Statistics Canada
www.statcan.gc.ca

SEEA Implementation in Canada

Regional Training Workshop on the System of Environmental-Economic Accounting

16-18 November 2015

Shanghai, China

François Soulard

Environment, Energy and Transportation, Statistics Division

Statistics Canada Statistique Canada

Canada

Presentation outline

1. Background
2. Environment-economic accounts
3. Water asset account
4. (not so) Experimental ecosystem account

Background

1. Work on material flows at STC dates back to the 70s (focus was on energy)
2. 1991 Green Plan included funding for the development of the Canadian System of Environmental and Resource Accounts (CSERA)
3. Accounts for energy and emissions first published in 1993
4. CSERA published in 1997

Background

- New environmental statistics framework based on the concept of natural capital: stocks of environmental assets provide flows of goods and services that contribute to human well-being

- Natural capital includes ecosystems, land, and non-renewable resources

- In 2013 published Measuring Ecosystem Goods and Services (MEGS)

Environment-economic accounts

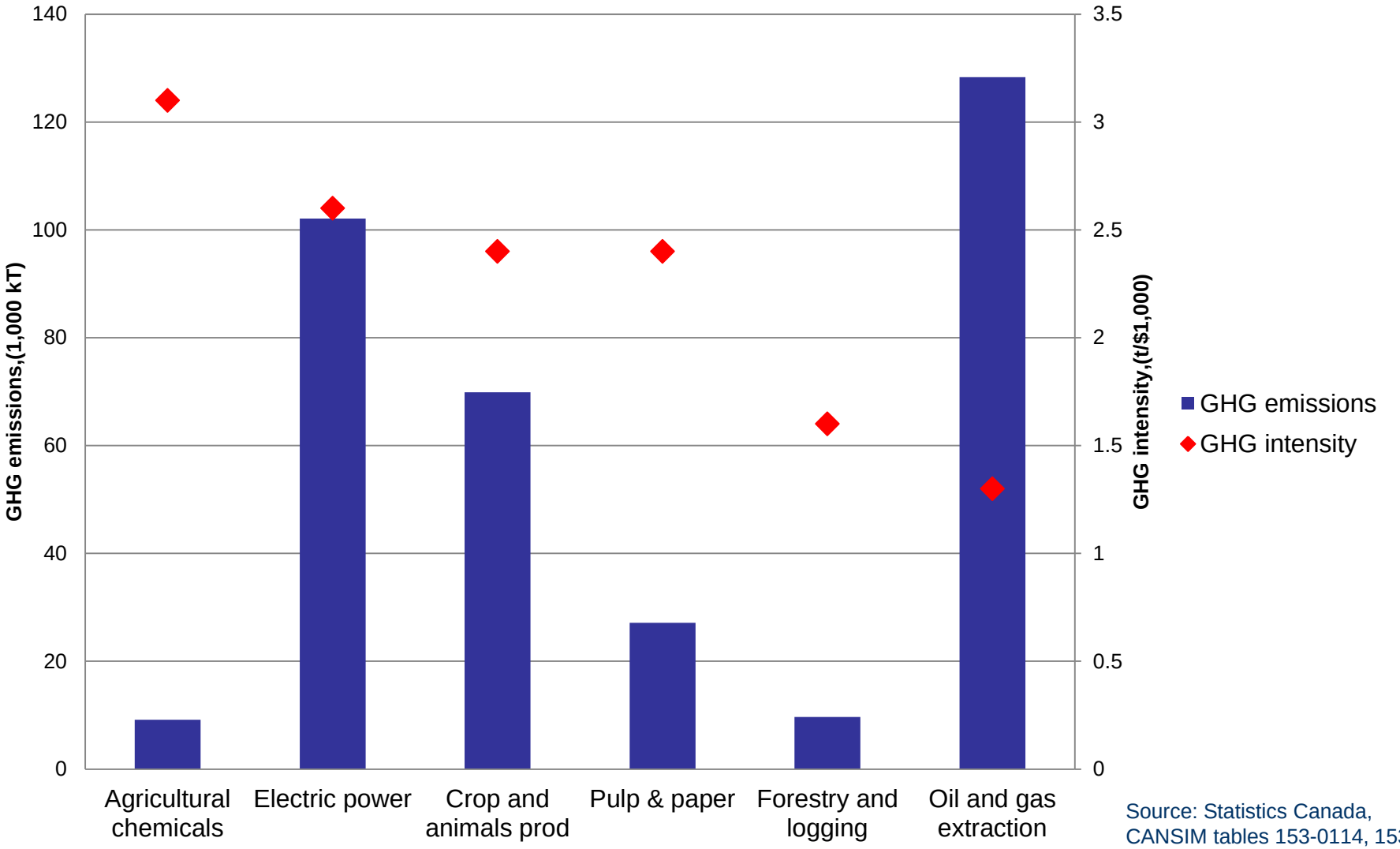
Natural capital stock accounts

- energy and mineral reserves (physical and monetary)
- timber stocks (monetary only)
- water (physical only)
- ecosystems (land use/cover, physical only)

Physical flow accounts

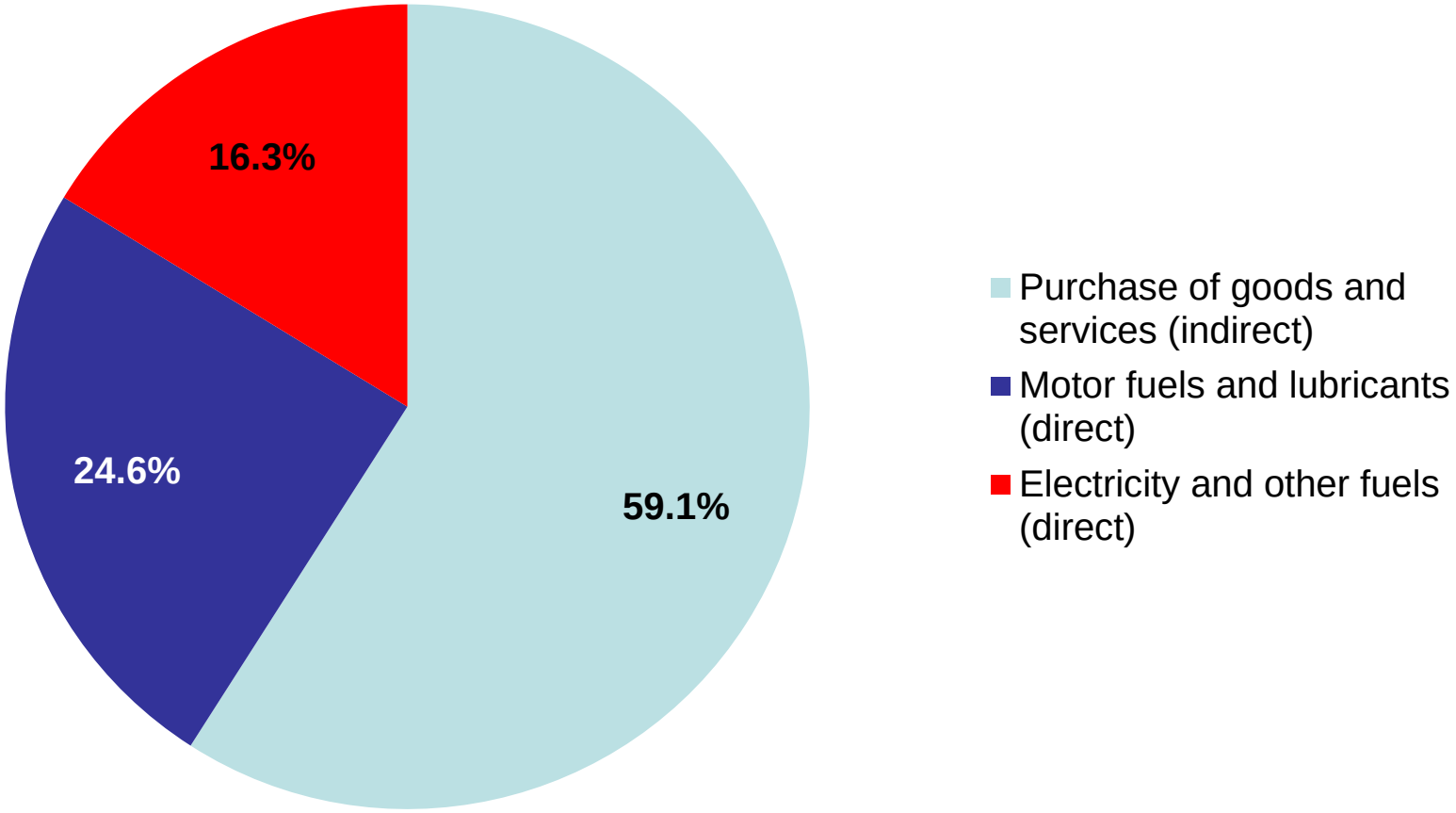
- energy use
- greenhouse gases (GHGs)
- water use

