



DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS
STATISTICS DIVISION
UNITED NATIONS



System of
Environmental
Economic
Accounting

System of Environmental-Economic Accounting— Ecosystem Accounting

Global Consultation on the complete document: Comments Form

Deadline for responses: 30 November 2020

Send responses to: seea@un.org

Name:	Jessica Andrews, Marcelle Grenier, Mark Henry, François Souldard, Jennie Wang
Organization & country:	Statistics Canada

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

All documents can be found on our website at: <https://seea.un.org/content/global-consultation-complete-draft>

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

General comments

Question 1: Do you have comments on the overall draft of the SEEA Ecosystem Accounting?

- Overall, and notwithstanding the comments below, this document is very useful in helping us plan and structure our data assets, and helps support the analysis in a way that matters for all three pillars of sustainable development. It also will support the production of indicators such as the SDGs, and the indicators that will evolve from the post-2020 biodiversity targets.
- Please note that no single Statcan reviewer has reviewed the entirety of the document.
- The draft uses both account in the singular and in the plural form, as in “extent account” and “extent accounts”. The same with condition. For any given EAA, should there not normally be only 1 extent account and 1 condition account? Table 2.1 refers to one account for extent, one for condition, etc. However, noted in Paragraph 5.18 – “ecosystem condition accounts are compiled by ecosystem type”: Does this imply that there is an account for each ET (multiple condition accounts) i.e. a condition account for forests, for cropland, for wetland, for marine, for urban? A single extent and condition account would certainly help with presentation because otherwise these tables will be very unwieldy.

Comments by sets of chapters

Question 2. Do you have comments on Chapters 1-2 of the draft SEEA Ecosystem Accounting?

Chapter 1

Paragraph 1.1 readability/language flow could be improved given its importance in setting the scope for this document as it is rather unwieldy.

Paragraph 1.3 & Appendix 1.2– The descriptions of the complementarity of the SEEA EEA and SEEA CF are helpful, as is the appendix that indicates how they are complementary and makes linkages to the PSIR framework, which is still a reporting structure that is in wide use.

1.1 “Biodiversity loss and climate change are among the biggest challenges that humanity is facing. There is an increasing recognition that biodiversity and ecosystems represent key components towards sustaining human societies, our well wellbeing and our global economy and are central to achieving the Sustainable Development Goals and the Paris Agreement on climate change. “ This statement is welcomed here and elevates this topic as a primary goal of ecosystem accounting (EA). However, how this topic is handled by EA should be clarified particularly in chapter 5. The underlying climate variables like temperature and precipitation (ecosystem characteristics) that allow us to understand and report on this issue are not discussed often and with explicit guidance on how they should be treated. These ecosystem defining variables are readily identifiable and understood by the public, particularly the monitoring temperature and precipitation and could be treated as characteristics, condition indicators and pressures (see chapter 5 comments).

1.1 “There is an increasing recognition that biodiversity and ecosystems represent key components towards sustaining human societies, our well wellbeing and our global economy and are central to achieving the Sustainable Development Goals and the Paris Agreement on climate change.” This makes it seem as if that’s why they are important, but that’s obviously not the case. The ecosystem accounts are central to achieving these human initiatives, but ecosystems themselves are crucial to the survival of humans, not to that of indicator initiatives.

1.1 ~~“There has been growing recognition~~ It has long been established that the degradation of nature is not purely an environmental issue and economic and human activity are having an impact on the state of the environment.

1.3 The SEEA EA’s focus on ecosystems can be combined with the data from the SEEA Central Framework accounts on environmental pressures, individual resource stocks and environmental responses in the form of expenditures, taxes and subsidies, to provide a comprehensive picture. Additional clarity could be provided in regards to some variables being both characteristics (climate) and pressures (important variables to be monitored in both contexts).

1.9 “Because of this, the SEEA 2003 was not formally adopted as an internationally agreed statistical framework. However, ...” (Typo)

Paragraph 1.16 It might be helpful to indicate how it will evolve. Is there a planned revision process or additions and a method to enable evolutions to be formally incorporated?

1.21 “The essence of ecosystem accounting lies in representing the biophysical environment in terms of distinct spatial areas each representing different a specific ecosystem types.” Otherwise it makes it sound as if there are as many ecosystem types as there are distinct spatial areas.

