

Discussion paper on spatial units

for the Forum of Experts in SEEA Experimental Ecosystem Accounting 2018

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1 Introduction

Ecosystem accounting requires the delineation of areas within a country into contiguous, mutually exclusive units, covered by a specific ecosystem, i.e. a combination of biotic and abiotic components and other characteristics that function together, and are relatively homogenous. Each of these units comprises an ecosystem asset, and form the conceptual base for accounting, in terms of stocks and flows, and the integration of relevant statistics. The stocks are represented by the ecosystem assets, and the flows by the ecosystem services derived from these stocks. Each ecosystem asset therefore generates a specific basket of ecosystem services. Generally, ecosystem accounts will be compiled and presented for areas of different ecosystem types rather than for individual ecosystem assets.

The delineation of ecosystem assets will, ideally, involve the use of a range of ecological and nonecological criteria, including vegetation type, soil type, hydrology, and land management and use. These criteria can be used to classify ecosystem assets to various ecosystem types. Although this topic has seen significant progression from the initial (interim) land cover classification in the SEEA Central Framework (2012), and subsequently The Experimental Ecosystem Accounting (2012) and the recent Technical Recommendations (2017), several issues remain unsolved and need to be addressed in the current Revision process.

The main goal of Working group 1 (spatial units) is to establish statistically and accounting relevant classifications for ecosystem types for SEEA EEA. In this short note we summarize the main research issues, articulate more detailed questions and present some initial questions and suggestions for resolving the issues, with the final goal of reaching consensus on a more elaborated standard classification of ecosystem types.

2 Revision issues

The SEEA EEA Revision Issues Note identifies 7 key issues to be resolved for Area 1 spatial units:

- 1. Establishing clear principles for defining ecosystem type classes, in particular concerning links to land use, land management and land ownership/tenure, as well as determining an appropriate set of classes for use at international level.
- 2. Ensuring alignment in the advancement of the SEEA Central Framework land use and land cover classifications as well as ecosystem services and ecosystem condition indicators.
- 3. Advancing the description and classification of marine areas.
- 4. Articulating the connection to atmospheric units in order to complete a spatial delineation of the environment.
- 5. Developing guidelines on using the revised classifications to support ecosystem accounting for urban areas, where urban areas are considered combinations of multiple ecosystem types rather than as built-up areas in terms of land use and land cover.
- 6. Exploring the possibility to link a set of ecosystem types defined for SEEA EEA purposes to other (national and international) land-related classifications.
- 7. Establishing agreement on standard national boundaries for statistical purposes such that country areas underpinning the accounts are consistently defined and harmonised.



We propose to cluster these issues as follows:

- 1. Establishing generic principles for defining ecosystem type classes (Revision Issue #1).
- 2. Developing an international standard classification of ecosystem types for terrestrial, freshwater, and marine areas, and integrating them (*Revision Issues #1, #2, #3, #4, #6, #7*).
- 3. Developing guidelines for urban or rural areas characterized by a mosaic of primary ecosystem types (*Revision Issue #5*).

3 Elaboration of the issues

In this section we describe the issues in more detail. We elaborate the main points for discussion, describe the information that needs to be collected, identify the experts and stakeholders that need to be queried, and identify the steps that need to be taken to resolve the issue.

1.1 Issue 1: Establishing generic principles for defining ecosystem type (ET) classes

WG1 will focus first and foremost on established practices and principles. In general, the work of Working Group 1 on spatial units will adhere to the UN Statistical Commission's basic principles and guidelines on developing international statistical classifications.¹

The essential components of a statistical classification are: (1) a consistent conceptual basis; (2) a flat or hierarchical structure; (3) categories that are mutually exclusive and exhaustive; (4) definitions that are clear and unambiguous, and which define the content of each category; and (5) statistically balanced. Classifications should be up-to-date and relevant, robust enough to last for a period of time, meet user needs, provide comparability over time and between collections, and provide guidelines for coding and output of data collected using it.²

At this stage of the work, stakeholder engagement and involvement is crucial. The WG will need to determine user requirements and to achieve correspondence with other (national and international) statistical classifications and standards. Communication and coordination are essential instruments.