GHG emissions and GHG intensity, selected industries, Canada, 2010



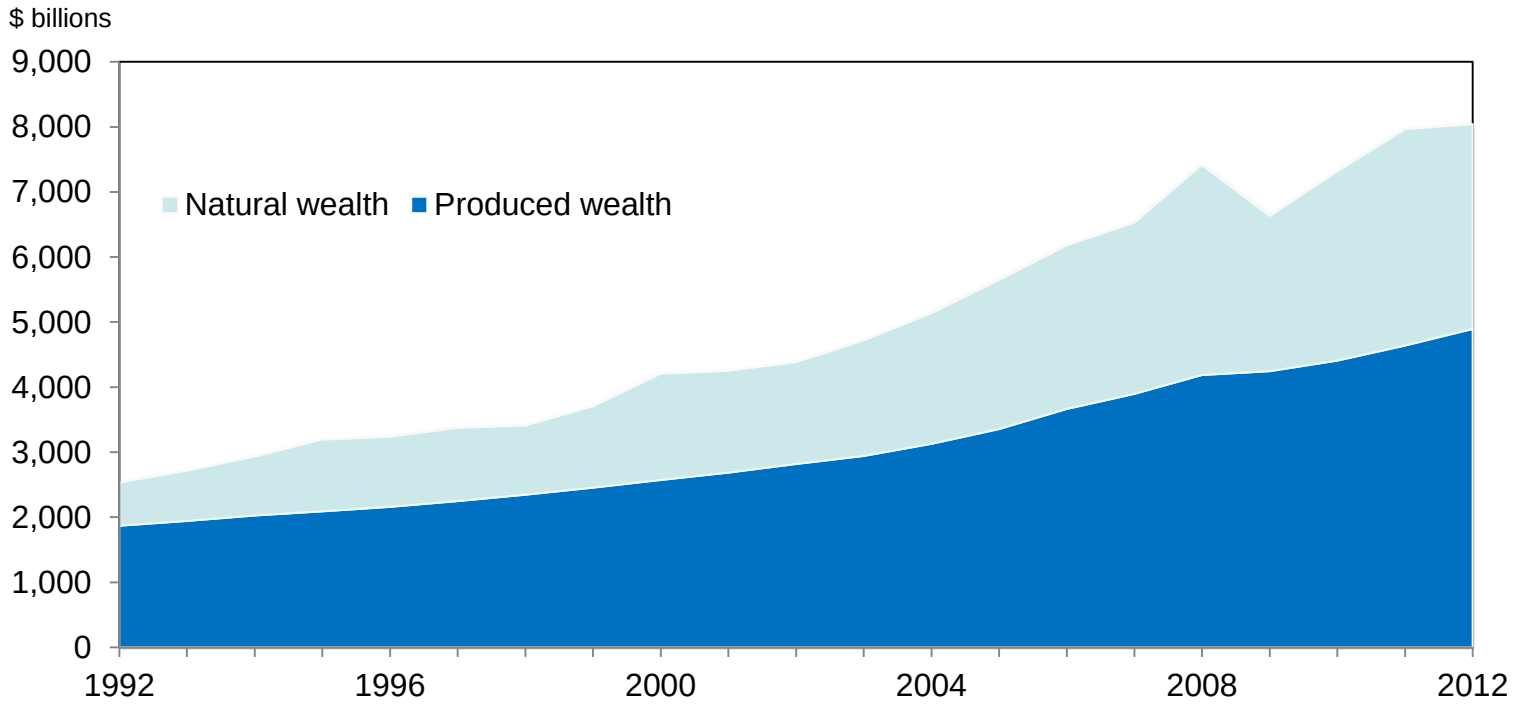
Source: Statistics Canada, CANSIM tables 153-0114, 153-0115

Indirect and direct GHG emissions from households, Canada, 2010



Source: Statistics Canada, Environment, Energy and Transportation Statistics, special tabulation

National wealth, Canada, 1992 to 2012



Notes: Natural wealth comprises natural resources assets and land. Produced wealth comprises produced non-financial assets.
Source: Statistics Canada, CANSIM table 378-0005

Water asset account

		Type of water resource						Total
		Surface water				Groundwater	Soil water	
		Artificial reservoirs	Lakes	Rivers and streams	Glaciers, snow and ice			
Opening								
Additions								
	Returns							
	Precipitation							
	Inflows from other territories							
	Inflows from other inland water resources							
	Discoveries of water in aquifers							
	Total additions to stock							
Reductions								
	Abstraction							
	for hydro power generation							
	for cooling water							
	Evaporation & actual evapotranspiration							
	Outflows to other territores							
	Outflows to the sea							
	Outflows to other inland water resources							
	Total reductions in stock							
Closing								

