DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS
STATISTICS DIVISION
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System of Environmental Economic Accounting

SEEA Central Framework 2028 update

Scoping note for issue A4: "How SEEA CF accounts can be made spatially explicit"

Version for SEEA CF Technical Committee review, July 2025

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Note: This note is prepared in the context of the SEEA Central Framework update, mandated by the United Nations Statistical Commission in 2024, expected to finish by 2028. There are 29 update issues, and the initial task is establishing a clear scope for all of the issues. This scoping note provides a short description of a specific issue with the aim of supporting a common understanding of the work that will be needed to fully investigate and articulate the alternative approaches and recommendations for change or addition to the SEEA Central Framework. Scoping notes will be discussed by the relevant task team and inform on the further work related to the issue.

1 Background to the issue

1. The short description of issue A4 "How SEEA CF accounts can be made spatially explicit" from October 2024 is:

> "Some modules of the SEEA CF could be extended to be more spatially explicit, for example in accounts for flow of residuals (covered under B2). Exploring this approach could harness synergies between the SEEA CF and SEEA EA."

2. The two key paragraphs from chapter 2 that initiate the spatial application of the SEEA CF accounts are (emphasis added):

> **"**2.76 **Examples of the application of such data** include the incorporation of employment data on the production of environmental goods and services, the use of socioeconomic groupings of households to assess water and energy use and access to resources, and **the linking of information on health status to data on air emissions in particular regions**.
>
> 2.80 Combining physical and monetary data is governed at its core by the logic of recording physical flows in a manner compatible with economic transactions as presented in the SNA. This linkage ensures a consistent comparison of environmental burdens with economic benefits, or environmental benefits with economic costs. **It can be examined not only at the national level but also at disaggregated levels, for example, in relation to regions of the economy**, or specific industries, or for the purpose of examining the flows associated with the extraction of a particular natural resource or the emissions of a particular material."

3. Uptake of spatial representations of SEEA CF are limited to accounts of land and sometimes water. Some air emissions accounts by region are available, Statistics Sweeden is the notable stand out here. A number of countries have previously reported regional water accounts according to the research by Edens 2007. Regional environment protection expenditure accounts are feasible (Australia). Asset accounts by region are feasible but have confidentiality and market sensitive information.

4. It is expected that, academically, linking regional accounts together, say forest asset accounts with emissions accounts, would be desirable but discovering examples is difficult. Much of the academic literature is focus on case studies of particular regions and their environment, economic, and social interactions.

2 Motivation for considering a change to the SEEA Central Framework

5. Managing environmental phenomena from a national or international perspective is difficult. So the rationale for encouraging spatial reporting on SEEA CF makes sense. From the question above, one could sense that there is a lack of clarity around the endorsement of spatial accounts rather than a lack of information on the need to do it.

6. Reviewing the paragraphs where spatial accounts are referenced (see Appendix 1), one can note:

    a. Most of the references to spatial explicit accounts are an addendum to the key point of the paragraph;

    b. The concepts of regional, disaggregated and spatial are used interchangeably throughout SEEA CF;

c. There is not a clear delimitation between what regional in a sub-national and regional in a group of countries meaning for spatial analyses.

d. There is a dedicated section on Spatial and temporal detail for natural assets (paras 5.495 to 5.497) however this is intended for water assets only.

7. There are a good number of references to spatially explicit accounts or report throughout the SEEA CF. However, these could be made more consistent, highlighted more prominently and have a stronger emphasis on accounts compilation.

8. One point to note is that there is no conceptual definition of a spatial or spatially explicit account in SEEA CF, nor any guidance on methods for spatial accounts.

3 Nature of the proposed change and research questions

9. For this scoping note:

a. Should a guidance note be focused on strengthening existing language within the SEEA CF? Guidance is sought on if a further note should include emphasis of spatial accounts, consistency of language, sub-national or intra-national emphasis and which terms should be used.

b. Should there be more information, say for example in each account, a section on the importance of spatial accounts?

c. Or, should there be a section in chapter 2 on the generic role of spatial accounts for analysis, policy use and for linking to other spatial accounts?

10. One last point to make is that there is a lack of any detail on the methods for producing spatially explicit accounts (apart from one suggestion for water, para 5.495). Opinions are sought on if this detail should be included in a guidance note or commissioned for a compilation note at a later stage of SEEA CF 2028 implementation.

