Environmental Accounting

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Introduction

- What is meant by “environmental accounting”?
  - Recording and/or disclosing environmental liabilities
  - Reporting on organization’s environmental record
  - Reporting by a government on environmental stewardship
  - Incorporating measures of environmental well-being in the *national accounts* - the focus of this session

Introduction

- National economic accounts:
  - "The System of national economic accounts module provides up-to-date portraits of national and provincial economies and their structures, based on an integrated, internationally recognized set of economic accounting concepts."

(http://www.statcan.gc.ca/nea-cen/index-eng.htm); accessed February 28, 2011

Introduction

- Main national economic accounts:
  - *Input-output accounts* measure productive activity by more than 700 commodities and 300 industries
    - Enable calculation of *Gross domestic product (GDP)*
  - *Income and expenditure accounts*
    - Wages and benefits; profits; interest and dividends
    - Consumer spending, government expenditures, business investments, and exports less imports
    - Also enable calculation of *Gross domestic product (GDP)*
  - *Financial and wealth accounts*
    - Financial flow accounts (statement of sources and uses of funds)
    - National balance sheet accounts
  - *Balance of international payments*
    - Current account
    - Capital and financial account

(For more information, see: http://www.statcan.gc.ca/nea-cen/about-apropos/index-eng.htm)

Introduction

- National balance sheet:
  - Net worth = non-financial assets minus net financial liabilities
  - 2009 market value of net worth = $6.1 trillion
  - Per capita = $182,011
  - Non-financial assets include:
    - Residential and non-residential structures
    - Machinery and equipment
    - Consumer durables
    - Inventories
    - Land

Statistics Canada. National Economic Accounts: Data Tables; from http://www.statcan.gc.ca/nea-cen/index-eng.htm, and Statistics Canada. Population by Year, by Province and Territory; from http://www40.statcan.gc.ca/l01/cst01/demo02a-eng.htm; accessed February 28, 2011.

Introduction

- Why incorporate measures of environmental well-being in the national accounts?
  - National accounts are an influential source or economic information.
  - They neglect measuring the contribution of the environment to national wealth.
  - They treat the use of natural resources as income but do not record capital depletion thus measuring the benefits of the use of the environment but not the costs.
  - They include expenditures to protect the environment as part of gross production.

(Statistics Canada. Environmental and Resources Accounts: Frequently Asked Questions. http://www.statcan.gc.ca/nea-cen/faq-foq/env-eng.htm; accessed February 28, 2011)

Introduction

- Why should public sector accountants and financial managers care about the measurement of environmental impacts in the national accounts?
  - Public sector financial managers are routinely called upon to provide comments or advice on the performance of agencies or on overall government financial or economic condition.
  - Governments are responsible for environmental stewardship and for the management of the economy, and need to be held accountable.
  - Accountants are in the business of accountability.
  - In a world where environmental externalities abound and with a rapidly increasing population, environmental stewardship is a top concern.

SEEA

- SEEA is a System of Environmental-Economic Accounting
- *"Environmental-economic accounting brings together economic and environmental information in a common framework to measure the contribution of the environment to the economy and the impact of the economy on the environment. By using common concepts, definitions and classifications, the SEEA provides a transparent information system for strategic planning and policy analysis which can be used to identify more sustainable paths of development."*

(United Nations Statistics Division. 'Environmental-Economic Accounting.' http://unstats.un.org/unsd/envaccounting/EnvAcc_Brochure_FINAL1.pdf; accessed, February 28, 2011)

SEEA

- SEEA development was undertaken under the joint responsibility of the UN, the European Commission, the IMF, the OECD and the World Bank.
- Much of the work done by the *London Group on Environmental and Natural Resources Accounting.*
- SEEA is a work in progress and has been under formal development for twenty years or so.

SEEA - History

- 1993: UN publishes *Handbook of National Accounting: Integrated Environmental and Economic Accounting*, an "interim" version of work in progress
- 1994: first meeting of *London Group on Environmental Accounting* formed by countries active in the field; Canada is a participant
- 2001 and 2003: *Handbook of National Accounting: Integrated Environmental and Economic Accounting - An Operational Manual* (original & revised)

SEEA - History (continued)

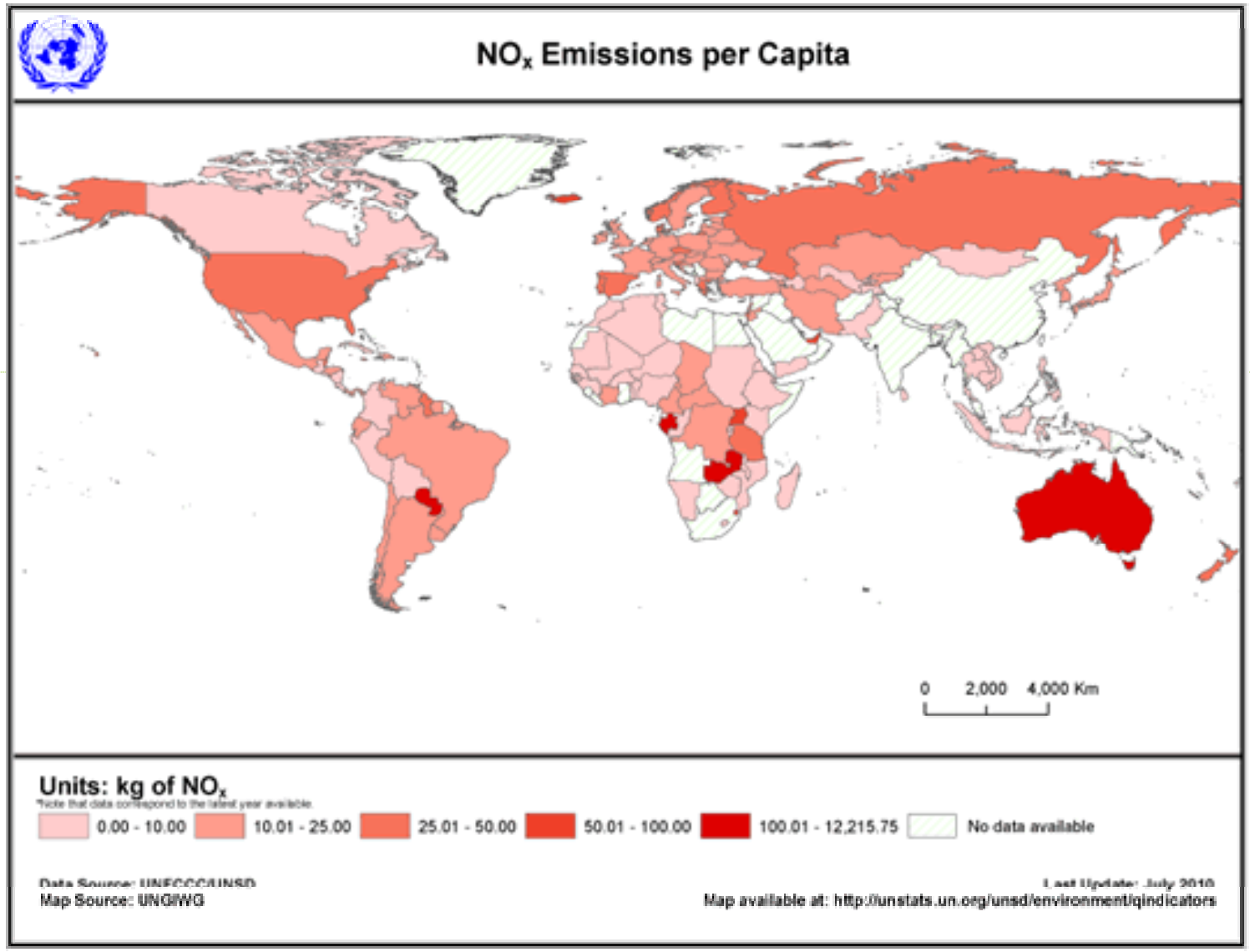
- 2004: *Handbook of National Accounting: Integrated Environmental and Economic Accounting for Fisheries*
- 2005: United Nations Committee of Experts on Environmental-Economic Accounting (UNCEEA) formed:
  - to mainstream environmental-economic accounting and related statistics
  - to elevate the *System of integrated Environmental and Economic Accounting* (SEEA) to an international statistical standard
  - to advance the implementation of the SEEA in countries
- UNCEEA has been meeting annually since