Water yield project

1. Develop a methodology for generating estimates of renewable freshwater (water yield) for Canada and regions

2. Provide a denominator against which compare water intake data

3. Track change over time and space in the amount of water being renewed by nature.

Overview of methodology

Filter HYDAT streamflow data

Filtered HYDAT Streamflow Data

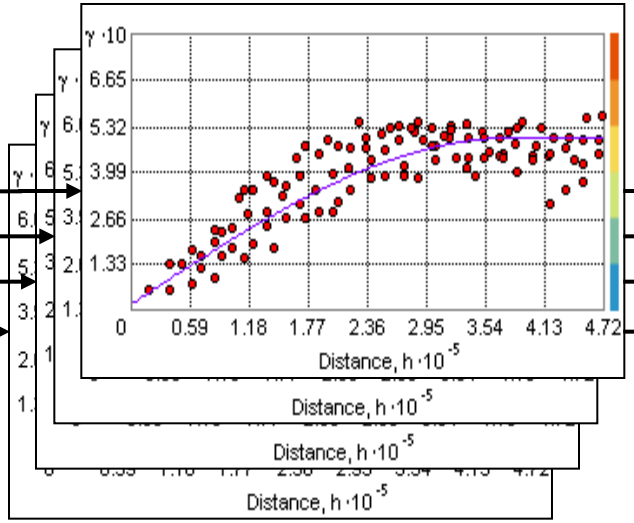
STATION_N	Hydr	Drainag	Effe	Reg	Year	Jan	Feb	Mar
01AA002	Q	598		N	1974	8.17	5.61	13.
01AA002	Q	598		N	1977	2.35	1.55	9.7
01AA002	Q	598		N	1975	3.5	1.86	5.3
01AA002	Q	598		N	1973	6.45	11	33.
01AA002	Q	598		N	1972	4.01	2.35	4.6
01AA002	Q	598		N	1971	2.04	1.38	2.6
01AA002	Q	598		N	1970	3.95	5.49	2.9
01AA002	Q	598		N	1969	4.1	3	2.1
01AA002	Q	598		N	1968	2.27	4.37	16.
01AA002	Q	598		N	1967			
01AA002	Q	598		N	1976	4.41	8.02	24.
01AD002	Q	14700		N	1973	125	212	282
01AD002	Q	14700		N	1980	79.6	37.7	48.
01AD002	Q	14700		N	1988	70.7	59.1	46.
01AD002	Q	14700		N	1987	86.5	38.4	11
01AD002	Q	14700		N	1986	79	179	82.
01AD002	Q	14700		N	1985	70.7	34.7	6

Derive monthly runoff values

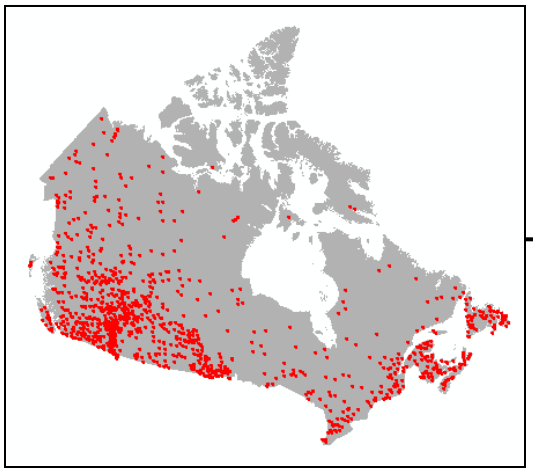
Monthly Input Runoff Data

Shape *	STNNBR	SOURCE	AREA	JUL	CRUNOFF	RUNOFFLT
Point	02XD001	Stlawsb	206	14.3	69.417476	1.84768
Point	02YD002	Stlawsb	200	1.96	9.8	1.033424
Point	02YA001	Stlawsb	306	14.1	46.078431	1.672822
Point	02XB002	Stlawsb	1060	45.5	42.924528	1.642707
Point	02XA004	Stlawsb	2060	74.4	36.116505	1.569567
Point	02YC001	Stlawsb	624	21.5	34.455128	1.549679
Point	02YR002	Stlawsb	399	4.15	10.401003	1.056943
Point	02YR003	Stlawsb	554	7.07	12.761733	1.138673
Point	02XA003	Stlawsb	4540	159	35.022026	1.556568
Point	02YR001	Stlawsb	275	5.45	19.818182	1.318443
Point	02YK005	Stlawsb	391	5.41	13.836317	1.171326
Point	02YS005	Stlawsb	2000	35.1	17.55	1.268344
Point	02ZH001	Stlawsb	764	22.9	29.973822	1.490995
Point	02YL001	Stlawsb	2110	56.3	26.682464	1.442205
Point	02YO008	Stlawsb	773	10.2	13.195343	1.152146
Point	02ZK001	Stlawsb	301	13.2	43.853821	1.651799
Point	02YQ004	Stlawsb	2200	39.7	18.045455	1.279791

