting treatment for the atmosphere in **para 2.70** seems generally inappropriate and not intuitive. Only in very special cases (which are not particularly important to EEA) is delineating concentrations of gases to an individual BSU relevant or feasible. It is especially not relevant or feasible for GHGs, which is the example given. The special case is for the concentrations of certain urban air pollutants that can accumulate (or at least be continuously recharged) in local areas. This is a special case that could easily be applied to EEA. But the more general case is that concentrations of pollutants don't stay concentrated anywhere for an accounting period. Thus, the “air volume” concept seems generally non-operational.

The proposed accounting treatment for biodiversity is also unclear and not intuitive (see detailed comments below).

Part II: Other comments

In the box below please supply any additional comments including those of a more technical nature.

Please reference your responses with the relevant paragraph number or section number.

Chapter 1, para 1.53: “...ecosystem as a complex, self-regulating system that, while influenced by economic activity, also operates outside of traditional economic management regimes.” This issue is perhaps a bit broader than is suggested by this statement, and it relates to the general topic of externalities. It's not only about “management regimes”, but also has to do with price determination and the scope and boundaries of traditional measures for economies. This is central to the relevance/importance for EEA.

Chapter 2, para 2.4: Why is resilience called a “function” of ecosystems here. Resilience seems more like a reference to an ecosystem’s capacity to function, perhaps, but not a function in itself. **Para 2.8** seems to suggest that the resilience of an ecosystem can be “enhanced” through management. This may be questionable or at least requires some further explanation. Management can help protect certain characteristics of an ecosystem that may be related to resistance but isn’t this different than “enhancing” resilience? An example would be helpful.

Para 2.11 suggests that EEA expands the scope of asset accounting. It could be added that this broader scope is defined by the ecosystem services – this makes the boundary expansion clearer. **Para 2.17** states that ecosystem services: “provide the link between ecosystem assets on the one hand, and the benefits used and enjoyed by people on the other”. But this is still not explicit enough. It’s not only that the services “provide the link”, they must *define* how the assets are identified and measured.

Para 2.24: Do not use vague phrasing like: “ways in which humans relate to ecosystems”. Should substitute this with: “may benefit from ecosystems.” There are other ways humans relate to ecosystems besides these benefits. Ecosystem services are defined by benefits.

Figure 2.3: The arrows of inputs into the benefits boxes seem to have missing text or errors. First arrow should read: “Input to production of SNA goods **and services**”. Second arrow should read: “Input to production of SNA **goods and services**”. Third arrow should read: “Direct input to non-SNA benefits **and SNA services** [cultural services input to the SNA services related to tourism?]”

Para 2.36: The point of this paragraph is not clear. This is confusing in light of the importance of *defining* ecosystem assets in terms of ecosystem services (see comment above). At least in principle (or at the conceptual level) there should be no reason to describe assets completely independently from any consideration of benefits. It must at least be assumed that the asset measures are correlated to services, even if this is not easily proven.

Para 2.54: I suggest deleting this paragraph. Why, in this context of EEA, would a user develop a “core set of classes” for an “ecosystem classification”? What do we need for accounting purposes that is not provided by the BSU, LCEU or EAU? If something additional is needed than this should be explained. Otherwise this para can be deleted as it will only confuse.

Table 2.2: Why not keep a more typical asset accounting structure, with a beginning of period and end of period value and changes in between down the left column, for each capacity measure (vegetation, biodiversity, etc.)? This would be simpler – it’s not clear how this table is populated and with what type of data.

Table 2.3: The purpose of this table is not very clear. Why is it in this section?

Chapter 3, Para 2.7: The last sentence of this para is not clear. Public benefits from private assets are not necessarily incorporated in values of assets already included in the standard national accounts (because of externalities). Therefore it is not clear how these benefits are “associated” with values already in standard national accounts.

Para 3.11-3.12: text states: “people also value species diversity...independent of the role of...ecosystem services”- I’m not sure this is correct. Can we really separate a value for biodiversity from the benefits it provides? I doubt it.

In EEA, biodiversity should be treated strictly as a (crucial) asset underpinning ecosystem services. It’s important not to confuse biodiversity, and its various roles in ecosystem functioning, with the way we value “iconic species”. In fact, this is a good example of why biodiversity should be treated strictly as an asset, and not as a service. Without sufficient diversity (at the genetic level for the species and across species for the habitat), an endangered species will not be able to continue to survive. However, the value related to that particular single species’ existence really has nothing to do with biodiversity. (obviously if one more species becomes extinct, iconic or otherwise, this would diminish species diversity; however, this marginal change to diversity is not the reason for valuing the iconic species – otherwise the same value should apply to non-iconic species). On the other hand, some species are of particular importance to biodiversity (keystone species) because of their special role in the food web. So we can use information on those species to proxy measure biodiversity – but again these should be asset accounting measures, not services.

Para 3.21: The term “ecosystem effects” is unclear and undefined. Should replace with “effects on ecosystem assets”.

Para 3.28-29: On disservices, actually a part of ecosystem services may be insurance, protection or buffering from the disservices; thus accounting for disservices separately seems superfluous and possibly double-counting.

Para 3.39 (iii): For added clarity, suggest adding at end: “However, for the case of uncultivated crops and other plants, the ecosystem services are measured by the harvested materials.”

Para 3.48 states that “it may be relevant to use indicators of changes in ecosystem condition and ecosystem characteristics as indicators.” An example should be given here as to what this means.

Chapter 4, Para 4.13: This paragraph doesn’t seem to have any relevance for EEA. Are we comparing between ecosystems in EEA? If so, why? As noted in the following paragraphs in the text, assessing a condition measure and not only its changes over time could be relevant for certain special analyses, but not for literally comparing across ecosystems. I think the point that should be made here instead is that any reference condition used should be flexible to the different types, and expected conditions, of ecosystems so that it may be used to construct an index to review aggregated changes over time. If the way we

measure changes to condition over time is “normalised” across the different types of units, than we can aggregate the changes to get the broad picture for a region or a nation.

Chapter 5, Para 5.36 correctly points out that in the special cases where a “costs of production” valuation approach is used in the SNA, the assumption is that the producer surplus is equal to zero. This section could also note that this is an equally reasonable assumption for ecosystem systems because we cannot expect the producer, i.e. the ecosystem, to be able to collect anything above a normal return from consumers. It is not logical to assume that consumers will voluntarily pay more than the cost of production of the services (the ecosystem certainly won't ‘charge’ them for it). So, if we are to stick strictly to an exchange value, that any ‘price’ above cost seems illogical and incomparable.

Chapter 6, Para 6.3: the statement “the standard economic measures of production, consumption, income and wealth are not designed to fully account for the non-market services that ecosystems provide”. This statement is not incorrect but it's perhaps not completely accurate. The benefits provided by ecosystems for which there is no transaction (or no exchange) are beyond the boundaries applied to the measurement of economic production, consumption, etc. This is for both practical and conceptual reasons. It's not so much that the measures are not ‘designed’ to account for ecosystem services (fully or partially or at all). Economic production and ecosystem services should be understood clearly as distinct concepts that do no overlap (although the latter is often an input to the former). In some places in the manual this is not entirely clear. It would probably help to add some simple explanations on the importance of the concept of externalities.

Para 6.65: The point here is well taken but is it really necessary for SEEA to “strongly advise” that the term Green GDP be avoided? As acknowledged here, the term “Green GDP” appears in a wide variety of contexts and is often understood as a generic term and not necessarily a precise measurement or accounting standard. Even though this terminology appears nowhere else in SEEA, it might not be best to judge here whether it is useful for communicating a message in another context.



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Overall, the text has improved greatly compared to previous versions and has made good progress in attempting to set out what might be the important elements of future ecosystem accounts. The key issues that came up in the technical discussions are correctly and fairly reflected. Congratulations to the editor!

The text as it now stands is probably close to what can possibly be achieved based on today's knowledge. However the text remains rather imprecise on several critical aspects (terminology chosen, definitions, units, accounting tables in physical units,

monetary valuation...). Testing and experimentation will be necessary before these key issues can be further clarified.

Eurostat welcomes that the text now makes it clear that the SEEA Experimental Ecosystem Accounting is work in progress and its key purpose is to offer as much guidance as possible for experimentation and testing. This is well described in the Cover Note which could almost become the Foreword to the book.

Eurostat also welcomes that the text now clearly sets out issues of organisation of the work and the role of different national institutions in the implementation (cooperation of statistical offices, environment agencies, research institutes etc.). Perhaps we should also address the issue of resource needs for implementation. Para 1.27 and 1.28 address data and organisational issues. The text should make it clearer that a lot of data may be available though dispersed and needs to be organised properly. However there are large areas of other data which are totally missing. The text should make clear that ecosystem accounting requires significant resources in terms of new data, funding and staff.

On monetary valuation the text is wisely quite cautious about the possibilities and problems. Eurostat would like that to be made even clearer to avoid raising unrealistic expectations. When large-scale monetary valuation cannot be made with reasonable reliability, parts of chapter 6 become irrelevant. The starting point should be to get good physical data which is scientifically and statistically sound. This point should be made clear also in chapters 3 and 4.

Much of the value of ecosystem services is not directly priced on markets in our day-to-day economic transactions. Attempts to use surrogate methods for this have proved very unreliable. Such modelling exercises are unlikely to be part of official statistics in the near future. Conversely, it could be made clear that part of the value of ecosystem services is already embedded in the values of flows and stocks recorded in the SNA. The present text is cautious about the possibilities of estimating values for ecosystem services flows and ecosystem assets in a way that is coherent with the SNA. But the text is much less explicit about the huge additional challenge involved in assessing the shares of these estimated values that are already included in the SNA. The text should make clear that these embedded values would need to be identified and re-classified before integration with the national accounts could be attempted. For example, a (possibly considerable) part of provisioning, cultural and regulating ecosystem services is embedded in e.g. land prices and real estate prices and in the flows of rents and of dwelling services.

In conclusion, the SEEA Experimental Ecosystem Accounting is a reasonable first step, but further work and practical testing by a few volunteer countries will be needed before broader implementation could be recommended.

For Eurostat, the critical issues for further improving the present text are

- a) to manage expectations properly. In particular to make sure that the text avoids creating unrealistic expectations of policy makers that statistical offices (or other institutions) could create large scale physical accounts and unrealistic expectations regarding the possibilities and usefulness of monetary valuation. The resources required to establish and maintain physical accounts are very large. Monetary valuation would require addressing substantial challenges.
- b) to make the current text as helpful as possible for its key purpose of guiding testing and experimentation. Several of our subsequent comments are intended to enhance the

text towards being as helpful as possible to those being able to experiment in this area.

Part II: Other comments

In the box below please supply any additional comments including those of a more technical nature.

Please reference your responses with the relevant paragraph number or section number.

Specific comments

1. Further clarify purpose and role of the SEEA Experimental Ecosystem Accounting in Chapter 1.

The draft makes it quite clear that further experimentation and testing is required. The following could be made clearer:

- The present situation as regards experience world-wide (which is very limited with some first promising experiments in a few advanced countries). A possible place is section 1.1.
- The actual purpose of the text itself. We suggest to
 - o actually recommend to readers to embark on experiments using the relevant part of the SEEA text as orientation to the extent possible. A possible place is around para 1.11 or section 1.8 (note para 1.11 should refer to section 1.8).
 - o recommend to the readers that reports about such experiments should where possible contain also a critique of the SEEA text to help build the basis for its improvement. A possible place is again around para 1.11 or section 1.8.
- The research agenda is not yet available – it will be an important place to further clarify the purpose of the text.
- Some allusion to the future of the text, i.e. that the testing would help build a basis for a review in a few years.

2. The priced and the unpriced

The draft chapter 5 on valuation methods is now quite well written. There is a problem however with the other chapters in that they have a very relaxed attitude towards what is captured in the SNA and what is not. For example, paras 1.3, 1.46, 5.10 and 6.15 seem to imply that ecosystem services are usually unpriced. Conversely, paras 5.51, 5.54-5.55 and 5.57-5.59 recognise that parts of the ecosystem service values are already captured within the SNA (embedded in other values).

Paras 3.70 and 3.71 (and also 5.57-5.59) seem to suggest that recreational and amenity services are partly captured within the SNA but only when the tourism industry is involved. Here, a reference should be added to the probably more important housing

industry where prices of buildings and (imputed as well as actual) rental payments will contain values of ecosystem services.

It should be made clear not just in chapter 5 but throughout the text that the SNA incorporates values of ecosystems and ecosystem flows in a number of places but generally not in a visible way. Teasing out those values already captured is a major challenge but would be a necessary step towards building useful ecosystem accounts. Places to make this clear could be the paragraphs cited above and in particular the section 6.4.1 (e.g para 6.44).

We feel strongly that para 6.45 which advocates that estimates of low and dubious quality can be useful is not in line with principles of official statistics. This should be clarified in the para..

We also agree with comments by others to the effect that the term 'satellite account' should be used in section 6.4 i.e. it should be made clear that any such experimental adjustments would be satellite accounts.

3. Definitions of ecosystems and ecosystem assets

The links between paragraphs 1.40 and 2.1 which define ecosystems, and paras 2.7 and 2.28 which define ecosystem assets could be made clearer. The definitions in paras 1.40 and 2.1 should be fully aligned.

4. Statistical units

We accept that in some instances the EAU can be an observation unit and that for both LCEU and EAU data may be compiled. But as often the reporting as well as observation units will be the BSU or some intermediate level between BSU and LCEU/EAU we consider that the use of the term 'unit' for the LCEU and EAU seems to cause too much confusion. We suggest calling the LCEU and EAU not units but simply 'areas', i.e. LCEA and EAA.

5. Relation between ecosystem extent and condition and biodiversity

The link between ecosystem assets and biodiversity is not very clear. We support suggestions made by others that this should be clarified.



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<p>As a general introductory remark, if we may consider the current draft as globally quite convenient in presenting what would an ecosystems accounting framework look like in theory, and in particular the state of the art of reflex-ions in this matter, it is insufficient, though, to form the basis of information for deciding to engage in investments in order to produce such</p>

an accounting system.

In particular, two pieces of information are missing to complement such a basis for a good decision making. They both will derive from the tests, and attempts to apply such theoretical approach to reality:

The first one concerns the possible **adaptation of the initial ambitions concerning the accounting framework to the reality of the required information system** (in terms of availability/coverage and accuracy/reliability). Even with a long term plan to develop such information system, it may very well appear that the conceptual framework needs to be adapted into a more applicable version, for instance not considering an ecosystem as a global asset providing a pack of services, but more simply building gradually ecosystems accounts ecosystem service by ecosystem service, starting with the example of the carbon accounting (part 4.4), and expanding this approach of carbon sink service to other important ecosystem services for which we have confidence in the reliability and availability of information at a satisfactory level.

Indeed, the feasibility issue may concern fundamentally the choice of spatial areas as statistical units with extended use of land cover information. The defined spatial areas are not always adapted to reflect the presence of the different ecosystems in quantity and quality. The French experience of ecosystems assessment through geographical information combining land cover general information and different layers of geographical information on agricultural land, forestry, wetlands... show that the classification of ecosystems used on each spatial unit fails to represent reality in a satisfactory manner. In short, there appears in France to be sometimes similar or more variability between the ecosystems of the same classification category than there is variability among categories (for natural areas).

In practice, the list of criteria for prioritization mentioned page 51 (or at least part of it) could be used on different ecosystem services (of the CICES classification...) to assess which ones have more chance to be measurable, independently from the priority derived from national situations and policy demand.

Along with this idea to present different alternatives, comes the surprise of not finding in the document clearer references to the simplified approach proposed by the EEA. A box focusing on this simplified accounting system as an alternative approach and highlighting its differences with the one proposed in the rest of the draft would be of value.

The second element missing for a go/no go on investing in the ecosystem services accounting at a country level is the **test of robustness of the underlying ecosystems/ecosystems services models**, for instance, using the evolution in time of the input data of these models to test the evolution of ecosystem services derived from the models and benchmark it on a given known territory that has evolved and for which evidence based ground information has been gathered by naturalists and other environmental science experts. Limiting here such test to the physical assessment of the services would allow to gain trust in the modelling approach proposed for ecosystems based on geographical units.

In line with this, the first prototypes of accounts in Australia (Victoria state) and of accounts throughout Europe made by the EEA to be expected in 2013 will play an important role in giving to the theoretical approach a more pragmatic colour.

In term, after the macro-regional prototypes have been made available and tested, a second version of the draft including comments on feasibility issues, difficulties encountered and possibly overcome, would enhance the realism of the SEEA-EEA.

This first draft could refer to these two additional inputs by:

- adding comments on the risk that feasibility issues may put on the integrated approach based on geographical units and evoke possible second best solutions in case the difficulty is not overcome, such as focusing on separate accounting of major ecosystem services.
- Referring to alternative simplified approaches like the EEA exercise, and describing them
- Evoke the appropriateness of testing the robustness and the realism of the underlying ecosystems models by running specific case studies, ideally with a changing nature of ecosystems or evolving ecosystems quality through time.

General comments on specific chapters:

Some warnings could be added in part 4.5 “Accounting for biodiversity” to take account of the very partial availability of data on the different species (in France and most European countries, only common birds give rise to yearly measures). It could also be noted that the annual updating of the accounts table for threatened species, even though ideal for annual accounting, would mobilize quite large amounts of human resources without being efficient since the value added of yearly measures for slow phenomena is weak. In France, the assessment is made every five years in a system of rolling reviews among species, which is fairly enough to track changes in biodiversity.

Concerning chapter V on valuation methods, different approaches are exposed, discussed and their limits highlighted. This is most welcome. In the end it is difficult, though, to derive from this analysis a practical decision rule for choosing which valuation method is the most relevant for which different situation and ecosystem. The examples of application or the delimitation of boundaries are often given from the SNA angle and less through pure ecosystem measurement issues.

Concerning the sequence of accounts (chapter VI), it should be recalled how the disservices are taken into account in the measurement of the flows of services (net value?) and the degradation. These negative services are discussed in chapter II, but not explicitly represented in the sequence of accounts, either separately, or by considering net flows of services.

Part II: Other comments

In the box below please supply any additional comments including those of a more technical nature.

Please reference your responses with the relevant paragraph number or section number.

* P18: Footnote number 7 could be more developed or reformulated to better understand its meaning.

* Figure 2.3 p20: Mineral and energy products are presented in the third column under SNA benefits, but in the top layer, at the level of ecosystem services-provisioning services (or even regulating services) whereas they should appear separately as SNA benefits but at the lower level close to the abiotic services. We think the mention "SNA benefits" is missing in the low part of the rectangle for benefits.

* §2.70 p28: affecting a special quality of air volume to the different BSU seems not realistic and the relevance of this is questionable.

* §2.82 p30: it would be particularly interesting to be more specific on which kind of ecosystem this evaluation of the total expected flows of services over an ecosystem life can be made, in this situation where current flows would exceed an ecosystem's capacity to provide the services. It requires the assessment of two types of flows (services currently delivered and the ecosystem's capacity to generate them), and the feedback loop of this overuse on the degradation of the ecosystem and on its future capacity, taking account of non-linear effects in such modelling. The result in view may easily become out of reach. So for which ecosystems and services are such calculations feasible?

* § 3.59 p48: an example of aggregation method is given with the one that consists in transforming the units into an index representing a rate of change. Another method is given at § 3.60 with the use of prices.

However the most common normalisation methods, using z-scores, min-max or distances could be mentioned. These methods have indeed been chosen for the most known environmental composite indicators (EPI, ESI).

* Table 6.1 p107

In the sources of reduction in stock of ecosystem capital one major cause of degradation seems missing. There is a line for "catastrophic losses due to human action". But does it include the degradation due to economic activities implying regular emissions of pollutants which accumulation gives rise to perturbations and damages to ecosystems? Or is it only related to particular "catastrophic" events like oil slicks?

When related to human action the term "catastrophic" could be removed. "Losses due to human action" is not limitative and thereby less ambiguous.

Part II: Other comments

In the box below please supply any additional comments including those of a more technical nature.

Please reference your responses with the relevant paragraph number or section number.

2.3.3 Land cover/ecosystem functional units

2.47 The second type of unit is the land cover/ecosystem functional unit (LCEU). For most terrestrial areas an LCEU is defined as the set of contiguous BSU satisfying a pre-determined set of factors relating to the characteristics and operation of an ecosystem. Examples of these factors include land cover type, water resources and soil type. A particular feature is that the set of BSU that comprise an LCEU should be seen as operating in a relatively joint manner and more or less independently from neighbouring LCEU.

Proposition: Please add the underlined expression.

Rationale: No ecosystem, nor its processes neither its services, is independent from neighbouring ecosystems (e.g. agricultural production is affected in appositive or negative way by adjacent hedgerows and forests). In the given context “more or less” would at the time express that less is “better” than more.

2.63 Although the generation of ecosystem services may take place over varying spatial areas depending on the ecosystem service, for a broad range of ecosystem services a useful measurement starting point may be to consider the ecosystem services generated within an LCEU. Particularly for provisioning ~~and cultural~~ services and also for some regulating services (air filtration, regulation of water runoff, groundwater recharge) an LCEU is likely to provide a useful spatial boundary for the measurement of ecosystem services.

