System of Environmental Economic Accounting

Urban Ecosystem Accounts

Virtual Expert Forum on SEEA EEA 2020

Session 4: Thematic accounts and indicators

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Urban Ecosystem Accounts

1. … are **rigorous data compilation relevant to ecosystem assets and services** in urban areas, in physical and/or monetary values

2. … are presented as a "Thematic Account" because they not only include information on ecosystem assets and services, **but also other ecologically-relevant data** from the SEEA Central Framework and SNA accounts
   - for example, land values, resource management expenditures, waste management, etc.

3. … can be compiled for **accounting areas** that cover all urban areas, a subset (e.g., large cities) or individual cities, depending on policy needs, data availability, etc.

Why account for urban ecosystems? (/1)

1. Accounting for ecosystem assets and services in urban areas is of increasing importance considering the **large and growing proportion of the world population living in cities**

2. There is a growing call to improve our understanding of the **ecological dimensions** in urban areas
   - A frequently mentioned focus of Urban Ecosystem Accounts is quantifying urban green and blue areas, associated condition variables and indicators (e.g., urban tree canopy cover, urban air quality) and related services (e.g., local climate regulation, water regulation, nature-based recreation)

Why account for urban ecosystems? (/2)

3. Urban Ecosystem Accounts can support various aspects of international, national, sub-national, and municipal level **policy-related information** such as
   - strategic planning and policy setting
   - communication and awareness raising
   - economic accounting (e.g. municipal balance sheet)
   - urban planning including peri-urban and coastal development

4. Urban Ecosystem Accounts can also support **other municipal management information needs**
   - Water resources management, water treatment, regulating services (e.g., local climate regulation, air filtration, flood mitigation), renewable energy sources and management of recreational opportunities, etc
   - Indicators (e.g. gross city product), trade-off and cost benefit analysis, SDGs

Urban Ecosystem Accounts and SEEA EA

1. Urban ecosystems are an ecosystem type included in the SEEA EA ecosystem classification and changes in urban extent are **tracked in aggregate relative to other ecosystem types** in the ecosystem extent account.
   - IUCN Global Ecosystem Typology defines a broad ecosystem functional group covering urban ecosystems (Class T7.4).
2. The compilation of a thematic account for Urban Ecosystem Areas provides the opportunity for a more **detailed accounting for urban area sub-types** within the broader framing provided by the IUCN typology
   - This compilation follows the same general guidelines as ecosystem accounting more generally, including the development of extent, condition and services accounts.
   - However, reporting on urban green and blue assets at a more detailed scale within the continuous urban extent is a distinguishing factor

Defining the accounting area

1. **Urban Ecosystem Accounting Area (EAA)**
   - Accounts can be compiled for cities based on
     - administrative boundaries (i.e., local government boundary)
     - functional boundaries (e.g., based on commuting flows)
     - morphological criteria, such as the extent of the built-up area plus a buffer zone.

2. This selection will depend on the **anticipated purpose and users** of the urban accounts being compiled.
   - For example a user may need to have a data compilation for cities that includes surrounding affected by commuting flows, or a green belt area, or areas comprising the ecological "hinterland" to capture the value of services provided to urbanites by the surrounding environment

Classifying urban ecosystem assets

- Urban ecosystem assets:
  - **Landscape approach:** This approach disaggregates the entire urban area and categorizes larger patches into sub-areas with common characteristics (e.g., high-rise, low-rise, sparsely-built, industrial)
  - **Individual asset approach**: This approach tracks various individual asset types at as fine a scale as possible (e.g., lines of street trees, playgrounds, allotment gardens, green roofs, etc)
- The classification approach and level of aggregation will determine the distinction between extent accounts and condition accounts.

Landscape approach

- Classifies all areas within urban EAA into sub-areas within similar characteristics
- Identifying urban sub-types in Milton, Canada