Develop monthly semi-variograms

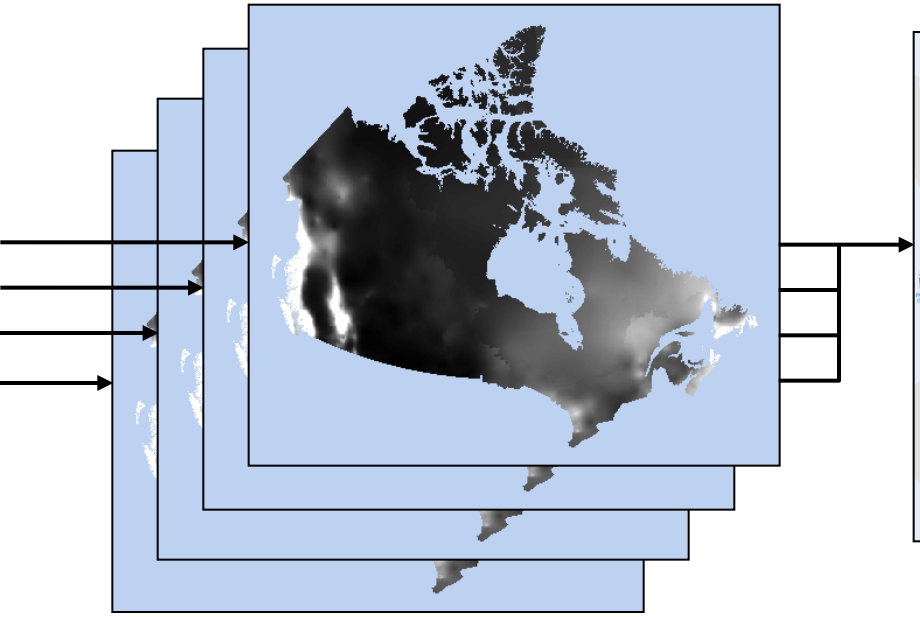


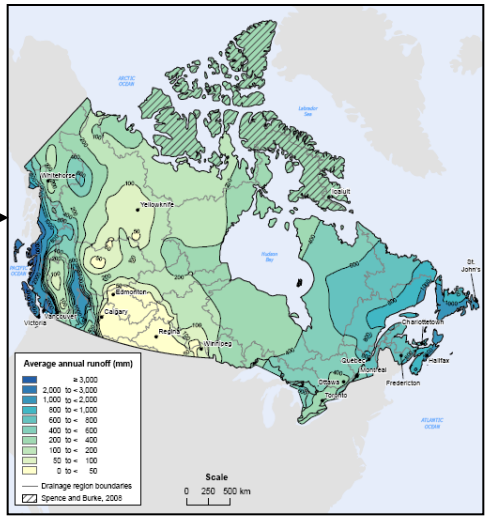
Generate basin centroids



Interpolate monthly surfaces

Summarize to generate outputs

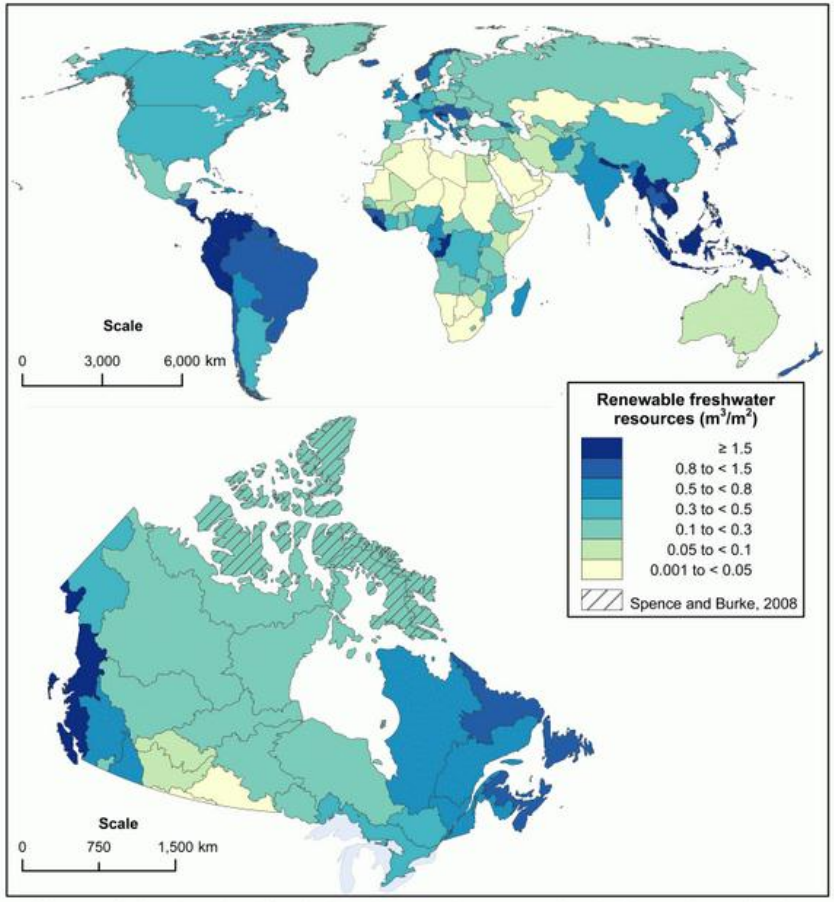


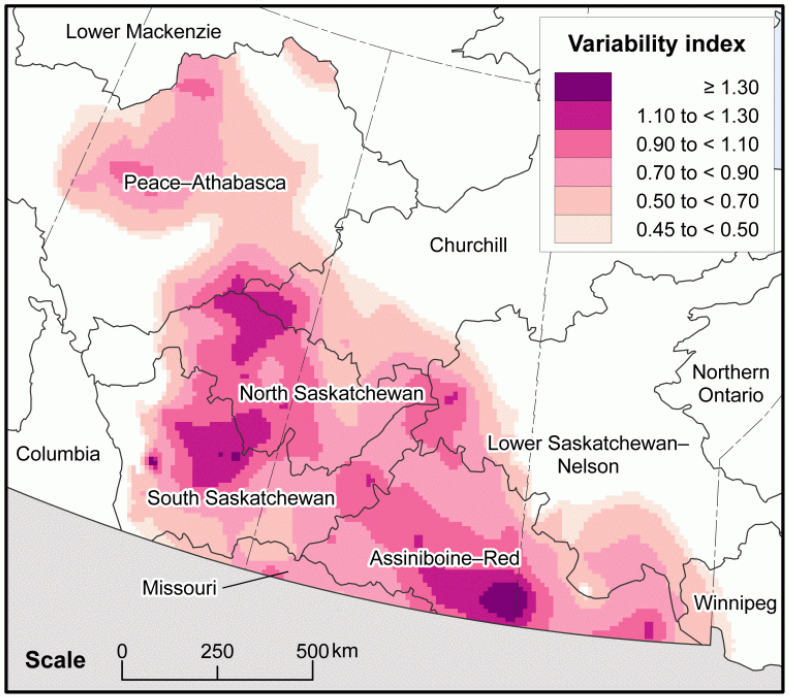


Average annual water yield by drainage region, 1971 to 2004

	Drainage region code	Water yield	
		Volume [1]	Volume per unit area
	number	km³	m³ per m²
Canada		**3,472.3**	**0.348**
Pacific Coastal	1	513.7	1.536
Fraser–Lower Mainland	2	128.6	0.552
Okanagan–Similkameen	3	4.2	0.270
Columbia	4	67.7	0.776
Yukon	5	106.0	0.318
Peace–Athabasca	6	99.9	0.206
Lower Mackenzie	7	246.3	0.185
Arctic Coast–Islands	8	231.3	0.131
Missouri	9	0.5	0.019
North Saskatchewan	10	10.2	0.068
South Saskatchewan	11	9.6	0.054
Assiniboine–Red	12	6.9	0.036
Winnipeg	13	25.4	0.236
Lower Saskatchewan–Nelso	14	47.6	0.132
Churchill	15	49.4	0.158
Keewatin–Southern Baffin Is	16	192.0	0.204
Northern Ontario	17	199.2	0.288
Northern Quebec	18	516.3	0.549
Great Lakes	19	133.1	0.419
Ottawa	20	62.6	0.428
St. Lawrence	21	71.3	0.600
North Shore–Gaspé	22	292.2	0.792
Saint John–St. Croix	23	29.2	0.697
Maritime Coastal	24	103.6	0.849
Newfoundland–Labrador	25	325.4	0.856

Water yield trends over space ...



