

Expert Meeting on Ecosystem Accounts

Melbourne, Australia

16-18 May 2012

<http://unstats.un.org/unsd/envaccounting/seeaLES/egm2/lod.htm>

**1st Meeting SEEA Experimental Ecosystem Accounts Editorial
Board**

Summary of Outcomes

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FINAL

Wednesday – Friday, 21 – 23 March, 2012

Starting 9.30am 21 March UNSD offices, New York

Chair: Carl Obst (SEEA Editor)

Attendees: Michael Vardon (Australian Bureau of Statistics)

Warwick McDonald (Australian Bureau of Meteorology)

Michael Bordt (Statistics Canada)

Anton Steurer (Eurostat)

Glenn-Marie Lange (World Bank)

Jean-Louis Weber (European Environmental Agency)

Lars Hein (Wageningen University, Netherlands)

Roy Haines-Young (University of Nottingham) attended by teleconference for agenda item 4

Bram Edens attended two sessions by teleconference.

Secretariat: Ivo Havinga, Alessandra Alfieri, Daniel Clarke, Sokol Vako (UNSD)

Apologies: Jawed Khan

1. Role of Editorial Board members

The range of expectations of Editorial Board (EB) members was discussed. Key aspects of the role include

- Providing technical expertise and contacts to other experts as appropriate
- Giving direction in drafting, especially in terms of content and structure
- As required, make decisions on content
- Evaluate feedback from consultation processes
- Support and promote the work on SEEA Part 2

2. Style and tone of SEEA Part 2

There was general agreement with the note covering this issue but a few additional aspects were highlighted in discussion.

- The need to position SEEA Part 2 clearly with respect to other ecosystem accounting approaches both small/local work and global efforts such as TEEB. The focus of SEEA Part 2 should be the development of macro level (i.e. regional and national, multiple ecosystem level) information.

- In this regard, the accounting basis underpinning the approach and the focus on the overall capacity of ecosystems to provide services are two key areas of differentiation.
- Given that the general intent of the volume is to permit countries to develop experimental/prototype/pilot ecosystem accounts there is a need to provide a sense of direction for experimentation and development (as distinct from a traditional research agenda). Describing more clearly what experimental means in the context of an international statistical document of this type would also be useful.
- There will be a need to manage expectations in terms of what is possible/feasible in this area of measurement given current data availability and development of techniques.
- Although the document should not provide detail on how ecosystem accounts should be compiled, some description of possible approaches should be included as appropriate.
- Need to examine whether it is useful and possible to include extensions and applications of ecosystem accounts data in SEEA Part 3.

3. Comments on draft SEEA Part 2 outline

Overall the draft outline provided a good starting point for discussion and generally covered the key aspects thought relevant for SEEA Part 2. An updated draft (Version 2) will be circulated for comment ahead of circulation for the Expert Group meeting in mid May.

Key comments related to

- Inclusion of description of classifications in Chapter 2.
- Discussion of scaling up (and benefit transfer) in Chapter 2 under key measurement issues.
- Switching order of Chapters 3 and 4 such that ecosystem services are explained ahead of ecosystem “assets” following the logic that the aim is to assess the capacity of ecosystems to deliver ecosystem services.
- In the new Chapter 4 (ecosystem asset accounts) highlight that the focus is measurement in physical terms. Also, need to distinguish between measures of stock (eg hectares, tonnes), condition/health and capacity.
- Also in Chapter 4 need to develop an underlying logic for the inclusion of various components of ecosystems that are the focus of measurement, and consider the extent to which summary indicators should be described.
- It was agreed to maintain a clear distinction between measures in physical terms (Chapters 3 & 4) and measures in monetary terms (Chapter 5) to make clear that ecosystem accounting does not require valuation.
- In Chapter 5 (Valuation) a distinction could be drawn between valuation and measures in monetary terms which would then encompass a broader range of topics including accounting for relevant taxes and subsidies and the emerging cases of payments for ecosystem services. This altered focus would also allow a discussion on prices for ecosystem services (as distinct from values).
- Chapter 5 requires a very clear articulation of the SNA valuation basis.
- Chapter 6 should include description of the sequence of accounts (intended under the sub-section “Recording degradation”).