11. After consideration by Task Team A the following is recommended for the guidance note:

a. Follow approach c, by adding content to chapter 2 on spatial accounting without the link to policy.

b. Ensure there is a link to ecosystem accounting.

c. Develop consistent references to spatial accounting throughout SEEA, using consistent terminology.

d. Discuss the roles of tabular and mapping concepts for spatial accounting.

e. Consider recent material on spatial analysis for satellite accounts from Measuring Sustainable Tourism.

f. Add discussion on the role of the global commons (see work by the ocean accounting taskforce)

g. Consider different representations of spatial data. Consider mapping such as use of global grids and the link to Global Geospatial Information Management and tabular versions for socio-economic analysis.

h. Add discussion on how spatial accounting can assist informing and supporting disaster risk management (and the link to extensions in environment expenditure accounting).

i. Add discussion on the links between bottom up compilation and top down disaggregation for the purposes of spatial analysis and potential data sources.

4 Links to other SEEA CF update issues

12. In taking forward work on integrating more information about indicators, links should be made to the following SEEA CF update issues

a. Issue A1 – Providing a broad overview of links between SEEA CF and SEEA EA. Ecosystems and environment are interlinked at a spatial level. Explanation of the linkages between the two should include reference to explicitly spatial accounts.

b. Issue A6 – Introduction of thematic accounts and strengthening the link to policy. The link to policy highlights the rationale behind the development of spatially explicit accounts for use in domestic policy.

c. Issue A7 – Links to social domain. SEEA CF already mentions the usefulness of linking spatially explicit accounts to social information, eg "…linking of health status to data on air emissions in particular regions." (para 2.76)

d. Issue B6 – Inclusion of residual flows to ecosystem type. This information will need to be predominantly spatial to link to ecosystem accounting.

e. Issue D1 – Inclusion of the carbon stock account. Most countries will need disaggregated forest (timber) and ecosystem accounts to produce carbon stock accounts (especially as species have different characteristics based on region).

f. Issue D4 – Consideration of water as a produced asset. Water will need to be measured spatially and as a produced asset.

5 Existing materials

13. Potential materials that may be considered in developing a Guidance note include (but are not limited to):

a. Research and papers on spatial accounts for the previous SEEA CF process and from London Group papers that have attempted to highlight challenges and successes.

i. https://seea.un.org/sites/seea.un.org/files/session_1_position_paper_human_induced_flows_country_example.pdf Linking air emissions to ecosystem accounts.

ii. https://seea.un.org/sites/seea.un.org/files/the_seea_as_a_conceptual_model_and_tool_-_vardon_et_al.pdf looking at the regional dimensions of SEEA

b. Case studies on the use of SEEA CF spatial accounts by countries.

i. https://seea.un.org/sites/seea.un.org/files/paperhaanhaynesllg2019_v1.0.pdf Netherlands case study

ii. https://seea.un.org/sites/seea.un.org/files/lg_24_c_10c.pdf Australian state water account

iii. https://seea.un.org/sites/seea.un.org/files/land_accounts_in_canada.pdf Canada land accounts

c. Existing SEEA based manuals for land accounts and water accounts.

d. The Global Statistical Geospatial Framework (UN-GGIM)

e. SEEA EA has a more advanced concept for spatially explicit accounting.

14. In developing a Guidance note it will be necessary to identify the relevant experts and stakeholders for the purposes of both drafting the content of the note and also ensuring appropriately wide consultation. These experts and stakeholders have not been identified at this stage.