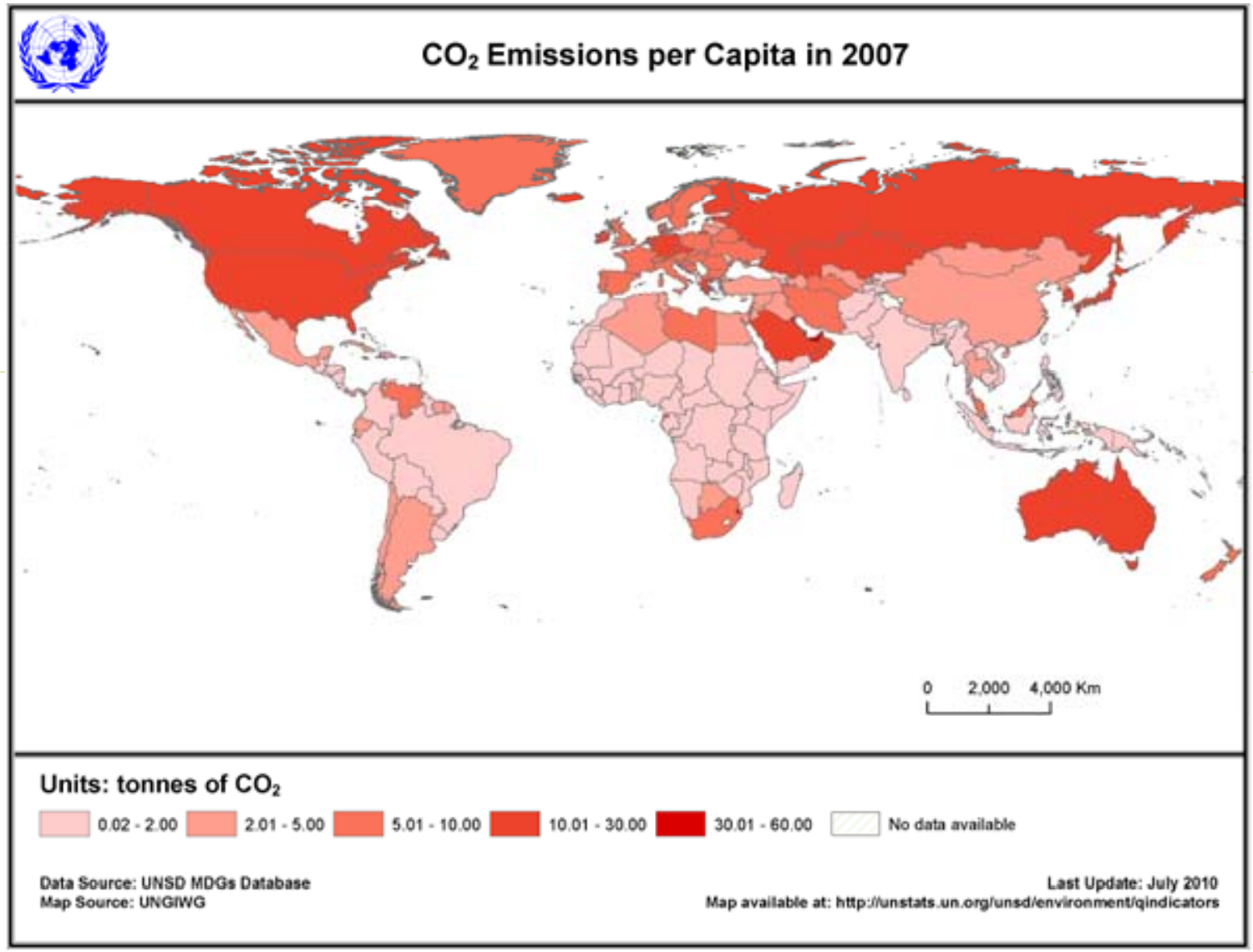
SEEA - History (continued)

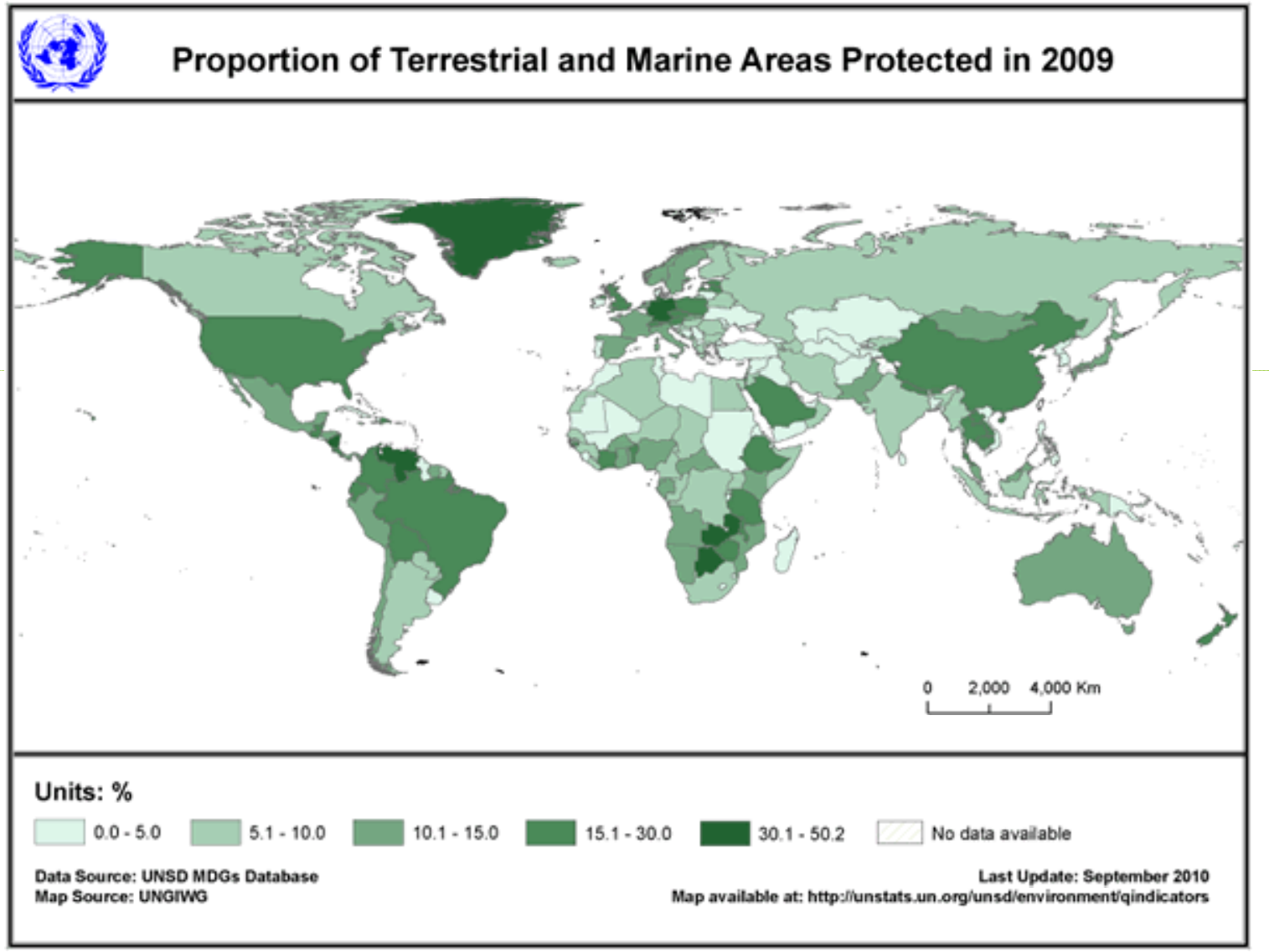
- 2007: *System of Environmental-Economic Accounting for Water* adopted as interim national standard
- Since 2007: UNCEEA is working on revisions for the Handbook, developing Volumes I to III for approval by the United Nations Statistical Commission (UNSC).
  - Volume 1 consisting of the international statistical standard
  - Volume 2 consisting of those topics for which consensus could not be reached but which are highly policy relevant
  - Volume 3 consisting of the applications of the accounts presented in Volumes 1 and 2