4. Defining and classifying ecosystem services

Extensive discussion under this agenda item focused on the relationships between ecosystems, ecosystem services and ecosystem benefits. There was general agreement on a

model although there were a range of ways in which this model was conceptualised and expressed by different EB members. In part the different expressions relate to alternative use of similar terms. It was agreed that the drafters (Carl and Lars) would work to describe the generally agreed model and seek feedback in a further round of consultation within the Editorial Board.

In broad terms the key aspects of the model are the following

- Ecosystems operate within defined spatial areas (although within any given spatial area there may be a number of ecosystems) and change through natural processes and through human induced changes (positive and negative)
- Ecosystems deliver ecosystem services which are the contributions that ecosystems make to production, accumulation and consumption activity undertaken by economic units (enterprises, households, governments)
- Ecosystem services do not include flows within ecosystems that may be considered to provide internal support to the functioning of the ecosystem (often referred to as supporting or intermediate ecosystem services). These types of flows should be accounted for within asset accounts for ecosystems although generally they would be implicitly part of measures of the characteristics of an ecosystem or incorporated into indicators of quality or capacity.
- Ecosystem services should be distinguished from the goods and services that are produced by economic activities (collectively known as products). Products encompass many of the benefits that people receive from the use of ecosystem services.
- The full set of ecosystem services should not be limited to those that are inputs to the set of products defined by the SNA production boundary. That is, ecosystem services contribute to a broader set of benefits. A term to define the full set of products/ecosystem benefits to which ecosystem services contribute was not agreed at the meeting.
- Explaining the differences between provisioning, regulating and cultural services will be important in providing the right contexts and explanations for ecosystem services.
- Flows of ecosystem services are different from flows of degradation and other flows relating to the changes in ecosystems although there are close linkages between these various flows in terms of measuring the changing capacity to generate ecosystem services. Measures of degradation and restoration should be recorded in asset accounts.
- It was agreed that a classification for ecosystem services should be included in the SEEA Part 2 following a hierarchical structure. The precise nature and extent of the hierarchy is to be determined.

Further discussion is required to finalise issues of scope of ecosystem services concerning

- Flows related to sub-soil mineral and energy resources
- Flows related to energy from renewable sources (wind, solar, water, geo-thermal, etc)
- Flows related to the atmosphere
- Flows between ecosystems

In terms of the discussion of ecosystem services in SEEA Part 2 the broad intent is to define a general model (building on the points above), describe the classification, and then to discuss some of the possible measurement approaches for some of the most well known and significant ecosystem services (using as a starting point the set of ecosystem services outlined in the paper by Lars Hein on the prioritisation of ecosystem services). In principle all ecosystem services for each ecosystem should be measured but this may not be possible in practice and hence a targeted approach may be required.

5. Accounting structure and models of ecosystem stocks and flows

This discussion built directly on the discussion concerning ecosystem services. The focus however, was more directly on what type of information was required concerning ecosystem stocks and flows and how such information should be organised.

As a general starting point it was thought that information on various stocks and flows should, at a minimum, be organised by type of ecosystem. However, exactly what might define an ecosystem for measurement purposes and an appropriate classification of types was not discussed under this agenda item and instead was picked up in relation to statistical units (agenda item 6).

Ecosystem service flow accounts. A basic set of information would include data on the generation of ecosystem services by type of ecosystem and by type of service. In addition, data on the beneficiaries from the services (enterprises, households, governments) should be included. Beyond this basic set of information it would also be of interest to determine the economic unit considered to generate the ecosystem services. Commonly, this might relate to the land owner/user/manager (no precise term was defined) although situations in which different units generated different types of ecosystem services from the same land area will arise and a conclusion regarding treatment and allocation in this situation was not determined. Ultimately, a supply and use table for ecosystem services might be constructed which could be linked to the general PSUT (Physical Supply and Use Table) described in SEEA Part 1. There is an outstanding issue of how to account for flows between countries and between one country and associated oceans and atmosphere.