1.24 “There is also a range of accounts and presentations related to these five accounts.” I’m not convinced there is value for this sentence in this location. Delete?

Paragraph 1.26 ii. Tonnes vs. tons (imperial)

1.27 “(natural inputs from and residual flows to the environment such as concerning?? water, energy, air emissions, solid waste)” Delete concerning?

1.28 Residual flows will also often indicate environmental pressures that can be related to changes in ecosystem condition. An opportunity to clarify or consider how climate variables are to be treated in EA in this context – average seasonal temperature increases going from -5 degrees to 2 degrees over 70 yrs.

1.35 “ In addition to research focused specifically on ecosystem accounting “

1.36 Section 1.36 had semi-columns at the end of each bullet points.

Paragraph 1.40 « establishment of networks of users » → why are networks of users specifically relevant to the implementation ? I would think networks of data providers, perhaps are necessary for implementation (i.e. para 1.43). Users are required to make the implementation worthwhile, but not the implementation.

Paragraph 152: Subannual accounts may be needed, particularly in countries with highly seasonal data- still could be updated annually but need to be season specific. Potentially true even for extent accounts (Sea ice for example)

1.44 “National statistical offices are especially well-positioned to provide oversight and governance given their experience in providing standard measurement and data quality frameworks.” However, NSO are usually populated with economists and demographers and other social scientists, but few physical scientists. This should be openly acknowledged and included here as one reason why inter-departmental collaboration is crucial.

1.46 “disseminate outputs as maps showing the location and”. Maps are only one output of processes involving spatial data, and arguably not the most important. I suggest replacing this part of the sentence with “disseminate outputs as spatial data identifying the location and...”

1.52 “Although assessment of specific policies or investments will likely require information additional to that presented in the ecosystem accounts; the data from... “ replace with comma

1.52 “Further, where different assessments are based on a common underlying data set it allows improved comparison of policy alternatives ” they allow

A1.2 “is broader that that provided” than

A1.3 “is on the individual components” Do you mean “resources”? Ecosystems are also components.

Comments on Chapter 2

2.6 “ Ecosystems change as a result of natural processes (e.g., succession and natural disturbances, such as a storm) and because of human actions, involving deliberate management or disturbance, such as the extraction of natural resources, pollution or restoration and conservation activity. “ Add climate change?

Figure 2.1: The general ecosystem accounting framework:

- Should the polygon in the Economy (GDP boundary) be tagged “SNA boundary”?

2.19 “For instance, in a natural forest ecosystem, natural processes exert the dominant effect on the dynamics of the ecosystem and there are likely to be fewer impacts from human management of the ecosystem or from human disturbances. “ There could be a comma after forest or after ecosystem, depending of the intended meaning. My suggestion above.

“Finally, ecosystems close to, and within, areas of human settlement may be significantly affected by human activity and disturbances such as pollution.” Is part of the sentence missing? Maybe add “ but nonetheless retain some characteristics of functioning ecosystems “ ?

2.21: “ The SEEA EA tends to focus on data concerning ecosystem diversity and between species diversity (commonly referred to as species diversity).” Is this sentence as intended?

2.23: “The extinction of the endemic species is often the final step in a long process of gradual reductions in abundance.” And diversity?

2.35: Typo “ For policy and analytical purposes there will therefore commonly be a need to complement the accounting values will those estimated” with

2.37: Table 2.1 makes it clear that there is 1 extent account, 1 condition account, etc, whereas throughout the document there are numerous instances where we refer to the extent (and other) accounts.

2.49: typo extra comma : “**Thematic accounts** are accounts, that organise data ”

2.88: This paragraph could refer to the “United Nations National Quality Assurance Frameworks Manual for Official Statistics” (<https://unstats.un.org/unsd/methodology/dataquality/un-nqaf-manual/>) as well as to the “Earth Observations for Official Statistics” (<https://marketplace.officialstatistics.org/earth-observations-for-official-statistics>)

Question 3. Do you have comments on Chapters 3-5 of the draft SEEA Ecosystem Accounting?

