Recommendations

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General

- Undertake capacity building on SEEA Central Framework
  - Many concepts, classifications and methods included: land, water, forest, timber, fish, crops…
- Involve planning and finance departments to ensure results are understood and used
- Coordinate detailed common spatial database to
  - Ensure no gaps and overlaps
  - Include roads, canals, power lines; small features (e.g., roadside vegetation)
  - Common definitions and classifications (e.g., land cover)
  - Share data (e.g., spatial infrastructure) and workload

Guangxi Province

- Forestry: Compare physical changes with SNA revenues
- Ocean and Fisheries: consider using global data
- Housing: consider direct economic benefits (e.g., harvesting from residential gardens and parks)
- Tourism: consider including non-designated tourist sites (e.g., wild areas)

Guizhou Province

- Land and Resources: Review approach to land cover/land use determination
- Forestry: Consider distinguishing forest types in different locations (e.g., upper/lower catchment area, distance to population, presence of pollutants)
- Forest Survey Planning: Consider including Non-timber Forest Products (NTFP) (fuelwood, berries, ornamental plants, mushrooms, etc.) from SNA or household survey

Answers to technical questions

1. Definition of “Natural resource assets” and “natural resource liabilities”

- SEEA-Central Framework defines “environmental assets” as “*naturally-occurring living and non-living components of the Earth…which may provide benefits to humanity*”
  - Includes accounts for “natural inputs to the economy”: water, land, mineral & energy, aquatic, other biological
- “Natural resource liabilities” not defined
  - Proposal: NPV of expenditures to maintain, protect or restore
  - SEEA-CF include Environmental Protection Expenditure accounts

Definitions: Natural inputs

*3.45 … all physical inputs that are **moved** from their location in the environment as a part of economic production processes or are **directly used** in production.*

Table 3.2
Classes of natural inputs

1	**Natural resource inputs**
1.1	Extraction used in production
1.1.1	Mineral and energy resources
1.1.1.1	Oil resources
1.1.1.2	Natural gas resources
1.1.1.3	Coal and peat resources
1.1.1.4	Non-metallic mineral resources (excluding coal and peat resources)
1.1.1.5	Metallic mineral resources
1.1.2	Soil resources (excavated)
1.1.3	Natural timber resources
1.1.4	Natural aquatic resources
1.1.5	Other natural biological resources (excluding timber and aquatic resources)
1.1.6	Water resources
1.1.6.1	Surface water
1.1.6.2	Groundwater
1.1.6.3	Soil water
1.2	Natural resource residuals
2	**Inputs of energy from renewable sources**
2.1	Solar
2.2	Hydro
2.3	Wind
2.4	Wave and tidal
2.5	Geothermal
2.6	Other electricity and heat
3	**Other natural inputs**
3.1	Inputs from soil
3.1.1	Soil nutrients
3.1.2	Soil carbon
3.1.3	Other inputs from soil
3.2	Inputs from air
3.2.1	Nitrogen
3.2.2	Oxygen
3.2.3	Carbon dioxide
3.2.4	Other inputs from air
3.3	Other natural inputs n.e.c.

2. How to calculate opening stock of water resources

- SEEA-CF includes water asset types: surface waters (lakes, rivers, streams, artificial reservoirs), soil water, ground water, snow and ice
  - Data are derived from different sources (e.g., hydrology, agriculture, forestry, geology)
- Opening stock is total for beginning of period
- Canada does not calculate total stock of water
  - Calculates renewable freshwater supply (rain and snow) at detailed sub-sub catchment area
  - Some areas can have water shortage while others flood

Water asset account

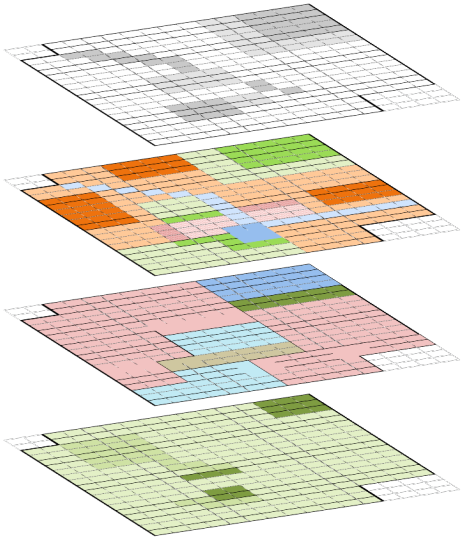
	Type of water resources						
			Surface water				
	Artificial reservoirs	Lakes	Rivers and streams	Glaciers, snow and ice	Goundwater	Soil water	**Total**
(A) Opening stock	**1,500**	**2,700**	**5,000**	-	**100,000**	**500**	**109,700**
Additions to stock							
(B) Returns (from Economy)	-	-	-	-	56	-	**56**
(C) Precipitation	124	246	50	-		23,015	**23,435**
(D) Inflows from other territories	-	-	17,650	-	-		**17,650**
(E) Inflows from other inland water	1,054	700	640	-	180	90	**2,664**
(F) Discoveries of water in aquifers					-		-
(G) Total additions to stock	*1,178*	*946*	*18,340*	-	*236*	*23,105*	***43,805***
Reductions in stock							
(H) Abstraction (to Economy)	280		141	-	476	50	**947**
(I) Evaporation and evapotranspiration	80	215	54	-		21,250	**21,599**
(J) Outflows to other territories			9,430	-	-		**9,430**
(K) Outflows to the sea			10,000	-	-		**10,000**
(L) Outflows to other inland water	890	640	1,754	-	90	180	**3,554**
(M) Total reductions in stock	*1,250*	*855*	*21,379*	-	*566*	*21,480*	***45,530***
Closing stock	**1,428**		**1,961**		**99,670**	**2,125**	**107,975**