Ecosystem asset accounts: These accounts refer to information that should be organised pertaining to ecosystems within defined spatial areas (also subject to the approach to be taken to define statistical units (see below)). Significantly, it was agreed that these accounts could contain information on the stock (quantity) of an ecosystem (e.g. hectares of a given land cover type), the condition (quality) of an ecosystem (i.e. its health), and the capacity of an ecosystem to generate ecosystem services. The general idea is that the combination of the stock and the condition gives an indication of the capacity. It was concluded that it is the third concept of capacity that provides the strongest basis for considering the scope of ecosystem asset accounting.

This conclusion implies that, as a first step, a strong focus is needed on determining the relevant ecosystem services generated by an ecosystem. From this starting point it is then pertinent to find the best set of indicators of opening and closing position and changes in position such that a full assessment of the capacity to continue to generate ecosystem services can be made.

The relevant set of indicators may vary by type of ecosystem (proxied by land cover type). Linkages may be made to the individual environmental assets described in SEEA Part 1 (e.g. timber, aquatic, water, soil resources, etc) but other indicators (for example considering changes in biological carbon, water and biodiversity) may provide alternative ways of providing a complete coverage of an ecosystem.

Depending on the most appropriate set of indicators the ecosystem asset account would be structured to show opening and closing stocks, changes in stocks (possibly classified as either human induced changes or due to natural processes) as well as additional information on characteristics/properties that indicated the changing quality of those stocks in generating ecosystem services. For example, changes in the Net Primary Productivity of agricultural land may provide an indicator of the changing quality of the associated ecosystem. Using this range of information measures relating to the opening and closing capacity and condition, and

changes in capacity and condition might be developed. SEEA Part 2 will need to discuss in some degree of detail possible indicators and ways of organising relevant information.

Summary indicators. There was some discussion on the extent to which SEEA Part 2 should discuss or perhaps recommend indicators that provided an overall view of the capacity or condition of an ecosystem or set of ecosystems. There are a number of examples of such indicators. Within the constructs of standard index number theory there does seem to be the possibility to develop summary indicators however it may be that the assumptions required to weight together different components are too contentious. At the same time, the development of price and/or value weights might provide a useful approach.

The general sense from the meeting was that SEEA Part 2 should be cautious in this area and refrain from advocating for any particular approach to summary indicators. At the same time discussion of the potential to develop summary indicators and the types of considerations that are needed may be useful inclusions. SEEA Part 3 might be a good place to present a more detailed description of the possibilities for summary indicators.

6. Defining statistical units for ecosystems

The discussion on statistical units seemed to converge on a model based on defining smaller units – referred to as land cover units – that would be formed through an assessment of land cover types within an overarching grid (say 1km x 1km). Contiguous grid squares of the same land cover type would constitute a single land cover unit. Factors such as rivers and administrative boundaries would need to be taken into consideration in the final formation of these land cover units.

An important general conclusion was that the level of the land cover unit should represent the level at which all relevant information are integrated. Thus, information that may be available at higher levels of spatial aggregation should be downscaled and information available at more detailed levels should be aggregated. The critical finding is thus that land cover type represents a basic building block for the organisation of information and the compilation of accounts.

Once land cover units are delineated there is less clarity on exactly what the higher level of aggregation might be. It was agreed that it is likely that for reporting and policy purposes some aggregation of land cover units was likely to be required. Possibilities suggested for aggregation included river basins, administrative or management related areas, and SELU (Socio-Ecological Landscape Units). It is noted that there was an outstanding question about whether certain stretches of rivers should be treated as distinct land cover units prior to aggregation within a higher-level aggregation or landscape.