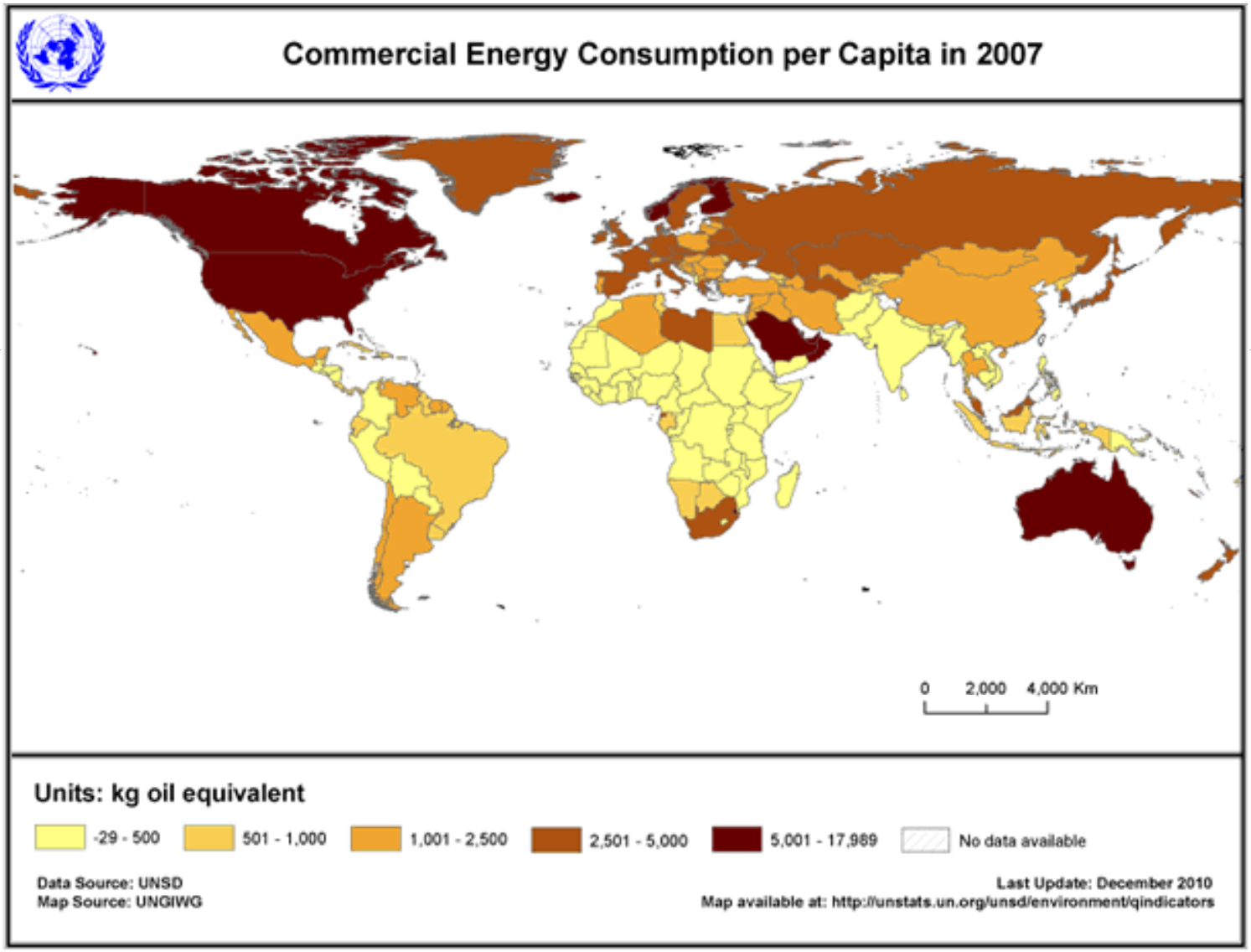
SEEA – Environment Indicators

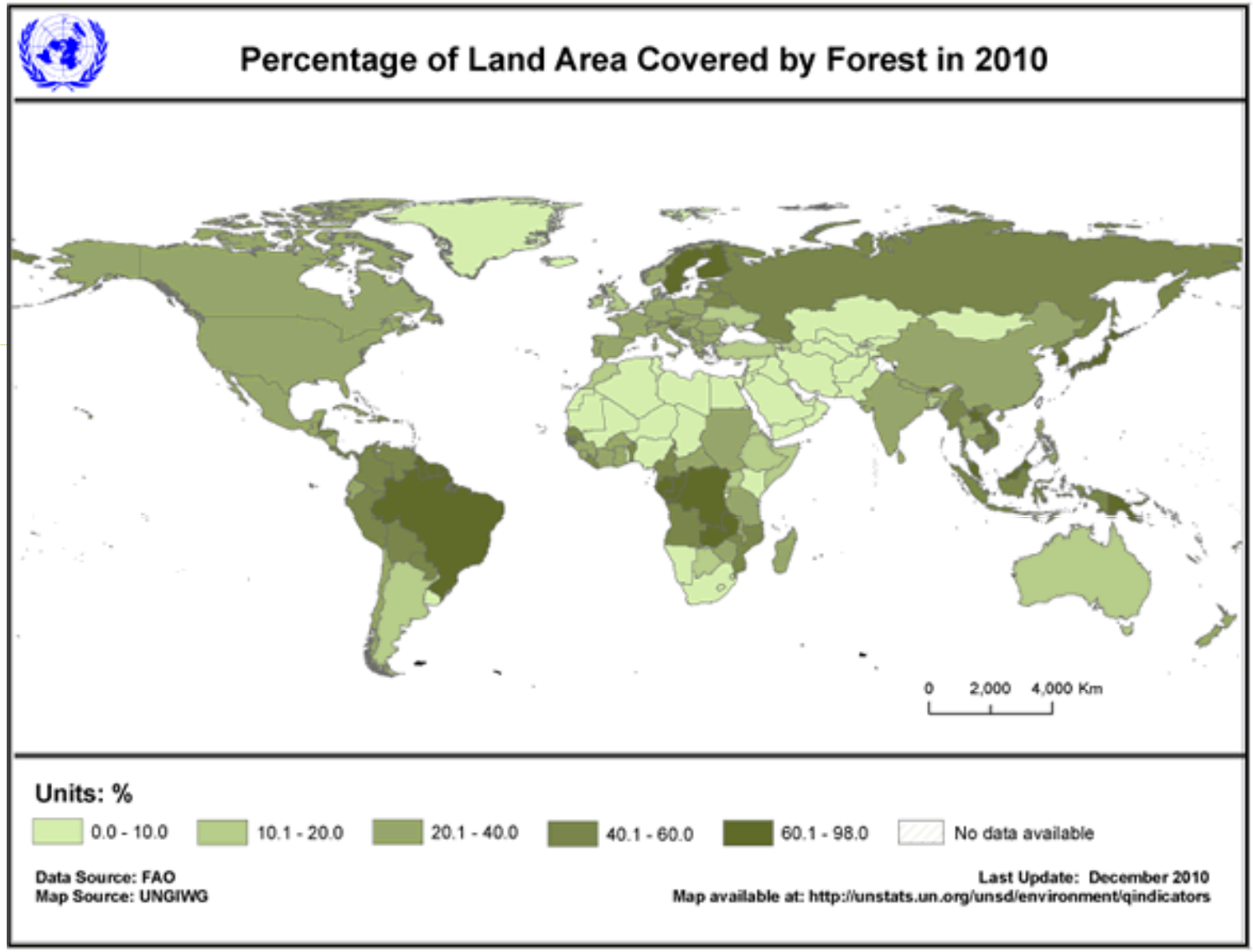
- The following group of slides shows a series of environment indicators currently published by the UNSC.
- Indicators are shown here on world maps, with variation at the country level (no variation within a country is shown).