If services depend on a specific mix of different LCEUs (e.g.: a mix of forest areas and open land is often seen as most pleasant for hiking; habitats for iconic species like the Black Storck (Ciconia nigra) must encompass forest and wetland) an appropriate unit for national accounting could be a special EAU, for example a grid that is large enough to capture the composition of LCEUs that forms the basis of the service.

Maps of ecosystem service generation may be useful tools in delineating LCEU and special EAU by providing an understanding of concentrations of related ecosystem services.

Proposition: Please add the underlined expressions and leave out the parts of the text that are crossed out.

Rationale: In some cases the “production” of an ecosystem service depends on different land use units / ecosystem types in a synergistic way ($\Delta ES / \Delta LCEU_1 = f(LCEU_1 / LCEU_1)$) or even in a limitational way (like a limitational production function: without quiet forest no black storck). In those cases LCEU are not a reasonable basis for ecosystem services accounting. For national accounting purposes much more appropriate is a simple grid structure which is able to capture the required composition of different LCEUs in landscape.

3.8:

Proposition: Together with our colleagues from the Swiss Federal Office for the Environment (FOEN) we want to suggest the following complementation of Paragraph 3.8

"This notion of ecosystem services is often referred to as "final ecosystem services" in that they are the final outputs that are generated and used from an ecosystem." Add the sentence: "The concentration on final services helps to avoid double counting."

Rationale: This would help to clarify the main message of the paragraph.

4.5.2 Definition and description of biodiversity

4.108 At ecosystem level, biodiversity loss is characterised by the conversion, reduction or degradation of ecosystems (or habitats). Generally as the level of human use of ecosystems increases in extent or intensity above a critical level, biodiversity loss increases.

Proposition: Please add the underlined expression.

Rationale: In the case of Europe the standard argumentation regarding human influence and biodiversity is that biodiversity has risen with the introduction of traditional forms of agriculture and decreased when agricultural use was more and more intensified.

4.116 The condition of biodiversity, as measured by species number and abundance can be measured directly. However, because this is costly to do for large areas, biodiversity condition is usually estimated using a range of data and methods, including modelling techniques based on information about land cover, land use, landscape composition fragmentation, connectivity, climate change and other pressures.

Proposition: Please add the underlined expression.

Rationale: Although the concepts of fragmentation and connectivity are belonging close together, both should be mentioned here. Habitats for species and recreational services of landscapes are often depending on a mix of different ecosystem (see also remark on paragraph 2.63).

Chapter 5

Proposition: Together with our colleagues from the Swiss Federal Office for the Environment (FOEN) we want to suggest the following addendum to Chapter 5:

"Before publishing monetary values within the accounts, the meaningfulness of these values should carefully evaluated. In cases where - due e.g. to limits of scope or methodological restrictions - the risk of considerable under- or overestimation cannot be ruled out, it is preferable to abstain from publishing these values within the accounts. In such cases, valuation studies outside the accounts may be a solution. In any way, the publication of monetary values should be accompanied by a transparent documentation of assumptions and considerations on the scope and robustness of the valuations."

Rationale: Monetary valuation of ecosystems and their services remain a challenging field. Methodological choices within the accounts (e.g. the exclusion of non-use values or restrictions on the use of available welfare studies) may lead to values that do not capture the whole range of relevant benefits or values. The resulting values may, in

some cases, be very misleading, creating an illusion of accuracy while neglecting the lion's share of the value of some ecosystems.

Valuation studies outside the accounts may have the advantage to respond to well-defined policy questions. Specific studies would also be an opportunity to show a range of values based on a range of scenarios and assumptions.

5.2.5 The 'Total Economic Value (TEV)' framework

5.25 It is important to recognise that both ecosystem services providing direct use value (~~in particular~~ e.g. provisioning services, air filtering, recreational services) and services providing indirect use value (~~in particular~~ many other regulating services) can be seen as final outputs of the ecosystem. In the context of the TEV...

Proposition: Please add the underlined words and leave out those that are crossed out.

Rationale: The original text is formally right but can reinforce the misleading interpretation that direct use values are equivalent to provisioning services. Cultural services and some services that are called regulating services are also direct use values.

5.26 Some connections may be drawn between the framework just outlined and the national accounts notion of value. Since non-use value is based purely on the utility of an individual, it can be concluded that non-use values are solely comprised of consumer surplus and hence should be considered out of scope of national accounts based measures of value. For such cases SNA offers a second best procedure (see also paragraph 5.35) in which the value of the non-monetary transaction is equal to the sum of the costs of producing the service (i.e. costs for the management of a protected area, opportunity costs of the land used for the protection of species, payments to farmers to adopt farming practices that save the habitats for specific species).

For the other components of value it is possible that all three play a role in setting prices following national accounts notions of value although exactly how these different components might be identified can only be determined on a case by case basis.

Proposition: Please add the underlined sentence.

Rationale: Without the additional sentence a reader might think that SNA rules would prohibit any kind of valuation of services that provide only non-use values.

Please check, whether SNA rules permit to use opportunity costs for valuation also in those cases where they accrue due to regulatory decisions and discuss the usage of opportunity costs within the boundaries of SNA in connection with other valuation techniques (e.g. in the course of 5.4.2 Approaches to pricing ecosystem services).

A3.24 Ecosystems provide an opportunity for tourism and recreation. Tourism is generally interpreted as involving overnight stays, potentially visitors from abroad, and recreation is more usually associated with day trips. The service usually involves some degree of investment ~~in the ecosystem~~, for instance to mark out and build walking trails, cycling paths, and camping sites. In physical terms, this ecosystem service can be measured by different methods to value the attractiveness of landscapes for recreation services that take into account for example landscape scenery, the composition and diversity of different ecosystem types within a landscape etc. and the number of people visiting the ecosystem landscape. In cases where the demand curve for the recreation services of a specific site is flexible due to a wide range of

opportunities for substitution (especially for holiday recreation) the number of visitors can be used as a proxy for the value of the service. In cases where the demand-curve is inelastic (e.g. for after work recreation) the number of visitors should be combined with attractiveness measures to get more valid indicators for value of the recreation services.

Proposition: Please add the underlined sentences leave out the expression that are crossed out.

Rationale: It is arguable whether walking trails are an investment in ecosystems or an investment in infrastructure. Regardless of how to answer to this question these investments can increase the value of ecosystem services.

The number of visitors is only a good indicator for recreation services for some kinds of recreation demand. Recreation is not a homogenous good that is "sold" on one market. Normally three kinds of recreation demands are distinguished: daily/after work recreation, which normally takes place more or less close to the home, weekend recreation and holiday recreation. The differentiating feature is the time budget to reach the recreation site. The time budget determines the alternatives for substitution.

A4.15

Remark: The text of paragraph A4.15 seemingly does not fit to the rest of text.

A4.25

Remark: The text of paragraph A4.25 seemingly does not fit to the rest of text.



DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS
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**SEEA Experimental
Ecosystem Accounting**

Comment form

Comment form for the Consultation Draft

Deadline for responses: 1 January , 2013
Send responses to: seea@un.org

Your name:	Stefan GRUBER, Joachim THOMAS
Your country/organization:	Germany/Destatis
Contact (e.g. email address):	Stefan.gruber@destatis.de Joachim.thomas@destatis.de

To submit responses please save this document and send it as an attachment to the following e-mail address: seea@un.org.

The comment form has been designed to facilitate the analysis of comments.

In Part I general comments on the structure and content of the draft document are sought. In Part II any other comments, particularly those of a technical nature should be included.

Relevant documents

Before submitting responses you are encouraged to read

Cover Note to the Consultation Draft

SEEA Experimental Ecosystem Accounting – Consultation Draft

Part I: General comments

In the box below please supply any comments on the structure of the document, the balance of material and the coverage of the draft including any thoughts on missing content.

Comments on the style, tone, and readability of the text are also welcome.

Please reference paragraphs numbers or section numbers as appropriate.

Chapter 1: Introduction; 1.1 What is ecosystem accounting?

“1.1 Ecosystem accounting is an approach to the assessment of the environment through the measurement of ecosystems, and measurement of the flows of services from ecosystems into economic and other human activity.”

The explanation given in 1.1 is unsatisfying, because the opportunity to define „Ecosystem Accounting“ in contrast to traditional „Ecosystem Analysis¹“ is not utilised., From a semantic point of view there exist in addition a pleonasm, if the term „Ecosystem Accounting“ is mentioned without specifying in how far “new” balances are created by “ecosystem Accounting”.

One could quote the following specific aspects of Ecosystem Accounting:

- Detailed compilation of human influence towards ecosystems,
- Incorporation of assets and their potential degradation; by introducing a stock or asset balance at the beginning and at the end of a fixed accounting period, degradation or accretion can be determined. This can give in addition hints with regards to sustainability of the ecosystem.

Proposal: Initially the terms ecosystem and ecosystem analysis should be explained. Then, the term „Ecosystem Accounting” should be distinguished by quoting the new and additional aspects.

Chapter 4:

In chapter 4 („Accounting for Ecosystem Assets in physical terms“) the topic „Carbon Accounting“ (CA) is presented in sub chapter 4.4. CA depicts one of in total two examples for the topic “Ecosystem Assets” - second example represents the „Accounting for biodiversity“ (S. 72 pp.).

Sub chapter 4.4 consists out of 5 only pages (67-71) including a voluminous figure regards the global carbon cycle (Figure 4.4.1 „The main elements of the carbon cycle“; p. 68) and a full-page table (4.5.1 „Carbon stock account“; S.70) regards the carbon stocks.

Table 4.5.1 represents an attempt to integrate on the one hand the physical flows und assets accounts regards fossil fuels (energy) resources and emissions from SEEA Central Framework and at the other hand the remaining carbon stocks and the flows between.

Whilst there exist data sources for some columns (fossil fuels and emissions), this might not be the case for a larger part of the stocks mentioned in table 4.5.1. In addition it is not visible in which way the presumably extensive work of data collection might be relevant. E. g. the

¹ Examples for ecosystems: Lakes with their nutrient balances and a regulating system ensuring stability, drainage areas with their water flows including inflows and outflows and the atmosphere with its micro elements which influences the climatic situation on earth. Ecosystems can be defined on quite different scale levels (from the Petri dish to the global atmosphere!) and they can contain also quite different flows and regulating systems. In general, ecosystem analysis starts with the definition of the border of the system, then the internal flows are analysed and also the flows crossing the border. In addition ecosystems can be formed and influenced by human activities, but they cannot be produced, i. e. installations cannot be seen as ecosystems.

accumulation of carbon in the economy is presumably completely irrelevant regards weight quantities.²

Furthermore we agree with Jock MARTIN from EEA, who mentioned in his comment on December 13 regards the report of the "Committee of Experts on Environmental Economic Accounting"³, that the aim of Carbon Accounting should be to integrate the various key policies regards resource efficiency (including energy, food safety), climate change und ecosystem maintenance. It is not visible how the proposed Carbon Accounting can be helpful for reaching this aim. The proposal of Jock MARTIN, to handle the topic Carbon Accounting in SEEA 3 should be considered. Destatis would agree to such a proposal and would like to participate in the preparation team.

Addendum: The draft SEEA Experimental Ecosystem Accounting contains in addition an Annex to chapter 4.4 on the pages 125-133. This Annex represents in large part a copy of chapter 4.4. Notably the figure and table from 4.4 are repeated. This seems to be inappropriate for an Annex, who should deliver additional information.

Still chapter 4:

Sub chapter 4.3.4 („Aggregation in Ecosystem Accounting“) speaks in paragraph 4.79 (p. 66) about the topic „normalisation“ of ecosystem characteristics with regard to a reference point. It is said that the proposed Asset Accounting gives the opportunity to utilize the starting point of an Accounting period as reference.

This accounting-method, with its ability to give a solid reference point, is then put into contrast to a kind of science which utilizes the „pre-industrial situation“ as benchmark for the „majority of eco-system assets“. 4.79 mentions explicitly the water quality norms of the European Water Framework Directive. This side blow on the (ecological) science and the European regulation on water protection is not only not understandable at all, it discredits also the principally correct interest, to develop a new measure to evaluate the stocks - comparison between the stocks at the beginning and at the end of the accounting period.

Proposal: This paragraph should only present the possibility for the establishment of a new reference point, namely via comparison of the situation at the starting point and the end of the accounting period. It

² Regards the monetary value this might be not the case if one considers that diamonds consist completely out of carbon!

³ Jock MARTIN: "Considering SEEA Part 3 *"/Applications and Extensions/*", I would like to remind the EEA position regarding the policy importance of compiling integrated carbon accounts as a way to address altogether in one framework key policies related to Resource Efficiency (incl. energy, food security), Climate Change (CO₂) and Ecosystem maintenance (incl. biodiversity). The current proposal presented with SEEA Part2 is heading in the right direction but its place in the overall SEEA setting is not appropriate. As basic fossil and biological carbon balances and emissions of GHGs are part of the SEEA Central Framework and broadly covered by the SEEA Energy, the integrated carbon account would be better placed in SEEA Part 3 than in Part 2."

should also be mentioned, that this instrument is still under development and possesses some difficulties. There exists natural fluctuation of considerable degree, e. g. for the stocks in water resources. This fluctuation restricts the utilisation of asset amounts at a certain point in time as reference point.

Still chapter 4:

Balancing of water resources

SEEA Experimental Ecosystem Accounting presents in chapter 4.3 - „Compiling Ecosystem Accounts“ - a table on water resources: Table 4.1 „Physical asset accounts for water resources“ on page 62.

Table 4.1 is completely identical to table 5.11.2 on page 198 of the SEEA Central Framework (CF). It's of course not forbidden to copy-paste tables from basis SEEA, this can be useful. In the case given, it is firstly not explicitly said, that this table comes from SEEA CF and it's in addition written in paragraph 4.56, that „ ... information at this level of detail is likely to be of particular relevance in ecosystem accounting“. The impression comes up, that special ecosystem accounting is not necessary. This cannot be intended.

Proposal: If table 4.1 should remain at this place, then the origin should be mentioned explicitly and it must be made clear, how this table could be utilised for ecosystem accounting.

Part II: Other comments

In the box below please supply any additional comments including those of a more technical nature.

Please reference your responses with the relevant paragraph number or section number.

Click here and start typing (The length of your response is not limited by this text box.)



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Comment form

Comment form for the Consultation Draft

Deadline for responses: 1 January , 2013
Send responses to: seea@un.org

Your name:	Raúl Figueroa Díaz
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Please reference paragraphs numbers or section numbers as appropriate.

2.19 “(ii) The benefits that accrue to individuals that are not produced by economic units (e.g. clean air and **water**). These benefits are **referred to as non-SNA benefits** reflecting that the receipt of these benefits by individuals is not the result of an economic production process defined within the SNA. A distinguishing characteristic between these two types of benefits is that, in general, **SNA benefits can be bought and sold on markets whereas non-SNA benefits cannot.**”

We consider that this sentence may generate confusion, since it points out that water is a benefit not included in the scope of the SNA because it cannot be sold on markets,

nonetheless, in situations where water becomes scarcer it may occur that it is commercialized on markets; not just from the point of view of the processes required for its purification and bottling, that according to the SNA is what gives a value to water, but from the point of view of a scarce good that is stockpiled or monopolized and generates rent or revenue in the private sector.

2.35 “Because the generation of some ecosystem services involves the extraction and harvest of resources, **and since ecosystems can regenerate...**”

In this paragraph, it should be clarified to which extent an ecosystem can regenerate, taking into account that biodiversity (flora and fauna) as a central part of an ecosystem may suffer irretrievable losses such as the extinction of species.

4.27 “In general terms, **ecosystem degradation** is the **decline** in an ecosystem asset over an accounting period”.

We consider that the extinction of biodiversity (flora and fauna) could be treated not just as degradation of an ecosystem, but also as depletion, since we are talking about irremediable losses. In this sense, in the 2008 SNA (paragraph 12.23), the differences in the quality of assets are treated as differences in volume.

4.35 “A particular feature of ecosystem assets is that **they naturally regenerate**. Regeneration means that they may provide the same ecosystem services over an indefinite length of time.”

The paragraph could be complemented with the consideration that not all actives regenerate at the same rate over time.

4.38 “If, over an accounting period, the increases due to natural regeneration are greater than the reductions due to human activity, then ecosystem degradation should be zero and the excess of regeneration should be shown as an addition to ecosystem assets.”

It may happen that way, however, we consider prudent commenting that when an analysis of the ecosystem by parts is made, it may be the case of a considerable increase in part of an ecosystem, but degradation or depletion in another part of the same ecosystem. Thus the degradation should not be zero even if it appears that way.

4.42 “First, ecosystem assets can regenerate without human involvement. Produced assets must be created (produced) new each time.”

It should be pointed out that there could be assets that cannot be regenerated, and it could happen that they can be regenerated only with human involvement, as can be the case of the reinsertion of endangered species to regulate an ecosystemic cycle.

4.66 “Perhaps the key issue on recording entries in this table is that it is likely to be most useful to **compile** entries in terms of expected flows of ecosystem services per year rather than in terms of absolute quantities.”

We comment that it must be considered for this analysis that the SEEA Central Framework paragraph **2.139** mentions that: “Ideally, the time of the recording of physical flows should align with the time of recording of the flows in monetary terms using an accrual approach. However, in practice, environmental processes may operate on quite different cycles and timeframes compared to the standard calendar and financial years used in monetary accounting. For example, in the case of water resources, the hydrological year does not

correspond to a calendar year. Adjustments to account for different underlying cycles in physical and monetary terms should be made as required”.

4.72 “Typical for regulating services is that the relationship between ecosystem assets and ecosystem services often has a spatial aspect. For instance, the ecosystem service air filtration **only** arises **when there are people living in the area** where air quality is improved.”

It must be considered that due to wind drafts the air produced in one zone can move to another one. In this regard the **SEEA Central Framework** mentions in paragraph **3.33**: “...so-called transboundary flows, for example polluted water flowing downstream into a neighbouring country or air emissions transferred into other countries’ atmospheres.”

4.75 “Cultural services are highly varied in terms of the type of services generated and the link between the services and the ecosystem assets. Recreational services are related to the attractiveness of an area, which is a function of for instance landscape, vegetation, wildlife, visitor facilities, presence of walking trails, etc.”.

It is important to suggest a comprehensive measurement of cultural and recreational services, but also the quantification of the impact generated by the population that is benefitted from this type of ecosystem services.

Regarding chapter 5 on the aspects of economic valuation, we comment that it must be considered a double economic valuation for the services of the ecosystem, differentiating the value of the individual services from the value in a group as a functional unit, since the price of each service is different to its price in a group. In fact, it is considered important to work in the measurement of ecosystem services through a systemic approach, for which in addition we should work in the modeling of complex systems for its study. We must think in integrated models that allow to answer to integrated public policy demands, seeing that an answer to the problems of shortage of water is linked to the problems of erosion and forestry production, and vice versa.

5.17 “A particular issue arises in the case of ecosystem assets since it may not be appropriate to apply valuation approaches developed in the context of produced assets (such as buildings and machines) to ecosystems that are complex assets, can regenerate over time and provide multiple services. A related question is whether the valuation of ecosystem degradation should be based on analysing foregone income due to the reductions in the current and future flows of ecosystem services, or if valuation of ecosystem degradation should be based on the costs of restoring the ecosystem to a previous state...”

It is commented that the economic valuation of the ecosystem services could be based on the expected future income or in the costs of replacement; we consider that for the second alternative it is important to contemplate that when damages to the ecosystem are generated by economic activity and are subsequently restored, there is a progressive deterioration in their quality, for which it must be considered to add an additional value.

Regarding chapter 6, we comment that the aspects of economic valuation are a complex subject to tackle, since it requires a lot of technical-theoretical work and time for a better analysis. In fact, the economic valuation in the SEEA is one of the most complex subjects but also we consider that is one of the less addressed.

One of the most difficult aspects is the consideration of the value of environmental services that are commonly not paid, and are not considered to be received by the market, for example, carbon capture, rain collection, natural purification of water, pollination, among

others, for which we consider that the way in which it is proposed may result complicated for the ones not specialized on the matter.

Part II: Other comments

In the box below please supply any additional comments including those of a more technical nature.

Please reference your responses with the relevant paragraph number or section number.

2.3.4 Ecosystem accounting units

Inside this classification it could be missing certain type of flora and fauna of marked relevance for ecosystem accounting. For example, plankton on sea ecosystems that according to its quantity may or may not affect an ecosystem in an important way by producing oxygen, or affecting the food chain where other species practice overgrazing of seaweed, such as the case of whales.

Besides, we consider that the works undertaken in the development of ecosystem accounting could be divided, for practical purposes, into two parts and that would not be motive of separation or duplication of efforts in terrestrial ecosystems and sea ecosystems, since the coastal zone is an area in which goods and services of both ecosystems are mixed.