Although the more general concept of an ecosystem could not be defined, it was generally accepted that different types of land cover units might be grouped on the basis of the extent to which they were “working together”. Ultimately, any aggregation is likely to depend on the policy and analytical questions of interest. (A parallel might be drawn to aggregations of individual economic units to industries or institutional sectors depending on the type of analysis.) Provided information can be integrated at the land cover unit level alternative aggregations should be possible.

7. Valuation of ecosystems and ecosystem services

The main conclusion from the discussion of valuation was that valuation in SEEA Part 2 should be undertaken consistent with the principles of valuation in the SNA. While generally referred to as based on market or transaction prices, it was suggested that the general SNA valuation principles should be explained in terms of marginal and average prices that are more commonly used in the relevant economics literature in this area.

The primary implication from adopting a marginal price approach is that any valuations used in the SEEA Part 2 should not incorporate elements of consumer surplus and hence valuation approaches based on the willingness to pay of consumers should not be used without appropriate adjustment.

While for many ecosystem services there are related market transactions (eg logged timber sold on the market) that can provide a strong basis for the valuation of the service, there are also important ecosystem services for which no market transactions occur (e.g. the benefits arising from air filtration by plants). Consequently, it will be necessary to consider alternative methods in the valuation of these flows.

The SNA describes a range of valuation methods, for example, the use of market equivalent imputations in the measurement of owner-occupied rent and in the application of the NPV approach in the valuation of assets – particularly natural resources. Of most importance in relation to ecosystem services is the use of input cost approaches to the valuation of production by non-market producers – primarily government. These outputs are valued at the sum of costs including the cost of consumption of fixed capital (depreciation) but excluding a return on capital. Strictly, the convention to exclude the return to capital in the valuation of output implies that the SNA values will not be aligned with a marginal price basis of valuation.

A topic of discussion was therefore whether non-market ecosystem services should be valued in a manner consistent with the SNA conventions or following the more general concept of marginal price valuation.

While there was an underlying ideal to be aligned with the SNA, a final answer to this specific question should be determined once there is a more complete investigation of potential valuation methods for various ecosystem services. The meeting did not discuss the relative merits of various valuation methods described in the ecosystem measurement literature.

Also during the discussion on valuation, the appropriateness of restoration cost based approaches and damage/benefit based approaches was considered as well as a method, known as Simulated Exchange Value being developed by researchers in Spain. The general issue of dealing with low-probability, high impact events and the issues of thresholds and irreversibility with respect to valuation all need to be taken into account in the chapter.

An important practical concern in valuation for the purposes of macro level ecosystem accounts is the issue commonly referred to as benefit transfers. This is the practice of using valuations of one ecosystem to determine a value in another ecosystem. Discussion suggested that this practice is widespread but generally poorly applied. Michael Bordt agreed to provide some text on this topic.

The general problem seems to one of determining the representativeness of a particular ecosystem. Discussion concluded that ideally we should be working towards developing the information base such that a sampling type approach might be applicable – i.e. developing various strata of ecosystems most likely based on a combination of land cover type (thus linking to the definition of units) and the mix of ecosystem services generated. Such an approach should be able to be applied in the compilation of data in monetary and physical terms.

8. Carbon accounts

There is no doubt that appropriate accounting for carbon is an integral part of ecosystem accounting. However, there remain some questions as to exactly how carbon should be incorporated. Key outcomes from the discussion at the Editorial Board meeting were

- Not all flows and stocks of carbon need to be included in an ecosystem account
- It is still necessary to account for all flows and stocks of carbon and hence a separate carbon account should be included in SEEA Part 2. Such an account would incorporate information that would be used in ecosystem accounts.
- A key distinction is between biological carbon (i.e. carbon in biomass and soil) and geological carbon (i.e. carbon stored in sub-soil resources). The general view of the meeting was that only biological carbon should be accounted for in an ecosystem account but that both sources of carbon should be included in a full carbon account.
- Accounting for carbon should encompass accounting for related ecosystem services such as the provision of timber and food and carbon sequestration.
- There is a question as to whether the scope of a carbon account should extend to oceanic and atmospheric stores of carbon or whether only the interchanges with these stocks are relevant.
- There is a question as to whether a full carbon account needs to consider all flows of carbon within the economy (eg in the manufacture of furniture) or whether only the interchanges between the environment and the economy are relevant. It was noted that measures of the stock of biological carbon in the economy were policy relevant.
- The background paper from Roy Haines-Young highlighted two possible definitions of the net carbon balance. The view of the EB members was that in fact two concepts were being defined and both may be relevant. The Editor is to clarify the distinctions being made.