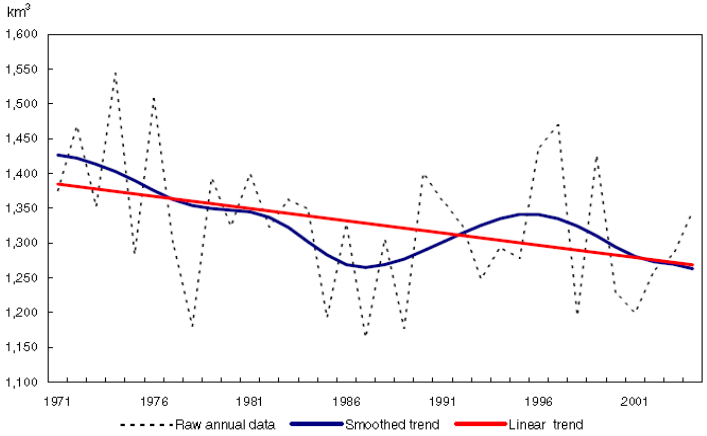


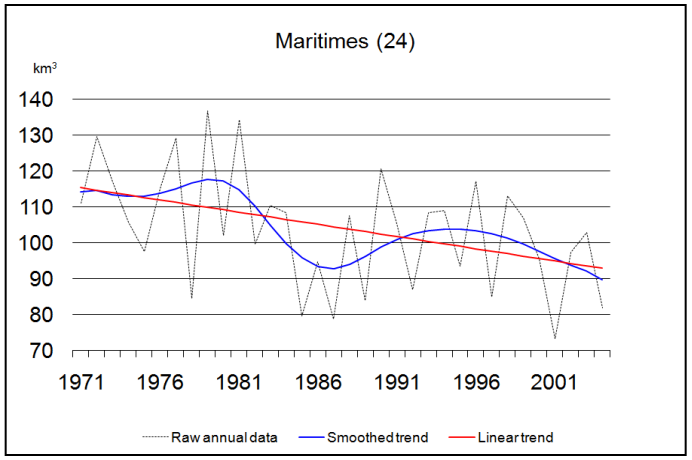
Note(s): Includes all or part of drainage regions 6, 9, 10, 11, and 12, the Peace–Athabasca, Missouri, North Saskatchewan, South Saskatchewan, and Assiniboine–Red.

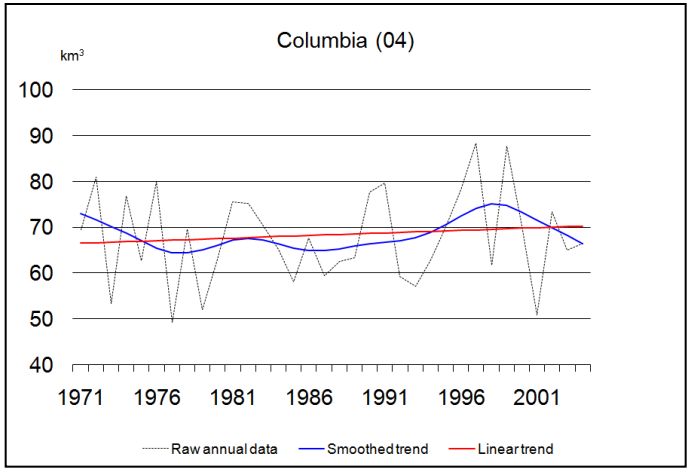
Sources(s): Statistics Canada, Environment Accounts and Statistics Division, 2010, special tabulation.

… and time

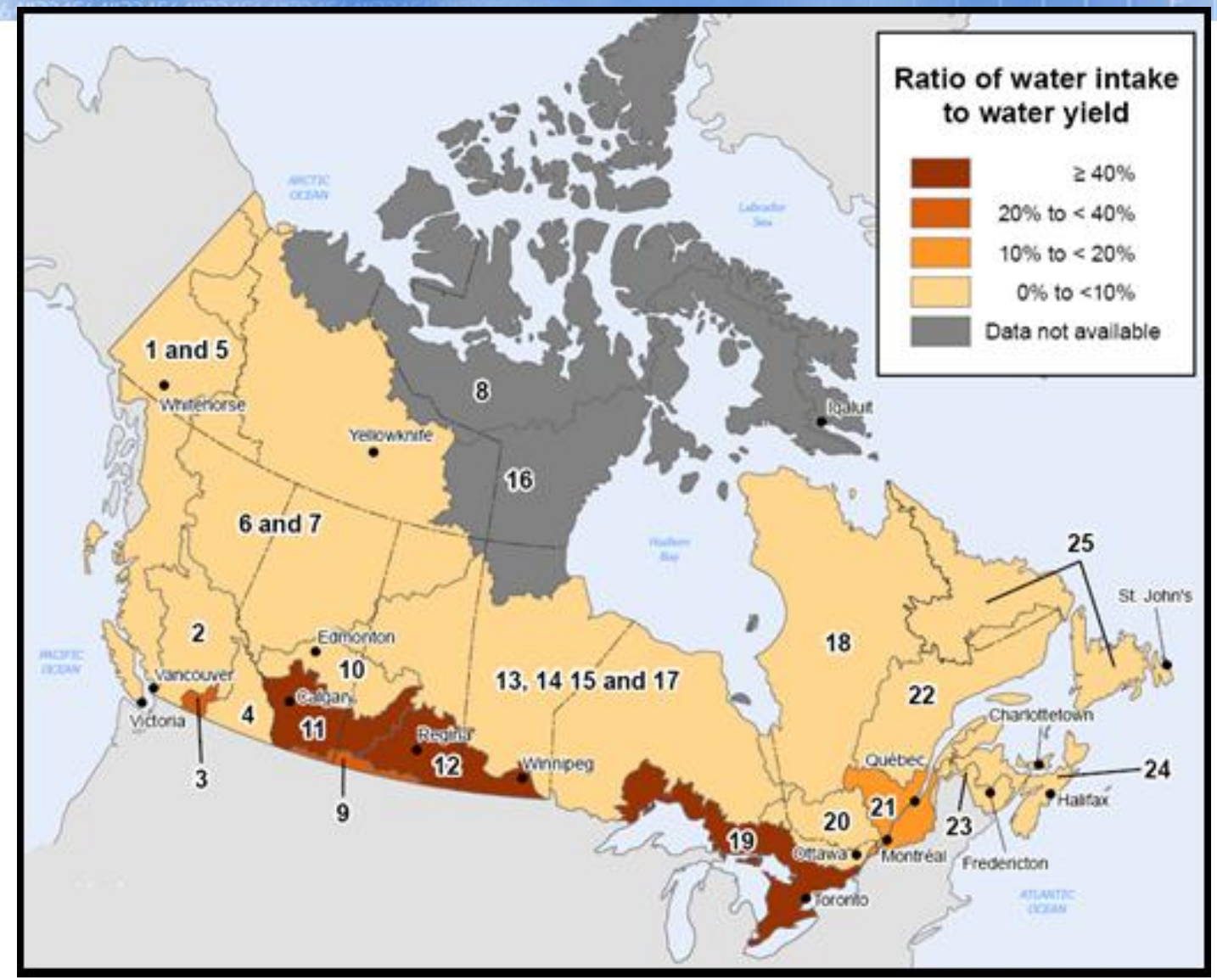

ARCTIC OCEAN
Labrador Sea
Whitehorse
Yellowknife
Iqaluit
Hudson Bay
St. John's
Vancouver
Edmonton
PACIFIC OCEAN
Victoria
Regina
Calgary
Winnipeg
Québec
Charlottetown
Halifax
Montréal
Ottawa
Toronto
Fredericton
ATLANTIC OCEAN
Scale
0 500 1,000 km


km³
1,600
1,550
1,500
1,450
1,400
1,350
1,300
1,250
1,200
1,150
1,100
1971
1976
1981
1986
1991
1996
2001
Raw annual data
Smoothed trend
Linear trend