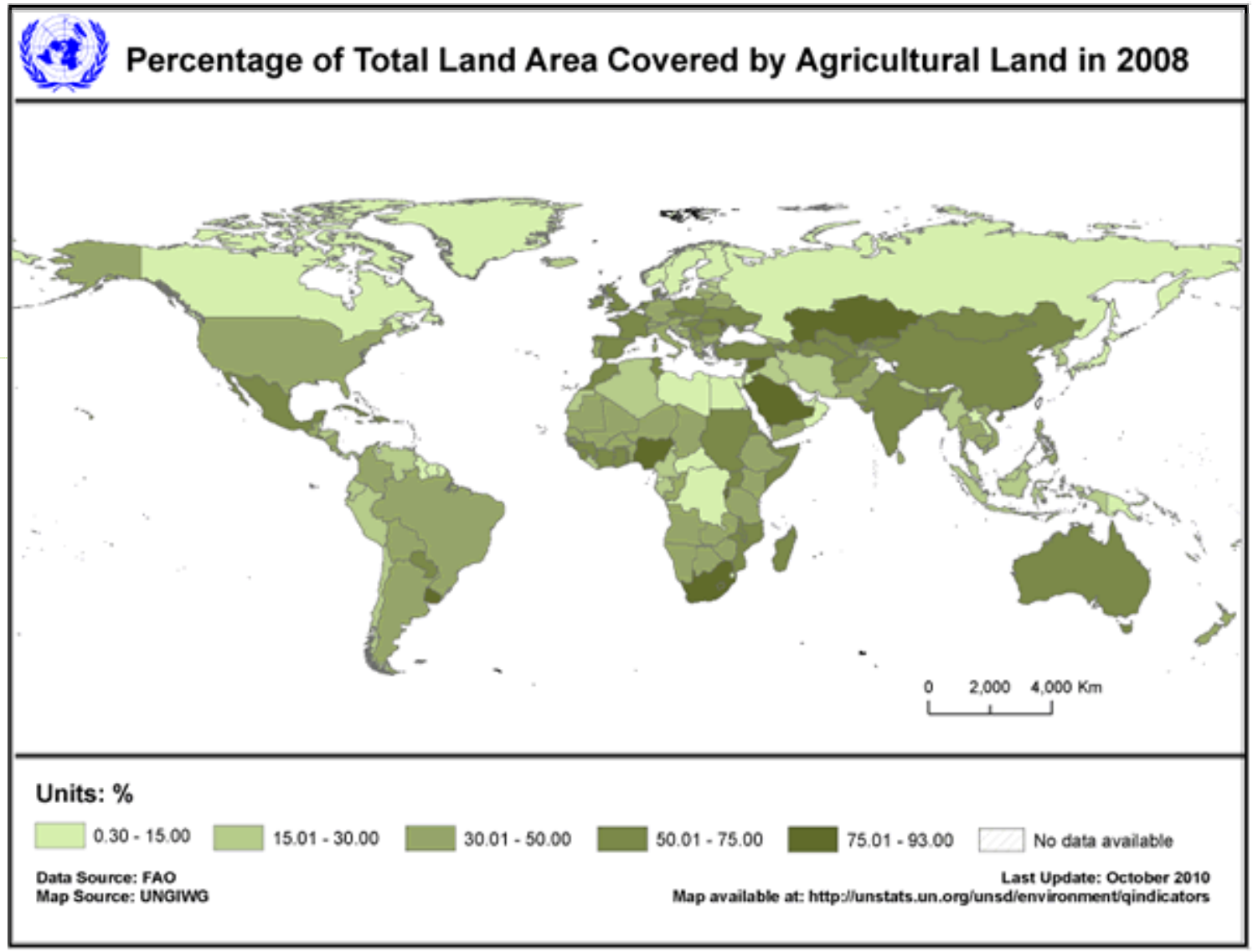

NOx Emissions per Capita
0 2,000 4,000 Km
Units: kg of NOx
*Note that data correspond to the latest year available
0.00 - 10.00
10.01 - 25.00
25.01 - 50.00
50.01 - 100.00
100.01 - 12,215.75
No data available
Map Source: UNGIWG
Map available at: http://unstats.un.org/unsd/environment/qindicators