4.72 “An exception in this case is carbon sequestration, since the impact of one unit of carbon sequestered on the global climate is the same regardless wherever the sequestration takes place?”

We consider that the question mark is outside context, seeing that the sentence does not have a question structure.

5.19 The word “Figure 5.1” is two times straight; perhaps an intermediate point is missing.



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Comment form

Comment form for the Consultation Draft

Deadline for responses: 1 January, 2013

Send responses to: seea@un.org

Your name:	Bram Edens
Your country/organization:	Statistics Netherlands
Contact (e.g. email address):	b.edens@cbs.nl

The comments below were obtained from the following agencies / departments within the Netherlands:

- LEI (agricultural economics institute) part of Wageningen University & Research Centre;
- National Institute for Public Health and the Environment – RIVM;
- PBL – Netherlands Environmental Assessment Agency;
- Ministry of Economic Affairs;
- Ministry of Finance;
- Ministry of Infrastructure and Environment;
- CPB Netherlands Bureau of Economic Policy Analysis;
- VoFF (‘Society for Field Research in Flora and Fauna’).

It should be mentioned that the length and detail of these responses varied greatly, some respondents seem to have taken more time than others for a detailed analysis of the documents. Nonetheless, all agencies/departments responded to our request.

The comments have been rearranged, anonymised and – in most cases – translated. In doing so we have tried to keep as much of the original response as possible, some comments have been summarized.

It is important to notice that the responses below not necessarily reflect the views of Statistics Netherlands. Statistics Netherlands is currently reflecting upon the outcomes of this consultation in combination with its own views, as a preparation for the UNSC in February.

Part I: General comments

As a general summary, the consultation draft is received very well by the agencies/departments, but a number of methodological issues is raised that may be further improved. Opinions differ with respect to valuation.

General reactions:

-We welcome the overall approach of the report, especially the challenging task to focus on the valuation of ecosystem accounting that permits integration with the standard national accounts (Section 5.13).

- It is an interesting report, and in some places also an eye opener, especially the distinction between value for welfare analysis and for accounting systems;
- We would like to stress the policy relevance of this report.
- We do not have expertise in this area;
- We welcome the idea to embed the economic accounting system in a broader system of ecosystem accounting. In this way material metabolism in the economic system can be linked to flows of environmental goods and services and to the available stocks of natural resources. Such an effort is very ambitious and one should learn from earlier attempts e.g. by Odum (1956), Hueting (1970) and the Genuine Savings approach of the Worldbank (1995). Recent work on an integrated set of Life Cycle Indicators (EC/JRC) can offer inspiration and relevant information to make the proposed accounting system operational. The feasibility of the undertaking can be increased with a stepwise approach that starts with developing accounting systems for vital materials flows e.g. the carbon cycle, the nutrient cycles and/or the water cycle.
- We are enthusiastic about this report. The report describes the characteristics of ecosystems and ecosystem services which can and should be measured (if we want a more complete set of national accounts), in a careful and quite comprehensive manner. The report makes a clear distinction between biotic and abiotic ecosystem services flows, environmental flows (such as wind, or extraction of minerals). Also a clear distinction is drawn between ecosystem services and the result thereof, the benefit for humans. Food is the benefit, the supply of water, nutrients, pest control etc. Most important thing is that the report makes clear that these are ecosystems and services nationwide, and that it therefore involves much, much more than just nature. The issue of rare species is properly included, not in dominant way, as often in national discussions on this topic. The report provides a sound basis for measuring and reporting on this issue. The report is very comprehensive in naming the relevant aspects (scale, ecosystem classification, measurement units, etc.) and gives practical tools for prioritization. The report is clear when it comes to considering the spatial units. For the Netherlands it seems practically feasible, because we are a small country but also because of the large amount of spatial information that we already have. An important role that the report can play is in the international harmonization and coordination of methodologies and indicators to facilitate international comparison. One point on which, among other things in the CBD there is much disagreement. This report enables prioritization and standardization easier. Dutch expertise is well recognized. The Netherlands will start soon with the Dutch National Ecosystem Assessment (NEA). This SEEA report provides a great base for developing a sound program based upon a clear conceptual framework. In short, an important report that the Netherlands should support. It would be good if the Netherlands is properly involved in the further development (especially Statistics Netherlands), we can really use this report for the elaboration of the NEA.
- It is an interesting report, but there is a need to put it into perspective. Economic processes are of a different category than ecological processes.

Valuation:

- We are against a correction of GDP for environmental effects. We want to keep existing economic indicators pure. In this experimental ecosystem accounting system this step seems not to be made, but the issues are discussed. We do not see the added value, in fact contaminated concepts may arise, but rather favor a satellite accounting approach as in SAMs or NAMEA's.
- The note that ecosystem services such as water, clean air, natural resources etc. are an essential share of wealth and essential for a well-functioning economy is elaborated in various studies TEEB (The Economics of Ecosystems and biodiversity) and connects well with the OECD green growth model. Major challenge is to actually place values on this: what do we have, how much does it generate and what would we lose when losing some ecosystems? We need to be better able to measure this in order to assign a value and know what that natural capital is what we are talking about and want to protect in order to secure

future welfare. This study addresses that question in a well-founded, clear and robust manner.

- The monetary valuation of ecosystem services (chpt 5) seems to be focused on the current economic value, while the real value of ecosystems lies in their potential to support future welfare: e.g. the value of the stock of a natural resource at the current 'market price' per unit used is much lower than the price would be when the stock is almost depleted. The risk is that efforts to monetize ecosystem services will draw away from vital ecosystem services that cannot be monetized. E.g. available ecosystem service valuations don't price the main ecosystem service, i.e. the production of oxygen, while oxygen production is vital for human existence and priceless when this service would decline. But also other vital functions of ecosystems, e.g. to sustain nutrient and water cycles, are for the future more relevant than the willingness to pay for its current recreational value. Different methods to value such 'minor' ecosystem services show large differences. But from available inventories it is shown that the willingness to pay for 'biodiversity' or 'nature protection' is considerably lower than the willingness to pay for health protection (e.g. through cleaning air or drinking water, or protection against flooding). Therefore we recommend to include environment related health risks (and costs made to reduce such risks) more explicitly in the system.

- Chapter 2 refers to benefit transfer methods and meta-analysis of ecosystem services (also chapter 5.5.2.) There may still be something more to be said about when such transfers do or do not work. WTP values can vary from situation to situation and studies also show that the errors made by such studies can be enormous. The theory is not so far that transfers can be widely used (although this happens already). First, more valuation studies need to be done (so that for a given situation values are really estimated on the basis of extensive stated or revealed preference methods and not on the basis of indicators) before benefit transfer studies can be used properly. This issue is already mentioned, but could be stressed more. It now seems as if there is almost more attention in the literature (not so much in this report) for meta-analysis than for specific valuation studies of certain concrete situations.

- The distinction made between value for welfare analysis and accounting could be discussed even more extensively. For compilers of national accounts this is perhaps obvious, but to the average environmental / ecological economist and ecologist, it is not clear. The question which valuation methods of environmental economics is or is not useful may also be discussed in greater detail. It is now said that one has to be careful with a number of methods because there are also elements of consumer surplus in it. But what should you do then? In which elements is the consumer surplus included, is it possible to omit certain parts of the study???? What is exactly the relationship between on the one hand direct use, indirect use, option and non-usevalue and on the other hand the value you estimate with the travel cost, hedonic pricing, CVM and conjoint methods? Many valuation studies also look at bundles of ecosystem services. How should one disaggregate towards individual ecosystem services?

- Nothing is said about estimating opportunity costs of ecosystem services as a method of valuation. I feel that this is also consistent with the values required for accounting and that in principle no elements of consumer surplus would be included. Para. 5.84-5.88 discuss the simulated exchange value approach to estimating the production function. I think you can do the same with the opportunity costs method, although I'm not quite certain how this may be accomplished

- The distinction between stocks and flows may be more extensive. In several places something appears about it while I think it is an important issue. Services are basically a flow, but how are they related to the stock behind it, what is the stock, and how do you deal with degradation? It is being discussed, but it's not clear to me.

- Experience from the UK with wetland banking showed that it was possible to manipulate the value of ecological systems in such a way that the quality degraded. The conversion in monetary values was not value free because you could manipulate by buying wetlands dumping them on the market or by organizing a 'bank run'. Translations and conversions are always ideologically colored.

Other methodological issues:

- For integrated modelling of economic-ecological relationships data are required at (at least) the level of economic sectors.
- The challenge is not only to link ecosystem stocks and flows to National Accounts at the national scale, but also to provide data on the interlinkages between countries, e.g. ecosystem services that are exported abroad (the distribution of the ecological footprint via trade relationships) and transboundary air and water pollution flows.
- Additional value of the Consultation Report is to identify linkages with systems of national accounts. Here, we envisage methodological difficulties in case the Consultation Report is going to link health benefits from nature, by assessing the reduction in expenses of the health sector. It is agreed long ago not to link national accounts with the prevention of expenses in the national economy. This would make systems of national accounts to be highly subjective.
- A main challenge will be to link the delivery of ecosystem goods and services with systems of national accounts. Section 5.13 clarifies that the focus of the report is on the valuation of ecosystems that permits integration with the standard national accounts. We appreciate this objective of the report, but would like to highlight some of the main methodological concerns related to this. Ecosystem services (e.g. ecosystem assets, as expressed in section 2.28) largely have a territorial dimension. However, national accounts have a sectoral approach. Some of the key methodological concerns remain undervalued in the report, and could be improved from some additional literature on ecosystem services for accounting. We therefore also welcome the plan to include an appendix with the approaches to define units for ecosystem accounting.
- Ecosystem accounting, presented in the Consultation Report, is an important topic to understand linkages between nature and the economy. We claim ecosystem accounting is part of a broader concept; it is part of a system to link (i) national accounts with external effects related to economic activities (e.g. waste, emissions of pollutants like CO₂ and SO₂), and (ii) the use of natural resources with economic activities (e.g. water, energy, minerals). These two topics are covered in the Central Framework, and quantify the external effects from economic activities (item i) as well as the use of natural resources in the economy (item ii). Well accepted approaches are available in environmental and resource economics to link the two items with national accounts. In conclusion, methods and tools are therefore needed to link the use of natural resources and ecosystem assets with economic activities. This is clarified by several documents from World Bank to link the use of natural capital with greening economies. In doing so, we are keen to extend the use of ecological capital (expressed in the Consultation Draft) towards natural capital. The Consultation Draft therefore builds on the Central Framework. We envisage further methodological advancements are needed to improve and agree on sound ecosystem accounting methods. Here, the input from academic research will be critical.
- We appreciate the current report does also emphasise the critical role of the biophysical features of ecosystems. We therefore recommend to clarify topics like resilience, tipping points, thresholds, response functions. Although it is mentioned in the report, we like to emphasise the importance of recent advancements in the scientific ecological literature.
- The majority of ecosystem services are delivered in a territorial context. They include common-pool resources (with high degrees of rivalry and difficulties to exclude others from use). Examples are grasslands, lakes and forests. However, the demarcation of the spatial scale is complicated in the delivery of some ecosystem services. See for example pollination by bees, with the ecosystem service being delivered across regions.
- Beneficiaries of the ecosystem services are not always clear. Accepted methodologies are available in national accounts to identify the beneficiaries and their mutual relations. This is similarly important in ecosystem accounting. Because of the indivisibility of some ecosystems and the lack of market prices, methodologies are needed to link ecosystems with the beneficiaries in a system of national accounting. To the best of our understanding, this is still largely unknown.

- Ownership of the property rights of ecosystem assets is critically important for national accounts. This is hardly addressed in the report.
- Costs of the management of ecosystems are not adequately addressed in the Consultative Report.
- The report does acknowledge the benefits of ecosystem services is subjective to arbitrary choices, especially when market prices do not exist. This often is the case with ecosystem services, and also complicates international comparisons as they become highly context dependent.
- We want to express the importance of marine ecosystems and their links to national accounting. The interaction between terrestrial and marine environments are vital and recommended to be elaborated in the report.
- There are many initiatives on ecosystems, both nationally and internationally (e.g. UNEP initiative TEEB; national ecosystem assessments). We understand the difference between ecosystem assessments and ecosystem accounting. So far, there is limited experience towards accounting for ecosystem services. Governments would benefit from a proper understanding of the two approaches, and the report could contribute to this. We therefore recommend addressing this distinction in a more explicit manner in the report. The report would also benefit from clarification of the relationships between the numerous ecosystem initiatives.
- The categories of value are divided into physical and non-physical. I find this a strange format because only money is called non-physical while cultural significance is assigned to the category physical (therefore it is actually a division into categories monetary and non-monetary). The point is that the classification should be something that everyone uses, so perhaps better to connect to the existing philosophical categories of value of nature.

Part II: Other comments

In the box below please supply any additional comments including those of a more technical nature.

Please reference your responses with the relevant paragraph number or section number.

- We recommend building upon available integrated economic-ecological system dynamic descriptions e.g. the World-models of Meadows c.s., the IMAGE-model, etc. The system description in the proposal (fig 2.2 and 2.3 on p18 and 20 respectively) is far from complete as it doesn't show the (pollution) flows from economy to environment and the associated reduction in ecosystem services. Also the description of the carbon cycle (fig 4.4.1 on p68) doesn't show relevant parameters that influence ecosystem carbon storage (now and in the future), such as changes in land use, temperature, ocean acidification or the nutrient cycle.
- Chapter 5 very quickly makes the transition to economic valuation and monetizing. The report could describe this transition a bit better by making clear why this step is desirable (and in which cases) before diving into the issues and bottlenecks. Reference could / should be made to the work of the OECD in this area, and to the TEEB study.
- According to item 1.15, the SEEA Experimental Accounting seems to focus on the impacts of economic activities on the environment. To the contrary (item 1.24 (iii)) the report is aimed to support our understanding of the contribution of ecosystem services to economic production, consumption and accumulation. We consider item 1.24 to be closer to the approach adopted in the Consultation Draft.
- The Consultation Report on Ecosystem Accounting seem to identify methods that are currently already used in several international initiatives (mainly TEEB – the economics of ecosystems and biodiversity; MA – millennium ecosystem assessment) are briefly mentioned (Section 3.23). An ecosystem services valuation database (ESVD) is developed in the Netherlands. Drawing from 300 case studies, the database offers monetary values of 1,350 studies. See also The Ecosystem Services Partnership (<http://www.es->

partnership.org/esp).

- The models shown in Chapter (e.g. p.20) are linear. Any ecologist will tell you that a sustainable system should be circular: everything has a function and is re-used.
- The definition of biodiversity (p. 38) is unclear. It comes from the CBD but the problem with the definition is that it encompasses everything and therefore not distinctive and difficult to link to an action perspective. You could state: for this and this application we use the concept of species. Ecologists who try to estimate resilience also do it that way.
- Biodiversity is very much discussed in terms of models, but it also possible as shown by the experiences in the Netherlands to measure biodiversity directly.



DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS
STATISTICS DIVISION
UNITED NATIONS

SEEA Revision

**SEEA Experimental
Ecosystem Accounting**

Comment form

Comment form for the Consultation Draft

Deadline for responses: 1 January, 2013
Send responses to: seea@un.org

Your name:	Andrew Harbidge
Your country/organization:	New Zealand Department of Conservation
Contact (e.g. email address):	aharbidge@doc.govt.nz , (04) 471 3199

To submit responses please save this document and send it as an attachment to the following e-mail address: seea@un.org.

The comment form has been designed to facilitate the analysis of comments.

In Part I general comments on the structure and content of the draft document are sought. In Part II any other comments, particularly those of a technical nature should be included.

Relevant documents

Before submitting responses you are encouraged to read

Cover Note to the Consultation Draft

SEEA Experimental Ecosystem Accounting – Consultation Draft

Part I: General comments

In the box below please supply any comments on the structure of the document, the balance of material and the coverage of the draft including any thoughts on missing content.

Comments on the style, tone, and readability of the text are also welcome.

Please reference paragraphs numbers or section numbers as appropriate.

1. Structure – The structure of the consultation draft, with statements of general concepts and principles followed by detailed analysis, is appropriate and user friendly. However, the Annexes could be incorporated into the chapters in the main body of the document to unite the principles with examples of their application.
2. Style, tone, and readability – Although necessarily highly technical in nature, the concepts and structures of the experimental ecosystem accounts are expressed in admirably plain English, with a minimum of jargon and with acronyms clearly

explained.

3. Missing content – The experimental ecosystem accounts, like the SEEA Central Framework, are not linked to any particular social theories or models of political economy, and could therefore be universally applied. However, this also means that the system of accounts is atheoretical in that it lacks any foundation in an explicitly articulated understanding of economy-environment interactions. The lack of a theoretical basis leads to inadequate modelling of environment-economy linkages. A general discussion of the theoretical basis of the experimental accounts, would be beneficial.

Part II: Other comments

In the box below please supply any additional comments including those of a more technical nature.

Please reference your responses with the relevant paragraph number or section number.

1. Paragraph A4.28 – Accurate and accessible data is essential for assessing the impact of the New Zealand Biodiversity Strategy. A review of the Strategy in 2005 highlighted the need for the development of key environmental indicators for monitoring and reporting on freshwater terrestrial and marine biodiversity. Biodiversity accounts could be used to track progress towards the key policy targets set out in the New Zealand Biodiversity Strategy.
2. Paragraph 6.45 – Economic valuation of ecosystem services in the form of monetary estimates is a pragmatic (and successful) strategy to communicate the value of biodiversity to decision makers and the public in a way that reflects the dominant model of political economy. Understanding and promoting the contribution of biodiversity and ecosystem services to economic prosperity is a key objective for the Department. A mature ecosystem accounting system could capture and convey the value of ecosystem services and ensure that ecosystem related information is included in national accounting and economic planning.
3. Paragraph 1.42, 2.8, 2.82 and Table 2.3 – A key concern is how the non-linear relationships between asset, services and benefits are addressed. Related to this is resilience (as introduced in paragraph 1.42, 2.8). Paragraph 2.82 and Table 2.3 discuss how changes in ecosystem condition and extent are ‘expected’ to result to changes in ecosystem flow. As this relationship can be non-linear then a clear understanding of that relationship is required in order to arrive at table 2.3. For example a 10% decrease in ecosystem condition may only result in a 5% loss of services, while a further 10% decrease may push the asset past a resilience/tipping point where it rapidly changes regime and a 90% loss of services is experienced. We feel this is an issue requiring further in depth discussion and is a potential research priority area.
4. Table 2.2 and 2.3 – Decreasing resilience (i.e. increased level of risk) and its implications could be better represented in the draft system. Boundaries/limits in asset condition or extent could be articulated, for example in Table 2.2, so the current position and trend relative to them can be understood. This would provide important context for the user of the information, and would have implications for

table 2.3. Related to comment 3.

5. Paragraph 2.5.4 – Time lags. The production of accounts is suggested on an annual basis. Are time lags between changes in asset condition and the expected supply of services a concern, particularly those associated with longer natural cycles?
6. Paragraph 1.23 – IPBES should be listed
7. Paragraph 1.44 – add income equity as an issue of concern (emerging research links wider income gaps to poorer economic, social and environmental outcomes).
8. Paragraph 3.12 – Declining diversity will likely decrease resilience, so threatening the supply of services beyond cultural.
9. Paragraph 2.75 – Limitations of ‘symbolic’ trend information. The data generated by accounts using entries in the form of up and down arrows would be of limited application in policy development and implementation monitoring.
10. Paragraph 2.21 – Ecosystem ‘disservices’. The model of ecosystem services takes no direct account of ecosystem ‘disservices’, such as pests and diseases. The impact of ‘disservices’ such as pests and pollution is crucial to ecosystem management and the flow of goods and services. The absence of a theoretical and accounting basis for disservices from the experimental accounts limits the practical application of this framework. More work is required to understand and account for disservices within the ecosystem accounting framework.
11. Section 5.4 – Non-market valuation mechanisms. For some ecosystem goods and services, prices and costs are not observable but must be taken as implicit or estimated using hypothetical valuation approaches. Generalising from hypothetical estimates of the value of flows of ecosystem goods and services to the value of their underlying stocks creates another layer of uncertainty, while not significantly contributing to reliable estimate of the monetary value of such stocks.
12. Paragraph A4.62, Tables A4.5.1 and A4.5.4 – Importance of non-monetary and qualitative metrics. Valuing and quantifying stocks does not tell us much about their underlying nature; their resilience and the risk of non-linearity and irreversibility thresholds. Frameworks that go beyond simulated market prices and incorporate qualitative and bio-physical measures may support a richer (and potentially even more experimental) assessment of the value of the flows and underlying stocks of ecosystem goods and services.
13. Section 4.3.4 – Reference conditions. Pre-industrial reference conditions may be difficult to verify given the potential lack of complete data. Selecting an ecosystem with minimal human interference as the reference baseline is also problematic, given that there so few such ecosystems. The reference baseline selected may in fact represent the ecosystem in an already degraded state, making comparisons against the baseline reference a potentially inaccurate measure of ecosystem condition.