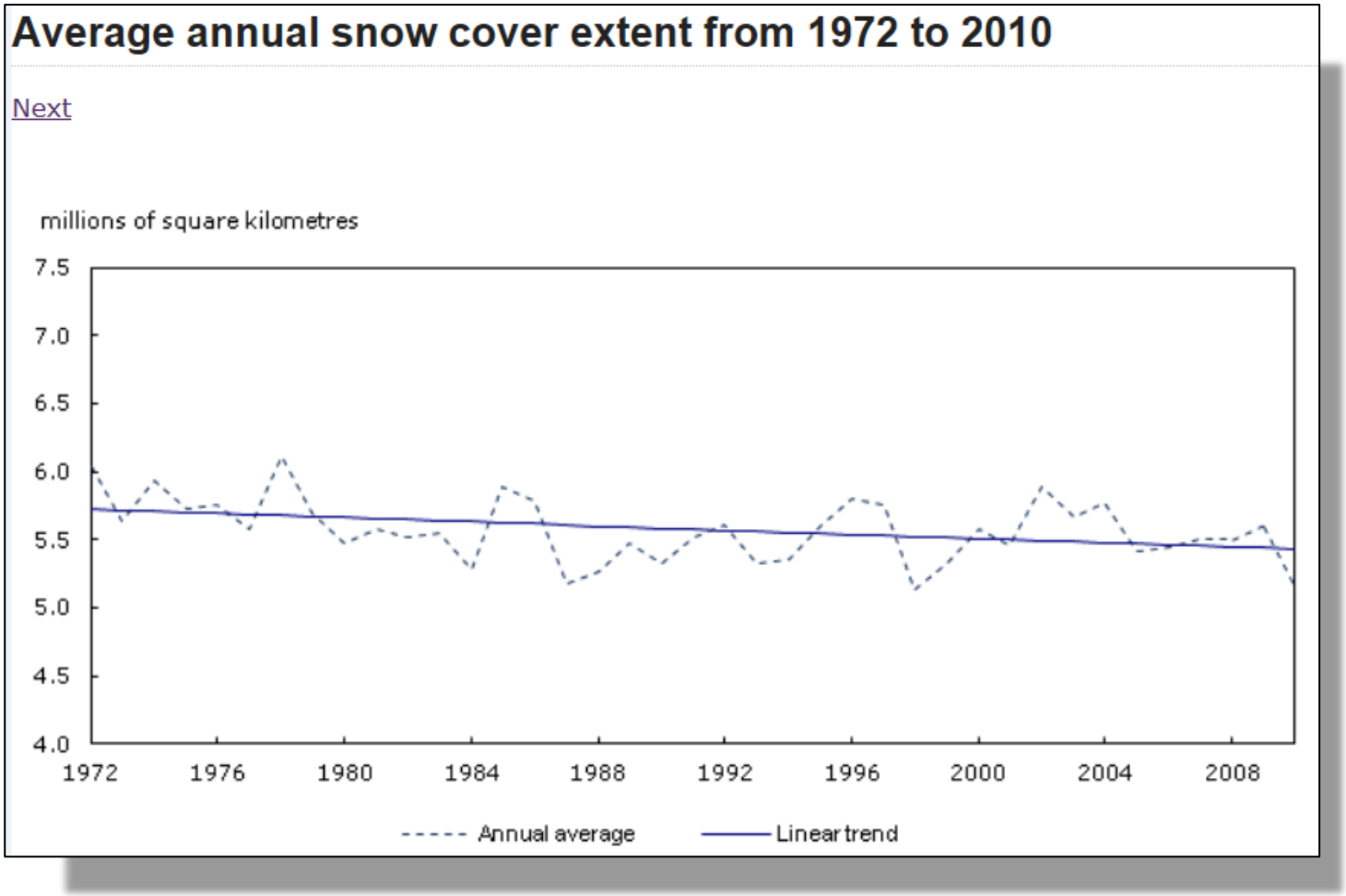

Maritimes (24)
km³
140
130
120
110
100
90
80
70
1971
1976
1981
1986
1991
1996
2001
Raw annual data
Smoothed trend
Linear trend


Columbia (04)
km³
100
90
80
70
60
50
40
1971
1976
1981
1986
1991
1996
2001
Raw annual data
Smoothed trend
Linear trend