- Chapter 3 Paragraph: 3.5 Avoid acronyms (eg CBD) whenever possible. Not all readers will have them on instant recall. 3.58 another example- several acronyms in the same paragraph reduce readability.
- Pleased that Sea Ice is now included as an ecosystem.
- Chapter 3 & 4 generally, with ref to Paragraph 3.32 and appendices – there is a lot of information here. Some confusion may remain on how best to identify and delineate change in extent over time, given the many data sources to integrate and noting the “general persistence of the characteristics of an ecosystem” as well as the overall complexity of classifying ecosystems based on the key drivers identified in Appendix 3.12. Recognizing that the lithology and topography are less likely to change, this is essentially about climate and its impacts on vegetation, water flows etc., since for the managed changes from natural and semi-natural to intensive land uses, it is more clear – the change occurs with the change in land use. But for gradual natural changes caused by, e.g. climate change, it may be difficult to discern when an ecosystem asset has changed types, rather than just experiencing a “reasonable degree of natural variation.” In addition the data sources to identify this change may be lacking. E.g. to identify an ecosystem asset classified as ‘arctic tundra and desert’ changing to a ‘boreal, temperate and montane peat bog’ – discerning this shift would need some detailed site specific info, which is hard to acquire. And if using a national ecosystem or biogeoclimate or vegetation classification to classify – it depends on regular updates to the classification scheme by ecologists (which are multi-year/multi-decade projects). Hence reliance on the remotely sensed land cover. The issue natural regression/expansion is well explained in paragraph 4.24, but the interplay of IUCN GET and national classifications and use of GIS and how to practically use/apply them all is less clear perhaps in Chapter 3.

3.9 Conceptually, ecosystem assets are envisaged as three-dimensional spaces (see Figure 3.1 and Figure 3.2).

More guidance could be provided on the treatment of the 3D issue to limit significant under/overestimation. Where forests and wetlands are measured and reported separately the overlap can be treated as forested wetlands. If they are measured using a generic land cover dataset that prioritize one over the other, there is often very significant underestimation.

3.13 Atmospheric boundary. More specific guidance could be given on the treatment of temperature and precipitation as characteristics, pressures and/or process/cycling/function variables.

3.38 Large scale usually refers to a large amount of detail and the geographic extent shown is small. The scale map is based on a fractional scale, a large scale map would have smaller denominator number, e.g. large scale = 1/5,000 vs small scale 1/100,000. Large scale should be replaced by small scale or low resolution covering large area.

3.22 **Wetlands** can be broadly defined as ecosystems that arise when **inundation by water produces** soils dominated by anaerobic processes, which, in turn, forces the biota, particularly rooted plants, to adapt to **flooding** (Keddy, 2010).

Wetlands can occur where the water table is at or close to the surface, in low-lying locations, or along the edges of lakes and river, using 'inundation' could narrow the definition.

Suggestion:

Wetlands can be broadly defined as ecosystems that arise when **land are saturated with water long enough to produce** soils dominated by anaerobic processes, which, in turn, forces the biota, particularly rooted plants, to adapt to **soil waterlogged** or flooded (adapted from Keddy, 2010)

A3.23

- Morphology could be replaced by Geomorphology: landform and soil parent material
- Landscape position is in fact wetland system

3.31 In concept, an ecosystem asset is differentiated from neighbouring ecosystem assets by the extent to which the interactions between **biotic and abiotic components** within the ecosystem asset are **stronger than the interactions with components outside** of the ecosystem asset. The differences will be reflected **in variations in function, structure and composition**. Hence, ecosystem assets should be delineated based on various **ecosystem characteristics** such as physical structure and type (including vegetation structure and type), species composition, ecological processes, **climate, hydrology**, soil characteristics, topography and depth. **Here is an example of where the reader can become confused about the treatment of climate variables and climate change. As a defining dimension (or theme), a set of characteristics and a priority policy issue, the expectation from many is that the accounts monitor, integrate and report on these variables especially in regards to the condition of the ecosystem. Can we add some**

text to make it clear that accounts can monitor these defining characteristics where it makes sense?