Part II: Other comments

In the box below please supply any additional comments including those of a more technical nature.

Please reference your responses with the relevant paragraph number or section number.

We have divided our comments into two parts. The first part addresses more fundamental aspects of this work and the second part provides more detailed comments to the text as it currently stands in this version.

Part 1. Fundamental Aspects of concern

1) Whereas SEEA-Central Framework (2012) was rather limited in terms of coverage and was very close to the national accounts (SNA2008) – it is not clear what the relationship of this document is to SNA since some of the proposed treatments (especially in chapter 6) are not integrated with the framework of SNA. It is certainly not simply an expansion of SNA or of SEEA. The specific relationships between these three documents are still unclear.

With regard to possible integration between ecosystem accounting and national accounts, we question the possibility of simply "including" ecosystem accounts into national accounts, and we point to the potential of satellite accounts as a fruitful avenue to integrate the accounting of non-market values more closely with the national accounts. Hence, we suggest that the editorial group will consider, initiate and perform a thorough discussion of how important elements of the Experimental Ecosystem Accounting can be included as satellite accounts to the national accounts. This may be a suitable task to be addressed by the countries contributing to performing the "experimental" ecosystem accounting, with the potential to gain valuable experiences on the possibility to develop satellite accounts for ecosystems and ecosystem services.

2) Statistical Units

Of the six persons that have read and commented on chapter 2 from Statistics Norway, not one had the same understanding of the discussion of statistical units. To us, this indicates that the current text does not communicate this topic very successfully. We provide some description of the different topics that we have discussed to help provide input into the revision of this chapter.

From the draft text one might get the impression that ecosystem accounts are basically some type of advanced area or land statistics since ecosystems are defined in relation to spatial areas with each area considered an ecosystem asset containing a combination of biotic and abiotic components and other characteristics that function together (§2.7).

Although it seems that the units simply appear to be area and aggregates of a geographic grid (aggregating BSU/LCEU to an EAU), we understand that this is not necessarily so, hence, the concept of statistical unit in the draft text is

somewhat misleading and the distinction between geographical unit and statistical unit needs to be clarified.

A standard approach to biodiversity measurement would be to distinguish between the extent of the ecosystem in terms of geographical unit (administrative unit or geo-biophysical unit like watershed) and the quality or condition of the ecosystem in terms of the attributes of biodiversity and ecosystem functioning of this land, relevant to the particular context. Considering the relevant attributes involves the choice of statistical unit.

By definition a statistical unit is a variable with certain properties that are relevant for the particular purpose of statistical survey. For example, the statistical unit for carbon storage in forests could be standing forest volume if the emphasis is on the potential for carbon storage or million tonnes carbon accumulated if the emphasis is on the actual flow of ecosystem service. In either case the statistical unit operationalizes an attribute of the land delineated by the geographical unit defined. These distinctions between geographical units and different statistical units for different purposes need to be clarified at the outset. Another point needing clarification is whether or not the individual ecosystem is an Ecosystem accounting unit.

We appreciate the proposed flexibility to encompass different types of geographical areas, depending of the purpose of the analysis, but we strongly recommend that the geographical unit, as basis for the statistical units describing ecosystem condition, will be defined in accordance with international statistical recommendations for advanced land accounting, and that the distinction between geographical units (extent of ecosystem) and statistical units (condition of ecosystem quality relative to purpose of analysis) are clarified and illustrated with examples useful for guiding the countries contributing to the "experimental" ecosystem accounting.

§2.28 The paragraph starts out stating that "Ecosystem assets are spatial areas". The point that the accounts are about the ecosystem services obtained from aggregations of spatial areas like BSUs or LCECs or from one EAU is difficult to understand. Potentially the reason may be that Tables 3.2 and 3.3 are without content in terms of examples. So are also Tables 4.2, 4.3 and 4.4. The question asked is, What is going to be measured? It would be useful to suggest examples of ecosystem services and expected "baskets" of ecosystem services.

3) The ecosystem concept needs a more extensive explanation. Traditional environmental economics has introduced the idea that nature submits several types of services to society. The text introduces ecosystem services – and it should be explained if these services are a set of various services that are linked together in a ecosystem or if the ecosystem gives an aggregate service to society. We prefer the first approach. The accounting structure (definition of each account and balancing items) is crucial and the discussion in Chapter 3 including the appendix need to be elaborated. The figures in Appendix to Chapter 3 need a more simultaneous presentation.

4) We have two substantive comments to models A and B in Chapter 6 (see comments 4a and 4b) – neither model do we think should be in a statistical manual. But before discussing the models there is a more important problem of lack of harmonization that needs to be dealt with first. In §6.66 – the next to last paragraph in the report – it is stated, “...SEEA Experimental Ecosystem Accounting does not recommend or endorse any specific approach to adjusted measures of income or any particular approach to valuation.” In other words, the conclusion of this chapter, as stated in §6.66, is basically rejecting the content of the chapter or at least it seems to be in conflict with what is presented in the chapter. This is rather concerning. The conclusion and what is presented in the chapter text need to be harmonized.

4a) From Chapter 6 it appears from model B that ecosystems shall be considered a “sector” just as, for example, households are a sector. The question then becomes, why is nature treated as a “sector” when it comes to the treatment of ecosystems. Nature is not a sector when wild fish are fished, oil is extracted, natural forests are cut for timber, etc. according to the SEEA-CF. By treating ecosystems as a sector implies that there is an economic institutional unit that controls them – but that type of treatment does not make much sense in relations to ecosystems. We conclude that treating nature as a “sector” is not consistent with SNA or SEEA-CF treatment so we do not support the Model B approach.

4b) From model A in Chapter 6, where ecosystems are not treated as a sector, the production of goods and services from ecosystems then have no source of production. So then the question becomes, what then is the point of putting together the ecosystem production and the economic production (GDP)? Adjusting GDP in this manner simply is not acceptable within the statistical system and any type of statistical manual which proposes this treatment cannot be supported by Statistics Norway. That research institutes or Ministries make these calculations is within their mandate but it is not within the mandate of official statistics.

5) In §2.113 it states that: “regarding valuation, the valuation principles of market prices is applied in SEEA Experimental Ecosystem Accounting in a manner consistent with the SEEA Central Framework and the SNA.” This statement seems a bit strong since many of the ecosystem services are not marketed.

Valuation approaches (Chapter 5): There is no market for most ecosystems or for their services, in particular supporting, regulating and cultural ecosystem services – so there are no market prices. The various surrogate techniques proposed produce widely differing results based on the assumptions made in the calculations. To say that the national accounts uses estimates for non-market prices to justify the methodologies proposed is not a good argument in our view. Yes, there is some small scale estimation of missing information that is applied in the National Accounts but these small additions are not comparable to the scale needed for ecosystem valuation where the entire valuation procedure is based on surrogate techniques due to the absence of

market prices. It is even less clear how we are “to assess the consistency of these approaches with the principle of market price valuation” (§2.113).

6) It is very difficult to understand exactly what is going to be included in the tables – assumed it would be numeric values but then statements like in §2.75, “it may be useful to show entries in the tables in terms of up and down arrows” are confusing. A clarification is needed on the suggested use of quantitative information and qualitative assessments for various purposes. Measurement approaches were to be included in an annex (stated in §2.76) which is missing. Perhaps this discussion should be moved to where this is discussed in physical units – it seems out of place here. In general the tables and the discussion about the tables are very abstract so it is very difficult to understand how to get from a starting point to the tables.

7) We do not find a discussion about ecosystem degradation in physical units – only in monetary terms. A wider discussion about ecosystem degradation is needed to better understand this concept/phenomenon from a physical flows perspective.

8) And finally it is not clear exactly what the role of the statistical system is/should be in the development of ecosystem accounts. It is not obvious that this proposed system is connected to the statistical system through any of the usual statistical units with which we are accustomed to working. We have drafted some text which may be helpful with regards to the role of the statistical institutes and attach this proposed text:

The role of statistical offices in extending statistical accounting to biodiversity and ecosystem services:

Biodiversity measurement, in our experience exemplified by the Nature index for Norway, is an important part of the information basis for ecosystem accounting. While the basic ecological data in such information systems often belong outside the competence and comparative advantage of national statistical offices, other aspects of biodiversity measurement and its application are clearly within the scope of the national statistical offices, including the information basis on the geographical areas of ecosystems as fundamental unit for ecosystem accounting. Another aspect of high relevance for the statistical offices is to provide knowledge on the role of human impact factors on ecosystems, which clearly brings biodiversity measurement into the socio-economic arena. Here national statistical offices have a certain role in integrating the ecological knowledge basis with knowledge on human economic activity and how it impacts on ecosystems via production and consumption. This calls for interdisciplinary cooperation between the national statistical office and ecological research institutes in order to develop and extend the ecological accounting framework and improve the statistical basis for knowledge on ecosystem services and ecosystem wealth. Index methodology and handling the uncertainty are issues within the core competence of a statistical office.

In accounting for ecosystem services, information on the provisioning services – harvesting of natural resources – is partly within the traditional domain of national statistical offices, while the integration of provisioning services with the “non-market” regulating, supporting and cultural parts of ecosystem services are, has so far been more or less outside the scope of responsibility for most statistical offices. Nonetheless, some information on these “non-market” services still exists, directly or indirectly, and needs to be utilized.

Part 2. Detailed comments to portions of the current draft text

a) In §1.3 (also §1.15 and §3.3) it states that ecosystem accounts can “organise information relevant to the assessment of trade-offs between different uses of ecosystems.” This claim is not supported or illustrated in the rest of the draft report. Making this type of unsubstantiated claim is inappropriate for such work in such an experimental condition. We suggest re-writing to indicate that this is an ambition and not part of this system at the current time.

b) It is unclear what is meant in §1.22 – what are cross-border ecological cycles? Which borders? – between different ecosystems or countries? This should be clarified in the text.

c) In §1.42 and §2.8 the concept of “resilience” is introduced and it would appear that this is an important concept – and something that should be measured – but then it is not explained much more in the draft report – although it is used (§2.30). What is the purpose of introducing this term?

d) Footnote 5: Annex 1 is missing. Annexes named in §2.69 and §4.96 are missing.

e) In §2.24 it is stated that the term ecosystem services is used to include the “various ways in which humans relate to ecosystems.” Does this mean that the portion of the ecosystem service that is not related to humans is excluded from the system? And how is “relate” defined/determined? Apparently the annex to chapter 3 provides some information about this but then it is unclear why this important information is in the annex. It is important to have an understanding of what is excluded – since in these cases there is no relation to humans. Is the focus only on the services arising from ecosystems that humans can use or is information on changes of the physical quality of the ecosystem also to be part of the accounting system? This is unclear.

f) The use of the term “CICES” is not explained before it is used in this figure – not explained for pages. A list of abbreviations for reference for readers is also needed.

g) §2.105 argues that wind is an ecosystem process and not an ecosystem service. But if the atmosphere is an ecosystem – which is what is stated in §2.70, then wind is an ecosystem service and should be included. But it is not clear what the difference is between an ecosystem process and an ecosystem service.

h) §3.23 uses the abbreviations MA and TEEB – these need to be replaced with the complete name.

i) §3.24 uses the expression “apply the harvest approach” – what does that mean? This is not explained in the text at all.

j) §3.57-3.60 give a rather simplistic version of constructing a composite indicator – this discussion needs to be more robust – see JRC/OECD handbook on constructing composite indicators for their 10 steps for doing this.

k) Tables 4.2 and 4.3 are “extensions” from SEEA-Central Framework tables. Theoretically this may be reasonable but it is difficult to understand what would go into the tables.



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SEEA Revision

**SEEA Experimental
Ecosystem Accounting**

Comment form

Comment form for the Consultation Draft

Deadline for responses: 1 January , 2013
Send responses to: seea@un.org

Your name:	Michael Nagy
Your country/organization:	Qatar Statistics Authority
Contact (e.g. email address):	mnagy@qsa.gov.qa

To submit responses please save this document and send it as an attachment to the following e-mail address: seea@un.org.

The comment form has been designed to facilitate the analysis of comments.

In Part I general comments on the structure and content of the draft document are sought. In Part II any other comments, particularly those of a technical nature should be included.

Relevant documents

Before submitting responses you are encouraged to read

Cover Note to the Consultation Draft

SEEA Experimental Ecosystem Accounting – Consultation Draft

Part I: General comments

In the box below please supply any comments on the structure of the document, the balance of material and the coverage of the draft including any thoughts on missing content.

Comments on the style, tone, and readability of the text are also welcome.

Please reference paragraphs numbers or section numbers as appropriate.

The document provides a good starting point for organising information on ecosystems and on the measurement of services they provide. Not all chapters have reached the same level of maturity yet.

The interrelationship between SNA, SEEA Part I and SEEA Part II, experimental ecosystem accounting, data requirements and policy needs is well presented. However, even if it is stated several times in the document that there are challenges in measurement and data availability, there is no reference to the recent work of UNSD on

the revision of the Framework for the Development of Environment Statistics (FDES). UNSD clarified in the international seminar "Towards Linking Ecosystems and Ecosystem Services to Economic and Human Activity" (New York, 27-29 November 2012) that the SEEA (including Ecosystem Accounting) and the revised FDES are frameworks that build on and support one another. Therefore, reference to the revised FDES should not only be given in the introduction chapter, e.g. in paragraph 1.26, but also in the "technical chapters" such as chapter 4 which is basically built upon information about appropriate characteristics of ecosystems (link to FDES component 1 required).

Chapter 2 (Principles of ecosystem accounting) is very useful and clear. For practical application several questions remain, however it is expected that they will be addressed by the research agenda and pilot country applications.

Chapter 3 (Accounting for ecosystem services in physical terms) is also well structured and clear. Weak points seem to be the units of measurement (volumes of ecosystem services, paragraph 3.25), in particular the identification of number of users (conceptually and practically). Numerical examples for all 3 types of ecosystem services would be useful for further discussion.

Chapter 4 (Accounting for ecosystem assets in physical terms) is conceptually clear. However, it would be appreciated if the link between the standard asset accounting and ecosystem accounting could be shown in form of a diagram and a numerical example.

Chapters 5 and 6 (Valuation for ecosystem accounting and accounting for ecosystems in monetary terms): Valuation of ecosystem services and ecosystems provides valuable additional information to physical accounting. The methodological options, limitations and potential inaccuracies are well described. What is missing is a discussion of the cultural and ethical aspects of giving the environment a price. Accounting in monetary terms can provide useful additional information to physical accounts and it can support awareness raising, but it should never stand alone.

However, the combined presentations for ecosystem accounting and the measurement of ecosystem degradation in monetary terms are considered useful tools for management of ecosystems and awareness raising.

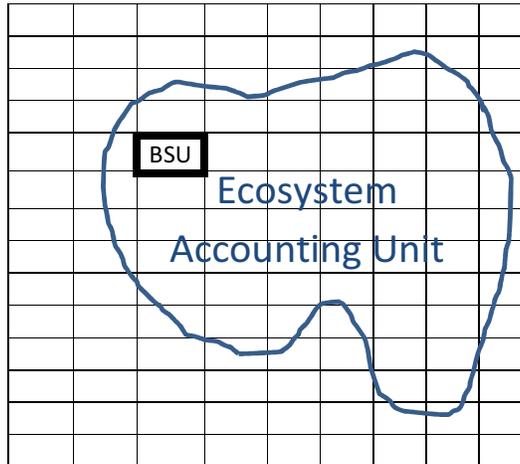
Part II: Other comments

In the box below please supply any additional comments including those of a more technical nature.

Please reference your responses with the relevant paragraph number or section number.

- Measurement challenges (para 1.26ff): Here could be a reference to the FDES
- Figure 2.3 (broad model of flows in ecosystem accounting): For consistency and completeness it would be good if the arrow between "Abiotic resources" and "Abiotic services" had a label (description)
- 2.3.4 Ecosystem accounting units: Please further elaborate this chapter and make figure 2.4 clearer. We understand an Ecosystem Accounting

Unit as a polygon as it can be identified from maps or remote sensing, whereas BSUs are cells of a grid and attributed with relevant information.



- 2.3.7 Issues in the delineation of units: Please provide guidance how environment statistics should be geo-referenced. Maybe link to FDES useful here.
- Paragraph 3.25: There should be more discussion about the measurement of regulating services and cultural services. How is the number of users of a cultural service, such as biodiversity of the Antarctica determined? Or has biodiversity of the Antarctica no value, or just a value for researchers (for how many)? What is the unit of measurement? There are lots of conceptual and practical questions related to that paragraph.
- Chapter 4: Accounting for ecosystem assets in physical terms: Please refer to FDES component 1 (Environmental Conditions and Quality).
- 5.2.2 The motivation for valuation in ecosystem accounting: Please address here also the problematic issues related to valuation of ecosystems: cultural and ethical aspects of giving ecosystems and their “services” a price and the concerns mentioned by W. Radermacher in his opening address to the International Seminar “Towards Linking Ecosystems and Ecosystem Services to Economic and Human Activity” (New York, 27-29 November 2012)

CONTRIBUTION TO THE SEEA EXPERIMENTAL ECOSYSTEM ACCOUNTING

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1. Introduction

The aim of this contribution is to offer an alternative accounting proposal to measure ecosystem total income based on the total economic value concept and the simulated exchange value approach in the framework of the SEEA Experimental Ecosystem Accounting consultation process. The total income concept is defined beyond the SNA flow and asset boundaries on the basis of Hicks (1939) and Krutilla (1967), respectively, commercial income and environmental income.

The Tables A6a and A6b show a simplified net value added and capital gain indicators for illustrating the main challenges we need to agree for being able to incorporate market and environmental (non-market) economic values in real measurement of total income and capital accounts of ecosystems at any scale.

2. Ecosystem total economic value

The economic valuations of an ecosystem have the ultimate aim of estimating the Hicks-Krutilla total income (Hicks, 1939; Krutilla, 1967), and to achieve this objective it is required to, in advance, value the stocks and movements of natural capital and manufactured capital in the accounting period. Thus, there exists a widespread consensus among environmental economists that the total economic value of the ecosystem is a framework of the theory of suitable economic value (Pearce, 2007; CBD, 2009, Bateman *et al.*, 2010, and TEEB, 2010). The total economic value includes all the sources that motivate individuals and/or institutional entities to attribute economic value to scarce goods and services that are consumed and/or appropriated. The clearer motivations of why people attribute an economic value to *final and intermediate* environmental goods and services are due to their *current active use*. Another reason why people assign economic value to known scarce sources is the motivation of ensuring the option of their future use. This *option value* emerges when the current generations are worried about the future supply of particular services for which they prefer to not put the persistence and/or provision of the desired service at risk. The option value is manifested in the availability of the current generations to include an additional management cost of the ecosystem as a way to ensure that in the future the preferred capital endowment is reached. The payment is justified, either due to avoiding the degradation of the supply of services of the ecosystem that originate from its current management, or because they prefer to have a future supply that is equal or superior to the current services. People and institutional entities also can give economic value to *passive use* (existence value) to try to mitigate habitat loss and the extinction of threatened species. The concept of *existence value* of an ecosystem has led to a lively controversy, which is not yet fully resolved, over the

difficulty of the valuation of the unique concept of passive use¹. The economic science that underlies an existence value is based on the observation that humans spend economic resources on an individual or collective level in an attempt to prevent non-replaceable ecosystems, biological varieties, and *unique* cultural values from disappearing forever (once they disappear they cannot be reproduced). This behavior occurs even in situations when the passive user only knows these unique assets are threatened by readings, conversations with other people and audiovisual mediums, and without the requirement of the foresight of the future active use they still express the willingness to pay for the possibility of their future existence (Krutilla, 1967; Pearce, 2007).

The economic values of both active and passive uses which made up the utilitarian exchange total economic value are additives, although they can appear errors and/or double-counting in the application and inconsistency of the value of services, unless you have taken into account the criteria of *double counting* and of *exchange value* of environmental services measurements.

Some analysts attribute “intrinsic worth” to nature other than human species to be confronted this non economic value with utilitarian exchange total economic value. This is to say that *intrinsic worth* is a non utilitarian value that support that everything in nature has an *absolute worth*. Opposite, TEV concept assumes that only human species has an *end in itself*, and from this it follows that to those other nature things different of human beings, might become to receive from people a mere *relative worth* (a price), but they do not have by their-self an intrinsic economic value.

3. Ecosystem private and public total incomes

The economic flows and stocks of and ecosystem are made up of *scarce goods and services* for which a person and/or an institutional entity are willing to pay a sum of money (numeraire) to access its use and/or property. The economic goods and services are classified in commercial and environmental, the latter being separated in public environmental and private environmental. Economic commercial goods and services are composed of *scarce goods and services* for which a person and/or institutional entity is willing to pay a sum of money to ensure their access to its use and/or property, and the person/institutional entity usually gains access by a payment of a sum of money through a *market transaction*. The Economic environmental goods and services generated by the ecosystem are formed by the scarce goods and services that are usually non-commercial that a person or institutional entity owns and self-consumes and that are non-proprietary with free access to their use and ownership, and for which people are willing to pay a sum of money to ensure their consumption and/or exclusive ownership.