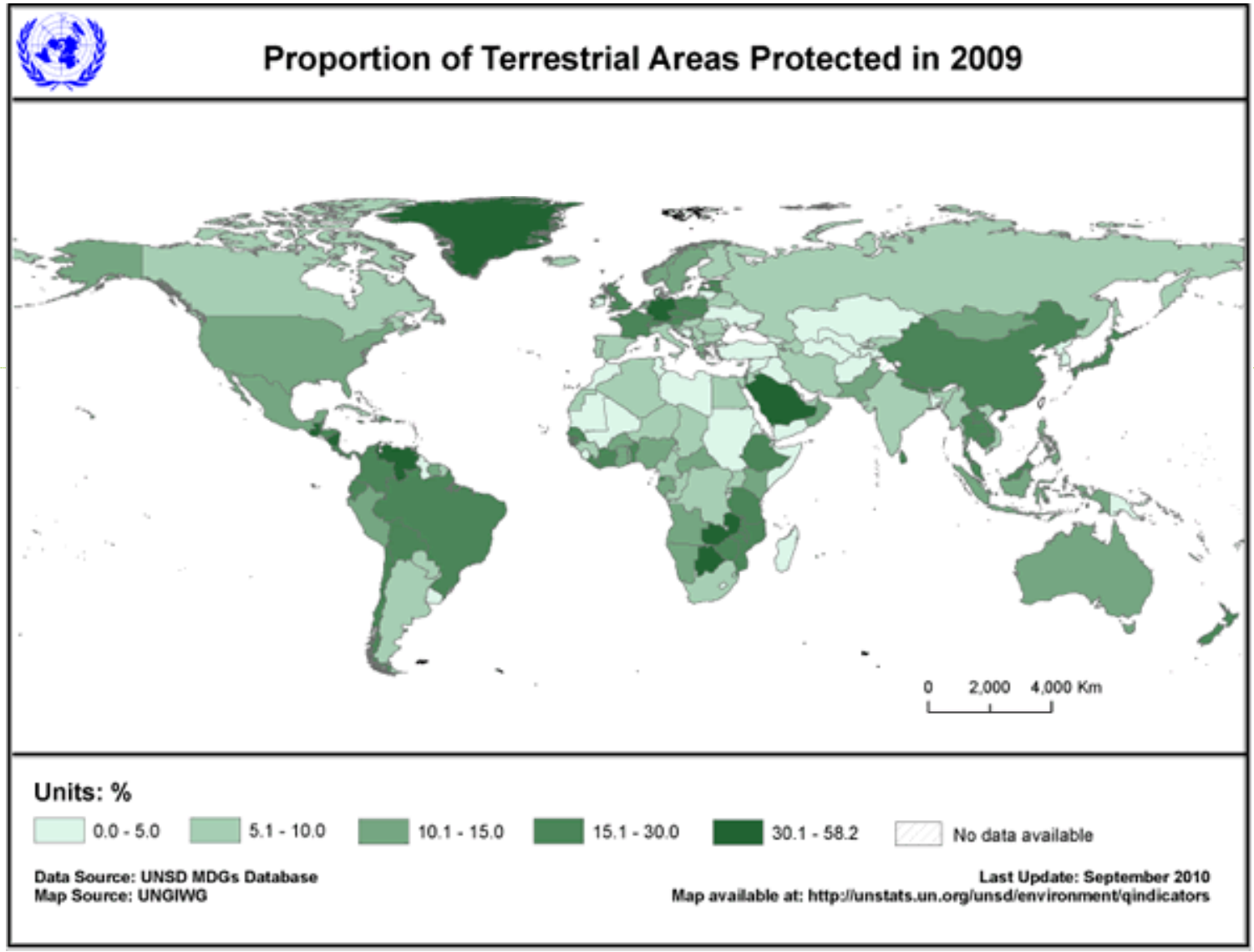

CO_2 Emissions per Capita in 2007
0 2,000 4,000 Km
Units: tonnes of CO_2
0.02 - 2.00
2.01 - 5.00
5.01 - 10.00
10.01 - 30.00
30.01 - 60.00
No data available
Data Source: UNSD MDGs Database
Map Source: UNGIWG
Last Update: July 2010
Map available at: http://unstats.un.org/unsd/environment/qindicators

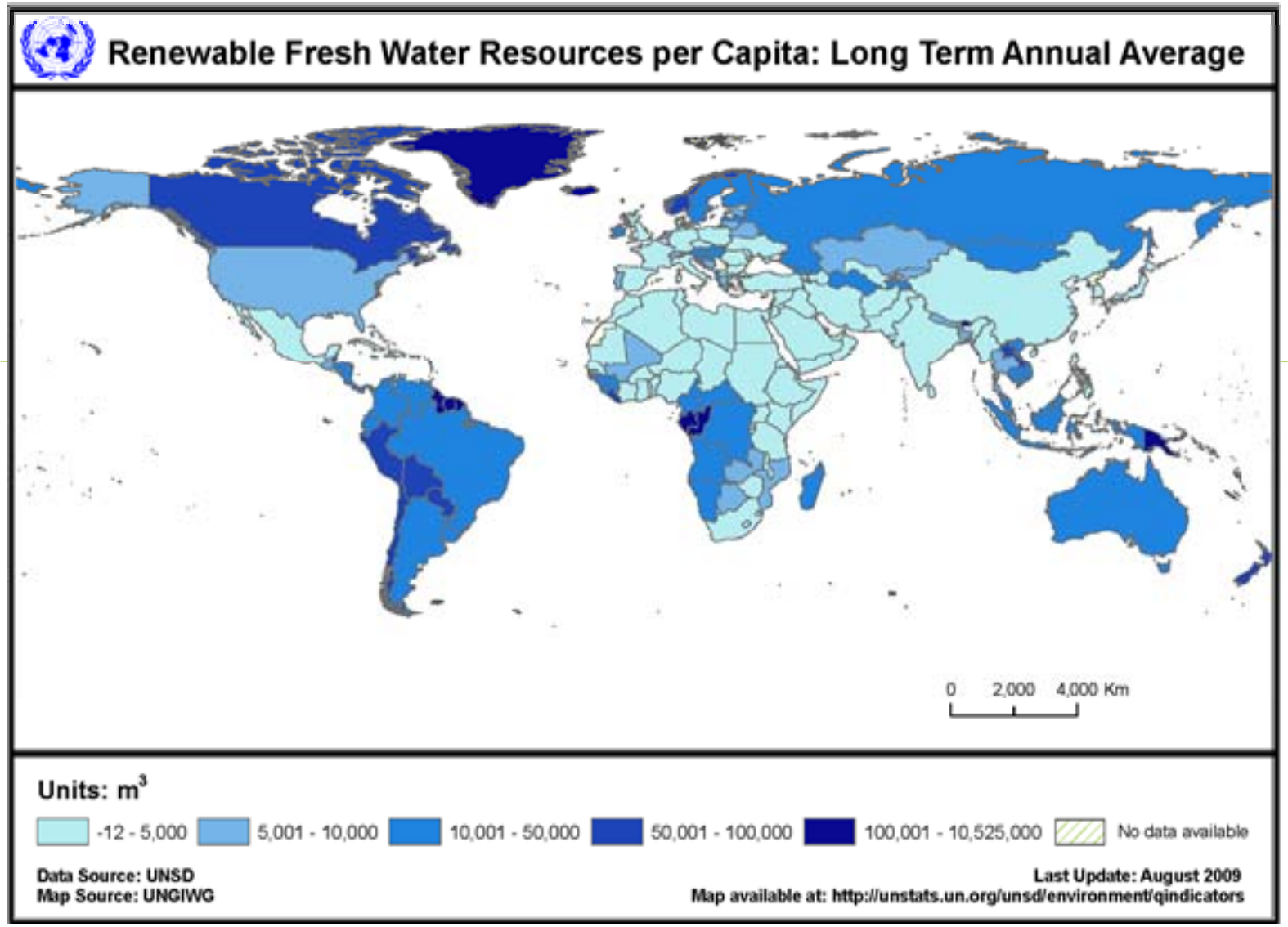

Proportion of Terrestrial and Marine Areas Protected in 2009
0 2,000 4,000 Km
Units: %
0.0 - 5.0
5.1 - 10.0
10.1 - 15.0
15.1 - 30.0
30.1 - 50.2
No data available
Data Source: UNSD MDGs Database
Map Source: UNGIWG
Last Update: September 2010
Map available at: http://unstats.un.org/unsd/environment/qindicators