As a final part of the discussion on carbon there was a brief discussion on soil and nutrient accounting which had been proposed to be a separate set of accounts. The general conclusion – subject to further discussion – was that soil and nutrient accounting should be incorporated within the broader approach to ecosystem asset accounting. At the same time changes in the stock and quality of soil should be recognised as important indicators for the quality of certain ecosystem types.

9. Biodiversity indices

The background paper compiled by Per Arild Garnasjordet and colleagues was welcomed by the EB members. The paper clearly indicates the potential to compile measures related to biodiversity and the potential applications of these measures. The paper outlined a range of recommendations which were discussed by the EB. A particular aspect of the EB discussion was exactly how to draw the link between accounting for biodiversity and the development of ecosystem accounts in SEEA Part 2.

Key outcomes from the discussion were the following

- It was agreed that any approach to accounting for biodiversity needs to recognise the variability of species and that biodiversity and ecosystem functioning are integrated concepts.
- In particular it was noted that assessment of the changes in biodiversity for an ecosystem are likely to provide important signals concerning the condition of an ecosystem.

- While ecosystem and biodiversity accounting are integrated, a set of ecosystem accounts need not encompass all aspects of accounting for biodiversity. Consequently, it is proposed that in the structure of ecosystem accounts in SEEA Part 2 only those aspects of biodiversity that are relevant to ecosystem accounts should be included.
- This will primarily relate to role of biodiversity in ecosystem functioning (i.e. the maintenance of functional groups within ecosystems). It was noted that this role is not yet fully understood but work is advancing (for example through the “resilience” community looking at substitutability of functions of species). Ecosystem accounts should also include the cultural ecosystem services of biodiversity.
- Given that the compilation of ecosystem accounts described in SEEA Part 2 will likely focus on land cover types, the focus of measurement for biodiversity for the purposes of ecosystem accounts seems likely to be linked to biodiversity at these spatial levels rather than biodiversity at finer (e.g. genetic) or broader levels.
- At the same time, given the importance of and interest in biodiversity it is recommended that a full biodiversity account be described in SEEA Part 2 as an adjunct to the ecosystem accounts. It should be possible to use the information in the full account to compile ecosystem accounts but also to provide a more comprehensive assessment of biodiversity. The exact form of such a full biodiversity account needs to be determined.
- The paper outlined a number of potential summary indices that provide an overall assessment of changes in biodiversity. In line with the general EB views on summary indices, it is recommended that while the potential for such measures should be explained in SEEA Part 2 no specific recommendations should be made. At the same time, a description of the most viable approaches should be considered for inclusion in SEEA Part 3: Extensions and Applications.

The meeting also considered the issue of reference conditions. There was general concern about the use of the term largely due to the degree of implied subjectivity in determining such conditions. At the same time it was recognised that assessments of quality and changes in quality are necessarily relative and hence a comparison point is required. It was noted that this is also the case for the compilation of measures of changes in price and volume for national accounts and prices statistics where adjustments for quality change are made.

Most focus of discussion was on the suggestion that, rather than a focus on various reference conditions, SEEA Part 2 should focus on the notion of a single base or reference year for a set of ecosystem accounts. Essentially, this implies the determination of a common starting point for the assessment of change rather than using a range of more specific, scientifically derived scientific condition. From such a starting point the assessment of trends could be undertaken.

