System of Environmental Economic Accounting

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Session paper

Session 3a: Spatial units

Spatial units concept note

Prepared by: SEEA EEA Revision Working Group 1 on spatial units (led by Sjoerd Schenau, Statistics Netherlands)

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Spatial units summary note

Sjoerd Schenau

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Working group 1 (Spatial units):

Sjoerd Schenau, Patrick Bogaart, Edwin Horlings (Statistics Netherlands), Jessica Chan (United Nations Statistics Division), David Keith (University of New South Wales), Trond Larsen (Conservation International), Roger Sayre (United States Geological Survey), (Statistics Netherlands), Francois Soulard (Statistics Canada), Keith Gaddis (NASA), Doug Muchoney, Francesco Tubiello (FAO)

Introduction

The organization of information about spatial areas is at the heart of ecosystem accounting. The focus to date has been the development of an accounting approach that enables relatively broad scale terrestrial ecosystems to be accounted for. The general approach for describing different areas in an accounting context - namely ecosystem accounting areas (EAA), ecosystem assets (EA) and basic spatial units (BSU) - has become relatively well established but there are still important matters requiring resolution.

The key focus in this research area is to establish statistically and accounting relevant classifications for ecosystem types through careful review and application, where possible, of existing classifications of this type. Worldwide, there have been many efforts on mapping land, including land cover, land use etc. For statistical purposes it is necessary to have an agreed set of classes using a common set of principles such that mapping exercises in different countries and locations can work towards a common measurement goal. It has been recognized that for ecosystem accounting, in principle, we need to go beyond land cover and consider a wider range of characteristics in delineating ecosystem assets.

The delineation of ecosystem assets will, ideally, involve the use of a range of ecological and non-ecological criteria, including vegetation type, soil type, hydrology, and land management and use. Distinct focus should also be placed on the description and classification of marine areas given the strong interest in applying ecosystem accounting for these areas. Also, consideration should be given to articulating the connection to atmospheric units in order to complete a spatial delineation of the environment. Furthermore, there is an emerging interest concerning ecosystem accounting for urban areas considering the large proportion of the world population living in cities.

Although these topics have seen significant progress from the initial (interim) land cover classification in the SEEA Central Framework (UN et al, 2014), and subsequently the guidelines provided by The SEEA Experimental Ecosystem Accounting (UN et al, 2014) and the recent SEEA EEA Technical Recommendations (UNSD, 2017), several issues remain unsolved and need to be addressed in the current revision process.

Work done so far

Over the last year the Working group on spatial units has produced three discussion papers:

1) Discussion paper 1.1: An ecosystem type classification for the SEEA EEA

This Discussion Paper provides options for the construction of a reference classification of ecosystem types and proposes initial guidance for further disaggregation at a national or regional scale. To provide a clear ecological basis for the SEEA-EEA reference ecosystem type classification, a number of fundamental concepts are reviewed. The concepts described concern ecosystems, their functioning, and their characteristics.

Based on both generic and specific principles, the following six design criteria for the SEEA-EEA ecosystem classification are proposed:

1. The classification typology should represent ecosystems
2. The classification units can be spatially delineated
3. The classification units are geographically and conceptually exhaustive, and comprehensive across all environmental domains
4. The classification types are mutually exclusive, both conceptually and geographically.
5. The classification should be practicable
6. The classification should be linkable to other established classification systems

A number of existing classification systems are evaluated using these criteria. Only two of them, IUCN Red List of Ecosystems (RLE), and the USGS/Esri globally distinct biophysical and biogeographic settings (GDBBS) meet all six criteria. Based on this review and the design criteria, a number of options are presented as candidates for the SEEA-EEA reference ecosystem type classification:

1. IUCN Red List of Ecosystems
2. USGS/Esri GDBBS
3. A two-tier approach building upon and linking IUCN RLE and USGS/Esri GDBBS
4. Existing habitat classifications (e.g. IUCN, EUNIS)
5. Existing land cover classifications (e.g., FAO; Corine)

Of these, the first three are the recommended options due to their conceptual relevance and depth and their coverage of all relevant environmental domains. The major strength of the first two options is their strong compliance with the design criteria and their support and maintenance by the authoring organizations. The third option aims at resolving weaknesses of these first options (IUCN RLE focusing on natural systems and lacking a practical mapping method; USGS/Esri GDBBS lacking ecosystem functioning) but is not fully developed and lacks a supporting organization/maintenance process.