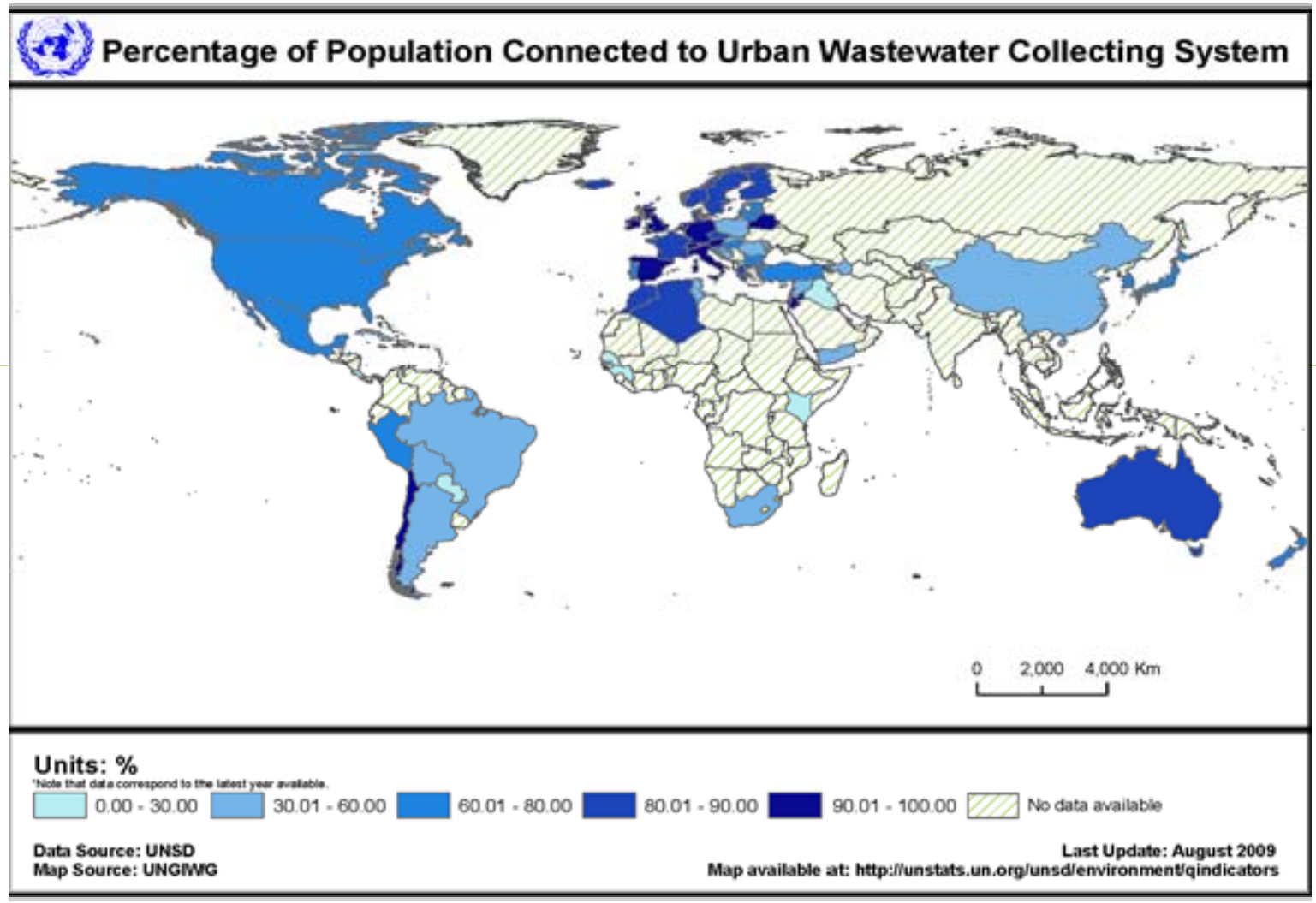

Commercial Energy Consumption per Capita in 2007
0 2,000 4,000 Km
Units: kg oil equivalent
-29 - 500
501 - 1,000
1,001 - 2,500
2,501 - 5,000
5,001 - 17,989
No data available
Data Source: UNSD
Map Source: UNGIWG
Last Update: December 2010
Map available at: http://unstats.un.org/unsd/environment/qindicators