At the same time, using the information in a biodiversity or ecosystem account, it should remain possible to undertake distance to target analysis where the target may be a scientifically defined reference condition or a policy determined target (e.g. the Kyoto Protocol 1990 levels of emissions). This type of analysis could be considered for inclusion in SEEA Part 3.

Whether this suggestion to focus on a single base year is appropriate for the accounting in the SEEA requires further discussion.

10. Policy applications

A very useful discussion on the links between ecosystem accounts and policy applications drew out a range of themes. The key aspects of the discussion were

- There remains significant international and national demand for the type of information that ecosystem accounts are able to provide
- Increasingly policy development is moving towards the integration of solutions across previously separate domains and thus information needs are changing.
- In particular there is an increasing understanding of the need for effective land management policies to implement policies in a range of other areas.
- The current policy drivers relate to resource efficiency, climate change, materials and waste management, the greening of the economy (thus implying higher demand on biomass) and evaluation beyond traditional GDP frameworks.
- Ecosystem accounts have the potential to contribute greatly in this area as they are based on integrated/system approaches. Also, SEEA Part 2 goes beyond SEEA Part 1 as it can contribute to a broad assessment of environmental impacts (e.g. through measures of degradation) which is not possible in SEEA Part 1.
- Consequently, data from SEEA Part 2 may be able to contribute more to discussions of sustainability and sustainable/balanced development although care is needed in discussing these concepts.

It was suggested that the discussion of policy links in SEEA Part 2 might be organised using the following logic

Foundation : what are the policy drivers for ecosystems accounts

Fit: where do ecosystem accounts fit into the broader range of information

Functionality : what are the new elements in ecosystem accounts that improve the information set

Flexibility : how can ecosystem accounts be applied to policy questions

11. Next steps

The next steps from the meeting involve

- Preparation of summary of outcomes for consideration by the Editorial Board ahead of (i) circulation to sub-groups of the Expert Group for comment, and (ii) finalisation of the summary as input to the May Expert Group meeting.
- Finalisation of background papers for the May Expert Group meeting. Authors will be given until 23 April to indicate whether the papers prepared for the EB meeting should be posted for the expert group meeting and to make any final changes to the papers. The intent in posting the papers is to ensure as great a degree of openness as possible in the process of developing SEEA Part 2. Versions of the following papers are recommended to be posted for the expert group meeting.
 - Issue paper on CICES (Roy Haines-Young)
 - Issue paper on Criteria and ranking of ecosystem services (Lars Hein)
 - Discussion paper on Accounting structures for ecosystems and ecosystem services (Carl Obst)
 - Note on Options for recording ecosystem services in the sequence of accounts (Bram Edens)
 - Papers on Statistical units (Leo Kolttola, et al.)
 - Issue paper on Monetary Valuation in Ecosystem Accounts (Lars Hein)
 - Issue paper on Carbon Accounts (Roy Haines-Young)
 - Note on Soils in SEEA (Lars Hein)
 - Draft text on Biodiversity accounts and indices (Per Arild Garnasjordet, et al.)
 - Paper on Policy Applications (Michael Bordt)

- Update draft outline of SEEA Part 2 based on comments from EB members.
- Commence drafting of chapters of SEEA Part 2. It is intended that draft text be available for discussion at the Expert Group meeting in mid May. To this end, draft text from lead authors (Carl Obst & Lars Hein) will be circulated to the members of the Editorial Board in the second half of April. A teleconference meeting of the EB will be scheduled for 2 May to discuss the draft text. Draft text to be posted for Expert Group meeting no later than 7 May.
- Broad communication of plans and draft outline for SEEA Part 2 to UNCEEA, the Expert Group and members of the London Group by end April.
- Proposed face-to-face meetings of the Editorial Board in Melbourne on 19 May (following the Expert Group meeting) and in Ottawa (or New York) in early October (possibly 2 days following the London Group meeting).
- Also, tentative dates for additional teleconferences : 31 May (ahead of UNCEEA), 21 June, 6 September & 11 December. The aim will be to circulate material for discussion at least one week ahead of meetings.