3.33 In delineating ecosystem assets for the purpose of ecosystem accounting, the following principles should apply

iv. *Ecosystem assets should be mutually exclusive, both conceptually and geographically.* As long as the ecosystem assets are mutually exclusive, there can be no “double-counting” of the same space. *Maybe a note could be added here about the treatment of the 3D issue as consideration should be given to overlaps of 2D classes where the overlap identifies a potential 3rd class.*

Ecoregions

A3.9 An ecoregion is “A geographic group of landscape mosaics”, “resulting from large-scale predictable patterns of solar radiation and moisture, which in turn, affect the kinds of local ecosystems and animals and plants found there (Bailey, 2009, 2014). This seems to present an overly complex definition at the outset. *Could a simpler definition be provided with this as a supplement? Something more along the lines of a homogenous area of ecosystem functions and characteristics generally along the dimensions of climate, vegetation, topography and lithology/soils.*

A3.13 For terrestrial ecosystems, key drivers are climate, topography, lithology and human activities. Key characteristics of the abiotic complex are soil and moisture regime. Key characteristics of the biotic complex include vegetation, and animals, often linked to human activity:

A3.14 Drivers:

- **Climate**, pragmatically defined as the statistics of weather, is an important driver of many ecosystems, because of its strong links to resources (e.g., water, energy) and constraints (e.g., droughts). From an ecological point of view the most relevant climatic parameters are:
 - **Temperature**: mean annual temperature; seasonality; temperature of the coldest month; accumulated growing degree-days.
 - **Precipitation**: total annual precipitation; seasonality.
 - **Potential evapotranspiration**: annual total; seasonality.

A clarifying statement could be added that drivers are or can be ecosystem characteristics that lend themselves to being good indicators of change occurring in ecosystems and candidates for ecosystem condition variables. The statements here and noted previously seem to be at odds with the statement in the condition section that climate change is external to ecosystems. The difference could be explained more clearly.

Table 4.1 – while helpful to see a mock-up table, the use of functional units is unrealistic, since we are unlikely to be accounting for changes in extent between tropical and subtropical and temperate-boreal forests in the same national account. Perhaps providing 2 example tables, one geared more to temperate/boreal/arctic table and one more tropical-tropical would allow presentation of a more coherent set of ET.

Chapter 4:

Paragraph 4.24 , 4.25 Some extents, particularly Sea Ice will need to be considered as seasonal. Much other marine ecosystem data are not available on an annual basis and accounts may need to be spaced on longer time periods .

Table 4.2- Could potentially grey out areas of change matrix that are extremely unlikely to happen.

Table 4.4- Should Crown/public be included as economic unit - relevant for shared pasture etc.

4.8 Compilers may choose to use an EAA of smaller geographical scope ...

Complementary extent accounts for subterranean ecosystems, aquifers and **linear features** may also be compiled. Potential structures for these accounts are described in section 4.2.4.

Might mention that linear features can also be measured as characteristics of a larger ecosystem or ecological geography.

4.3.3 Extent accounts for linear features and sub-surface ecosystems

Where appropriate a mention of distinguishing between natural and human made linear features and their treatment, specifically roads vs rivers.

Chapter 5:

5.3 Measurement of ecosystem condition is **of significant interest in supporting environmental policy** and decision making, which is often focused on protecting, maintaining and restoring ecosystem condition. Comprehensive and comparable measures of ecosystem condition are therefore of direct relevance.

Measuring, monitoring and integrating climate change variables like temperature and precipitation and their influence on condition could be clarified, and more guidance provided. The characterization of the issue of climate change and its importance relative to the treatment of individual climate variable is likely to be somewhat confusing to the reader – see section 5.98

5.25 Ecosystem characteristics are the system properties of the ecosystem and its major abiotic and biotic components (water, soil, topography, vegetation, biomass, habitat and species) with examples of characteristics including vegetation type, water quality and soil type. The term ecosystem characteristics is intended to encompass all of the perspectives taken to describe the long term, ‘typical behaviour’ of an ecosystem. Climate again could be given more treatment here as one of the (four) foundational dimensions of ecological geographies and a key policy area. Question could arise as to why it is mentioned as a defining dimension and not included here. Precipitation (water cycling) is such an important key function or process.

5.26 Ecosystem condition characteristics are those ecosystem characteristics that are relevant for the assessment of ecosystem condition. ...Beyond stable ecosystem characteristics, ancillary data includes data on population and demographics, emissions of pollutants, types of natural resource management and expenditure on ecosystem restoration (Czúcz et al., 2020). Consideration or a mention might be given to the idea that anthropogenic ecosystems such as agro-ecosystems have humans regularly applying

nutrients and this could now be considered as a regular function of that ecosystem that is to be monitored as a process, function and/or cycling(?).

