Online Course on SEEA Experimental Ecosystem Accounting

2. Spatial units

3. Ecosystem extent account

François Soulard
Statistics Canada
Introduction

• Purpose of the online training

  > To help participants acquire knowledge and skills to deepen their understanding of the accounting principles and basic data needs for compiling ecosystem accounts and valuing ecosystem services based on the SEEA Experimental Ecosystem Accounting (SEEA EEA)

  > To become acquainted with the various biophysical modeling tools and global data resources;

• Components of the online training

  > Self-paced online training modules
  > Live webinars
Self-paced online training module

- Consisted of 8 modules
  - i. Module 1: Key concepts
  - ii. Module 2: Spatial units
  - iii. Module 3: Ecosystem extent
  - iv. Module 4: Ecosystem condition
  - v. Module 5: Ecosystem services
  - vi. Module 6: Carbon accounting
  - vii. Module 7: Water accounting
  - viii. Module 8: Biodiversity accounting

- Available in English and Spanish
## Live webinar schedule

<table>
<thead>
<tr>
<th>Topic</th>
<th>Date</th>
<th>Presenter</th>
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<tbody>
<tr>
<td>General introduction to SEEA and ecosystem accounting</td>
<td>18 September</td>
<td>Julian Chow, UNSD</td>
</tr>
<tr>
<td>Spatial units and ecosystem extent account</td>
<td>25 September</td>
<td>Statistics Canada</td>
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<tr>
<td>Ecosystem condition account</td>
<td>2 October</td>
<td>Joachim Maes, EU JRC</td>
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<td>Ecosystem services</td>
<td>12 October</td>
<td>Lars Hein, Wageningen University</td>
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<td>Valuation</td>
<td>16 October</td>
<td>Rocky Harris, UK DEFRA</td>
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<td>Ecosystem accounts in the Netherlands</td>
<td>23 October</td>
<td>Sjoerd Schenau, Statistics Netherlands</td>
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<tr>
<td>Modelling techniques</td>
<td>30 October</td>
<td>Bethanna Jackson, University of Wellington</td>
</tr>
<tr>
<td>Policy aspects of ecosystem accounting</td>
<td>6 November</td>
<td>UN Environment</td>
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</tbody>
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Table of Content

1. Introduction: Canada and SEEA
2. Review of basic concepts
3. Experimental Applications in Canada
4. Official Applications in Canada
5. National Spatial Data Infrastructure
6. Questions and answers
Introduction: Canada and SEEA

Ecosystem accounting timeline

SNA ‘93: Satellite accounts for the environment

System of Environmental-Economic Accounting (SEEA, draft)

Millennium Ecosystem Assessment

SEEA-Water as a statistical standard

SEEA-Central Framework as a standard

SEEA Experimental Ecosystem Accounting

SEEA EEA Technical Recommendations

1993  2003  2005  2007  2012  2017


Physical Flow Accounts
- Energy
- GHG
- Water

Canadian Environment and Sustainable Development Indicators

Canadian System of Environment and Resource Accounts

HAE M.E.G.S.

Framework for Environmental Statistics

HAE Economy and the Environment

HAE Agriculture

HAE Water Supply and Demand

HAE Water Ecosystems

HAE Urban Ecosystems

HAE Forests
Introduction: Canada and SEEA

Accounts produced in Canada

Natural capital stock accounts
- Energy and mineral reserves (physical and monetary)
- Timber stocks (monetary only)
- Water (physical only)
- Land (physical and monetary)
- Ecosystems assets

Physical flow accounts
- Energy use
- Greenhouse gases (GHGs)
- Water use
- Ecosystem services
Introduction: Canada and SEEA

Why do we produce the accounts?

- Informs public policy issues, for instance, the loss of the best agricultural land for urban land uses.
- Helps provide answers to local issues, such as urban sprawl.
- Contributes to the development of laws and policies aiming to frame spatial planning, namely metropolitan areas.
Review of basic concepts
Review of basic concepts

1. **Basic Spatial Unit (BSU)** is a small square, rectangle or polygon, to which basic data is attached, and that supports the delineation of EAs and ETs.

2. **Ecosystem assets (EA)** are spatial areas comprising a combination of biotic and abiotic components and other characteristics that function together.

3. **Ecosystem types (ET)** are essentially bins for grouping similar ecosystem assets into classes to simplify reporting in ecosystem accounts.

4. **Ecosystem Accounting Areas (EAA)** are the geographical units used to measure and report, over time, on ecosystem data.
Review of basic concepts
Review of basic concepts

- BSU
- EA
- ET
- EAA

- Vegetation
- Hydrology
- Pedology
- Elevation
- Bio-climate
- Etc.
Experimental Applications in Canada
Experimental Applications in Canada
### Experimental Applications in Canada

#### Individual EAs

#### Ecosystem Types (defined by three variables)

<table>
<thead>
<tr>
<th>Count</th>
<th>Land cover</th>
<th>Elevation</th>
<th>Terrain ruggedness index</th>
<th>Area (km²)</th>
<th>Percent</th>
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<td>1</td>
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<td>Plain</td>
<td>Moderately rugged surface</td>
<td>104,902.6</td>
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<td>4</td>
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<td>9</td>
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<td>11</td>
<td>Evergreen forest</td>
<td>Hill</td>
<td>Extremely rugged surface</td>
<td>368,372.2</td>
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<td>Lowland</td>
<td>Moderately rugged surface</td>
<td>63,733.6</td>
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<td>Plain</td>
<td>Level terrain surface</td>
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<td>14</td>
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<td>37,255.8</td>
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<td>49,254.3</td>
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<td>Extremely rugged surface</td>
<td>152,162.2</td>
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<td>Intermediately rugged surface</td>
<td>50,428.9</td>
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<td>31,743.2</td>
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Experimental Applications in Canada