Some first thoughts with regard to issue 1 are:

 Both land cover and land use should be part of the classification scheme at the finest level: each ecosystem asset must have these defined. This implies that the land use and land cover classifications that are used to create an ecosystem type classification should live up to the same basic principles and reach the same level of quality that we aspire to achieve for the ecosystem type classification. The existing land cover and land use classifications should be reviewed for this purpose.

² Hancock, A. (2013). , Best Practice Guidelines for Developing International Statistical Classifications, Expert Group Meeting on International Statistical Classifications New York, 13-15 May 2013, ESA/STAT/AC.267/5, 6 May 2013.



¹ Hoffmann, E., & Chamie, M. (1999). Standard statistical classifications: basic principles. Statistical Commission Thirtieth session, New York, 1-5 March 1999.

- Many forms of land cover and/or use are associated with characteristic ecosystem services, or intensities thereof. A key question for WG1 to be answered is if ecosystem services should be embedded in the classification or superimposed on another layer.
- The basic land cover / land use classification might be augmented with additional layers (e.g. land management & ownership, but possibly also climate, soil or geomorphology) to enable corresponding aggregation of assets for specific applications.
- The classification requires a hierarchical organisation, given that results will need to be aggregated into categories for description and analysis, also in combination with other variables.³ The hierarchical approach to both ecologic and economic classification is firmly grounded within landscape-ecological theory and socio-economic practice. It allows for flexibility with regards to local classification levels of detail, depending on applications and data availability. It also ensures alignment of mutually exclusive categories, allowing countries to make their own decisions with regard to levels of aggregation or national (derived or related) classifications without producing partial overlap between different categories.
- At an early stage user needs with regard to the ET classification must be defined. This may be difficult as there are many potential uses and users for the accounts. Focus should therefore be on the most important user needs.

1.2 Issue 2: Developing an international standard classification of ecosystem types for terrestrial, freshwater, and marine areas, and integrating them

Developing a classification of ecosystem types for terrestrial, freshwater, and marine areas involves six activities.

- 1. investigating existing classifications and their underlying principles (Revision Issue #2);
- 2. determining an appropriate set of classes for use at international level (*Revision Issue #1*);
- 3. linking a set of ecosystem types defined for SEEA EEA purposes to other (national and international) land-related classifications (*Revision Issue #6*);
- establishing agreement on standard national boundaries for statistical purposes (*Revision Issue #7*);
- 5. articulating the connection to atmospheric units in order to complete a spatial delineation of the environment (*Revision Issue #4*); and
- 6. Integrating the classifications of ecosystem types for terrestrial, freshwater, and marine areas into a common classification of ecosystem types.

The classification of ecosystems for marine areas will be based on different principles than the classification for terrestrial and freshwater areas. In contrast to terrestrial and freshwater ecosystems, which have a two dimensional (x and y) extent, marine ecosystems also have a third dimension (z), distinguishing between e.g. bethic, pelagic and photic environments at the same x,y location.

Activity 1: Investigating existing classifications and their underlying principles (Revision Issue #2)

³ "A hierarchic classification structure should be used when there is a requirement to aggregate or group categories into categories that are sufficient for the descriptive or analytical needs, alone or in combination with other variables." Hancock (2013).



Table 1 provides a preliminary list of existing classifications.

Table 1. A preliminary inventory of international and national classifications of land use, land cover, ecosystem types and ecosystem services

