

Note on Assets in Ecosystem Accounts

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In the central framework of the SEEA, the environmental assets are defined as the living and non-living elements that deliver goods and ecosystem services to the benefit of current and future generations through the interaction between the biological and physical environment.

The environmental assets described in the central framework are individual assets for which balances and their changes can be measured with the quality assurance required for official statistics, chiefly through direct observations. At the same time, the central framework recognises that these stock and flows of benefits through the delivery of goods and services rendered by these individual assets are the outcome of complex interactions from ecosystems.

Central Framework Classification of Environmental Assets

Mineral and energy resources		
Land and associated water areas		
Soil resources		
Biological resources	Timber resources	Cultivated timber resources
		Natural timber resources
	Fish resources	Cultivated fish resources
		Natural fish resources
	Other biological resources	Cultivated livestock resources
		Cultivated crop resources
		Other cultivated animal and plant resources
		Other natural animal and plant resources

Water resources		

It is these assets and their interaction that define the transactions between the biological and physical environment of the socio-ecological area. It is this dominant land cover area that defines the ecosystem accounting unit, labelled socio-ecological landscape unit (SELU) for land-based ecosystems. It is SELU that has the capacity to maintain and hold environmental assets, which in turn provide the benefits in terms of ecosystem services to the present and future generation through its environmental functions and processes.

These ecosystem services are functionally organised by provisioning, regulatory and cultural services with inputs from the support services. The balance of opening stock, additions and reductions and closing stocks for an accounting period make up the physical asset accounts for the four assets (land as a geographical coverage of space), soil, biological and water resources) of the land-based ecosystems defined by the SELU classification.

Classification of socio-ecological landscape units (SELU)	
1	Mountain ecosystem landscapes
1.1	Urban and associated developed areas
1.2	Broad pattern agriculture
1.3	Agriculture associations and mosaics
1.4	Pastures and natural grassland
1.5	Forest tree cover
1.6	Other dominant natural land cover
1.7	Composite land cover (no dominant land cover)
2.	Highland ecosystem landscapes
2.1	Urban and associated developed areas
2.2	Broad pattern agriculture
2.3	Agriculture associations and mosaics
2.4	Pastures and natural grassland
2.5	Forest tree cover
2.6	Other dominant natural land cover
2.7	Composite land cover (no dominant land cover)
3.	Lowland ecosystems (inland) landscapes
3.1	Urban and associated developed areas
3.2	Broad pattern agriculture
3.3	Agriculture associations and mosaics
3.4	Pastures and natural grassland
3.5	Forest tree cover
3.6	Other dominant natural land cover
3.7	Composite land cover (no dominant land cover)
4.	Coastal landscapes
4.1	Urban and associated developed areas
4.2	Broad pattern agriculture
4.3	Agriculture associations and mosaics

4.4	Pastures and natural grassland
4.5	Forest tree cover
4.6	Other dominant natural land cover
4.7	Composite land cover (no dominant land cover)
5.	River systems

In the physical and monetary supply and use tables, these additions and reductions are cross classified by industries, being the groupings of economic production units of the institutional sectors of the economy.

The main purpose of ecosystem asset accounts is to measure and monitor changes in natural capital in the same way that economic accounts can be used for monitoring changes in monetary wealth of countries or industries. The ecosystem accounts represent stocks of assets from which flows of benefits or services are enjoyed by society.

The capital and much of the productive activity of ecosystems are not included in the SNA because they are non-market and fall outside the SNA asset or production boundaries. But this exclusion creates some important limitations for the national accounts for understanding economic growth. It implies that all these non-market contributions of ecosystems to economies cannot be depleted and will not impact the calculations of net value added.

The balancing item in the SNA production account is value added, measured in gross or net terms. Net value added is the value of output less the values of intermediate consumption and consumption of fixed capital. Intermediate consumption consists of goods and services used up in the course of production within the accounting period. The SNA defines the consumption of fixed capital as:

“Consumption of fixed capital is the decline, during the course of the accounting period, in the current value of the stock of fixed assets owned and used by a producer as a result of physical deterioration, normal obsolescence or normal accidental damage.”

Since the non-market inputs ecosystems are not incorporated into the SNA, depletion of natural capital is taken for granted and not accounted for. Therefore, one of the central purposes for producing ecosystem accounts is to produce a set of balances that measure depletion or degradation of natural capital for a given accounting period.

The natural capital of ecosystems is unique in that when managed sustainably it is not consumed or depleted because it is, by nature, self-regenerative. Consumption of natural capital is not inevitable from the ecosystem perspective and can result either directly or indirectly from unsustainable use. Therefore, in order to assess degradation we need physical measures at the beginning and ending of accounting periods that can represent actual degradation (or depletion of value from the perspective of delivering goods and services to present and future generations) for a given space or environmental unit. In order to account for this degradation, we also need to identify the relevant core assets and

how they are to be monitored.

Ecosystem asset accounts are composed of physical measures collected as annual balances – what is interesting is the year to year change in stock. Their natural capital is understood as a comprehensive capacity to provide ecosystem services. Ecosystem accounts will not assess all aspects of ecosystems; instead the focus is on this capacity. Therefore, fundamental to ecosystem asset accounts is the recognition of degradation to ecosystems in their capacity or potential to deliver ecosystem services is equivalent to consumption of fixed capital in the typology of the SNA.

While ecosystem dynamics and their interactions with human societies are complex, the approach of ecosystem accounts is to identify some simple but powerful rules that guide or approximate key changes. According to the literature from ecology on ecosystem resilience (see, e.g., Folke 2006), the essential elements include the sustained diversity within systems and the regeneration or enhancement of components or processes within the systems through normal processes of localized interactions. In other words, diversity and regenerative/growth capacity are two fundamental requirements of ecosystem resilience and can also be used to assess degradation over time. Put another way, the approach is essentially to identify dysfunction, non-sustainability or declining health (controlling for natural dynamics – e.g. seasonal variations - in the systems).

Implicit in any framework involving sustainability are thresholds beyond which the systems are no longer functioning or interacting with society sustainably. In some cases the derivation of threshold measures are very complicated and the models are almost always non-linear. For some other aspects of ecosystem capacity the natural science is simply not yet sufficiently developed to identify thresholds. However, this does not reduce the utility of ecosystem accounts because the framework simply measures changes in a series of key ecosystem health variables during each accounting period where negative changes can be interpreted as degradation and a form of consumption of fixed capital.

Ecosystem accounting takes the same foundation of any accounting system: maintain capital. The portion of value above at the end of period above the value at the beginning of the period is profit or net growth to be enjoyed. Thus the approach is essentially one of weak sustainability between ecosystems – with the recognition that some forms of natural capital are non-substitutable and essential.

Assets of institutional units:

Land (ha.)

Biological resources

 Biomass (carbon)

Water resources

Soil resources

Additional indicators of quality:

- biodiversity
- degree of disease prevalence, regeneration capacity
- degree of autonomy, artificiality