Appendix 1 – References to spatial and regional in SEEA CF

1. Para 1.12? Topics covered include resource efficiency and productivity indicators, decomposition analysis, analysis of net wealth and depletion, sustainable production and consumption, input-output analysis and general equilibrium modelling, analysis using geospatially referenced data, and extensions designed to link SEEA-based information to household data sets. Summaries of topics are included together with references to more detailed descriptions of the techniques.
2. Para 2.76 Examples of the application of such data include the incorporation of employment data on the production of environmental goods and services, the use of socioeconomic groupings of households to assess water and energy use and access to resources, and the linking of information on health status to data on air emissions in particular regions.
3. Para 2.80 Combining physical and monetary data is governed at its core by the logic of recording physical flows in a manner compatible with economic transactions as presented in the SNA. This linkage ensures a consistent comparison of environmental burdens with economic benefits, or environmental benefits with economic costs. It can be examined not only at the national level but also at disaggregated levels, for example, in relation to regions of the economy, or specific industries, or for the purpose of examining the flows associated with the extraction of a particular natural resource or the emissions of a particular material.
4. Para 3.185 For the purposes of water resource management, the compilation of data for a river basin or other hydrologically relevant area may be appropriate. It is noted, however, that while physical data may be available for such geographical areas, corresponding economic data will generally be available only for administrative regions; therefore, these two geographical boundaries may not align.
5. Para 3.221 Net domestic water use focuses on the use of water by resident units. This aggregate excludes all flows of water between economic units (and hence is a net measure) and also deducts all exports of water. It is most directly defined as the sum of all return flows of water to the environment plus evaporation, transpiration and water incorporated into products. Net domestic water use can be compiled for individual industries and for households. Where exports and imports of water are relatively small, there will be little difference between gross water input and net domestic water use at a national level. However, there may be interest in compiling this aggregate at an industry level, for example, for agriculture or for the water collection, treatment and supply industry, or for regions within a country between which imports and exports of water may be significant.
6. Para 3.82 In principle, flows of residuals between the national environment and another environment are not recorded in the PSUT, as there are no flows out of or into an economy. Nonetheless, depending on the nature of the relationship between the different national environments, there may be interest in recording these flows. For example, countries at the downstream end of a river system may be interested in the flows of residuals generated by other countries and transported by a river or the deposition of acidification ("acid rain") originating from acidifying emissions in other countries.
7. Para 3.132 The major exception to this kind of treatment occurs with respect to natural aquatic resources. Following accounting conventions, the harvest of aquatic resources is allocated to the residence of the operator of the vessel undertaking the harvesting rather than to the location of the resources. Thus, the amount of natural resource input that should be recorded for a country is equal to the quantity of aquatic resources caught by vessels whose operator is resident in that country, regardless of where the resources are caught. Natural resource inputs are not recorded for the harvest of aquatic resources by vessels operated by non-residents in national waters and neither are exports

recorded in this situation. In the accounts of the country to which the non-resident operator is connected, there should be entries for natural resource inputs for aquatic resources caught in non-national waters but no reduction in national aquatic resources in the asset accounts for this harvest.

8. Para 5.268 With data structured in an accounting format, it is possible to link land cover to land use, including through the presentation of matrices showing the changes in land cover and land use over an accounting period. In assessing land cover and land use change, it may be useful to determine the proportion of the opening stock of land whose cover or use has remained unchanged. To undertake this type of analysis the data must be based on spatially referenced data sources.

9. Para 5.333 In addition to an asset account such as presented in table 5.17, there may be interest in tabulating types of soil resources by type of land use or land cover at a particular point in time. Such information may help in determining whether various types of land use are being undertaken on high-quality or marginal soil and may hence provide a basis for assessment of alternative land uses. Considerable analytical benefits would also be derived from mapping information on soil types, land use and land cover using data that are spatially referenced.

10. Para 5.470 As natural biological resources form an important part of biodiversity and ecosystems in particular regions, there may be interest in compiling data on the availability and extraction of these resources at subnational spatial levels. Further, information on these resources may be able to form an input into broader measures of ecosystems that are discussed in SEEA Experimental Ecosystem Accounting.

Spatial and temporal detail

11. Para 5.495 Water statistics can provide data for water management at many geographical levels, ranging from local levels and the level of river basins, to national and multinational levels. The choice of spatial reference for the compilation of water accounts ultimately depends on the data needed by users and the resources available to data producers. The choice of spatial scale is important, as countries may experience significant geographical variation in the availability of water (e.g., areas of very high or very low rainfall) and national aggregates may not accurately reflect the issues facing particular countries.

12. Para 5.496 It is recognized internationally that a river basin is the most appropriate spatial reference for integrated water resource management (see, e.g., Agenda 21 (United Nations, 1993) and the European Water Framework Directive (European Parliament and Council, 2000)). This is because the people and economic activities within a river basin will have an impact on the quantity and quality of water in the basin, and conversely the water available in a basin will affect the people and economic activities that rely on this water. In areas where groundwater is an important source of water, aquifers may also be appropriate spatial references for the compilation of water statistics.

13. Para 5.497 Although data for specific spatial scales within a country are often more appropriate for the analysis of water resources, integration of physical data on water at relevant spatial levels, e.g., river basins, may not align with the available spatial detail for economic data (which are more commonly compiled based on administrative boundaries). In these situations, common areas of observation, accounting catchments, should be defined.