The ecosystems produce natural goods and services depending on circumstances of *demand*, *location* and *property rights*, among others, which are *economic*, or the same goods and services are *non-economic* or *free* in other places and circumstances. That is to say, they are non-economic when the owner of the ecosystem does not find a person and/or institutional entity willing to pay a sum of money for its consumption and/or appropriation. The natural production of acorns, grass and pine nut that livestock, game species and people do not consume are considered free environmental goods, and therefore in these cases they are non-economic natural goods. Also the natural forestry water which is regularly consumed in excess

¹ Or non-use, as it is called by others, although this form of reference to passive use is nominally inconsistent with the theory of the consumer.

over natural grasslands by woody vegetation and the flow of natural forestry water that reaches the rivers without reservoirs are considered free environmental goods.

The flows and stocks of economic goods and services of an ecosystem depending on the way in which they are produced, they can be classified as natural resources (NRs) and manufactured resources (MRs). Among the NRs are natural fixed capital (FC_N), which are composed of *land* (FCl), *biological resources* (FCbr) and other natural (FCo_N); *natural raw materials* (RM_N); *natural work in progress* (WP_N); and *natural services used* (SS_N). The MRs can be grouped into *manufactured fixed capital* (FC_M), which are composed of constructions (FCco), equipments and machinery (FCe), plantations (FCp) and other manufactured (FCo_M); *manufactured raw materials* (RM_M); *manufactured work in progress* (WP_M); *manufactured services* (SS_M); and *labor costs* (LC), formed by employees (Lce) and self-employed (LCne). Thus, the *Hicks-Krutilla total income* (TI) extended to the economic environmental values of the ecosystem can be expressed by the equation [1]:

$$TI = F(NR, MR) = F(RM, SS, LC, WP, FC) \quad [1]$$

The equation [1] contains all the information needed to estimate the Hicks-Krutilla total income for any scale of territory (nation, region, natural ecosystem, vegetation, etc.). The ecosystem *production account registers and organizes the information of economic activities* to estimate the *net valued added* (NVA) in the accounting year. The economic resources that remain in the territorial economic unit for more than a year are organized in a capital balance account (including fixed capital and work in progress accounts) in order to measure the ecosystem *capital gain* (CG). The measurement of total income (TI) is resolved with the aggregation of both *net valued added* (NVA) and *capital gains* (CG) (Eisner, 1989, p. 17 and BEA, 2010, p. 18):

$$TI = NVA + CG \quad [2]$$

The science of economics is developing methods of environmental valuation that simulate the quantities and prices associated with the production and consumption of economic environmental goods and services, that have in some cases a comparable consistency to the criteria of valuation of the SNA². They need the information of supply and demand to come reach an estimate of the partial equilibrium price that corresponds to the amount of supply of environmental goods or services that they want to assess. Thus, the total amount consumed/produced multiplied by its marginal price offers a total environmental economic value consistent with the commercial value of market goods and services of the SNA (Campos and Caparrós, 2011). In recent years there has been progress towards improving the techniques of environmental valuation based on individual preferences both revealed and stated by the population, but it is worth noting the few occasions in which they have tried to consistently use these techniques in green national accounting.

Tables A6a and A6b present the summarized estimation of total income as illustrative aim. The rows show, for each of the private and public activities carried out in the columns, the total

² Clearly, the principle of the SNA which states that theoretically one should only include market goods and services is not met in practice. In the majority of countries a significant part of economic activity of the governmental is free to citizens, and certainly in this case there is not a market price, nor any measured supply of the offered goods and services provided for free. The government simply decides to “attribute” the free public supply of goods and services that are consumed by citizens in a specific period of time an imputed market value equal to the cost of its production.

output and total cost, by distinguishing between the commercial SNA and the non-SNA items. The columns represent the private and public predominantly activities that have complete production and capital accounts, and therefore their total income and capital can be estimated.

By definition an activity whose ordinary most important output is environmental is called an environmental activity. It should be noted that an environmental activity can supply own account commercial gross fixed capital formation and generate commercial costs. Thus, an environmental activity could generate a mixed environmental and commercial total income, and this mixed total income could be separated into environmental income and commercial income depending on the activity. Another distinct feature is that a commercial activity can generate a mixed joint private and public total income, which can be separated into private income and public income depending on the activity. In other words, the total income of the ecosystem can be classified, by the criterion of ownership, in public and private, and, by the criterion of the market, in commercial and environmental (Campos and Caparrós, 2006). When valuation is done at producer prices, the Hicks-Krutilla total income is also called total social income.

The *total output* of the ecosystem is classified, on the one hand, in total *commercial output* and total *environmental output*, and, on the other hand, in total *private output* and total *public output*. The total *commercial output* is estimated by the sum of total *private commercial output* and the total *public commercial output*. The later consists of the own account public commercial gross fixed capital formation generated by the government management spending associated with the total output of the ecosystem.

The *private environmental goods and services auto-consumption final output* generated in an ecosystem consists of all the flows of *scarce goods and services* for what a non-industrial private ecosystem owner is *willing* to pay a sum of money (numeraire) to guarantee its use by holding exclusive property of the ecosystem. The final private amenity consumption is not traded as a flow, but requires that its capital value is internalized by the potential market transaction of land (Campos et al., 2009).

The total *public environmental output* generated in an ecosystem consists of all the flows of non-commercial *scarce goods and services* not usually traded to which a consumer and/or institutional entity non-owner has free access, and for which the person and/or institutional entity is willing to pay a sum of money (numeraire) to guarantee their consumption and/or exclusive ownership.

The *private total output* results by adding the *private commercial total output* and the *private environmental total output*, and, equally, the *public total output* is estimated by the sum of the *commercial* and *environmental* public outputs.

Also the total cost, in the same way as the total output, can be disaggregated into commercial and environmental, and, also, into private and public. The private total cost coincides with the private commercial total cost, and the public total cost is the aggregation of public commercial total cost derived from governmental public spending in the ecosystem and the environmental total cost.

The disaggregated estimation of government spending on the public management of the ecosystem allows its full integration into the ecosystem accounts system in a way that is consistent with the concepts of commercial output and costs of the conventional SNA. The contribution of government spending in the ecosystems and the commercial output, as well as

the environmental output, and, also, to the private and public outputs, could be estimated by market values and the simulated exchange value approach. These measurement are achieved by building comprehensive private and public accounts, and, as the sum of both, we obtain the social accounts of the ecosystems (Campos and Caparrós, 2006; Campos and Caparrós, 2011).

4. Recommendation

The scientific communities, governmental specialized agencies and governments have stated concerns on building the gap to melt private and public incomes in an sole accounting tools, as recently stated the European Commission (2011), will map and assess the state of ecosystems and their services in their national territory by 2014, assess the economic value of such services, and promote the integration of these values into accounting and reporting systems at EU and national level by 2020. We need to follow the criterion of don't let the best be enemy of the good. Nowadays scientific techniques to emerge partial equilibrium marginal environmental prices are enough robust tools as the conventional criteria that make possible more than six decades ago to worldwide governments agree in the first United Nations System of National Accounts.

The appendixes tables A6a and A6b illustrate that at any scale of vegetation, landscape, farm, region, nation and the world it is possible to extend de production and capital boundaries of conventional SNA to measure the well established definition of Hicks-Krutilla total income.

The current draft on SEEA Experimental Ecosystem Account could increase their "experimental" aim incorporating the public environmental goods public expenditures and capital gain into the measurement of ecosystem services, being this mythological note to serve this aim.

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Table A6a. Grassland ecosystem social total income

Class	Private	Public ³	Social
1. Total output (TO)	290 + X	30 + X	320 + X
1.1 Intermediate output (non-SNA)	80 ⁴	X	80 + X
1.2 Final output	210+X	30 +X	240 + X
1.2.1 SNA	200 ⁵	X ⁶	200 + X
1.2.2 Non-SNA	10 ⁷	30 ⁸	40 + X
2. Total cost (TC)	165+ X	20 + X	185 + X
2.1 Intermediate consumption	105	20+ X	125 + X
2.1.1 Own intermediate consumption (non-SNA)	80 ⁹		80 + X
2.1.2 Bought intermediate consumption (SNA)	X	20 ¹⁰	20X
2.1.3 Work in progress used (non-SNA)	25 ¹¹	X ¹²	25 +X
2.2 Labor cost	50 + X	X	50 + X
2.2.1 Employee labor cost (SNA)	50	X ¹³	50 + X
2.2.2 Self-employed labor cost (non-SNA)	X ¹⁴		X
2.3 Consumption of fixed capital (SNA)	10	X ¹⁵	10 + X
3. Net operating margin (1 – 2)	125 + X	10 + X	135 + X
3.1 Natural net operating margin	90	30	120
3.2 Manufactured net operating margin	35	– 20	15
4. Net value added at producer prices	175 + X	10 + X	185 + X
5. Capital gain ¹⁶ (non-SNA)	X	– 15 ¹⁷	– 15 + X
5.1 Capital revaluation	5	– 15	

³ It is assumed that public environmental goods and services are value by the simulate exchange value approach.

⁴ Imputed market value of natural grass consumed by own livestock grazing.

⁵ Total livestock products and hunting fess received by the landowner from sold the hunting positions.

⁶ Example: government own account gross fixed capital formation on infrastructures employed to supply free access landscape recreation, landscape conservation and threatened biodiversity.

⁷ Game gross work in progress formation (game animal yield both births and net natural growth).

⁸ Whole society (consumers) marginal price willingness to pay for avoiding to increase the number of threatened biological species by continuing with the current government wilderness preservation program in the relevant area where the farm is included.

⁹ Grazing forage units consumed by own livestock.

¹⁰ Raw materials and services bought by the government and used in the accounting year to produce the species preservation public total output.

¹¹ Imputed market hunting resource rent.

¹² Example: Carbon dioxide withdrawals because timber cut in the accounting year.

¹³ Example: government as employer of dependent workers to supply free services to the public and government own account durable goods used for public goods and services supply.

¹⁴ Example: Family work could be objectively estimated as residual positive value under an assumed criterion for labor marginal productivity.

¹⁵ Example: consumption of fixed capital on equipment and machinery used in the production of the public goods and services.

¹⁶ Example: private fixed capital goods and work in progress revaluation net of destructions and adjusted by consumption of fixed capital to avoid double counting.

¹⁷ Example: government fixed capital goods and work in progress revaluation net of destructions and adjusted by consumption of fixed capital to avoid double counting

5.1.1 Natural capital revaluation	15 ¹⁸	- 15 ¹⁹	0
5.1.2 Manufactured capital revaluation	- 10 ²⁰		- 10
5.2 Capital destruction (less)			
5.2 Consumption of fixed capital	10		10
6. Total income (4 + 5)	190 + X	- 5 + X	185 + X
6.1 Labour income	50		50
6.2 Capital income	140	-5	135
6.2.1 Natural resource rent	105	15	120
6.2 .2 Manufactured capital income	35	-20	15

X: Attribute could be present.

¹⁸ Increased value of the accounting year opening inventory game animals that the still continue in the closing inventory.

¹⁹ Public economic environmental services revaluation (it includes degradation).

²⁰ Manufactured capital revaluation equals consumption of fixed capital on the basis of assuming constant prices.

Table A6b. Forest ecosystem total income at producer prices

Class	Private	Public ²¹	Social
1. Total output (TO)	204 + X	30+ X	234 + X
1.1 Intermediate output (non-SNA)	X ²²	X ²³	X
1.2 Final output	204 +X	30 +X	234 + X
1.2.1 SNA	200 ²⁴ + X ²⁵	X ²⁶	200 + X
1.2.2 Non-SNA	4 ²⁷ + X ²⁸	30 ²⁹ + X ³⁰	34 + X
2. Total cost (TC)	205 + X	45	250 + X
2.1 Intermediate consumption	145 + X	45	190 + X
2.1.1 Own intermediate consumption (non-SNA)	X ³¹	45 ³²	45
2.1.2 Bought intermediate consumption (SNA)	40 ³³	X ³⁴	40 + X
2.1.3 Work in progress used (non-SNA)	105 ³⁵	X	105 + X
2.2 Labor cost	50 + X	X	50 + X
2.2.1 Employee labor cost (SNA)	50	X ³⁶	50 + X
2.2.2 Self-employed labor cost (non-SNA)	X ³⁷		X
2.3 Consumption of fixed capital (SNA)	10	X ³⁸	10 + X
3. Net operating margin ³⁹ (1 – 2)	– 1 + X	– 15 + X	– 16+ X
3.1 Natural net operating margin	4 ⁴⁰	– 15	– 11
3.2 Manufactured net operating margin	– 5		– 5

²¹ It is assumed that public environmental goods and services are value by the simulate exchange value approach.

²² Example: forage units supply consumed by livestock grazing.

²³ Example: regulated natural water yield consumption by forest vegetation in excess over grassland in a context of natural water scarcity.

²⁴ Wood cut.

²⁵ Example: livestock products.

²⁶ Example: government own account gross fixed capital formation on infrastructures employed to supply free access landscape recreation, landscape conservation and threatened biodiversity.

²⁷ Timber net natural growth (NNG) in the accounting year. NNG is from gross natural growth (GNG): $NNG = r * GNG = 0.05 * 80 = 4$. GNG exclude pure discounting effect revaluation of standing timber originated by having shorter the discounting period.

²⁸ Example: private amenity.

²⁹ Gross carbon captured in the accounting year.

³⁰ Example: partial equilibrium marginal price times quantity for `public recreation, landscape conservation, threatened biodiversity and regulated natural water yield final output.

³¹ Example: forage units consumed by livestock grazing.

³² Joint timber harvest carbon withdrawals as atmospheric heat filter input consumption.

³³ Fuel bought by the landowner and used in the accounting year to cut the wood.

³⁴ Raw materials and services bought by the government and used in the accounting year to produce the public total output.

³⁵ Timber cut in the accounting year at its resource rent price (standing price less accounting year silvicultural manufactured total cost).

³⁶ Example: government as employer of dependent workers to supply free services to the public and government own account durable goods used for public goods and services supply.

³⁷ Example: Family work could be objectively estimated as residual positive value under an assumed criterion for labor marginal productivity.

³⁸ Example: consumption of fixed capital on equipment and machinery used in the production of the public goods and services.

³⁹ Net operating margin is the operating benefit at producer prices.

⁴⁰ Wood natural net operating margin is estimated from wood net natural growth.

4. Net value added at producer prices	49	- 15	34
5. Capital gain ⁴¹ (non-SNA)	33 + X	- 15	18 + X
5.1 Capital revaluation	23	- 15	8
5.1.1 Natural capital revaluation	33 ⁴²	- 15 ⁴³	18
5.1.2 Manufactured capital revaluation	- 10 ⁴⁴		- 10
5.2 Capital destruction (less)			
5.3 Consumption of fixed capital ⁴⁵	10	X ⁴⁶	10
6. Total income (4 + 5)	82 + X	- 30 + X	52 + X
6.1 Labour income	50		50
6.2 Capital income	32	- 30	2
6.2.1 Natural resource rent	37	- 30	5
6.2.2 Manufactured capital income	- 5		- 5

⁴¹ Capital gain is measured from capital revaluation less capital destructions and adjusted by consumption of fixed capital in the accounting year for avoiding double counting.

⁴² Wood natural capital revaluation is measured from opening standing wood revaluation because discounting is a period sorter at the end of the accounting year (Wr) less net natural growth (NNG) value of the accounting year for avoiding double counting.

⁴³ Public economic environmental services revaluation (it includes degradation).

⁴⁴ Manufactured capital revaluation equals consumption of fixed capital on the basis of assuming constant prices.

⁴⁵ It is considered to avoid double counting.

⁴⁶ Example: government manufactured fixed capital consumption on supply public goods and services.



DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS
STATISTICS DIVISION
UNITED NATIONS

SEEA Revision

**SEEA Experimental
Ecosystem Accounting**

Comment form

Comment form for the Consultation Draft

Deadline for responses: 1 January , 2013
Send responses to: seea@un.org

Your name:	Gülsevil BAHÇELİ
Your country/organization:	Turkish Statistical Institute
Contact (e.g. email address):	Gulsevil.bahceli@tuik.gov.tr

To submit responses please save this document and send it as an attachment to the following e-mail address: seea@un.org.

The comment form has been designed to facilitate the analysis of comments.

In Part I general comments on the structure and content of the draft document are sought. In Part II any other comments, particularly those of a technical nature should be included.

Relevant documents

Before submitting responses you are encouraged to read

Cover Note to the Consultation Draft

SEEA Experimental Ecosystem Accounting – Consultation Draft

Part I: General comments

In the box below please supply any comments on the structure of the document, the balance of material and the coverage of the draft including any thoughts on missing content.

Comments on the style, tone, and readability of the text are also welcome.

Please reference paragraphs numbers or section numbers as appropriate.

Information on the subject obtained, however TurkStat has been dealing with environmental accounts very newly. Studies on physical water flow accounts, material flow accounts and air emission accounts continued. So we don't have studies on the subject and we have no comment on the balance of material and the coverage. The draft document is really readable and well structured.

We think that statistical offices should not have the primary responsibility for the calculation of the experimental ecosystem accounts. Statistical offices may provide

basic data for responsible institutions.

Part II: Other comments

In the box below please supply any additional comments including those of a more technical nature.

Please reference your responses with the relevant paragraph number or section number.

Click here and start typing (The length of your response is not limited by this text box.)



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Send responses to: seea@un.org

Your name:	Rocky Harris
Your country/organization:	UK Department for Environment Food and Rural Affairs (Defra) in consultation with the Office for National Statistics (ONS) and the Forestry Commission
Contact (e.g. email address):	Rocky.harris@defra.gsi.gov.uk

To submit responses please save this document and send it as an attachment to the following e-mail address: seea@un.org.

The comment form has been designed to facilitate the analysis of comments.

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Comments on the style, tone, and readability of the text are also welcome.

Please reference paragraphs numbers or section numbers as appropriate.

Defra and the ONS welcome the release of the consultation draft of the SEEA Experimental Ecosystem Accounting report. We think this is a very significant step forward in supporting the development of ecosystem accounts that follow an agreed set of principles and that explicitly relate to the SEEA Central Framework for environmental accounts.

It is important for us that the report covers principles for ecosystem valuation alongside principles for measuring flows and assets in physical terms. We see valuation (in addition to physical measurement) of stocks and flows as an essential part of an ecosystem accounting approach.

A monetary metric helps in assessing trade-offs and places the economic value of ecosystems on a comparable basis with conventional accounting measures.

We recognise that valuation in itself may not be sufficient when it comes to addressing questions of sustainability. Among other things, integrated ecosystem accounts would be the ideal framework to investigate unacceptable depletion or damage in relation to environmental limits/thresholds.

We still have general concerns about readability and the amount of repetition. Examples are given in the specific comments.

We agree the need for a glossary of terms.

Part II: Other comments

In the box below please supply any additional comments including those of a more technical nature.

Please reference your responses with the relevant paragraph number or section number.

Chapter 1

1.12 final sentence: development of “analysis of trends” rather than “trends”.

1.17 “uses of energy”. Not clear how this could be done within the ecosystem accounts. Policies relating to alternative sources of energy could be informed by the accounts, but not so much the uses. Final clause “uses of ecosystems”: better to express this as the trade-offs between the different services we get from ecosystems, rather than “uses of the ecosystems themselves”.

1.18 “part of landscape management”. Not sure what this is about.

1.19. Seems to repeat much of what has gone before.

1.20. It’s a fair point, but reads awkwardly and it doesn’t really come out what

you do with the information once you have it. If your natural capital is a fraction of your human capital, so what?

1.21. Needs a bit more qualification. The policy response is usually developed at an aggregated level but the intervention will be at a local level.

1.22. This is very tenuous: cross-border analyses might be possible but we doubt if we have any evidence for them. Should concentrate more on the possibility of more integrated analysis of global environmental challenges.

1.28. Repeats earlier text.

Section 1.5. The main argument for NSO involvement is that they are generally responsible for the National Accounts and this expertise is needed to ensure strong links with the SNA.

1.34 second sentence: Delete “be” and “also consider”.

1.42. Resilience crops up here and elsewhere, but it’s not clear how this fits in to the accounting framework or what the point that’s being made is. In practice it’s just one aspect of the quality assessment.

1.43 first sentence “crosses” rather than “cross”.

1.44 final sentence “other” residuals (as pollutants are also residuals).

Paras 1.47 to 1.51. This section needs to come before 1.40, otherwise it is not clear what the other two disciplines contribute to the accounting activity.

Chapter 2

2.4 final sentence. The key location characteristic for us is proximity to areas of population. Climate is also important.

2.9. It would be useful to distinguish between characteristics which are in some sense “given” and those which are variable indicators of quality or condition. Land cover and biodiversity fall in the latter category.

2.13 second sentence. What are we trying to say here?

Figure 2.2. Human inputs affect the ecosystem processes and also the way in which services are delivered (as Figure A3.1 shows).