5.30 The class **physical state characteristics** (A1) includes the physical descriptors of the abiotic components of the ecosystem (soil, water, air). Physical stocks (e.g., water table level, impervious surfaces) that may be subjected to degradation due to human pressures are relevant choices, as they are sensitive to change, and relevant for policy interpretation.

The treatment of climate should be clarified here or somewhere in this section especially as such an important policy/ecosystem issue.

5.38 Generally, selection of variables should prioritise those that reflect a role in ecosystem processes, and hence contribute to whole-ecosystem functioning, and their risk of change (Mace, 2019).

Role of climate variables could be clarified here.

5.4 Ecosystem condition accounts complement environmental monitoring systems by using data from different monitoring systems,

Guidance on climate should be given here.

5.8- Second sentence is missing an of.

“Ecosystem condition can be described by combinations of physical “...

5.94 Indeed, accounting tables should **not be blind to the policy issues** highlighted by the most relevant pressures. In the case of most pressures (e.g., erosion, pollution, invasive species)

The role that monitoring climate and particularly temperature and precipitation as important characteristics, pressures and indicators needs somewhat more treatment in the condition section. The issue of monitoring climate variables, the larger issue of climate change and as being internal (characteristics) vs external (climate change) can seem at odds or confusing in the different sections.

5.95 Using these environmental stocks as condition indicators comes with multiple further advantages:

It could be noted here that measurement of the stock can often be difficult or unlikely across the target accounting area and that the practical vs optimal is so often the issue.

Table 5.7: I was happy to see “indicative ecosystem characteristics for selected ecosystem types” – as the examples provided in previous iterations left it very open to interpretation. I recognize this is not necessarily a full list, but even more examples might be useful, and possibly linkages to other reporting frameworks.

5.98 Some pressure indicators should probably not be used in the ecosystem condition accounts. This includes pressures (or drivers) which provide more indirect measures of change in ecosystem state (e.g., **climate change**, human demographic changes). These changes should be considered **external** to the studied ecosystems.

These statements might be confusing or seem counter-intuitive relative to previous statements - climate as a foundational dimension of eco-geographies and the prominence of climate / climate change as a policy issue. How are we considering climate as a foundational dimension but change in priority climate variables like temperature and precipitation as external? Or not to be considered relative to changes in condition?

However, with regards to T6: Polar alpine functional state: extent of sea ice is shown as an ecosystem characteristic. First, why is it in polar/alpine and not e.g. marine shelves? but secondly sea ice is also proposed as an ecosystem type in Table Annex 3.2 IUCN Global Ecosystem Typology, which is perhaps conflicting.

Question 4. Do you have comments on Chapters 6-7 of the draft SEEA Ecosystem Accounting?

6.37 Factors determining use_ some ecosystem services are included even if there is not a human user directly- intermediate services.

7.15- Using words instead of SUT would make this paragraph more readable

7.19 sentence is too long. Rewrite to “ The following discussion retains a focus on explaining the principles and treatments of accounting for ecosystem services at the level of individual ecosystem assets. It is noted in practice compilation is likely to be for ecosystem types.”

Question 5. Do you have comments on Chapters 8-11 of the draft SEEA Ecosystem Accounting?

Question 6. Do you have comments on Chapters 12-14 of the draft SEEA Ecosystem Accounting?

Section 13.5 Ocean Accounts: Expected this section to reference the Global Ocean Framework and concentrate more specifically on SEEA EA.

Paragraphs:

13.67- Expected more expansion of the idea behind this paragraph. The difficulty with scarcity, availability and comparability of ocean data sets is huge particularly in the SEEA EA context. How can we compensate for this data gap in the short term, when everything else really depends on this fundamentally.

13.68- Maybe ecosystem condition should be point 1- all 4 listed are primarily economic

13.82 –Important to mention condition of ocean assets

Table 13.4- helpful a good addition to the section

Annex 13.2- I would reorganize the table- Extent then condition then pressures, services, then monetary assets+economy, then governance