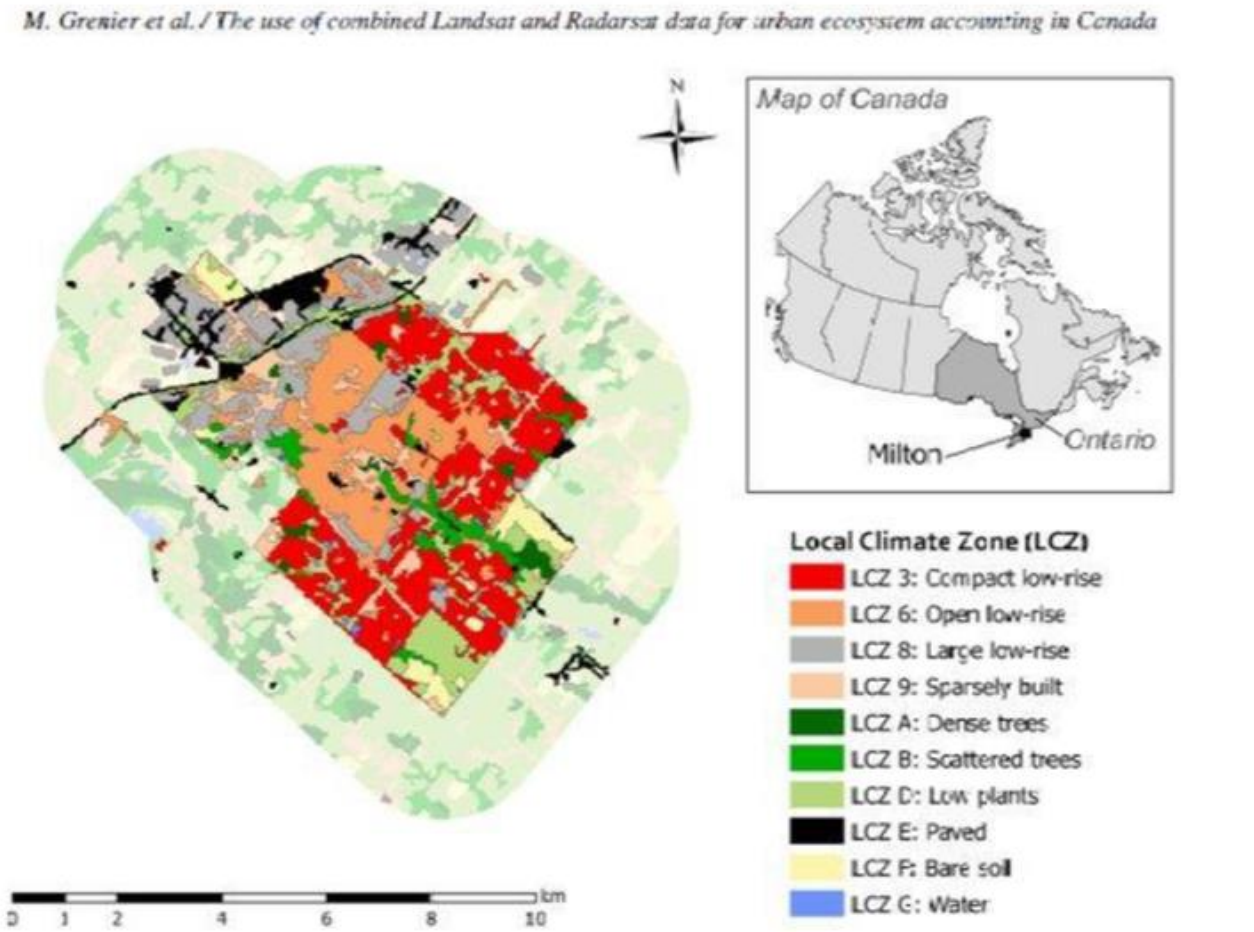

Fig. 1. Milton urban local climate zones – 2019.

Landscape approach – example tables

Table 13.5: Example – extent account presentation using landscape approach

	Example ecosystem types in urban areas													
	Urban/built-up type and example sub-classes						Natural and semi-natural types							
	Compact high-rise	Open high-rise	Compact low-rise	Open low-rise	Sparsely built	Paved	Cropland	Grassland	Shrubland	Forest	Barren	Wetland	Inland water	Total EAA
Opening extent (km2)														
Additions to extent														
Reductions in extent														
Net change in extent														
Closing extent (km2)														

Table 13.6 Example condition account presentation using landscape approach

														Examp
Example condition variables		Compact high-rise		Open high-rise		Compact low-rise		Open low-rise		Sparsely built		Paved		
Variables	Unit of measure	Opening stock	Closing stock	Opening stock	Closing stock	Opening stock	Closing stock	Opening stock	Closing stock	Opening stock	Closing stock	Opening stock		
Water quality	g/l													
Air pollutant concentrations	ppm													
Soil contaminant concentrations	g/kg													
Soil sealing / Imperviousness	%													
Greenness	%													
Canopy cover	m^2													
Street trees	km													

Individual asset approach

- Identify area of specific green/blue ecosystem assets
- Identifying tree crown height in Oslo, Norway

Individual asset approach – example table

	Example ecosystem types and assets in urban areas											
	Example urban ecosystem assets											
	Allotment garden	Street trees	Sports field	Playground	Cemetery or religious grounds	Public park or garden	Green roof	Private green space (e.g., yards)	Beach	Cropland	Grassland	Shru
Opening extent (km2)												
Additions to extent												
Reductions in extent												
Net change in extent												
Closing extent (km2)												

Measuring urban ecosystem services

- Urban ecosystem service supply and use accounts may focus on a different basket of services, given the differing functions and conditions of urban ecosystems.

		Example ecosystem types in urban areas													
		Urban/built-up type and example sub-classes						Natural and semi-natural types							Total EAA
Example list of services	**Unit of measure**	Compact high-rise	Open high-rise	Compact low-rise	Open low-rise	Sparsely built	Paved	Cropland	Grassland	Shrubland	Forest	Barren	Wetland	Inland water	
Provisioning services															
Crops															
Regulating services															
Water regulation															
Climate regulation															
Air filtration															
Noise regulation															
Cultural services															
Recreation															
Amenity services															

Other considerations

- Importance of high **resolution** data and **accuracy** of change detection at small spatial scales
- Substitution possibilities between ecosystem services and man-made services may be more apparent in urban areas
- Heterogeneous use factors can result in variations in beneficiaries and valuation results, particularly for recreational and amenity services.
  - > These use factors can be related to differences in population density, socio-economic and cultural diversity, substitution possibilities, qualitative values and non-linear distance decay of benefits

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