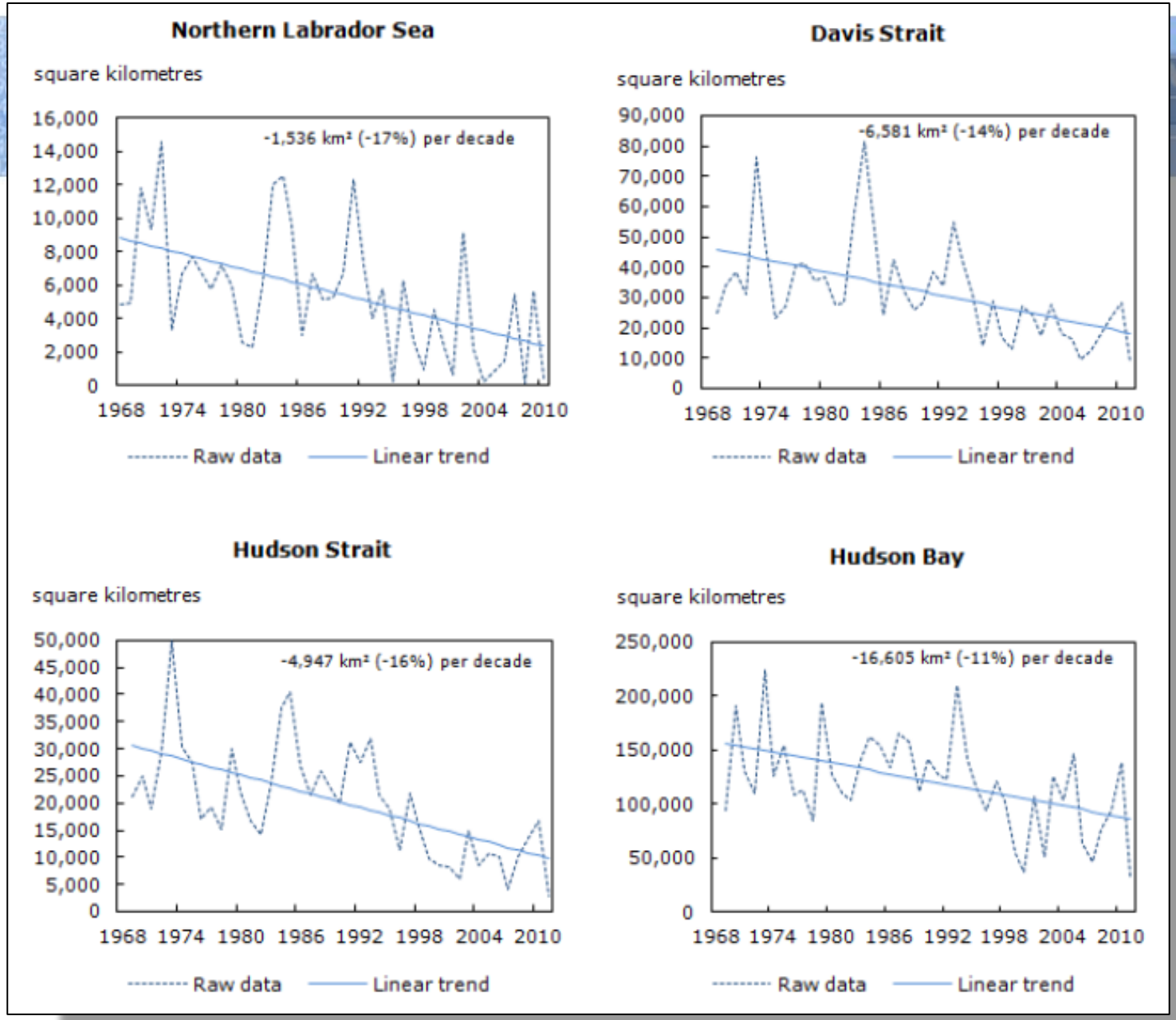
Water supply and demand : August 2005



Other water asset work includes…



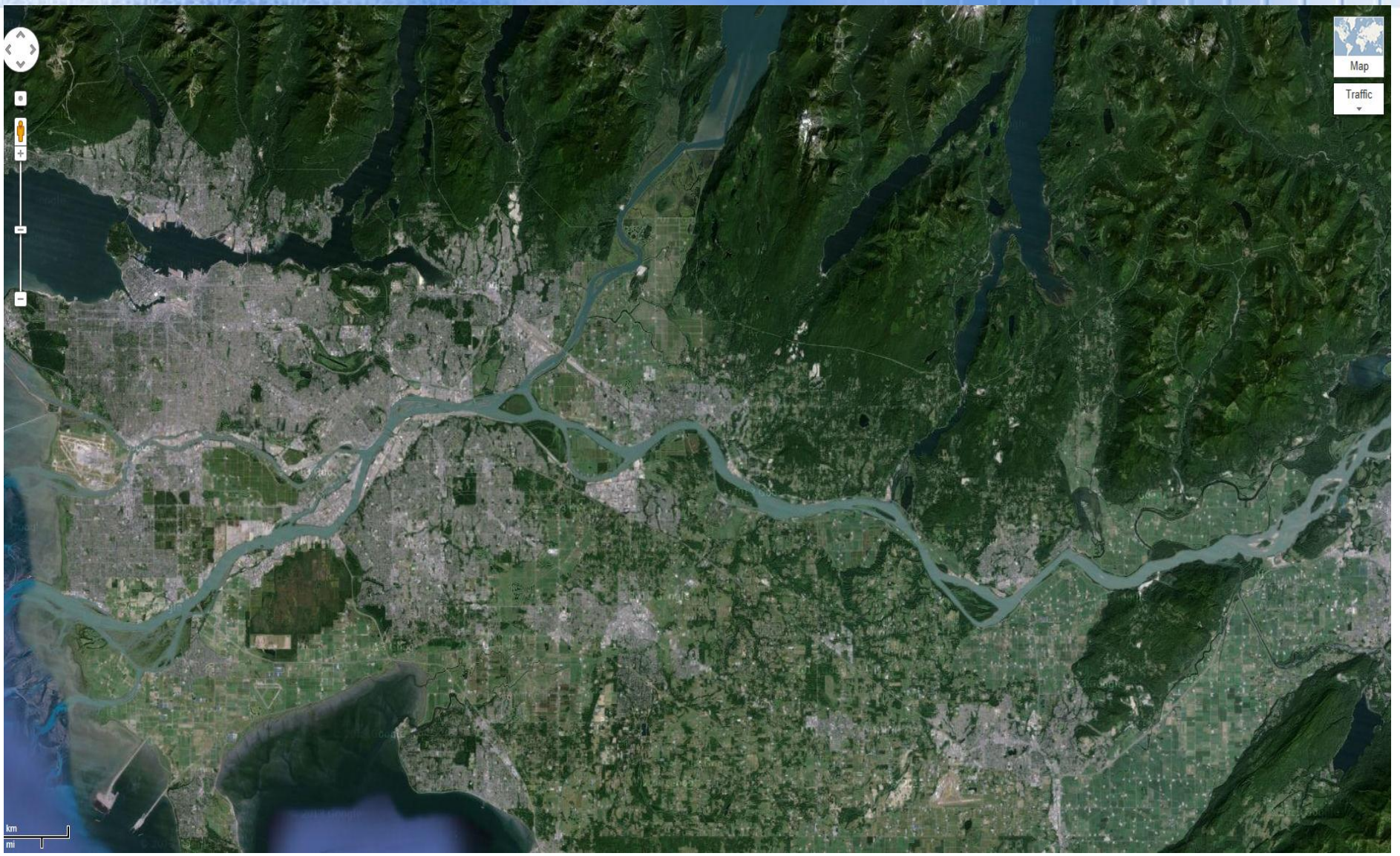
Average area covered by total (all) sea ice during summer