3. How to measure quality of arable land, forest and mineral resources

- SEEA-CF does not include quality measures
- SEEA-Energy considers quality of mineral assets (concentration) to determine if economically viable
- SEEA-EEA “Condition Accounts” give some examples of condition measures of vegetation, water, soil, biodiversity, habitats
- There is no international index of quality
  - Many use composite index (e.g., beginning of accounting period = 100)

3. How to measure quality of arable land, forest and mineral resources

Maps



Carbon

Water

Soil

Biodiversity

Vegetation

Tables

Ecosystem type	Ecosystem extent (ha)	Ecosystem condition					
		Vegetation biomass (tonnes)	Biodiversity Index	Soil Organic matter	Water Quality Index	Carbon Carbon Balance	Index
Urban and associated							
Rainfed herbaceous cropland							
Forest tree cover							
Inland water bodies							
Open wetlands							

Scaling, aggregation, biophysical modelling

4. How to measure general quality of water resources in an area

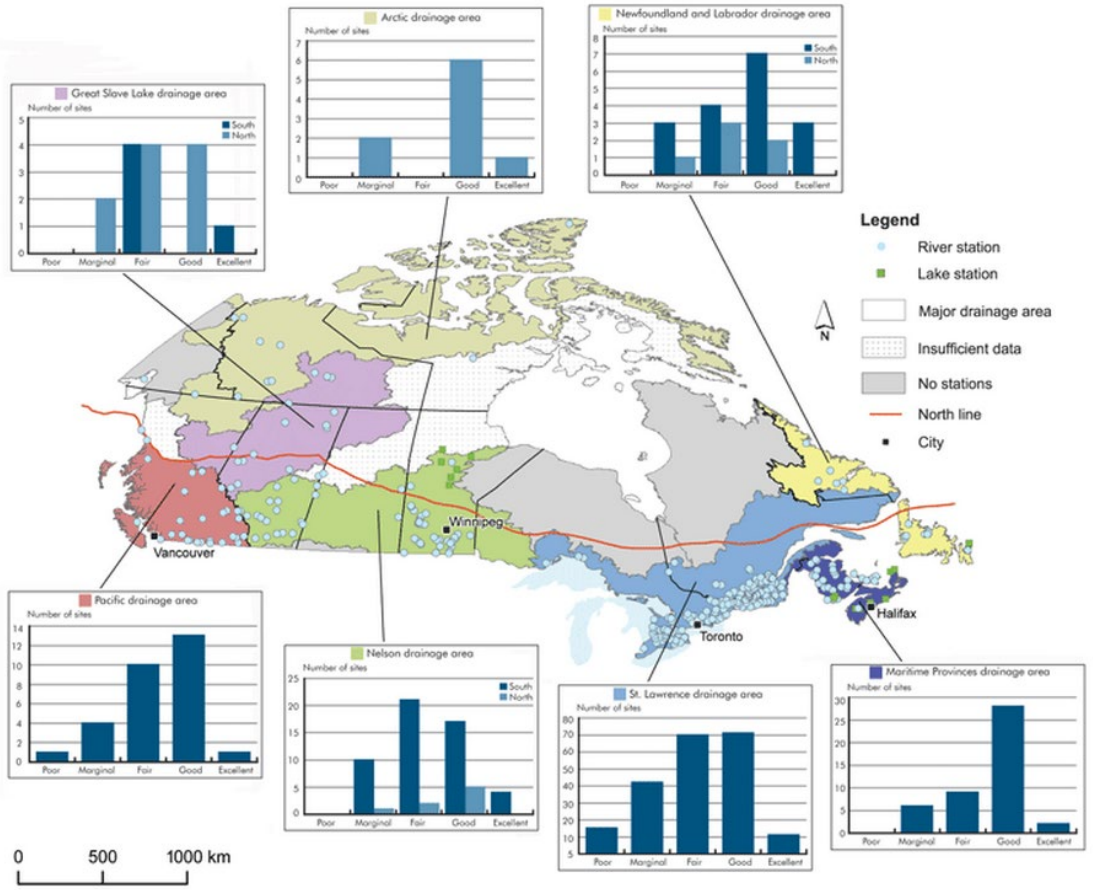
- No general approach in SEEA
- Hundreds of possible parameters
- Depends on expected use (industry, agriculture, wildlife, recreation, drinking)
- Canada's Water Quality Index (WQI)
  - Over 1000 sampling stations; located for expected problems
  - Measure at least 12 parameters; 4 samples per year
  - Index in terms of exceedances of standard for use
  - Result is index of: Poor, Marginal, Fair, Good, Excellent

4. How to measure general quality of water resources in an area

Are data representative?

Canada example:

- Monitoring sites selected to identify “problems”
- Some areas and types of streams undersampled
- Populated areas oversampled
- Solution?



Source: Statistics Canada, 2007