

Note on Statistical Units for Ecosystems

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A. Introduction

1. A statistical unit is an entity about which information is sought and for which statistics are ultimately compiled. It is the unit that provides the basis for statistical aggregates and to which tabulated data refer. Statistical units may be defined according to many criteria including accounting or organizational, geographical and from the point of view of production. The relative importance of these criteria depends on the purpose from a statistical perspective of compilation and dissemination.
2. The importance of well defined statistical units is well understood in economic statistics. Statistical units serve as a tool for measuring in an unduplicated and exhaustive manner several aspects of the economy. They therefore constitute the basis upon which statistical systems are constructed.
3. Economic units have numerous characteristics. Each characteristic can be classified in different ways, namely by institutional sector reflecting the objectives, functions and behaviour of the unit, economic activity reflecting the production process and geographical location or region. Classifying statistical units by these characteristics requires that they be as homogeneous as possible with respect to them. Different statistical units may be applied according to the characteristic being analyzed.
4. In a similar manner as in the economy, statistical units can be defined in the environment. Section B of this note briefly outlines the main statistical units in economic statistics. Section C extends the concept to the statistical units for ecosystem accounting.

B. Statistical units in the economy

5. The statistical units in the System of National Accounts are the institutional units. An institutional unit is an economic entity that is capable in its own right, of owning assets, incurring liabilities and engaging in economic activities and in transactions with other entities (SNA 2008 para 4.2). Institutional units are able to take economic decisions and engage in economic activities.
6. There are two types of units which are used in the SNA, namely households and legal or social entities. The latter are responsible and accountable for their economic decisions but their autonomy may be constraint by other institutional units (e.g. shareholders, etc.). Institutional units consist of corporations, non-profit institutions, government units and households. These units are intrinsically different from each

other in that their economic objectives, functions and behaviour are different. For example, although all types of institutional units undertake production they do so with different objectives: corporations produce goods and services with the aim to sell them at economically significant prices; governments produce goods and services to individual and community at large free or at non-market prices; and households mostly produce for own consumption or at small scale.

7. From the point of view of production, institutional units are grouped in establishments and enterprises. An establishment is part of the enterprise that is situated in a single location and which engages predominantly in one kind of economic activity.

8. An enterprise is an institutional unit that produces goods and services. It is the smallest legal unit that has certain autonomy in decision-making. It is the basic statistical unit at which all information on production activities and transactions are maintained.

9. With respect to production, institutional units can be classified by economic activities using the standard International Standard Industrial Classification of All Economic Activities (ISIC). The same institutional unit may produce different goods and services that are classified according to the Central Product Classification.

C. Statistical units for ecosystems

10. The short summary on what constitutes a statistical unit in economic statistics and accounting is useful to arrive to similar conclusions for what constitute statistical units for ecosystem accounting.

11. The statistical unit about which we want to collect information is the land, including inland water, which provides the space which supports economic activities and ecosystem processes. We define below the steps to define the basic statistical units for ecosystem accounts.

12. In the case of ecosystems, the statistical units of departure are the bio-physical objects and the derived land-cover types that are defined using the Land Cover Classification System 3 (LCCS3 of FAO). These units are scale independent in the sense that they describe the objects (e.g. trees, scrubs, etc.) and, as such, they cannot be mapped.

13. When studying ecosystem, it is important to describe geographical areas according to the natural vegetation (e.g. forests, scrubland, heartland, grassland, cropland and marches) or absence of natural vegetation (e.g. sand, rocks, glaciers and water bodies) or artificial character (e.g. built up areas). Starting from the units defined in LCCS3, land cover functional units (LCFU) arrange the biophysical objects in mappable classes according to established patterns. A LCFU produces goods and services from a homogeneous land area that functionally forms a typical cluster of spatial relationships of objects, characteristics and properties of land. LCFU are characterized by a dominant land cover type defined on the basis of the objects it contains. It should be noted that LCFU may include other types of land cover types which are however secondary. LCFU is analogous to the establishment in economic statistics, with the establishment being homogenous in terms of the processes it engages in. LCFU can be classified on the basis of the land cover types. One example of LCFU is urban and associated developed areas. This unit is a composite unit including in addition to built up areas also significant

amounts of herbaceous and tree vegetation (green urban areas, tree alignments alongside avenues and street) and in some cases of water surfaces.

14. While LCFUs are mappable classified according to the dominant land cover type, they are not sufficient to analyze the “behaviour” of the unit. The “behaviour” in terms of the functions of the ecosystem cannot be analysed for a relatively small land area in isolation rather it is necessary to analyze it in connection with the neighbouring units and the topographic characteristics such as river basins and geographical zones (mountain, lowland, highland and coast). There is thus a need to observe these units as part of a landscape which reflects the concept of the socio-ecological system reflecting also the interaction of humanity with the ecological functions.

15. The basic units for ecosystem accounting are the so-called socio-ecological landscape units (SELU). They are classified according to their characteristics of slope and altitude (mountain, highland, lowland) and belonging to a river basin, location (proximity to the sea), dynamism of exchanges (the rivers networks vs. more static land objects) and lastly dominant land cover type. The dominant land cover type is assessed regarding the influence that the various land cover functional units on their own space as well as on their neighbourhood because of their size or/and number in a particular area.

16. The water catchment (relief or sub-river basin) dimension of SELU captures the natural and clearly significant factors of a central ecological driver: water. Water catchments or watersheds are understood in ecology as functional entities and thus clearly relevant as a dimension for modelling the socio-ecological systems. The landform (topography) plays a major role in determining the pathways of flows of water along with nutrients and all other types of elements and materials that are drained and stored along the catchments.

17. Rivers are land cover units of a particular type where the dynamics of the water flow is the essence. In the case of rivers, SELU will be the river system of the sub-basin. SELUs will be decomposed into drains (main drains, secondary drains...) and segments (reaches) of homogenous water discharge.

18. SELU can be compared to enterprise in economic statistics. They support the assets in the area (e.g. water, soil, vegetation, etc.); they use these assets to produce services; the majority of the interactions happen within the SELU and they are in some sense autonomous concerning the processes that take place within them.