Piloting SEEA EEA accounting for the United States
August 2020
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www.tinyurl.com/us-nca
Piloting natural capital accounts for the U.S.

Nationwide; Wentland et al. in press (Ecosystem Services)

Guidance in development on data sources & participants needed for SEEA-CF

System of National Accounts (SNA)

- Land accounts
  - Land cover
  - Land use
  - Land value

- Water accounts
  - Water use by industry
  - Water productivity
  - Water quality
  - Expert elicitation of water quality – water use linkages

- Ecosystem accounts
  - Crop pollination
  - Water purification
  - Avian biodiversity
  - Recreational birdwatching
  - Air filtration
  - Urban heat-island mitigation
  - Stormwater mitigation
  - Wildfire mitigation

- Other accounts
  - Minerals
  - Potential future SEEA-CF accounts (forests, ocean, fisheries, etc.)

10-state region: Warnell et al. 2020 (Ecosystem Services); Nationwide: Heris et al. in review (urban accounts)
Key considerations:

Data should be publicly available on a national scale.

Accounts summarized geographically and by ecosystem type.

Analyses should be updateable – tracking over time is essential.

Avoid proprietary tools and models.
Services measured: SEEA EEA

• 10-state region of the U.S. Southeast (Warnell et al. 2020)
  • Recreational birdwatching - PSUT
  • Air filtration by vegetation - PSUT
  • Carbon storage - Condition
  • Bird biodiversity - Condition
  • Water purification – Condition (functional state indicator)
  • Wild pollination – Condition (functional state indicator)

• National scale
  • Urban heat mitigation – Physical & monetary SUTs, Heris et al. in review
  • Rainfall interception – Physical & monetary SUTs, Heris et al. in review
  • Wild pollination – Heris et al. in prep
Southeast U.S. - physical supply-use accounts (2001-2011)

Recreational birding (measured in birding days)

Air quality in developed areas (concentration of pollutants known to influence health)

Warnell et al., 2020

Nowak et al. 2014
Southeast U.S. - ecosystem condition accounts (2001-2011)

Includes metrics related to:
• Wild pollination
• Purification of runoff water
• Bird species richness
• Air pollutant removal
• Carbon storage

<table>
<thead>
<tr>
<th>Ecosystem Types (Land Cover)</th>
<th>Offshore</th>
<th>Open Water - non-freshwater</th>
<th>Open Water - freshwater</th>
<th>Developed - Open</th>
<th>Developed - Medium</th>
<th>Developed - High</th>
<th>Barren</th>
<th>Deciduous Forest</th>
<th>Evergreen Forest</th>
<th>Mixed Forest</th>
<th>Gravel/Scrub</th>
<th>Pasture/hay</th>
<th>Cultivated Crops</th>
<th>Woody Wetlands</th>
<th>Emergent Herbaceous Wetlands</th>
<th>TOTAL</th>
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<tbody>
<tr>
<td>Area of pollinator habitat in flight range of pollinator-dependent crops (sq km)</td>
<td>2001</td>
<td>5,471</td>
<td>2,516</td>
<td>1,336</td>
<td>1,290</td>
<td>165</td>
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<td>Area of pollinator-dependent crops in flight range of pollinator habitat (sq km)</td>
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<td>Ratio of pollinator habitat to pollinator dependent crops</td>
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<td>Area of purifying land cover types between NPS sources and waterways (sq km)</td>
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<td>% of flowpath between NPS sources and waterways in purifying land cover types</td>
<td>2001</td>
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Warnell et al. 2020
Sub-state scale: from spatial data & models to accounts

• Atlanta MSA (right)

• New county-level GDP estimates from BEA enable finer scale analysis

• Ability to extract results for any geography e.g., watersheds, public lands

Warnell et al., 2020
Urban ecosystem accounts (2011-2016) – 768 cities with pop > 50,000 (Heris et al. in review)

<table>
<thead>
<tr>
<th>Ecosystem service</th>
<th>Year</th>
<th>Physical supply &amp; use</th>
<th>Monetary supply &amp; use</th>
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</thead>
<tbody>
<tr>
<td>Energy savings (GWh &amp; million $)</td>
<td>2011</td>
<td>4,098.4</td>
<td>$522.7</td>
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<tr>
<td></td>
<td>2016</td>
<td>4,229.3</td>
<td>$538.6</td>
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<tr>
<td>Rainfall interception (m$^3 \times 10^6$ &amp; million $)</td>
<td>2011</td>
<td>2,442.0</td>
<td>$433.6</td>
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<tr>
<td></td>
<td>2016</td>
<td>2,627.0</td>
<td>$424.7</td>
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</tbody>
</table>
National pollination account (Heris et al. in prep)

- Will cover 2008-2020 at 3-year intervals for the nation
- Also 1999-2020 at 3-year intervals for four states where earlier data are available
- Planned monetary supply-use account for California
Partners

- Project team:
  - USGS
  - Bureau of Economic Analysis
  - NOAA
  - United States Environmental Protection Agency
  - Forest Service
  - Department of Agriculture
  - Department of State

- Funders:
  - SESYNC
  - Powell Center
  - Southeast Climate Adaptation Science Center
  - NASA
What worked well?

1. Series of 5 working group meetings, October 2016-March 2019
2. Group has stayed cohesive: monthly phone meetings & preparation of technical & written products has continued
3. Much larger critical mass of SEEA-savvy researchers & practitioners in the U.S.
4. Partnerships built between core U.S. government agencies, academics, international community
5. Use of NESCS to partition ecosystem services into condition & physical supply-use accounts
6. Data availability is fantastic (e.g., 30 m, annual cropland data; new LCMAP product gives annual 30 m land cover data for 1985-2017; 30 m land use dataset, crosswalked to NAICS codes)
What didn’t work well?

1. Working group model has kept people engaged but with limited dedicated time to develop or promote accounts

2. No mandates for SEEA in the U.S.
   • Status as experimental/pilot accounts
   • No guarantees of long-term support
Challenges identified

1. Better knowledge of data & knowledge gaps to complete regular, national-scale accounts

2. Paradox of working in a data-rich, scientifically advanced setting: simple models are unlikely to be acceptable

3. How to code & store models to best support their reuse & reccompilation?
   • “Kindness of strangers” approach – SE accounts
   • Code repositories a savvy programmer can adapt & reuse (e.g., Python) – nationwide accounts
Use of results

• Water accounting in Hawai‘i – state & local government + water users
• Urban ecosystem accounts: partnership with New York City – using urban SEEA for urban forest management
• Outreach to statewide conservation NGO in Florida
• Team is working on a paper about further potential “use cases” for national/state/local government, NGOs, private sector, etc.
For more information (+ www.tinyurl.com/us-nca)

- Heris et al. in review. Piloting urban ecosystem accounting for the U.S. (Ecosystem Services)
- Heris et al. in prep. A national pollination account for the U.S. (journal TBD)
- Bagstad et al. in prep. Lessons learned from SEEA accounting in the U.S. & Europe (Ecosystem Services)
- Posner et al. in prep. Developing use cases for SEEA accounting in the U.S. (journal TBD)
- Bagstad et al. in review. Water accounts for the U.S. (Ecosystem Services)
- Wentland et al. in press. Land accounts for the U.S. (Ecosystem Services)
- Haas et al. in prep. Guidance for compiling SEEA CF accounts for the U.S.