2.19. This dichotomy may not be helpful for the later discussion on overlaps with the SNA. For example, health benefits are reflected in the SNA (in terms of improved labour productivity) but are not produced by an SNA production process. Is the distinction really necessary? It crops up frequently elsewhere but does not seem to be an important distinction to have.

2.20 first sentence. Again, not sure about the words “used” or “activity”. Services may be passively received. Suggest “benefits to the economy and to society generally”.

2.22. This is right, but sits poorly with 2.19 which says that water is not an SNA benefit, and Fig 2.3 which has it as an SNA benefit.

2.23. Isn't this true of all non-provisioning services?

2.25. Repeats earlier text.

2.30 first sentence. This is where a distinction between characteristics which are indicative of quality and those which are “given” would be helpful.

2.34. It's important to note that not all service flows can be measured in physical terms. Non-monetary terms is a better expression, and is sometimes elsewhere in the text.

2.41. With respect to what is not articulated, important to note that the units for measuring characteristics both of quality and other characteristics as well as biodiversity are not discussed in this section.

Section 2.3. Agree with Australia's comments generally. Not sure that the word “functional” adds anything to LCEU (it just makes it seem even more complicated than it needs to be!).

Table 2.3. What we are finding is that the expected flows of services from an ecosystem are not obviously related to the stock or condition at a point in time. Freshwater resources being a case in point, but also enclosed farmland where the land cover can vary significantly over the year. To do this properly we will need to take a view of the expected extent and state of the ecosystem over the accounting period.

2.86 seems to suggest making comparisons at the BSU level, whereas in practice these comparisons would have to be done at a more aggregated level.

2.99. The time period of 1 year may be sensible from an accounting point of view, but would be difficult in terms of data availability e.g. for forest inventories.

2.104, 2.105. Repeats earlier text.

Chapter 3

3.14 to 3.16 Ditto.

3.21 (iii). By national level assessment, do you mean a specific provisioning service assessment whereas from a broader ecosystem service perspective a distinction between cultivated and natural yields may be more relevant?

3.24. It is just worth noting that this approach should obviously exclude production from intensive systems that have minimal reliance upon local ecosystem services (e.g. glasshouse production and pig or poultry sheds - which use piped mains water, imported growth media or animal feeds, and electricity to control the micro-climate).

3.36. Delete references to abiotic services as already noted (several times).

3.37. Combine with 3.4.

3.39. Repeats earlier text.

3.42 first sentence. The primary consideration must be to organise information by type of ecosystem/land cover type, as shown in Table 3.2.

3.42 second sentence. Is the distinction between those benefitting from and those using (see first sentence) the services intended?

3.44, final sentence. This isn't necessarily true as it will be possible to allocate the share of the relevant service pro rata to the amount of the LCEU which is in each EAU.

3.74 last sentence. The CBD argument (with which we agree) is that this is the problem: a focus on provisioning services has led to the degradation of ecosystems and the loss of other services. It would be better if this sentence were strongly qualified.

3.76. By 'production volumes' we mean amounts of water abstracted for drinking and for irrigation?

Chapter 4

4.52 to 4.54. Needs some mention of marine areas. A challenge for us is also how to deal with linear features (small rivers, coastal margins, drystone walls, hedgerows etc). Although some of these don't change in extent, others do.

Table 4.1. The inclusion of groundwater is relevant to the hydrological cycle and provisioning services but doesn't fit well with the two dimensional approach to the measurement of 'extent' - this needs further discussion.

Table 4.2, Para 4.60. As noted above in the comment on 2.9 above, there are some characteristics of ecosystems which are variable and relevant to the provision of services such as management regime, access etc. These need to be covered in Table 4.2 and the subsequent text.

4.68. Reference should be to Table 4.4 not Table 4.3.

4.71. Other factors besides the Leaf Area Index may be important, for example

in urban areas in the UK it may be that height above ground is a relevant factor as hedgerows and shrubs have been found to be more effective than trees in terms of air filtration.

4.124. We have found that indices of species abundance are better expressed in a logarithmic form and need to take into account i) declining species which fall below the level of reliable random survey detection (by freezing the index for that species at a suitably low level) and ii) naturally colonising species (introduced into the indicator at the average level of the indicator in the year of introduction. It's also useful to have measures of invasive non-native species.

Chapter 5

Generally speaking we think the chapter is a big improvement although it still needs further work on linguistic precision.

The chapter could perhaps be clearer on the need to separate the value of ecosystem services from the value of other inputs. Such things as fishing effort need to be excluded from the value of the fish harvest. This is something that was dealt with successfully in the valuation methodology for the UK's National Ecosystem Assessment. It is more of a reminder for the economists carrying out the required valuation study but it is worth emphasising and also links to the Annex to Chapter 3.

Overall, there is a good attempt to appreciate the importance of valuation of non-market goods. However, a very cautious approach is taken in describing the valuation techniques. The cover letter stated that the purpose of this document is not to set standard, but to mark the beginning of a more integrated research programme in Ecosystem Accounting. Therefore, it is recommended that a more ambitious approach should be taken for the research agenda. This research document should allow the challenges to be explored instead of limiting its scope.

Though this chapter recognises various valuation techniques, a number of them are not carefully assessed. While we agree the valuation of ecosystems should be consistent with the SNA, this should not limit the document to reject certain valuation methods which are not consistent with the SNA valuation principle. Instead these should be recommended for further research.

We should recognise that SNA has limitations and this is the very reason we are going beyond SNA. On one hand, it is recognised that SNA has flaws because it does not take into account those transactions that are external to the economy, yet we are valuing the environment and ecosystem using the valuation methods that are part of the economy (SNA). Nevertheless, there are a number of methods that are in principle consistent with the SNA valuation, but this chapter is weak in recognising them.

This chapter is rather weak on revealed preference methods. Most of these methods are capable of producing estimates that are consistent with the SNA as they allow one to derive a demand curve and calculate an area that excludes the

consumer surplus. Revealed preference methods especially travel cost method are well established and are being used for decades. The travel cost methodology is based on well-established economic principles. There has been extensive use of this method in peer-reviewed literature, dating to 1947 when Harold Hotelling first proposed it. This method involves using generalised travel cost as a proxy for the prices of visiting outdoor recreational sites and as a basis for estimating a demand curve.

This document has almost dismissed stated preference methods but we should recognise that stated preference methods can be used where other alternative methods are not viable. There are a number of researches on this and a lot of academics are pointing to this method, though there are some who disagree as well. Dismissing this altogether would be a missed opportunity.

The contingency valuation method (CVM) is a widely used nonmarket valuation method especially in the areas of environmental cost benefit analysis and environmental impact assessment. Its application in environmental economics includes estimation of both nonmarket use values and non-use values. The main concern with this method is the reliability and validity of the responses. The concern is whether the individuals would really pay the amount stated in the survey. This issue has been subjected to a great deal of empirical testing and debate and while there is a range of views among environmental economists on the potential of CVM to yield reliable findings, carefully designed studies have proved capable of producing reliable estimates.

This chapter has considered two main valuation methods - revealed preference and stated preference; however, there is another emerging method - life satisfaction approach, which should also be considered in this chapter. As it is not based on observed behaviour, the underlying assumptions are less restrictive and non-use values can – to some extent – be measured. Furthermore, individuals are not asked to value the public good directly, but to evaluate their general subjective well-being, life satisfaction or happiness. Though this method has not been used widely, it has been applied in a number of studies in the UK and some other countries, and is worth considering further (see for example the discussion in the UK Government advice on evaluation, at http://www.hm-treasury.gov.uk/data_greenbook_index.htm, Annex 2).

There is not much emphasis on option values and non-use values. Chapter 5 on page 84 has discussed option values in terms of insurance against possible losses, and a similar concept of insurance against future losses could be applied to non-use values.

In valuing the ecosystem and ecosystem services, if we could use proxies by observing a parallel market, regardless of the method used, we will not be including consumer surplus.

5.1 Non-market valuation techniques estimate the value that people place on things for which market prices do not exist, like ecosystem services. As such under certain condition they can offer a basis for estimating the value of non-market transactions within an ecosystem accounting context. So we suggest replacing last two sentences with: As a consequence, economic principles must

be applied to measure the prices that would have been paid for the various ecosystem services and assets even when these prices are not directly observable.

5.2 There are different methods but the conceptual approach to valuation is the same - the idea being to estimate the area under the demand curve in order estimate consumer surplus.

5.4 “either...or...” not “either...and...”

5.5 Deny people “the benefit” not “to benefit”.

5.15 *For estimates in monetary terms, the initial targets of valuation are ecosystem services.*

Does it mean that by adding up all the ecosystem services of an ecosystem capital, we get the total monetary value of the ecosystem? Or we are valuing the ecosystem capital separately? Could this be clarified?

5.22. Concept not conception.

5.23. Types and concepts both used here, the first is probably the better one.

5.47 to 5.59 It would be helpful if the text in these sections could be simplified.

5.56. The statement that *“Many of the valuation methods developed in the field of environmental economics include consumer surplus and are therefore less applicable in the context of ecosystem accounting”* is not true.

Perhaps this should be rephrased as *“a few of the valuation methods developed in the field of environmental economics include consumer surplus and are therefore less applicable in the context of ecosystem accounting”*.

Section 5.4.2. On valuation methods, we still have issues with the lack of sufficient caveats on the replacement cost methods and the excess of caveats on travel cost methods and revealed preference methods more generally. The section would be much stronger if it started with saying that given the conceptual framework of figure 5.1, any economic method that helps derive a demand curve can in principle support the determination of suitable marginal prices “P”, although in practice existing valuation studies may often report measures of average or aggregate consumer surplus. You could then talk about methods for estimating demand curves. The replacement cost method is a supply curve focused method and hence less directly related to value (though under specific circumstances may be a suitable approximation).

5.63 We are not sure it is right that with open access the resource rent approach is no longer valid. Ultimately accounting is about current management conditions, not ideal management condition. The counter-argument to this (for example from a conservationist perspective) is that it would lead to perverse outcomes (the more we deplete a resource the less it

appears to have value). But this can be highlighted by policy analysis informed by accounts, accounts need to be objective.

5.67 & 5.68 These are confusing and would be helpful if simplified and explained with examples.

5.71 The service is the sequestration of carbon, not the storage (which is a risk in terms of potential future release, as it is not permanent).

5.77. *Given that many of the valuation studies undertaken in the environmental economics literature are preference based...*

This is not true. A number of studies are observation based (revealed preference).

The discussion on travel cost and consumer surplus is now more balanced compared to previous version, but 5.81 is not entirely consistent with 5.77 and arguably redundant. Also the production function method discussion could be usefully expanded as this is a methodology that has been applied (or has been shown to be suitable in theory) to the valuation of regulating services.

5.78 Suggest: Give an example for clarity.

5.79 Suggest “characteristics of the house” not “properties of the house” – the use of property in this sentence doesn’t read well as it has two meanings.

5.80 Suggest: Additional sentence highlighting that this method often underestimates the problem – lack of information, myopic behaviour and complexity in calculating and understanding the issues are all reasons why people don’t do what is good for them.

5.81 Estimates the “value” not “price.” There is some confusion elsewhere in the text on these two terms. Also suggest highlighting examples of the costs for clarity, e.g. travel time, visit time, petrol costs.

5.82 Choice experiments – compare ecosystems with a market good? For example? Better explanation needed and an example.

5.84 Types of value not concepts of value.

5.85 How is this calculated? More detail needed, this comes across as a new and untested idea – therefore it’s uncertain and caution in using it should be applied.

5.87 Agreed although this section appears a bit suddenly, these points could be made earlier in the chapter.

5.98 Introduction of acronyms: Net Present Value (NPV).

Chapter 6

Overall this chapter reads well but there are very strong caveats in 6.4 and 6.44 of this chapter which should be avoided. Point 6.44 (i) also states that “*there are strong contrary views about the meaningfulness.....*”. Not using the word “strong” will help to present a more balanced view.

6.4 (ii) This is too general. Better to say there are concerns from “part of the official statistics community”.

6.25 and 6.44: The discussion of weak sustainability may for balance reflect the argument that shadow prices would in theory adjust to reflect scarcity as specific assets become scarcer (and will approach infinity when substitutability approaches zero). Having said that it is probably fair to say that consideration of future scarcities is difficult to reflect in operational choices around shadow prices.

In a similar vein, the text could perhaps acknowledge that some authors (e.g. Ian Bateman after Karl-Göran Mäler) have discussed the possibility of developing “weighted shadow prices” to reflect thresholds and irreversibilities, even though this remains an area for further research .

Table 6.1. The table does not deal well with changes in stock resulting from human action which do not lead to catastrophic changes or additional regeneration. An example might be where woodland changes from unmanaged to managed woodland, with consequent increases in recreational benefits and improved flood protection and hence an improvement in the stock of the asset. Or where a reduction in management results in lower timber yields which are not catastrophic. The breakdown in Table 4.3 seems to deal with these changes more systematically.

6.34. The logic behind the first sentence is not clear: “*If ecosystem degradation is considered to relate only to reductions in ecosystem condition it is not possible to apply standard asset accounting models...*”. Why?

6.44 (i). “*Consequently, the approaches to valuation that are commonly used to integrate values of ecosystem services into standard national accounting structure may not be appropriate.*”

This is not true as some of them are. Perhaps “a few” should be added in the above sentence.

Section 6.3.2 Some examples will be helpful. It also needs a definition (or a set of definitions to reflect different perspectives) of ecosystem degradation in monetary terms. It should probably be something like “a reduction in the value of ecosystem service flows due to human activities”. The section could also then usefully expand on the various additions and reduction categories in the context of monetary ecosystem accounts. The SEEA Central Framework is much more precise in describing the approach to asset accounting in physical terms and we think it would help to have something similar. In this context we think it would

be useful to expand on the “Revaluation” category, which in the context of monetary ecosystem accounts is quite important as this is where changes in unit values (e.g. reflecting better estimates) or other methodological assumptions (e.g. around discounting) would be reflected.

6.37 to 6.39. These seem to suggest that what is called “damage-based” assessment (which one might term value, demand-based) is more problematic than restoration costs approaches, which seems inconsistent with the discussion in Chapter 5. It does on the other hand capture some of the issues of overlaps with Chapter 5.

Section 6.4.2. This section needs more a bit more work as to why wealth accounting is important. It should describe the rationale and the aim of wealth accounting to make it more understandable. There should also be a reference to WAVES project.

6.57 point ii): In fact location values can reflect the value of ecosystem services (e.g., properties, proximity to urban green spaces providing cultural ecosystem services).

6.57 point iii): The ABS was very clear when this issue came up at the margin of the PCT meeting in Washington that protected areas should be in the SNA boundary and that the practice of assigning them zero value as “unproductive land” was malpractice, and that at the very least they should be valued at the opportunity cost of agricultural land. There may be a widespread misconception that this land should not be valued in conventional accounts.

Section 6.4.4. The discussion about adjusted income aggregates seems rather dismissive, compared to the more balanced treatment of wealth accounts.



DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS
STATISTICS DIVISION
UNITED NATIONS

SEEA Revision

**SEEA Experimental
Ecosystem Accounting**

Comment form

Comment form for the Consultation Draft

Deadline for responses: 15 January, 2013
Send responses to: seea@un.org

Your name:	Environmental-Economic Accounts
Your country/organization:	United Nations Statistics Division
Contact (e.g. email address):	seea@un.org

To submit responses please save this document and send it as an attachment to the following e-mail address: seea@un.org.

The comment form has been designed to facilitate the analysis of comments.

In Part I general comments on the structure and content of the draft document are sought. In Part II any other comments, particularly those of a technical nature should be included.

Relevant documents

Before submitting responses you are encouraged to read

Cover Note to the Consultation Draft

SEEA Experimental Ecosystem Accounting – Consultation Draft

Part I: General comments

In the box below please supply any comments on the structure of the document, the balance of material and the coverage of the draft including any thoughts on missing content.

Comments on the style, tone, and readability of the text are also welcome.

Please reference paragraphs numbers or section numbers as appropriate.

<p>UNSD welcomes and supports the development of the SEEA Experimental Ecosystem Accounting. The consultation draft reflects the state of the art on ecosystem accounts and provides a conceptual framework from which countries could start in the testing and experimentation of ecosystem accounting. The SEEA-Experimental Ecosystem Accounting remains work-in-progress in the sense that it would benefit from experience in countries experimenting on the application of the conceptual framework put forward. It provides a sound conceptual basis building on existing practices and scientific and economic knowledge.</p>

Part II: Other comments

In the box below please supply any additional comments including those of a more technical nature.

Please reference your responses with the relevant paragraph number or section number.

Chapter 1

The relationship between the SEEA Experimental Ecosystem Accounting, the SEEA Central Framework and the System of National Accounts (SNA) can be further elaborated in the chapter.

Chapter 2

Statistical units

In the field of official statistics, while rules on how to define statistical units and reporting units in economic and social statistics (e.g. in terms of establishments and households) are fairly established, such guidelines do not exist for environmental and geospatial statistics. The current draft is a step in the right direction; however this is an area where practical experimentation is needed in order to define the concepts more definitely and clearly. It is recommended to place this issue in the research agenda and learn from current and future country experiences.

The units model in the current draft define three different types of units: Basic spatial units (BSL), Land cover/ecosystem functional units (LCFU) and Ecosystem accounting units (EAU). The concept can be better illustrated through examples. We welcome the drafting of an Annex presenting examples on how the units model has been applied in countries.

The issue of data collection method, data sources, and data quality framework are not covered in the consultation draft. These are areas that can be further elaborated in a compiler manual.

Classification of ecosystems

The present draft does not provide a definite classification of ecosystems. Yet a provisional list of such will be useful for reader to crystallize the concept. It is recommended to put this topic in the research agenda.

Chapter 3

Boundary and CICES

We support the current text on CICES and in particular the boundary cases. We think it is important to maintain consistency with the SEEA-Central Framework boundaries when delineating the boundary between the economy and the environment. As such we agree that cultivated biological resources such as crops and plantation timber are

considered within the economy as output of economic production process (e.g agriculture) and not as final ecosystem services. Consequently, the relevant final ecosystem services for CICES are flows relating to nutrients, water, pollination, etc for these outputs.

Abiotic services, while agree not included them in CICES, we believe it is important that they are defined in a separate but complementary block in the broader framework of modelling flows in the SEEA Experimental Ecosystem Accounting, to support integrated land management decision and assessment of trade-offs between alternative land uses.

Underlying rules to structure CICES and separate category at each level should be clearly defined.

Para 3.24: We have reservation on the suggestion to apply the harvest approach for cultivated crops and other plants for pragmatic reason. The SEEA Experimental Ecosystem Accounts is a conceptual document and compilation issues should be left to a compilers manual.

Aggregation

Methods to derive weights, their underlying assumption and pros and cons, can be explained and elaborated in details with examples in the annex.

Chapter 4

Ecosystem assets

Ecosystem assets are defined in spatial areas as such carbon and biodiversity are considered as characteristics of ecosystem assets but not ecosystem assets itself. The relationship should be clearly stated in the chapter.

As such, the relationship between ecosystem asset accounting, carbon accounting and biodiversity accounting needs also to be clearly stated in the chapter.

Degradation

The relationship between the concept of degradation and depletion (defined in the central framework) is not clearly stated in chapter 4. They are two different concepts but non-technical readers may get confused about the two definitions

According to Para 4.27, degradation will be reflected in declines in ecosystem condition and/or declines in expected ecosystem service flows. The question is whether a decline in ecosystem extent is also considered as degradation (e.g. a decrease in the forest area).

Since degradation can be reflected in terms of expected ecosystem service flows, ecosystem conditions and ecosystem extents but they are measured at different scales, methods to compare and aggregate them should be elaborated in details.

Chapter 5 & 6

We agree with and support the conservative approach taken in chapter 5 and 6 on valuation and monetary accounting, of listing out existing approaches and divergent views on valuation without providing recommendation. The topic of valuation is recommended to be placed in the research agenda. Common agreement needs to be reached and testing needs to be done in coming years before any monetary data to be considered as part of official statistics.

**Specific comments on “SEEA Experimental Ecosystems Accounts”,
exposure draft January 1.**

Paragraph (Par) 1.4. Monetary terms are required if there is to be a link to the economy. Also the boundary has to be better defined. The point needs to be made that a non-economic approach to ecosystem may be of benefit but inasmuch as the topic at hand is within the context of environmental economic accounts, the focus has to be on the intersection between ecosystem accounting and economic accounting. The implication is that not all of ecosystem accounting is relevant to the national accounts.

Par 1.6. This paragraph is too broad

Par 1.7. What is the meaning of the first sentence? See comment above on par 1.4.

Par 1.8. Remarkably compatible? From what perspective?

Par 1.10. Last sentence. It is not true that the money valuation depends on physical quantities. Much of the national account quantity measures are derived via deflation.

Pars 1.13 through 1.15. Here would be a good place to place some of the caveats mentioned in chapter 6. Furthermore the “holistic” view may not be compatible with economic accounting—it may have more to do with ecosystem accounting that is not applicable to the national accounts.