Land cover	Land cover classification SEEA EEA CF (Annex C, p. 299), which includes			
	possible ecosystem types per land cover class			
	FAO, Land Cover Classification System (LCCS), and the corresponding Land			
	Cover Meta Language:			
	http://www.fao.org/geospatial/resources/standards/en/			
	http://www.fao.org/docrep/003/x0596e/X0596e00.htm			
	CORINE Land Cover (CLC), <u>https://land.copernicus.eu/pan-european/corine-</u>			
	land-cover/view https://land.copernicus.eu/eagle/files/eagle-related-			
	projects/pt_clc-conversion-to-fao-lccs3_dec2010			
	EUNIS habitats classification, https://www.eea.europa.eu/data-and-			
	maps/data/eunis-habitat-classification, is hierarchical and covers all types of			
	habitat from natural to artificial, from terrestrial to freshwater and marine			
	IUCN Habitats Classification Scheme, <u>http://www.iucnredlist.org/technical-</u>			
	documents/classification-schemes/habitats-classification-scheme-ver3			
Land use	Land use classification (interim) SEEA EEA CF (Annex C, p. 289-299)			
	distinguished land, inland waters, coastal waters, and the exclusive			
	economic zone			
	FAO, Definitions and classification of Land Use, Agricultural Practices and			
	Irrigation,			
	http://www.fao.org/fileadmin/templates/ess/ess_test_folder/Definitions/L			
	and Use Definitions FAOSTAT.xlsx			
	FAO, World Programme for the Census of Agriculture 2020, Classification of			
	land use (LU) for the agricultural census, <u>http://www.fao.org/3/a-i4913e.pdf</u>			
	FAO, Indicative Crop Classification,			
	http://www.fao.org/fileadmin/templates/ess/documents/world_census_of			
	<u>agriculture/appendix3_r7.pdf</u> , refers to crops that are grown rather than			
	the product(s) generated from that crop.			
Ecosystem	Common International Classification of Ecosystem Services (CICES),			
services	https://cices.eu/			
	EEA, Ecosystem types of Europe, <u>https://www.eea.europa.eu/data-and-</u>			
	maps/data/ecosystem-types-of-europe, which combines the Corine based			
	MAES ecosystem classes with the non-spatial EUNIS habitat classification for			
	a better biological characterization of ecosystems across Europe.			
	US-EPA Final Ecosystem Goods and Services Classification System (FEGS-CS),			
	https://www.epa.gov/eco-research/final-ecosystem-goods-and-services-			
	classification-system-fegs-cs			
Ecosystem types	MAES, Mapping and Assessment of Ecosystems and their Services (MAES),			
	https://biodiversity.europa.eu/maes			



Activity 2: Determining an appropriate set of classes for use at international level (*Revision Issue* #1)

Key questions to be answered are: What will be the hierarchical structure of the classification? How many layers will be needed for the classification to be useful for ??? at the international level as well as national and local levels?

The WG will also take into account here data sources (i.e. data availability), variation across countries, and feasibility. The UN defines statistical feasibility as follows: "The statistical feasibility of a statistical classification means that it is possible to effectively, accurately and consistently distinguish between the categories in the classification on the basis of the information available"⁴

The proposal will in part be based on existing schemes and therefore it should be possible to directly establish links to them.

Activity 3: Linking a set of ecosystem types defined for SEEA EEA purposes to other (national and international) land-related classifications (*Revision Issue #6*)

Activity 4: Establishing agreement on standard national boundaries for statistical purposes (*Revision Issue #7*)

Activity 5: Articulating the connection to atmospheric units in order to complete a spatial delineation of the environment (*Revision Issue #4*)

The main issue here in relation to a classification of ecosystem types is not yet clear. More discussion with the editor/ working group / SEEA EEA TC and experts will be needed.

- Is the connection to atmospheric units a conceptual issue considering that the atmosphere is not an environmental asset – or is it a factor that should be considered for inclusion in the ecosystem type classification?
- Does the issue of atmospheric units concern standard national boundaries or atmospheric layers?

Activity 6: Integrating the classifications of ecosystem types for terrestrial, freshwater, and marine areas into a common classification of ecosystem types

The ET classifications for terrestrial and marine ecosystems, and optionally atmospheric units, must be integrated into one comprehensive international classification system of ecosystem types. Key is the process of engaging and involving a wide community of experts, users, and other stakeholders.

⁴ Hancock (2013).



1.3 Issue 3: Developing guidelines on using the revised classifications to support ecosystem accounting, in particular when applied to urban, rural, and nature areas

The SEEA EEA TR note that "it seems appropriate that in the case of urban ecosystems various ecosystem types can also be differentiated based on the combination of cover, use and the services they supply. This may include, for instance, urban parks within city boundaries, different types of parks nearby cities but outside residential zones, and perhaps even specific areas such as rivers flowing in urban areas, river beds, canals or cemeteries." (SEEA EEA TR, 3.30).