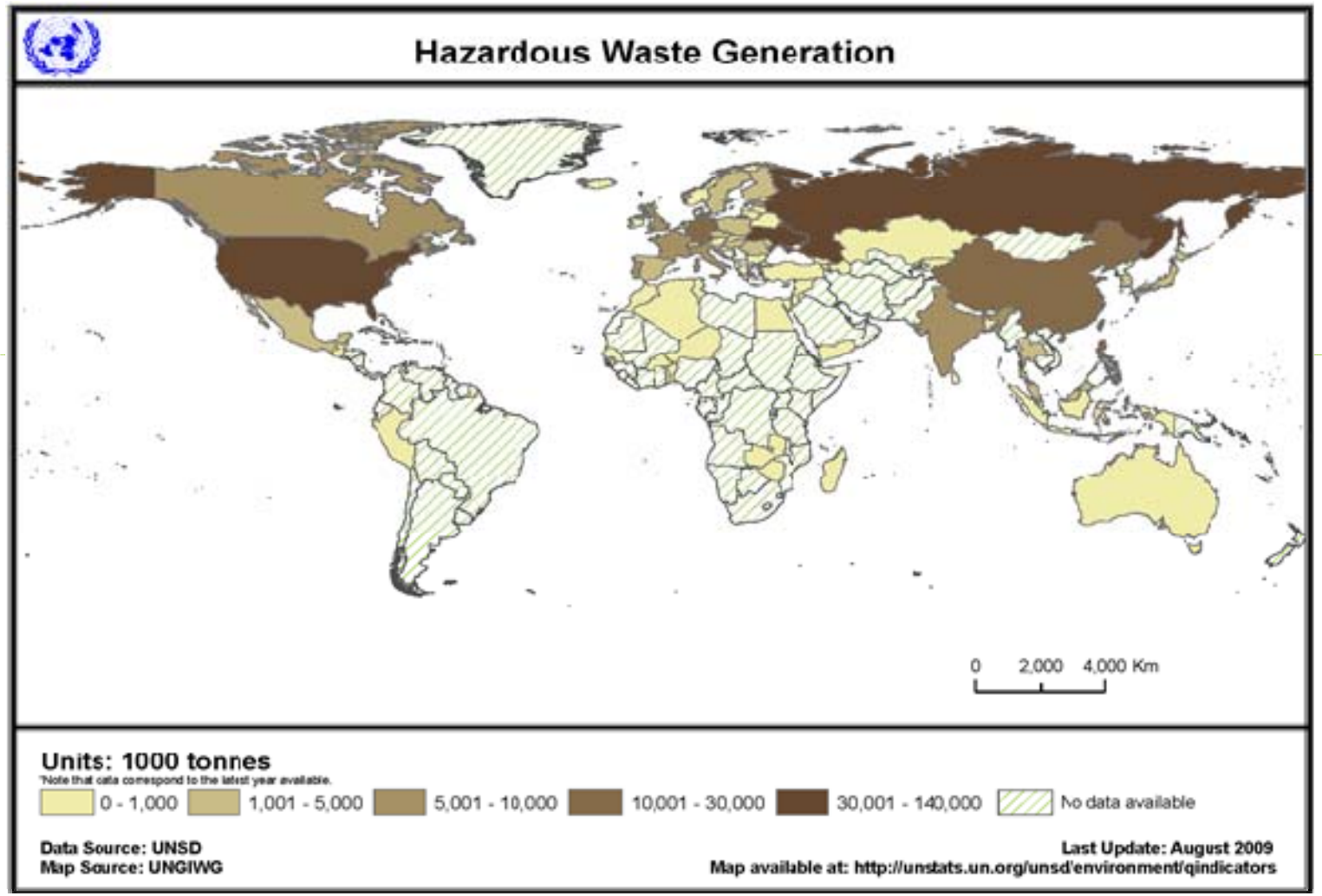

Percentage of Land Area Covered by Forest in 2010
0 2,000 4,000 Km
Units: %
0.0 - 10.0
10.1 - 20.0
20.1 - 40.0
40.1 - 60.0
60.1 - 98.0
No data available
Data Source: FAO
Map Source: UNGIWG
Last Update: December 2010
Map available at: http://unstats.un.org/unsd/environment/qindicators

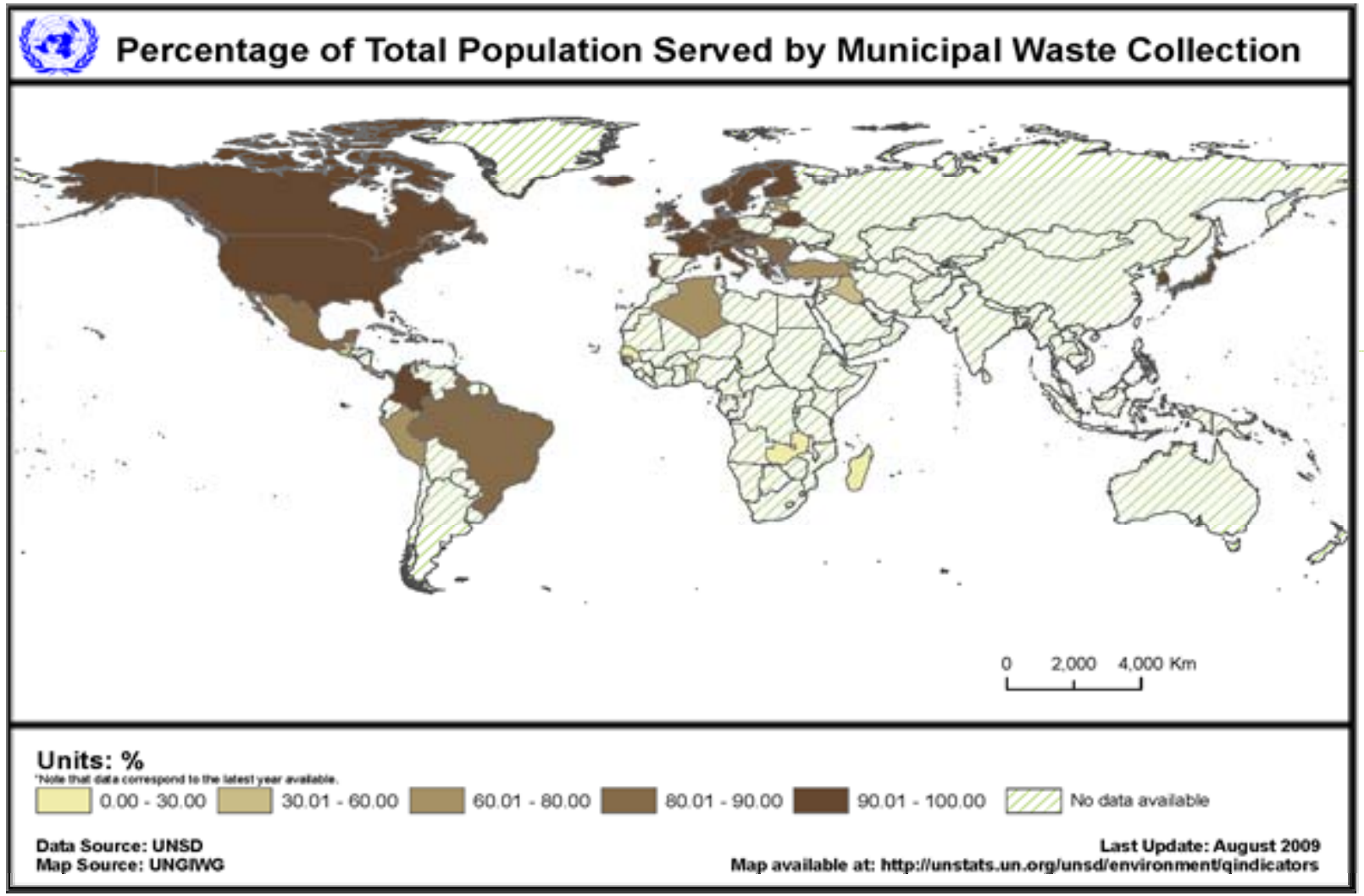

Percentage of Total Land Area Covered by Agricultural Land in 2008
0 2,000 4,000 Km
Units: %
0.30 - 15.00
15.01 - 30.00
30.01 - 50.00
50.01 - 75.00
75.01 - 93.00
No data available
Data Source: FAO
Map Source: UNGIWG
Last Update: October 2010
Map available at: http://unstats.un.org/unsd/environment/qindicators


Proportion of Terrestrial Areas Protected in 2009
0 2,000 4,000 Km
Units: %
0.0 - 5.0
5.1 - 10.0
10.1 - 15.0
15.1 - 30.0
30.1 - 58.2
No data available
Data Source: UNSD MDGs Database
Map Source: UNGIWG
Last Update: September 2010
Map available at: http://unstats.un.org/unsd/environment/qindicators


Renewable Fresh Water Resources per Capita: Long Term Annual Average
0 2,000 4,000 Km
Units: m3
-12 - 5,000
5,001 - 10,000
10,001 - 50,000
50,001 - 100,000
100,001 - 10,525,000
No data available
Data Source: UNSD
Map Source: UNGIWG
Last Update: August 2009
Map available at: http://unstats.un.org/unsd/environment/qindicators


