Classification of ecosystem types: Experiences and perspectives from Statistics Canada



Jennie Wang, François Soulard, Mark Henry, Marcelle Grenier Environmental Accounts and Statistics Program Statistics Canada



Statistics Statistique Canada Canada

Introduction

- Presentation will cover the main items in the discussion paper:
 - Statistics Canada's initial experiences
 measuring ecosystem extent
 - Perspectives on select discussion issues identified in the SEEA EEA 2020 Revision: Revision Issues Note



But first: Ecosystem assets and ecosystem types

- <u>Ecosystem assets</u> are spatial areas comprising a combination of biotic and abiotic components and other characteristics that function together
- <u>Ecosystem types</u> are essentially bins for grouping similar ecosystem assets into classes to simplify reporting in ecosystem accounts.
- The goal is to develop a classification of these types that is statistically relevant and that is appropriate for use at the international level.



Ecosystem types: Is it forest or wetland?

Peatland forest (spruce bog)

Hardwood swamp









Experience (1) in measuring ecosystem extent

- Measuring Ecosystem Goods and Services (MEGS 2013) geodatabase
 - Included selected ecological characteristics (land cover, elevation, ruggedess) to delineate ecosystem assets (previously termed 'land cover ecosystem units')
 - Preliminary effort included data at different scales (land covers at 30m, 250m; elevation at 800m)





Experience (1) in measuring ecosystem extent (cont.)

This method delineated 420 distinct types of LCEU and the most common types were water, followed by wetlands and evergreen forests. Top 20 land cover ecosystem units in Canada

	Count	Land cover	Elevation	Terrain ruggedness index	Area (km²)	Percent
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 9 20	13,215 12,438 12,154 11,425 11,082 10,869 10,648 9,741 9,617 9,563 9,045 8,813 8,743 8,694 8,657 8,375 8,288 8,244 8,123 7,742	Water natural and artificial Water natural and artificial	Plain Plain Plain Lowland Lowland Lowland Lowland Plain Plain Hill Lowland Plain Hill Lowland Plain Hill	Moderately rugged surface Extremely rugged surface Highly rugged surface Moderately rugged surface Intermediately rugged surface Extremely rugged surface Slightly rugged surface Moderately rugged surface Extremely rugged surface Moderately rugged surface Slightly rugged surface Extremely rugged surface Extremely rugged surface Extremely rugged surface Extremely rugged surface Extremely rugged surface	104,902.6 68,196.3 54,511.0 100,814.1 66,329.1 58,217.6 37,206.0 53,631.4 52,258.9 48,421.0 368,372.2 63,733.6 271,280.9 37,255.8 49,254.3 26,964.3 181,858.8 152,162.2 50,428.9 21,742.2	1.1 0.7 0.6 1.0 0.7 0.6 0.4 0.5 0.5 0.5 0.5 3.7 0.7 2.8 0.4 0.5 0.3 1.8 1.5 0.5

Source(s): Statistics Canada, Environment Accounts and Statistics Division, 2013, special tabulation.

Statistique

Canada

anada

Experience (2) in measuring ecosystem extent

- Ecosystem extent accounts for metropolitan areas
 - Produced data for aggregated ecosystem types including built-up (settled and road), arable land, and natural and semi-natural land (forest, water and other).
 - Accounts for each metropolitan areas (ecosystem account area) are standalone and cannot be aggregated.

Experience (2) in measuring ecosystem extent (cont.)

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

	Total built-up area ¹		Arable ²	Natural and		
	Settled	Roads		semi-natural ³		
	square kilometres					
Opening stock 1971	850	418	4 930	6 615		
Land lost to settled area	1.55		-961	-448		
Balance of change ⁴	1 409	403	-102	-300		
Closing stock 2011	2 260	821	3 867	5 866		

Experience (3) in measuring ecosystem extent

- Use of Ecological Land Classification
 - Hierarchical classification system with four main levels: ecozones, ecoprovinces, ecoregions and ecodistricts.
 - Delineates ecosystems into ecologically distinct areas—discrete systems resulting from the mesh of geologic, landform, soil, vegetative, climatic, wildlife, water and human factors.
 - The dominance of any one or a number of these factors varies within a given ecological land unit.





Ecodistricts of Canada



- 1,027 ecodistricts
 - distinct macro-scale ecosystems
 - range in size from approximately 50 km² to 110,000 km²)
 - characterized by distinctive assemblages of relief, landform, geology, soil, vegetation, waterbodies and fauna

** Within these ecodistricts there are often multiple ecosystem types.





- Preferred approach to identify ecosystems is to use ecological characteristics and ecosystem use.
- A focus should therefore be development of a classification structure that will allow grouping of ecosystem assets into types based on these multiple characteristics.





- Using land cover to delineate ecosystem assets and class ecosystems by type may be practical.
- However, there are basic shortcomings in using this approach to capture the complexity of ecosystems including the interaction of their biotic and abiotic characteristics.
- Land cover provides a 2D view of ecosystems, when they are multi-dimensional.





Land cover: Is it cropland or is it grassland?

Hay production

Statistique

Canada

Canada

Natural pasture







- Multi-dimensional hierarchy
 - Database ideally linking all relevant ecological and non-ecological characteristics for each cell (basic statistical unit).
 - Climate, terrain, soils, vegetation, land cover
 - Land use, anthropogenic connection, management/tenure.



Aggregation based on similar characteristics (iterative)

Including a larger number of characteristics will complicate matching and aggregating of types.

Number of ecosystem types

Predetermined set of ecosystem types (allocation)

Statistique

Canada

Complicated since many characteristics that are related to ecosystem services coexist in a given area.



- Link to services and scale matters:
 - Certain ecosystem assets, land cover types, may generate fewer ecosystem services while others more.
 - Top-down remote sensing may only need to zoom in on areas where it is important.
 - Southern vs. northern Canada
 - Urban areas vs. remote areas





THANK YOU!

For more information, please visit <u>www.statcan.gc.ca</u>



Statistics

Canada

Statistique

Canada



www.statcan.gc.ca

Other discussion issues:

- Issue paper 3 topic is based on understanding that:
 - ET= Land cover * land use * (maybe) ES
 - What does this mean in practice?
 - How to integrate the ecological factors? (the 3D)
- The ecosystem type as the "legend" (C. Obst)
 - Can there be more than one legend category for the same area? Does it involves defining multiple classifications?