Ecosystem Accounting Areas (EAA)

1. Ecological Land Classification of Canada

   - Ecozones (15)
     - Major drainage areas (11)
     - Sub-drainage areas (164)
     - Sub-sub-drainage areas (974)

   - Ecoprovinces (53)
   - Ecoregions (194)
   - Ecodistricts (1,021)

2. Drainage Area Classification of Canada
   https://www.statcan.gc.ca/eng/subjects/standard/sdac/sdac

   - Ecosystem types (920,613)
   - Basic statistical units (39,904,728)

   Land cover
   Elevation
   Ruggedness

MODIS 250m x 250m
Applications in Canada

Ecological Land Classification of Canada

Terrestrial ecozones and marine ecoregions of Canada

Standard Drainage Area Classification

Sub-drainage areas


Ecosystem extent accounts

This table shows a basic condition extent account using high level ecosystem types based on the land cover classification in the SEEA Central Framework. Additional sub-classes may be added depending on the ecosystem types of most relevance within a country.

Explore the highlighted areas to get more information!

• Is a BSU of 250m appropriate to measure ecosystem change in Canada?
Official Applications in Canada
Metropolitan Landscapes
Official Applications in Canada

Metropolitan Landscapes


square kilometres

Forest
Water
Other

Built-up area

Arable land

Natural and semi-natural land

Land cover and land use

SEEAA
## Ecosystem asset account, Toronto census metropolitan area-ecosystem, 1971 to 2011

<table>
<thead>
<tr>
<th></th>
<th>Total built-up area(^1)</th>
<th>Arable(^2)</th>
<th>Natural and semi-natural(^3)</th>
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<tbody>
<tr>
<td></td>
<td>Settled</td>
<td>Roads</td>
<td></td>
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<tr>
<td>Opening stock 1971</td>
<td>850</td>
<td>418</td>
<td>4,930</td>
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<tr>
<td>Land lost to settled area</td>
<td>...</td>
<td>...</td>
<td>-961</td>
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<tr>
<td>Balance of change(^4)</td>
<td>1,409</td>
<td>403</td>
<td>-102</td>
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<tr>
<td>Closing stock 2011</td>
<td>2,260</td>
<td>821</td>
<td>3,867</td>
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</table>
Map 3.3.2
Land use and water yield for the Fraser–Lower Mainland drainage region

- Built-up
- Natural and semi-natural
- Agricultural land use
- Water
- Provincial boundary

Monthly water yield, 1971 to 2013
Trends in water yield, 1971 to 2013
Developing a NSDI

Establishing the spatial areas required for ecosystem accounting is best undertaken within a broader context of work. While not being essential to commence work, a national spatial data infrastructure (NSDI) would support integration of environmental and socio-economic data:

- The starting point in utilizing an NSDI is an inventory of what spatial data infrastructure already exists in a country, in particular within government agencies such as spatial planning or environmental agencies.

- This assessment should include documenting the most commonly used GIS software packages and the available datasets. Where feasible, the development of a spatial data infrastructure for accounting should build upon existing infrastructure.

- The development of spatial data infrastructure also requires selecting hardware with sufficient processing, storage and back-up capacity, and GIS software.

- Official boundaries (country, administrative, statistical, river basins, biogeographic areas, shorelines, etc.) as polygon vector data
- Elevation and topography data, based on a digital elevation model (DEM) to distinguish elevation and slope of BSU
- Land cover data
- Land management/use
- Vegetation type
- Soil and geology data
- Hydrological data related to rivers, lakes, streams, coastal and marine areas
- Data on urban infrastructure, including cities, villages, industrial zones, and transport (rail, road), needed for assessing ecosystem condition and understanding ecosystem use (e.g. relevant for mapping fragmentation and other impacts)
- Socio-economic data including population data, employment, economic activity, etc.

List of data layers recommended for integration in a spatial data infrastructure
Official Applications in Canada
National Spatial Data Infrastructure

METHODS
- Spatial analytics
- Modelling
- Valuation
- Standards and classifications

DATA
- Products (indicators, analytical reports)
- Ecosystem accounts
- Census profiles
- Environmental register
- Source data (biophysical and socio-economic)
  - Federal
  - Provincial
  - Territorial
  - Academia
  - NGOs

USERS
- Product user
- Product user
- Policy maker
- Analyst
- Public
- Media
- Academic

Microdata user

SEEAA
Official Applications in Canada
National Spatial Data Infrastructure
Conclusion: SEEA (E)EA in Canada

1. Currently researching and integrating the databases required to build ecosystem accounts at a national scale.

2. Developing the I.T. environment and interdepartmental partnerships required to build comprehensive ecosystem accounts.

3. Initiating work to create Ocean ecosystem accounts, in partnership with Canada’s Department of Fisheries and Oceans.
Questions and answers

Check out our annual publication:

**Human Activity and the Environment**


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