Content

• Overview and background
• Basic concepts and definitions
• Accounts

The System of Environmental Economic Accounting (SEEA)

• The **SEEA Central Framework** was adopted as an international statistical standard by the UN Statistical Commission in 2012 to measure the environment and its relation with the economy

• The **SEEA Experimental Ecosystem Accounting** complements the Central Framework and represents international efforts toward coherent ecosystem accounting
Two Different Perspectives

SEEA Central Framework:
- Individual environmental assets/resources
  - Timber
  - Water
  - Soil
  - Fish

SEEA Experimental Ecosystem Accounts:
- Ecosystem assets (spatially based)
  - Forests
  - Lakes
  - Agricultural areas

Ecosystem Assets are environmental assets viewed from a systems perspective

SEEA EEA: Background

- Complements SEEA Central Framework with focus on ecosystems perspective
- Developed as part of broader process of revising SEEA 2003
- Integrated statistical framework for accounting for ecosystem assets and associated ecosystem services
- Not a statistical standard – “Experimental” for now
- EEA Revision by 2020 launched
Relationship to SEEA Central Framework

- Extends range of flows (production boundary) for accounting compared to SNA and SEEA in physical and monetary terms
- Many flows from Central Framework also included in Experimental Ecosystem Accounting (e.g. flows of timber), but extension of EEA is to attribute flows to spatial areas
- Some Central Framework natural input flows are excluded from Experimental Ecosystem Accounting (e.g. mineral and energy resources)

Key concepts: definitions
Ecosystem assets: definition

Ecosystem assets are spatial areas containing a combination of biotic and abiotic components and other characteristics that function together:

- Ecosystems are considered assets because they support not only economic production, but also our well-being, health and security.
- Potential ecosystem assets include forests, wetlands, agricultural areas, rivers and coral reefs.

- Example: A forest is an area that:
  - Can be located on a map (spatial)
  - Contains trees, shrubs, grasses, soil biota, birds, mammals, insects… functioning together with
  - The soil, water, geology (rocks), sunlight, wind…

Ecosystem accounting framework
The Ecosystem Services Cascade

**Ecosystem services** are the contribution of ecosystems to benefits for people...

The use of ecosystem services for generating benefits, in turn, puts pressure on the biophysical structures and processes (e.g., by degradation or conversion).

Source: Nottingham School of Geography

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**Ecosystem accounting is spatial**

- Ecosystems are different and function differently depending on **where** they are.
- Their capacity to supply services depends on their **location**.
- The benefits of many services depends on whether or not the ecosystems are **accessible**.
- Therefore...Ecosystem accounting needs to integrate **spatial** and **non-spatial** data.
- For example, wetlands in northern Canada may have the **capacity** to purify water, but there is no population there to benefit from it.
Ecosystem accounts

Connections between ecosystem and related accounts and concepts

 Accounts in physical terms:
1. Ecosystem extent account
2. Ecosystem condition account
3. Ecosystem services supply and use account - physical

Tools: Classifications, Spatial units, scaling & aggregation, Biophysical modeling

 Accounts in monetary terms:
4. Ecosystem services supply and use account - monetary
5. Ecosystem monetary asset account

Integrated accounts:
- Combined presentations
- Extended supply and use accounts
- Sequence of accounts
- Balance sheets

Thematic accounts:
- Land
- Water
- Carbon
- Biodiversity
Broad steps in ecosystem accounting

a. Steps in physical terms

1. Ecosystem extent (by ecosystem type)
2. Ecosystem condition (by ecosystem type)
3. Ecosystem services supply (by ecosystem type)
4. Ecosystem services use and benefits (economic units – ind. h/holds)

b. Steps in monetary terms

1. Ecosystem services supply and use values
2. Ecosystem asset values (by ecosystem type)
3. Integrated accounts
   - Combined presentations
   - Extended supply & use tables
   - Sequence of sector accounts
   - Balance sheets