Urban, rural, nature areas could be seen as an additional layer that can be added to the accounts and that would consequently not be part of the proposed ecosystem classification. We should provide guidelines how these are delineated and used in the various accounts (extent, condition etc.). For example, urban regions could be identified as a mosaic of adjacent selected ecosystem types

4 Issue papers

We propose to produce the following issue papers:

Issue Paper 1: An inventory of user needs

In order for a classification scheme to be effective within a policy context, it must not only be scientific credible, but also salient (relevant to the needs of policy makers) and legitimate (respectful of stakeholders' divergent values and beliefs).⁵ WG1 will survey experts, reviewers, and other stakeholders in its network to identify user needs. This survey will be coordinated with UNSD to avoid overburdening the network and because other WGs may have similar questions to ask the same network. The NY forum in June will provide the first input for identifying user needs.

Issue Paper 2: Conceptual basis for an ET classification

In this paper we will develop a conceptual framework grounded in both landscape-ecological theory and socio-economic practice (ISIC/NACE); establish conceptual links to land cover, land use, and ecosystem services classifications; and provide definitions of terms and concepts. In the paper we will also make a comparative analysis of land use, land cover, and ecosystem service classifications. We will compare the relevant classifications on the understanding that Ecosystem Type (ET) = Land Cover (LC) * Land Use (LU) * (possibly) Ecosystem Service (ES); discuss adding layers of information on climate, soil, management, ownership, etcetera; discuss whether or not ecosystem services should be embedded in the classification or included as a layer; discuss whether or not atmospheric units should be included in the classification.

Issue Paper 3: Classification structure for an ET classification

⁵ Cash, David W., et al. (2003), Knowledge systems for sustainable development, Proceedings of the national academy of sciences, 100 (14), 8086-8091.



In this paper we will present a draft classification of ecosystem types, incorporating the results of issue papers 1, 2 and 3 as well as the feedback from TC, experts and reviewers. The paper provides definitions of terms and concepts; defines the scope of the classification; describes the hierarchical structure; develops discrete, exhaustive, and mutually exclusive categories which can be assigned to one or more variables used in the collection and presentation of data, and which describe the characteristics of a particular population; presents separate classifications for terrestrial, freshwater, marine, and EEZ; and integrates these classifications into an ET classification for the SEEA EEA Revision.

5 Stakeholder engagement and involvement

The Revision Issues Note rightly emphasises the importance of stakeholder involvement. The development of an international standard classification of ecosystem types can only be successful if experts, users, and other stakeholders are engaged and closely involved in the process.

To support the work of WG1 we propose to set up a network of classification experts, users of accounting information, providers of information on land cover and land use (especially the remote sensing communities), and members of the other SEEA Revision WGs. The network should ideally cover all nations where SEEA EEA is currently being tested and implemented.

The members of our network will be asked to perform particular roles and to provide very specific inputs to the development process. Current proposals are:

- A group of no more than five experts will be asked to review WG output.
- The larger network will be asked to provide specific information (e.g. on the classifications that are used in their country) and to reflect on intermediate results and discussion issues. They will also be kept informed of the process.
- Results will be presented and discussed at expert meetings, such as those of the London Group, and will be discussed with the other Working Groups and the UNSD.

All communications with the WG1 community will be coordinated with UNSD and the editor.

6 Timeframe

Table 2 shows a preliminary timeframe for the work on spatial units.

Work on the issue papers (D5, D6, and D7) will be planned after completion of the final draft work program (D4).

Month	Milestones	Deliverables
April 2018	M1: start of work	
May 2018		

Table 2. Milestones and deliverables for WG1 on Spatial Units



June 2018	M2: discussion of short note	D1: a short 2-5 page note
	among UNSD/Editor and	containing extensive clarification
	Working Group	and description of the revision
	M3: discussion of short note	issues
	with SEEA EEA Technical	D2: presentation and finalisation
	Committee M5: based on initial	of work program at the Forum of
	set of issues, consider questions	Experts on Ecosystem
	of allocation of work and	Accounting
	scheduling for discussion among	D3: first drafts of work program
	UNSD/Editor and Working Group	and plans for discussion by the
	M4: Final set of issues to be	SEEA EEA Technical Committee
	determined following discussion	
	at Expert Forum	
July 2018	M5: engagement of an	D4: final draft work program
	appropriately broad network of	
	associated experts	
August 2018		
September 2018		
October 2018	M6: discussion at the London	
	Group meeting	
November 2018		
December 2018		
January 2019		
February 2019		
March 2019	M7: second Forum of Experts on	
	Ecosystem Accounting	