Paragraph 1.13 states “It is not intended that SEEA Experimental Ecosystem Accounting constitutes an international statistical standard but rather it is to provide an accounting framework for multidisciplinary research.” A stronger statement that the SEEA-EEA is not and will not be a standard is required.

Par 1.16 and 1.17. These talk of the policy relevance of ecosystem accounting—but this volume is about economic ecosystem accounting and these are not necessarily the same.

Par 1.18. Tradeoffs cannot be assessed without valuation. Simple ratios of quantities are not tradeoffs unless they come from some general equilibrium setting.

Pars 1.21-1.23. These do not necessarily involve any economic issues—concern environmental statistics

Par 1.25. What does statistical perspective mean? Surveys? Parts iii and iv are not done—possibilities are listed—it sounds as though something definitive is provided. Valuation techniques should be defined or principles established—what does explained mean?

Par 1.26-1.29. Ecosystem accounting is not dependent on economics so the task is to determine what part of ecosystem accounting ties to an environmental economic accounting that focuses on ecosystems.

Section 1.5. It seems to be assumed that NSOs are entities that include more environmental statistics. Is this generally true?

Par 1.40. A sentence should be added: Economics focuses on production and consumption and so the challenge is to define what can be applied to economic accounting.

Par 1.43. All of a sudden ecological economics appears. Is the idea that this is field is the basis for tying economic and ecosystem accounting? If so, how?

Par 1.45. Ecology and ecosystem do not connote the same thing; the latter is a subset of the former.

Par 2.1. Why the difference in definitions between this paragraph and 1.40?

Paragraph 2.8 defines ecosystem resilience as “The propensity of ecosystems to withstand change, or to recover to their initial condition following disturbance”. In 2.30 the indicators are to be selected based on their ability to reflect resilience. This appears to mean that the condition of the ecosystem - and hence the measurement of the ecosystem asset - is dependent on its ability to withstand a potential shock. But this bears no relationship to the ecosystem’s ability to provide services.

Par 2.11. Fourth sentence. But the focus of economics is on production and consumption so how will these be reconciled? How about putting paragraph 2.22 around here?

Figure 2.3: It is curious that there are no abiotic flows into ecosystem assets, given the discussion of solar energy in photosynthesis earlier, for example.

Par 2.28. Where do expected ecosystem service flows come from?

Par 2.30. What kind of characteristics—scientific or the price determining kind as in hedonics?

Par 2.34. The analogy is with the measurement of capital and capital services—not with multifactor productivity.

Paragraph 2.36 Does the paragraph mean “ecosystem assets in terms of their capacity to generate **expected** ecosystem services”. There is a future-tense aspect to the statement that is missing. The paragraph also says nothing of disentangling the relationship between ecosystem condition and future services. As stated earlier, this is likely to be a highly non-linear relationship, but in the absence of any caution it is likely that a one-for-one relationship will be imputed, which may over- or under-state the actual effect on future flows.

Par 2.38 and 2.39. Investment and Enhancement should be mentioned earlier because these are important economic activities and help to tie economic and ecosystem accounting.

Par 2.42. Because this paragraph suggests aggregation a sentence should be added about where aggregation will be discussed.

Par 2.74. What is the nature of the trade off? This paragraph describes a bilateral comparison but for the notion of trade off to make sense economically then either the whole economy has to be considered or it has to be specifically stated that these services cannot be traded outside of the area. The latter will have implications for aggregation.

Par 2.78. How is the specific recording of inter ecosystem flows to be recorded?

Par 2.113. In the second sentence "many" should be changed to "most". Accordingly, monetary valuation without market data is important.

3.4. The list should reference academic literature from whence these classifications came. Presumably it is De Groot et al. (2002). See also 3.37.

Par 3.24. Joint production should be emphasized more—this is key for relating to economics.

Par 3.26. How would this understanding be accomplished?

Par 3.31. The potential for double counting should be mentioned here and there should also be some discussion about setting a boundary.

The sub-section beginning at 3.31 discusses the importance of connecting the location of beneficiaries to the ecosystem measurement units. The section has little to say on how unused ecosystem services are to be treated, although 3.31 states "This information is needed to ensure that changes in the population of beneficiaries are taken into account in measuring the volume of ecosystem services." Is the implication that areas with zero beneficiaries have zero ecosystem services? It needs to be stated explicitly that unused services are not part of final ecosystem services.

Paragraph 3.34: Many of the regulatory services may entail rather large cross-boundary flows, such as carbon sequestration or water filtration. The paragraph seems to be focusing on tourism, whereas there are huge cross border flows of regulatory services elsewhere in the accounts.

Par 3.56. It is not clear how this gets around the need for aggregation.

Paragraph 3.58: More detail on the third method of aggregation is needed. How can we express water filtration and carbon sequestration in terms of a common

“currency”? A reference for the third method of aggregation would be very useful here.

Par 3.59. The use of weights requires separability—is that being assumed? If not, then how is double counting avoided?

Par 3.60. Where do the prices or monetary values come from? It is not as easy as this paragraph makes it sound.

Paragraph 3.71: The wording needs to be careful here, so as not to give the impression that the majority of cultural services are beyond the production boundary. Many cultural services – e.g. nice views – are likely to be embodied in property values and hence housing services – or otherwise in purchases of intermediate inputs – e.g. gas to drive to the national park.

Section 4: Using “condition” and “extent” as the two dimensions of ecosystem asset measurement is perhaps a bit short-sighted. Again, the point, as will be made clear below, is that the connection to beneficiaries must be considered in the measurement of assets. For example, how can population changes can be incorporated into the ecosystem asset measurement framework suggested here? Suppose that a city’s population doubles, and that the surrounding ecosystems have sufficient excess capacity to deliver the same amount and quality of a given ecosystem service (water provision, say) to the residents. Clearly the current and expected ecosystem services have increased, without a change in either the condition or the extent of the ecosystem assets.

Section beginning 4.27 on degradation: There is no mention of beneficiaries in relation to ecosystem degradation. Ecosystems that are being used are subject to degradation; ecosystems that are not being used are not.

It is unclear how section 4.4 (Carbon stocks) fits into the chapter on accounting for assets in physical terms. First, are carbon stocks unused ecosystem services? Second the measuring framework in table 4.1 suggests that the asset is not to be measured by using indicators. But all of the chapter is devoted to indicators, rather than direct measures of stored services.

Paragraph 4.101. This chapter is about accounting for assets in physical terms through the use of indicators of condition and extent. The interest in biodiversity is thus connected to how it can tell us about ecosystem condition or extent. However, the following suggests that biodiversity is a measurement objective in-and-of-itself: “Biodiversity accounts can be used to track progress towards policy targets such as those concerning the protection of threatened species or ecosystems (or habitats), the sustainable use of harvested species, the maintenance and improvement of ecosystem condition and capacity, and where the benefits of use of biodiversity accumulate.” Why does biodiversity get singled-out as a particularly useful indicator? The section should make this case if this section is to be included. Is it important for regulatory services? Provisioning services?

Paragraph 5.1: "Valuation is therefore involves the estimation of "missing prices"

Paragraph 5.6: It may be instructive to discuss valuation of government services at cost in the SNA here. It is likely that a set of ecosystem service monetary accounts would involve reclassification of some transactions already covered in the SNA. In some cases, this reclassification may involve government spending (for example, on the up-keep of national parks).

Par 5.8. Why general "accounting framework"? The motivation has always been for economic accounts not some general accounting framework that may have other measurement targets. More specifically the tie to the national accounts has been made repeatedly.

Par 5.11. What is the purpose of this paragraph? It suggests that the integration of with the national accounts can include social valuations among other things and that is not the case. It throws out possibilities to the reader that he may not know are actually not possible.

Par 5.14. After this paragraph, another paragraph is needed to talk about market prices versus imputed prices. And then some discussion about the SNA concept of prices that are required for integration with the national accounts.

Par 5.16. There are a lot of "maybe possibles" but unless some concreteness is provided these are meaningless. How can such things be done? The paragraph also treats aggregation in an offhand manner. If dollars are not to be used as the aggregation unit, what would be used?

Par 5.28. Should be perfectly competitive market not perfect market. Second it must be emphasized that transaction prices and market valuation are marginal valuations not total valuations. See Nordhaus (2005, http://nordhaus.econ.yale.edu/CRIW_0120305.doc) on the importance of this difference.

Par 5.46. It is not clear what this paragraph means.

Par 5.50. In the example discussed, how does the institutional arrangement influence the value of the service?

Par 5.52. It would seem then that something like owner's equivalent rent should be used where the private price is the proxy of value instead of focusing on the producer's surplus just because the land is not owned or leased by the beneficiary. Estimating producer surplus would be very difficult.

Par 5.53. Here it needs to be stated that externalities are not included in the national accounts. So this part of the ecosystem accounting cannot be integrated with the national accounts.

Par 5.64. More specificity is needed here and at the very least a reference should be provided.

Par 5.65. What literature?

Par 5.70. Omit "new" and tell the reader where they can find details if they are interested.

Par 5.73. Odd that caveats are put on market prices but not on the other more debatable prices. Again, what if markets are imperfectly competitive or one treats the government as a type of monopolist?

Par 5.74. This section is about estimating the value of ecosystem services not the ecosystem services. It would seem that biodiversity is a way of estimating the service but not the value. Credits could be bought and sold and then the problem could disappear

Par 5.81. None of the last 3 methods mentioned are consistent with SEEA Valuation principles as they related to economic accounts.

Par 5.83. When would they be aligned with the SEEA valuation procedures? This chapter in general oversells the suitability of the presented valuation procedures.

Par 5.86 and Figure 5.2. What validation has this technique received? There is no monopoly supply curve. The discussion of simulated exchange is unclear on the exact valuation approach. The discussion under figure 5.2 suggests that hypothetical prices and quantities are used. But these hypothetical quantities would not match the recorded physical flows? What then?

Par 5.90. Confusing, after devoting a lot of space to total valuation concepts there is this sudden return to marginal valuation.

Par 5.96. Aggregation across ecosystems is more complicated. Given that the ecosystem is location specific and the quality of the services depend on location, what does it mean to sum monetary values, even if they exist? One can sum the sales of produced cars from different auto manufactures because the price captures the differences among the cars. But there is an underlying standardized unit, the car. If however, a car made in Michigan was said to be unique and not comparable to a car made in Ohio, then how can aggregation be achieved?

Par 5.104. For the benefits approach described in the preceding paragraph it would be useful to provide some references and a bit more discussion of the particulars. How is a reader to understand what is being described?

Par 6.6. Is this paragraph talking about environmental protection expenditures for a particular ecosystem?

Par 6.13. If an example cannot be provided then what is the point of the paragraph? Only stating that it is conceptually possible is not informative, unless you are going to provide some context.

Par 6.16. Are such data sets available?

Par 6.21. Is the point that PES would not be considered within the SNA boundary if there was no monetary transaction? If so, that point is not clear.

Par 6.31. If they are being added to the stock why can't they be considered as an offset?

Par 6.33. What is meant by conversions? It needs to be defined or discussed.

Paragraph 6.35. Another concern of the restoration cost approach is that is at odds with the inherent human-centric philosophy of the national accounts, wherein consumption by households constitutes final demand. Degradation of an ecosystem may occur with little-to-no impact on final demand. If the SEEA-EEA is to be integrable with the SNA, it must adhere to the same philosophy. (Now restoration costs may be in-line with other philosophies, such as 'deep ecology' and other notions of the living world having equal value to human life, but that is not the point-of-view of the SNA.)

Par 6.41. The first sentence should read "will certainly require assumptions".

Par 6.45. This is essentially an argument that some number is better than no number, which is counter to the whole notion that government provided statistics must rest on solid foundations.

**Volume 2 - Chapter 1: Experimental Ecosystem
Accounting--Extended Deadline for Comment
January 15, 2013**

Author	Comment
Russia	<p>Most general comment: well structured and clear enough document. Certainly, the subject (ecosystem) is a very complex entity and in this draft it is considered mostly from its external sides, like properties and assets (used by society). Internal mechanisms of ecosystems, e.g. reproduction of assets and generation of benefits processes, are not directly studied. While "ecosystem processes" are mentioned on the fig.2.2, they are not defined. Notion "ecosystem asset" is defined (and can be measured) in multiple aspects (2.28). In one of them "ecosystem assets are considered in terms of expected ecosystem service flows. ... the capacity of an ecosystem asset to generate a basket of ecosystem services". This makes the measure of any ecosystem asset a potential concept with not clear enough meaning. Does this mean an ultimate level of "output" of ecosystem services? For many reasons it is difficult to consider ecosystem asset akin to productive capital because of its complex, synergetic (and significantly stochastic) nature. In this connection it looks like difficult to measure the "production capacity" (of ecosystem asset) in its usual meaning. Chapters 3-6, from my point of view, can be more or less equally referred to environmental accounting in general.</p>
Finland	<p>I think that ecosystem accounts are of extreme importance for the future of environmental accounts. However, I would prefer a much more simple and straightforward definition of the statistical unit. Use of several different basic spatial units should be avoided. The criteria for the statistical units presented in beginning of ch. 2.3 are valid and relevant, but I have great difficulties in understanding the discussion in the later part of the chapter. I think that a more straightforward definition of the statistical unit would also clarify the relationship to economic classifications. Land use and ownership are ways to link the spatial units of ecosystem accounts to statistical units of economic statistics. However, we should also be able to link the ecosystem services and products produced by the spatial unit and the ecosystem services and products used for the building of the ecosystem capital of this spatial unit to the products and services of economic units. The proposed general structure of the accounts seems to be feasible and working. Unfortunately, the solution of the issue of statistical unit has some effects</p>

	on the structure of the accounts in general. Pilot studies to test the delineation of statistical units are urgently needed.
Lithuania	Statistics Lithuania appreciates the efforts put in developing the current consultation draft of the volume of Experimental ecosystem accounting. Whereas ecosystem accounting is still only at an experimental stage of development (A Common International Classification of Ecosystem Services (CICES) is under development, various concepts and measurement issues are work in progress), we consider that the document is well-structured and, in general, contains the most important elements related to ecosystem accounting.
Jordan	Department of Statistics expresses its great thanks to the team who was behind introducing this document in this way, to serve both statisticians and environmentalists. At the same time, it seems that more time and work are still remaining in term of implementation the accounts. The document is written well, also the document structure is excellent and the material is adequately balanced.
United Kingdom	Defra and the ONS welcome the release of the consultation draft of the SEEA Experimental Ecosystem Accounting report. We think this is a very significant step forward in supporting the development of ecosystem accounts that follow an agreed set of principles and that explicitly relate to the SEEA Central Framework for environmental accounts. It is important for us that the report covers principles for ecosystem valuation alongside principles for measuring flows and assets in physical terms. We see valuation (in addition to physical measurement) of stocks and flows as an essential part of an ecosystem accounting approach. A monetary metric helps in assessing trade-offs and places the economic value of ecosystems on a comparable basis with conventional accounting measures. We recognise that valuation in itself may not be sufficient when it comes to addressing questions of sustainability. Among other things, integrated ecosystem accounts would be the ideal framework to investigate unacceptable depletion or damage in relation to environmental limits/thresholds. We still have general concerns about readability and the amount of repetition. Examples are given in the specific comments. We agree the need for a glossary of terms. EEA_UK.pdf
Morocco	Thank you for these efforts that build a real synergy and great cooperation within offices, and as Moroccan national account, we appreciate the opportunity to be a part and to contribute constructively to this version of draft. Generally, the article is well structured and wealthy. However, we suggest to add more tables for more organisation and clarity (Para 2.4: it will be more comprehensive if it will be formed

	in table)
Qatar	<p>Thank you for these efforts that build a real synergy and great cooperation within offices, and as Moroccan national account, we appreciate the opportunity to be a part and to contribute constructively to this version of draft. Generally, the article is well structured and wealthy. However, we suggest to add more tables for more organisation and clarity (Para 2.4: it will be more comprehensive if it will be formed in table)</p> <p>EEA_Qatar.pdf</p>
Czech Republic	<p>The Czech Statistical Office appreciates all efforts and work done on the development of the SEEA Volume concerning Experimental Ecosystem Accounting. Thank you for the chance to comment this draft. Generally, we agree with the structure and style of the document but the CZSO is not involved in this topic and unfortunately we cannot provide any specific comments. We have sent this draft to a few bodies interested in ecosystem accounting, but we have not had any answer.</p>
United Nations Statistics Division	<p>UNSD welcomes and supports the development of the SEEA Experimental Ecosystem Accounting. The consultation draft reflects the state of the art on ecosystem accounts and provides a conceptual framework from which countries could start in the testing and experimentation of ecosystem accounting. The SEEA-Experimental Ecosystem Accounting remains work-in-progress in the sense that it would benefit from experience in countries experimenting on the application of the conceptual framework put forward. It provides a sound conceptual basis building on existing practices and scientific and economic knowledge.</p> <p>EEA_UNSD.pdf</p>
France	<p>UNSD welcomes and supports the development of the SEEA Experimental Ecosystem Accounting. The consultation draft reflects the state of the art on ecosystem accounts and provides a conceptual framework from which countries could start in the testing and experimentation of ecosystem accounting. The SEEA-Experimental Ecosystem Accounting remains work-in-progress in the sense that it would benefit from experience in countries experimenting on the application of the conceptual framework put forward. It provides a sound conceptual basis building on existing practices and scientific and economic knowledge.</p> <p>EEA_France.pdf</p>
Eurostat	<p>UNSD welcomes and supports the development of the SEEA Experimental Ecosystem Accounting. The consultation draft reflects the state of the art on ecosystem accounts and provides a conceptual framework from which countries could start in the testing and experimentation of</p>

	<p>ecosystem accounting. The SEEA-Experimental Ecosystem Accounting remains work-in-progress in the sense that it would benefit from experience in countries experimenting on the application of the conceptual framework put forward. It provides a sound conceptual basis building on existing practices and scientific and economic knowledge.</p> <p>EEA_Eurostat .pdf</p>
Sweden	<p>Thank you for the chance to comment. We have sent out the document to a range of people interested in ecosystem accounting. They have not forwarded any comments through us, but perhaps you will receive their comments directly from them. We appreciate that you have written this first attempt to incorporate ecosystems into an accounting framework. Clearly, there lies much practical work ahead of us to make this area measurable in a harmonised statistical system. We intend to undertake work to see how we can include aspects of ecosystems into the accounts. For us the coupling to economic actors will be a major important issue. The SEEA for us has its strength in that it covers all the human activities in the economic production and consumption. We see that the management of land and water areas is not well reflected in the measuring practice today and we wish to add more information there. To set up a new data system based on grids with different properties as is suggested in Chapter 2.3 Units for ecosystem accounting, is not the way that we would want to go. Such information systems could be used as source data for identifying the most important aspects (what is referred to as "the statistical units are the entities about which information is sought") from an environmental accounting point of view. We would want to know how many square km of an ecosystem that is managed in a particular way. But an inventory of the properties of the land is a source of data rather than an account. As for the readability of the report, we were most interested in Chapter 3. Chapter 2 was more difficult to understand and could probably be condensed somewhat. It is difficult to understand what is intended by the term ecosystem - it is defined so that it could be life in a drop of water or a rainforest. From the Tables in Chapter 3 we got a feeling for the size that you intend to cover. Many of the research studies in this area cover much smaller systems and that will be a challenge to measure in a way that is comparable between larger regions or nations. The report seems to imply that biodiversity is a well-known concept with a clear measurement practice. To measure e.g. carbon or water we know the units and how to aggregate them. For biodiversity, there is a lot of data on species abundance, but not any clear recommendation on how to aggregate the information. In general, we expect to encounter difficulties</p>

	<p>when going from the local inventory to a national scale. As you note, this work will have to be conducted in close cooperation between many different kinds of organisations and experts. Let us hope that many countries will contribute by making pilot studies on which the practice can be built.</p>
Romania	<p>We do not have any comments regarding the Consultation on SEEA Experimental Ecosystem Accounting.</p>
Mexico	<p>We do not have any comments regarding the Consultation on SEEA Experimental Ecosystem Accounting. EEA_Mexico.pdf</p>
India/VP Parameswaran	<p>The following are my comments on the draft of SEEA Experimental Ecosystem Accounting: Para 2.8 Ecosystem degradation or ecosystem enhancement can also take place by natural processes. Is this aspect also covered here as the e.g. mentioned does not relate to natural processes? Para 2.11 It is mentioned that mineral and energy resources are the assets that do not interact as part of ecosystem processes. Release of gases in the underground mining areas do take place, Is this a process of interaction? What about the soil conditions around the mining areas? Para 2.59 Is there no possibility of duplication or mutual exclusiveness here? Is it allowed or how to deal with it? Para 2.60 I think there can be same type of two large scale natural features in two different EAUs. Para 2.70 Can't the atmosphere (or quality of air) above one BSU be affected by the atmosphere or space above other neighbouring or even far away BSUs? In other words, characteristics of atmosphere above one particular BSU may have affected by characteristics of other neighbouring BSUs. For e.g. air above a clean and unpolluted area or BSU need not be clean if there are polluted BSUs nearby. Para 3.6 Does (iii) mean the ecosystem services that are generated from areas that are publicly owned or something more than that? What about the ecosystem services that are generated from economic assets that are privately and publicly owned and managed and which contribute to the production of public benefits? Para 3.20 Crop growth has a relation to nutrient cycling, abstraction of soil water, pollination etc. In other words, productivity is based on these factors. In such a case, will there be a significant difference between the ecosystem service equivalent to crop that is harvested (when the crop growth is not managed) and ecosystem services equivalent to combination of items (when the crop growth is cultivated)? Therefore, instead of complicating the matter one could go by the amount of crop that is harvested. Para 3.21(iii) What about the sub-national level assessment? Para 3.48 Cultural services are not only related to the people interacting with the ecosystem, but also the ecosystem attracting the people. For e.g. the number of people visiting</p>