Ecosystem extent account

Maps

Ecosystem type

Spatial units Classifications

SEEA
Types of spatial units

Ecosystem condition account

• What?
  » Ecosystem condition reflects the overall quality of an ecosystem asset, in terms of its characteristics. (SEEA EEA paragraph 2.34)

• Why?
  » Policies to limit degradation of natural heritage, rehabilitation of degraded ecosystems
  » Links to capacity to produce services (Services Supply)
  » Indicators:
    - Indices of condition ➔ change over time ➔ where changes
    - Good/bad condition (exceeding “safe” levels) ➔ where

SEEA
Ecosystem condition account

• What does a Condition Account look like

Maps

<table>
<thead>
<tr>
<th>Ecosystem Service</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon</td>
<td>Vegetation (e.g., native cover)</td>
</tr>
<tr>
<td></td>
<td>Water quality (e.g., turbidity, pH)</td>
</tr>
<tr>
<td></td>
<td>Soil (e.g., erosion, pH, nutrients)</td>
</tr>
<tr>
<td></td>
<td>Biodiversity (e.g., species richness)</td>
</tr>
<tr>
<td></td>
<td>Habitat (e.g., fragmentation)</td>
</tr>
</tbody>
</table>

Tables

<table>
<thead>
<tr>
<th>Proxy ecosystem type (based on condition)</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetation (e.g., native cover)</td>
<td>O</td>
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Scaling & aggregation

Ecosystem services supply

• What?
  • Physical flows of “final” ecosystem services from ecosystems to beneficiaries
  • Directly used by (or affect) people

• Why?
  • Inform policies of contribution of ecosystems to human well-being
  • Assess trade-offs between development and conservation
  • Link to standard economic production measures in SNA
  • Link to other SEEA-EEA accounts (Condition, Services Use, Monetary Ecosystem Services; Ecosystem Monetary Asset valuation)

• Indicators:
  • Flows of individual services (physical and monetary) ➔ change
  • Indices of aggregated services by ecosystem type ➔ change
Types of ecosystem services

**Provisioning Services**
- **= goods that can be harvested from, or extracted from ecosystems**
- **Example:** providing fish for fisheries, or providing wood for timber harvest

**Regulating Services**
- **= the regulation of climate, hydrological, ecological and soil processes**
- **Example:** pollination, carbon sequestration, flood control

**Cultural Services**
- **= the non-material benefits provided by ecosystems**
- **Example:** recreation, tourism, providing a setting for cultural or religious practices

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**Ecosystem services supply account**

### Maps
- Ecosystem extent
- Provisioning
- Regulating
- Cultural

### Tables
- **Ecosystem type**
  - **Type of service**
    - Urban and associated
    - Forest tree cover
    - Agricultural land
    - Open wetlands
  - **Provisioning**
    - e.g., tonnes of timber
    - e.g., tonnes of wheat
  - **Regulating**
    - e.g., tonnes of CO₂ stored/released
    - e.g., tonnes of CO₂ stored/released
  - **Cultural**
    - e.g., hectares of parkland
    - e.g., number of visitors/hikers
    - e.g., hectares of duck habitat

### Valuation
- Monetary Services Supply

- **Look up tables Biophysical modelling**
Example: Netherlands

- Carbon storage
  - High: 7.862.64 ton/ha
  - Low: 32.34 ton/ha

Model used:

- Look Up Tables (every land cover class is attributed a specific carbon storage value)

Example: Central Kalimantan

- Carbon storage
  - High: 1.67 m3/ha/year
  - Low: 0.42 m3/ha/year

- Timber production
  - High: 1.67 m3/ha/year
  - Low: 0.42 m3/ha/year

Model used:

- Kriging (values are interpolated from samples)

Source: Sumarga and Hein, 2014
Other issues

- Valuation in monetary terms
- Thematic accounts
  - Biodiversity
  - Carbon
  - Water

THANK YOU
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