2) Treatment of ecosystems assets in urban areas

The link between ecosystem assets and services and human activities in urban areas can be better understood through the application of a more detailed spatial scale than is required for accounting at a national level. Some of the main questions and issues relevant to spatial units in urban ecosystem accounting that are discussed in this Discussion paper are:

1. What size of urban area should be included in ecosystem accounts for urban areas; how to delineate the urban ecosystem accounting area, how much of the urban periphery/hinterland should be included?

2. What urban ecosystem asset categories are relevant for an urban/built-up ecosystem type class breakdown? What are the physical (and other) characteristics of a green/blue area that lead it to be considered urban/built-up and differentiate it from non-urban ecosystem types, particularly when this area is within or adjacent to an urbanized region? To what extent do these characteristics reflect the ecosystem type or the ecosystem condition?

3. What is the scale at which ecosystem assets in urban areas should be delineated to provide useful information to policy makers, i.e., what is the size threshold for urban ecosystem assets?

3) Treatment of the atmosphere and oceans in SEEA EA

The oceans and the atmosphere play a key role in the earth ecology and environmental processes. Furthermore, they interact with economic activities and processes, for example by providing natural resources and specific ecosystem services, but also by receiving residuals. The objective of this discussion paper is propose an approach to the treatment of the atmosphere and the marine environment in an ecosystem accounting context, particularly with regard to the delineation of spatial units.

Currently, it is not yet clear how the atmosphere should be treated in an ecosystem accounting context. Two options are proposed:

1. The atmosphere as a part of ecosystem assets: The atmosphere/air directly above and within an ecosystem could thus be considered part of the ecosystem asset as one of its abiotic components. Several important ecological processes are based on the interaction with the atmosphere, including photosynthesis, respiration, nitrogen fixation, but also the impact of air pollution on vegetation and fauna. Accordingly, the air could be considered part of the ecosystem, similar as the soil water and soil are also considered to be part of the ecosystem.
2. The atmosphere as a separate unit: The atmosphere could also be considered as a separate unit in SEEA EEA, i.e. separate from 'other' ecosystem assets. The atmosphere could be seen as one unit, but could also possibly be subdivided into (vertical) subunits.

The interim conclusion is that the advantages of the treatment option 1 seem to outweigh those of option 2.

An important difference between terrestrial and marine ecosystems is that marine ecosystems are not concentrated near one surface (i.e. the air-land/water interface), but may extent throughout the water column and the underlying sediment. The question is whether and how the spatial approach of SEEA EA for ecosystem assets can be applied to the marine environment. Basically, there are two options to define ecosystem assets for the marine environment:

1. Following the spatial approach of SEEA EA, each area of the seas/oceans belongs to one single ecosystem asset. When we follow the reasoning (see section 4.1) that the ecosystem asset is best envisaged as a three dimensional column, an ecosystem for the seas/oceans would include the entire water column and underlying sediments (plus a part of the overlying atmosphere) delineated by a certain area.
2. Particularly for deep pelagic waters, ecosystems near the seafloor will be very different from ecosystems within the water column, which in turn will be very different from ecosystems near the surface waters. Accordingly, it then makes more sense to describe the condition, biodiversity and supply of services for different ecosystem assets.

This issue is still open for discussion.

Expert review

All three discussion papers were send out for expert review in May 2019. A short summary of this review will be available for the Forum.

Objectives for the Forum of experts

Building on the export review the main objectives for the forum of experts is to further discuss the different options presented in the discussion papers. The aim is identify issues of agreement and issues that need further discussion. Key questions that will be addressed with regard to the reference ecosystem type (ET) classification (Discussion paper 1.1) are:

a) What are your thoughts about the requirements for the reference ET classification, for SEEA-EEA purposes, from an ecological point of view, i.e. how much ecological detail (e.g. structure, functioning) is needed in the classification? How do you evaluate the presented classification options with this in mind?
b) What are your thoughts about the requirements for the reference ET classification, for SEEA-EEA purposes from a practical point of view? Considering (1) mappability, given biophysical data (un)availability, and (2) assessment of ecosystem condition, and the flow of ecosystem services. How do you evaluate the presented classification options with this in mind?
c) There are ample existing national and international classifications of ecosystems, habitats, land cover etc. How should the SEEA-EEA reference ET classification relate to these? E.g. in terms of its design and the need for crosswalks, guidelines etc.?
d) What are your recommendations for further refining and testing of presented options?