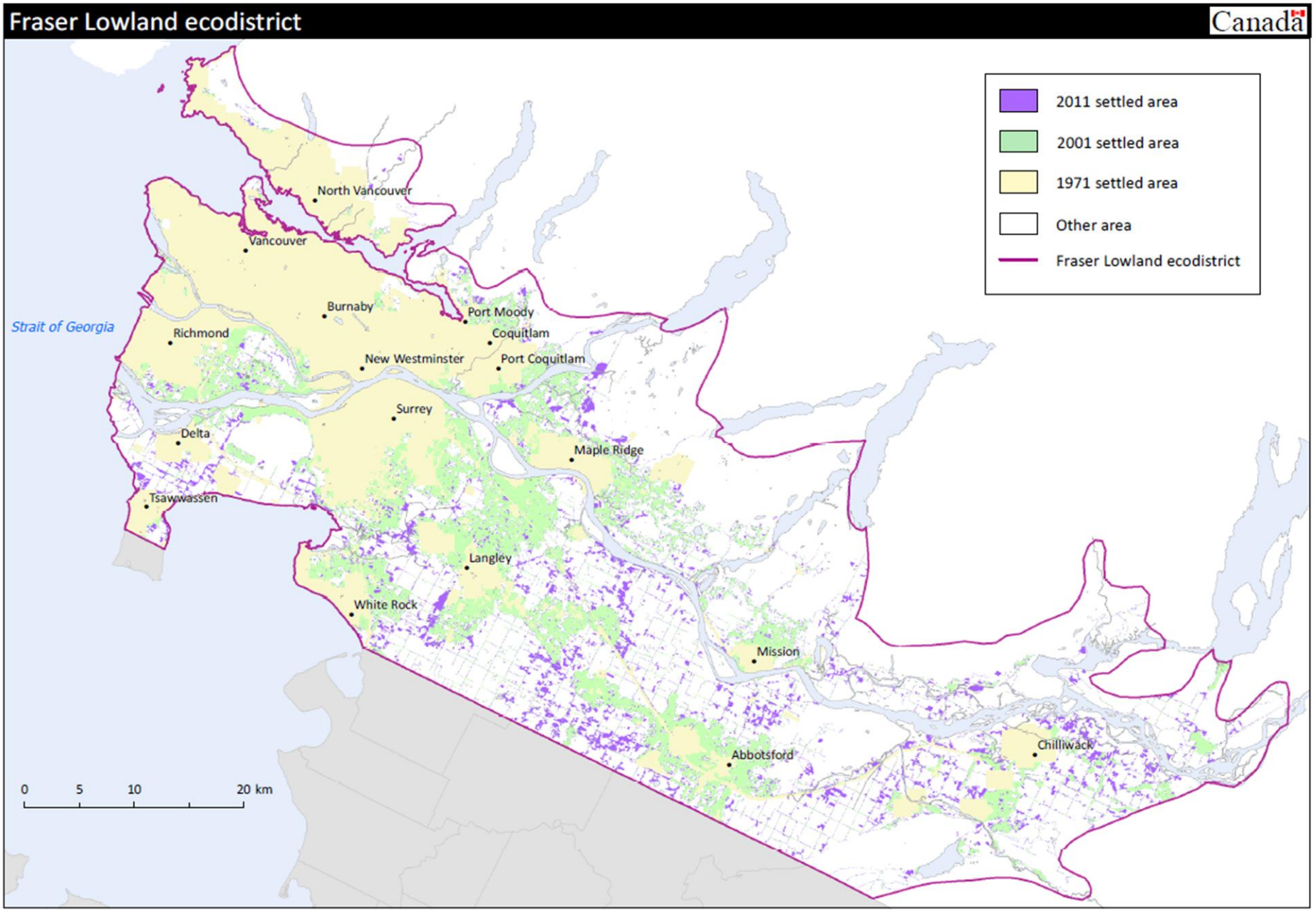
Experimental Ecosystem Accounting

Land cover: Extent and change

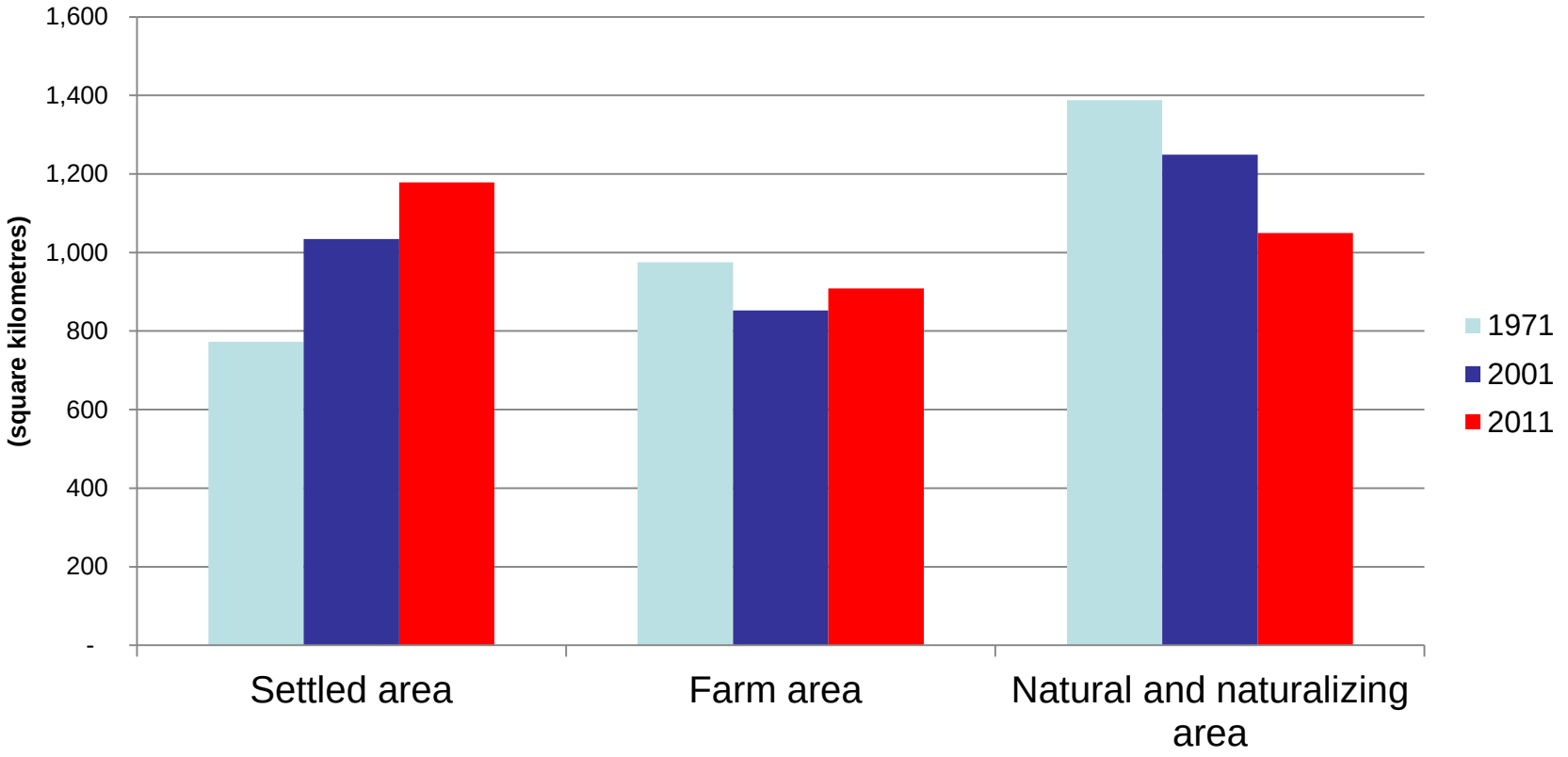
Settled Area: Fraser Lowland Ecodistrict



Settled Area: Fraser Lowland Ecodistrict



Fraser lowland ecodistrict, land types, 1971, 2001 and 2011



Note: Settled area for 1971 is pereliminary. The 2001 estimate was derived from 2000 AAFC 30 m satellite imagery.
Source: Statistics Canada, Environment, Energy and Transportation Statistics Division, special tabulation

Coming soon …

1. Renewable water, and land-cover estimates have been released on a one-time basis – annual estimates will now be released as of 2016

2. Pilot accounts to be assessed for possible release: environmental expenditures and solid waste

Conclusion:

1. Towards a Census of the Environment
   - R.S., coupled with other data, allows the development of a comprehensive representation of land cover / use and ecosystems assets

2. Implementation of U.N. S.E.E.A. requires R.S.
   - Ecosystem Accounts, Water Accounts, Land Accounts

3. With increasing accessibility of R.S. products, users and usages are growing quickly
   - N.S.O. need to move forward to avoid being left behind

SEEA Implementation in Canada

Regional Training Workshop on the System of Environmental-Economic Accounting

16-18 November 2015

Shanghai, China

francois.soulard@canada.ca