	<p>a bird sanctuary also depends upon the number/variety of birds visiting the sanctuary. Table 3.3 Households also contribute for generation of ecosystem services. For e.g. independent houses having big gardens contribute both to regulating and cultural services. Even in the case of people residing in multi-storey apartments, terrace/kitchen gardens contribute to generation of ecosystem services. With more and more urbanisation taking place, such activities are in increasing trend.</p>
Singapore	<p>1. With regards to the importance of GIS application for SEEA reporting, it is recommended to include a section that focuses on GIS and its application, so as to provide a brief introduction of what GIS is about for non-GIS practitioners and to provide a pathway to show the critical role which GIS could play in SEEA reporting.</p>
Spain/Spanish National Council for Scientific Research-Pablo Campos	<p>1. With regards to the importance of GIS application for SEEA reporting, it is recommended to include a section that focuses on GIS and its application, so as to provide a brief introduction of what GIS is about for non-GIS practitioners and to provide a pathway to show the critical role which GIS could play in SEEA reporting.</p> <p>EEA_Spain.pdf</p>
Colombia	<p>El DANE, despu�s de revisar y analizar los documentos borrador del SEEA Revision: SEEA Experimental Ecosystem Accounting dentro del proceso de consulta global por parte de Naciones Unidas; del env�o de comentarios al documento en su primera versi�n, y del establecimiento con satisfacci�n que los comentarios enviados por la entidad fueron integrados en la segunda versi�n del mismo, estamos de acuerdo en el desarrollo del SEEA Experimental Ecosystem Accounting. Esperamos seguir contribuyendo mediante la implementaci�n de este Sistema en el ejercicio propio del avance de nuestras cuentas ambientales y en el marco del proyecto Wealth Accounting and Valuation of Environmental Services-WAVES del Banco Mundial, en el cual Colombia hace parte como pa�s piloto y el DANE participa junto con otras instituciones en la estructura y aplicaci�n de la cuenta de ecosistemas. Unofficial translation: The DANE, after revising and analyzing the "SEEA Revision: SEEA Experimental Ecosystem Accounting" draft documents, within the United Nation consultation process; of the submission of comments to the first draft, and establishing satisfactorily that the comments submitted by the entity were integrated to the second draft document, we agree the development of the SEE Experimental Ecosystem Accounting We look forward to continue contributing through the implementation of this system in the proper exercise of the progress of our environmental accounts and within the framework of the</p>

	<p>Wealth Accounting and Valuation of Environmental Services-WAVES project from the World Bank, in which Colombia takes part as pilot country and DANE participates with other institutions in the structure and application of the ecosystems account.</p>
Bulgaria	<p>The document SEEA Experimental Ecosystem Accounting (Consultation Draft) is a well structured and balanced material that marks the start in applying an integrated approach in this field. The material successfully provides a synthesis of current knowledge on ecosystem accounting and presents different measurement concepts. At the same time flexible research approaches are allowed. Central concepts in measuring ecosystems are clear and well described. We share the opinion that this document will play a key role in developing standards and in framing information sets in this area on national level. A specific challenge for the national statistical offices will be the ambitious aim to organize the information from a spatial perspective and to describe linkages between ecosystems and economic and other human activity on national level. Besides, as this is a new area of accounting, a large amount of information gaps exist on national level. Their filling-in will require both establishment of appropriate institutional co-ordination and applying spatially related analytical techniques.</p>
Malaysia	<p>1. In general, the structure of document are well written and organize. The examples and tables are useful and well elaborate. 2. We would like to suggest a structured tutorial for better understanding. 3. Since the Ecosystem Accounting has not been developed by DOSM, we are not able to provide specific qualified comments on this drafted methodology for ecosystem accounting.</p>
New Zealand/ Statistics New Zealand	<p>Statistics NZ has little experience in this relatively new and highly challenging area so we have consulted with the leading central government agency working on ecosystem service valuation, the NZ Department of Conservation (DOC), and one of the countries leading research institutes, Ecological Economics Research New Zealand (EERNZ). I have attached both responses which broadly endorse, as Statistics NZ do, the approach being taken to build consensus and international agreement on definitions, standards, and methodology. Although DOC generally support the UNSD's approach, some of their technical feedback challenges the current proposals. We hope that this constructive feedback is helpful and look forward to working with you over the coming years to assist in the development of ecosystem accounting.</p>
New Zealand/	<p>Statistics NZ has little experience in this relatively new and</p>

<p>Department of Conservation</p>	<p>highly challenging area so we have consulted with the leading central government agency working on ecosystem service valuation, the NZ Department of Conservation (DOC), and one of the countries leading research institutes, Ecological Economics Research New Zealand (EERNZ). I have attached both responses which broadly endorse, as Statistics NZ do, the approach being taken to build consensus and international agreement on definitions, standards, and methodology. Although DOC generally support the UNSD's approach, some of their technical feedback challenges the current proposals. We hope that this constructive feedback is helpful and look forward to working with you over the coming years to assist in the development of ecosystem accounting.</p> <p>EEA_New_Zealand.pdf</p>
<p>New Zealand/ Ecological Economics Research New Zealand (EERNZ)</p>	<p>Thank you for the opportunity to review the 'SEEA Experimental Ecosystem Accounting - Consultation Draft'. As Director of Ecological Economics Research New Zealand (EERNZ), more specifically as a researcher and practitioner in the field of Ecological Economics and Ecosystem Services, I am very familiar with the concepts presented in the draft consultation report. The 'Core principles of Ecological Economics' described on page 11 of the report reflect this field well. I am aware that this report is the result of many years work and consultations at the UN with internationally recognized Ecological Economists. I strongly support the proposition presented in this report. Guidance toward international consistency around how ecosystem services are described, classified and valued is extremely important. The proposed approach has the potential to guide the monitoring and reporting, while allowing flexibility for national policy making and local management of ecosystem processes. The Ecosystem Services paradigm and associated proposal for environment-economic accounting practices provides an opportunity to;</p> <ol style="list-style-type: none"> (1) connect considerations at multiple scales: e.g. local, regional, national and global level; (2) develop a common language between ecology and economics, as well as between science and policy; (3) create integration and tradeoff scenarios of all relevant ecosystem benefits and; (4) consider the supply and demand of ecosystem services. An elaboration of point 4 is, for example, concerns the inelasticity of the supply of ecosystem services, which doesn't respond to price signals but rather responds to slow changes in land use and ecosystem functioning. By comparison, the demand for ecosystem services may be more responsive to market based prices. In addition, the proposed framework allows for non-market valuation based approaches, which are crucial to accommodate certain

	<p>ecosystem demand profiles, such as for cultural and spiritual values. ‘Uncertainty in valuation” (page 100-101) is a science-policy challenge that needs to be understood and managed. Countries that succeed in doing this well will benefit from such understanding and pave the pathway toward ‘genuine progress” and the realization of new value propositions. I strongly endorse the content and direction provided by the Consultation Draft. Please, don”t hesitate to contact me in the future for elaborations on this theme.</p>
Belarus	<p>National Statistical Committee of the Republic of Belarus has no comments and suggestions to the draft within its competence.</p>
Dominican Republic	<p>In general, the document contains the most important elements related to the account of ecosystem. Its structure is similar to the water account, which has been the only experience of integrated environmental and economic accounts held in the Dominican Republic, coordinated by several agencies. The topics and subtopics cover a variety of aspects, which as they progress in the development and implementation in some country, has undoubtedly may strengthen the system of integrated environmental and economic accounting.</p>
United States/Bureau of Economic Analysis	<p>1. We congratulate the Editor and the Board on the current draft of the volume and offer our sincere thanks for the time and effort that they have put in 2. Because the volume is inherently experimental, and because much of the material is so complicated that it cannot be adequately covered within a 150 page document, it would be prudent to cite the relevant academic literature throughout the text; particular attention should be paid to chapter 5. The citation of papers would be especially useful to readers who desire to educate themselves further. 3. There does not appear to be a single purpose to the volume. The title suggests that it provides aspects of how experimental ecosystem might be constructed. But such a posture is not maintained. In some places there are discussions of alternatives, while in others it is very prescriptive, particularly with regards to CICES and the ecosystem accounting units. 4. It is hardly emphasized that there is much ongoing debate about several features of ecosystem accounts, such as valuation, and that the link to the national accounts will not be straightforward or even possible. Moreover, any link to the national accounts must satisfy the crucial tenets that the computation of estimates be transparent and replicable. 5. The connection between service flows and beneficiaries is integral to the measurement of ecosystem service transactions. In certain places this is addressed, but the issue appears to be treated as another layer of information that can be overlaid on the Ecosystem accounting units. Because it is treated in an</p>

	<p>ancillary way, the connection to beneficiaries is often lost. See, e.g., the subsection beginning in 4.27 on degradation. Hypothetically, if ecosystems that generate no services experience a decrease in condition or extent, is it necessary to record degradation? From this section, the answer appears to be "yes", despite the fact that there is no reduction in expected ecosystem service benefits. 6. The sections and paragraphs relating to valuation of ecosystem services strongly suggest that the bulk of ecosystem service transactions occur without monetary valuation. For example, many of the cultural services may overlap with the SNA-defined economy, so that valuation would simply entail a re-classification of transactions recorded in the economy. Our point is that there are transactions already in the national accounts that may cover part or all of such ecosystem services. (This point is touched-on in 5.11, but the point is that it may extend beyond the provisioning services as discussed in 5.47-5.52 onwards, and that the discussion of valuation of cultural services in 5.57-5.59 is too narrow.) The overall preponderance of the text focuses on imputation, whereas we may find that re-classification accounts for much more of the ecosystem services than suggested. 7. Paragraph 6.4 contains examples of caveats that should be placed throughout the manual. Readers may not read the volume cover-to-cover, and hence these caveats should be placed next to the material to which they pertain. See accompanying document for more specific comments. EEA_USA.pdf</p>
Hong Kong, China	<p>The Consultation draft of SEEA has proposed a very useful framework about the measurement of ecosystem accounting. The classification of ecosystem services into provisioning services, regulating services and cultural services provides a systematic model for the establishment of ecosystem accounting in a co-ordinated way. In general, we agree that the SEEA Experimental Ecosystem Accounting requires further clarification on some technical issues before becoming an international standard. For example, when measuring the ecosystem degradation in monetary terms, the estimated values of using damage-based or cost-based perspectives may be quite different and more guidelines are required for choosing the two methods. In addition, given its multi-disciplinary nature, consensus among different parties (e.g. ecological scientists, biologists, statisticians) has to be reached, more researches have to be done and statistical systems have to be set up before the accounting system can be put up for practical implementation.</p>
Latvia	<p>We appreciate work done so far on ecosystem accounting. In general we agree that structure of document is good and is well written. As Central statistical bureau of Latvia are not</p>

	involved in work with ecosystem accounting we cannot provide very specific comments on text.
Mauritius	<p>The structure of the document is well defined. However, a good description of ecosystem goods and services appears to be inadequate. These are important for health, social, cultural, and economic needs. General Comments</p> <p>Ecosystem accounting stems from the SEEA which articulates around the Environment and the Economy relationships. While a wide range of economic statistics is handily available with appropriate standard methodologies such as the SNA, such is not the case for Environmental statistics in many countries. The UNSD has therefore justifiably come up with the revision of the Framework for the Development of Environment Statistics (FDES). Therefore the Environment- can also better be measured/assessed with the FDES and then can be coupled with the economic statistics for compiling ecosystem accounts. The ecosystem approach will then be easily applied in compiling the accounts.</p>
Germany/Destatis	<p>The structure of the document is well defined. However, a good description of ecosystem goods and services appears to be inadequate. These are important for health, social, cultural, and economic needs. General Comments</p> <p>Ecosystem accounting stems from the SEEA which articulates around the Environment and the Economy relationships. While a wide range of economic statistics is handily available with appropriate standard methodologies such as the SNA, such is not the case for Environmental statistics in many countries. The UNSD has therefore justifiably come up with the revision of the Framework for the Development of Environment Statistics (FDES). Therefore the Environment- can also better be measured/assessed with the FDES and then can be coupled with the economic statistics for compiling ecosystem accounts. The ecosystem approach will then be easily applied in compiling the accounts.</p> <p>EEA_Germany.pdf</p>
Austria	<p>We regret having to state that we reject the approach laid down in the Exposure Draft for SEEA -Experimental Ecosystem Accounts. There are two main reasons: · As already stated in our comment on the System of Environmental-Economic Accounts (asset accounts) figures on stocks and also on environmental services whether in physical or monetary terms cannot tell anything about the quality of ecosystems (state and changes in state of ecosystems). We do not see how figures on stocks and flows of ecosystem services could show the changing condition and health of ecosystems and their capacity to continue to deliver benefits to humanity. In our view there is a</p>

	<p>contradiction because an ecosystem's capacity to deliver ecosystem services depends on its state. How to measure the "condition" of an ecosystem? The meaning of several paragraphs is unclear, especially the way ecosystems and their services as well as their relation is understood in the document seems strange (see also remarks on 1.17, 1.35, 1.61, 2.4). · We do have only in a few cases data to fill in the tables. It would afford an enormous amount of resources (monetary and non-monetary) to gather the necessary data. We doubt that it would be in balance with the advantage. But apart from that we think that in many cases it is factual impossible to generate figures; see also remarks on Table 2.1, 2.4, 3.2, 4.6. We are even missing clear definitions, e.g. do you mean by ecosystem services only those which are used? Is your perception of an ecosystem service the resulting product, e.g. crops, or is it the function of the ecosystem to produce crops? We are generally very sceptical against monetary valuation of ecosystem services.</p>
Azerbaijan	<p>In my opinion the structure of the document, the balance of material and the coverage of the draft are satisfactory.</p>
German Federal Agency for Nature Conservation	<p>The document clarifies a lot of the questions that were raised in the preceding discussions between statisticians, environmental economists and ecologists of different professions on the challenges and ways how to integrate biodiversity, ecosystems and ecosystem services into environmental economic accounting. These questions regarded especially but not exclusively. - the role of the production boundary in the definition of services, - the interrelationship between SNA, SEEA Part I and SEEA Part II, experimental ecosystem accounting, - a system of units for ecosystem services accounting, - data requirements for the evaluation of ecosystem services consistent with the economic concept of value, - differences in concepts and measures of value in SNA compared with welfare/environmental economics. By giving basic answers to these questions and showing ways how to systematically solve the different problems of ecosystem accounting aligned with common accounting principles and methods this document provides an excellent and urgently required common basis for the (still) heterogenous "ecosystem accounting community" to foster additional internationally and interdisciplinary more coherent efforts on the development of, first, experimental ecosystem accounts and - as the last step - for practical, scientifically sound and commonly accepted (standard)solutions to integrate ecosystem services and natural capital into SEEA and SNA. For detailed comments see Part II (The Federal Statistics Office of Germany will receive a copy of this comment. Despite the exchange between BfN and German Statistics</p>

	Office on ecosystem accounting it was due to time shortages unfortunately not possible to integrate the comments of both agencies and send a joint version)
Hungary	However we appreciate the progress on ecosystem accounting the Hungarian Statistical Office do not wish to comment the document in this preliminary phase. On the one hand the topic is far beyond the scope of statistical practice and on the other hand further clarifications and amendments should be made for the development of the document.
Norway	The draft text has brought together knowledge of statisticians and environmental experts and for the first time there is a comprehensive attempt at giving a consistent presentation for ecosystem accounts. That statisticians have been involved in trying to consolidate this work has hopefully helped to translate often unclear needs into more measurable frameworks. But we wish to point out that, in our view, ecosystem accounting is still only at an experimental stage of development and much more work in trying to implement and populate some of the proposed tables is needed, as in fact is suggested by the editorial group in their call for "experimental" efforts by the countries giving priority to this work. What has been described in the report is at a very theoretical or conceptual level and it may be difficult to envision how many of the ideas being presented can be developed into meaningful accounts for practical purposes. With a focus on the text directly, the consultation draft seems rather fragmented and it is difficult to understand exactly how the different chapters relate to each other. One reason may be that much of the important conceptual discussion has been placed in the many annexes referring to many different chapters at the end of the report which makes it difficult to get a comprehensive impression of the relationship between the core concepts. We recommend that the most important parts of these annexes are moved back into the main text. This appears to be a work in process - a progress report - rather than any type of manual that could be considered as part of a "SEEA" family of manuals. There seems to be a number of important "parts" of a system being described but it is still unclear exactly how the different parts fit together into accounts. There is a need for substance and methodology which may be the result of an "experimental" practical application of this framework carried out in the countries giving this priority. The text does try to establish a common set of terminology which can be used for further work. Until now there has been a flourishing of divergent terminology which has often caused confusion. Consolidation of the terminology is an important first step.
South Africa, South	SANBI has only recently been exposed to the work being

<p>African National Biodiversity Institute</p>	<p>done on developing SEEA Experimental Ecosystem Accounting. Due to this fact, as well as looming annual vacations and the deadlines that come with this, we are unfortunately unable to make comments on this substantial draft document given the short amount of time. However, SANBI sees this work as very important both nationally and internationally, and would like to take this opportunity to ask to be involved in further development of SEEA Experimental Ecosystem Accounting. As a national public entity, SANBI has done a great deal of work on mapping and classification of ecosystems nationally in terrestrial, freshwater and marine environments, as well as assessing the condition of these ecosystems (some of this work is summarized in our recently published National Biodiversity Assessment synthesis report and technical reports, available at http://bgis.sanbi.org/). We would greatly appreciate an extension of the commenting deadline to the end of Jan 2013. However, if this is not possible, we would still like to request to be involved in this evolving work going forward. SANBI also intends on meeting with the South African NSO in the new year to discuss possible collaboration on developing ecosystem accounts.</p>
<p>Bosnia and Herzegovina</p>	<p>Agency for Statistics of Bosnia and Herzegovina welcomes adoption of international standards System of Environmental-Economic Accounting (Central Framework). SEEA is a framework for an interdisciplinary approach, which describes the interaction between the economy and the environment, and provides a comprehensive and user-friendly view for countries in this matter, and international comparisons. There is no experience in Bosnia and Herzegovina in this matter. It was only conducted a pilot study- Environmental expenditure on a limited number of reporting units, with the goal of understandability questionnaire. Further work is required to develop these statistics. Agency for Statistics of Bosnia and Herzegovina has taken action on the translation of Chapter 1: Introduction to the SEEA Central Framework, for purpose of popularization of this document and informing the public with this matter in Bosnia and Herzegovina. Translated Chapter 1 will be posted on the website of the Agency for Statistics of Bosnia and Herzegovina (www.bhas.ba)</p>
<p>Slovakia</p>	<p>Statistical Office of the Slovak Republic appreciates all efforts and hard work which were put into the development of the methodology for ecosystem accounting and in general agrees with the presented document. In our opinion, the document is well written, the structure of document is good and the balance of material seems to be adequate. The ecosystem accounting has not yet been introduced and developed within the Statistical Office of the SR so we are</p>

	not able to provide specific qualified comments on this drafted methodology for ecosystem accounting.
Switzerland	<p>We consider the document an excellent foundation for organising information on ecosystems and on the services they provide. Especially Chapters 1-4 are conceptually sound. Chapter 5 provides important considerations on valuation for which, however we have some concerns (see Part II of this comment form). Paragraph 5.14 We support the existing paragraph: "Given the range of options that are available in the area of valuation it is recommended that where valuation is undertaken the purpose be clearly articulated together with a clear explanation of the underlying assumptions that have been made." Proposition: We propose however to add the following: "The meaningfulness of these values and the risk of under- or overestimation e.g. due to limits of scope or methodological restrictions should carefully be documented and systematically communicated." Rationale: Monetary valuation of ecosystems and their services remain a challenging field. Methodological choices within the accounts (e.g. the exclusion of non-use values or restrictions on the use of available welfare studies) may lead to values that do not capture the whole range of relevant benefits or values. The resulting values may, in some cases, be misleading, creating an illusion of accuracy while under- or overestimating the value of some ecosystems. Valuation studies outside the accounts may have the advantage to respond to well-defined policy questions. Specific studies would also be an opportunity to show a range of values based on a range of scenarios and assumptions.</p>