Percentage of Population Connected to Urban Wastewater Collecting System
0 2,000 4,000 Km
Units: %
*Note that data correspond to the latest year available.
0.00 - 30.00
30.01 - 60.00
60.01 - 80.00
80.01 - 90.00
90.01 - 100.00
No data available
Data Source: UNSD
Map Source: UNGIWG
Last Update: August 2009
Map available at: http://unstats.un.org/unsd/environment/qindicators


Hazardous Waste Generation
0 2,000 4,000 Km
Units: 1000 tonnes
*Note that data correspond to the latest year available.
0 - 1,000
1,001 - 5,000
5,001 - 10,000
10,001 - 30,000
30,001 - 140,000
No data available
Data Source: UNSD
Map Source: UNGIWG
Last Update: August 2009
Map available at: http://unstats.un.org/unsd/environment/qindicators


Percentage of Total Population Served by Municipal Waste Collection
0 2,000 4,000 Km
Units: %
*Note that data correspond to the latest year available.
0.00 - 30.00
30.01 - 60.00
60.01 - 80.00
80.01 - 90.00
90.01 - 100.00
No data available
Data Source: UNSD
Map Source: UNGIWG
Last Update: August 2009
Map available at: http://unstats.un.org/unsd/environment/qindicators

Statistics Canada CSERA

- Canadian System of Environmental and Resource Accounts (CSERA) provide information on:
  - The size of Canada's natural resource stocks and their contribution to national wealth;
  - The extraction of these same resources and their disposition among businesses, households, governments and the rest of the world;
  - The generation of various wastes (liquid, solid and gaseous) by industries, households and governments and the management of these wastes;
  - The expenditures made by businesses, households and governments for the purposes of protecting the environment.

Statistics Canada CSERA

- Market value and/or quantities of established and/or proven stocks of:
  - Natural gas, crude oil, coal
  - Gold, iron, potash, miscellaneous minerals
- Market value of timer resources
- Measures of flows of resources

Statistics Canada CSERA

- Miscellaneous series on waste and energy use:
  - Direct plus indirect energy intensity by industry
  - Direct plus indirect GHG by industry
  - GHG by sector
  - Energy use by sector
  - Manure production
  - Disposal of waste by source
  - Materials prepared for recycling
  - Etc.

Statistics Canada CSERA

- Capital and operating expenditures on environmental protection
  - By North American Industry Classification
  - By type of activity and establishment size
- Distribution of capital expenditures on pollution abatement and control and prevention
  - By North American Industry Classification
  - By environmental medium and province/territory

Statistics Canada CSERA: Sustainability Indicators

Households and the environment survey (2007): use of fertilizer and pesticides	
	%
Households not in an apartment reporting having a lawn or a garden	95
Applied fertilizer or pesticide	58
Applied chemical or organic fertilizer	51
Applied only organic fertilizer	24
Applied chemical or organic pesticide	33
Applied only organic pesticide	8

Source:
Statistics Canada. Table 153-0064 - Households and the environment survey, use of fertilizer and pesticides, Canada and provinces, every 2 years (percent) (table), CANSIM (database), http://cansim2.statcan.gc.ca/cgi-

Statistics Canada CSERA: Sustainability Indicators

Material and Energy Flow Accounts **Energy use and greenhouse gas emission**	**1997**	**2003**	**2006**
Total direct and indirect household energy use (petajoules)	5,978.6	6,615.1	6,297.3
Direct household energy use (petajoules)	2,149.4	2,328.2	2,289.3
Indirect household energy use (petajoules)	3,829.2	4,287.0	4,008.0
Household energy use per unit of expenditure (index, 1990=100)	94.2	86.1	73.5
Total direct and indirect household greenhouse gas emissions (megatonnes)	403.1	431.8	410.9
Direct household greenhouse gas emissions (megatonnes)	103.9	110.7	108.6
Indirect household greenhouse gas emissions (megatonnes)	299.2	321.1	302.2
Household greenhouse gas emissions per unit of expenditure (index, 1990=100)	93.6	82.8	70.7

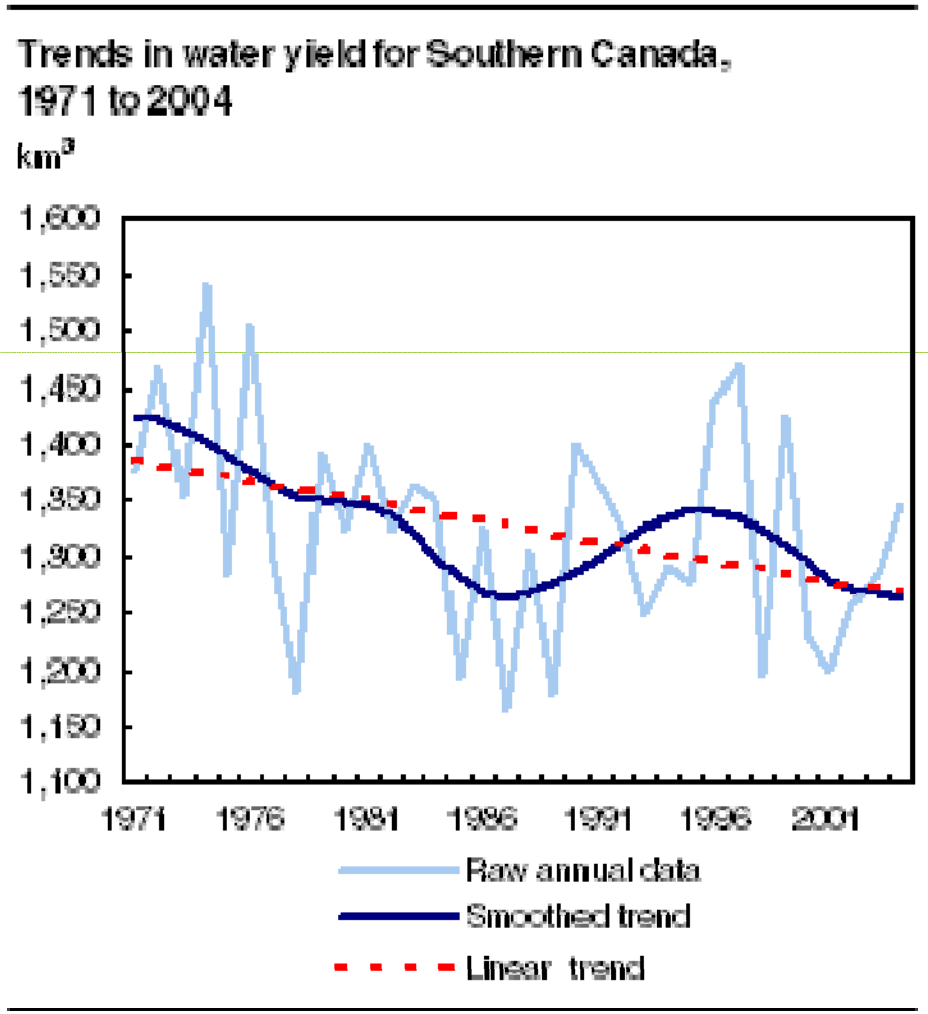
Source:
Statistics Canada. Table 153-0046 - Direct and indirect household energy use and household greenhouse gas emissions, annual (table), CANSIM (database), http://cansim2.statcan.gc.ca/cgi-

Statistics Canada CSERA: Sustainability Indicators

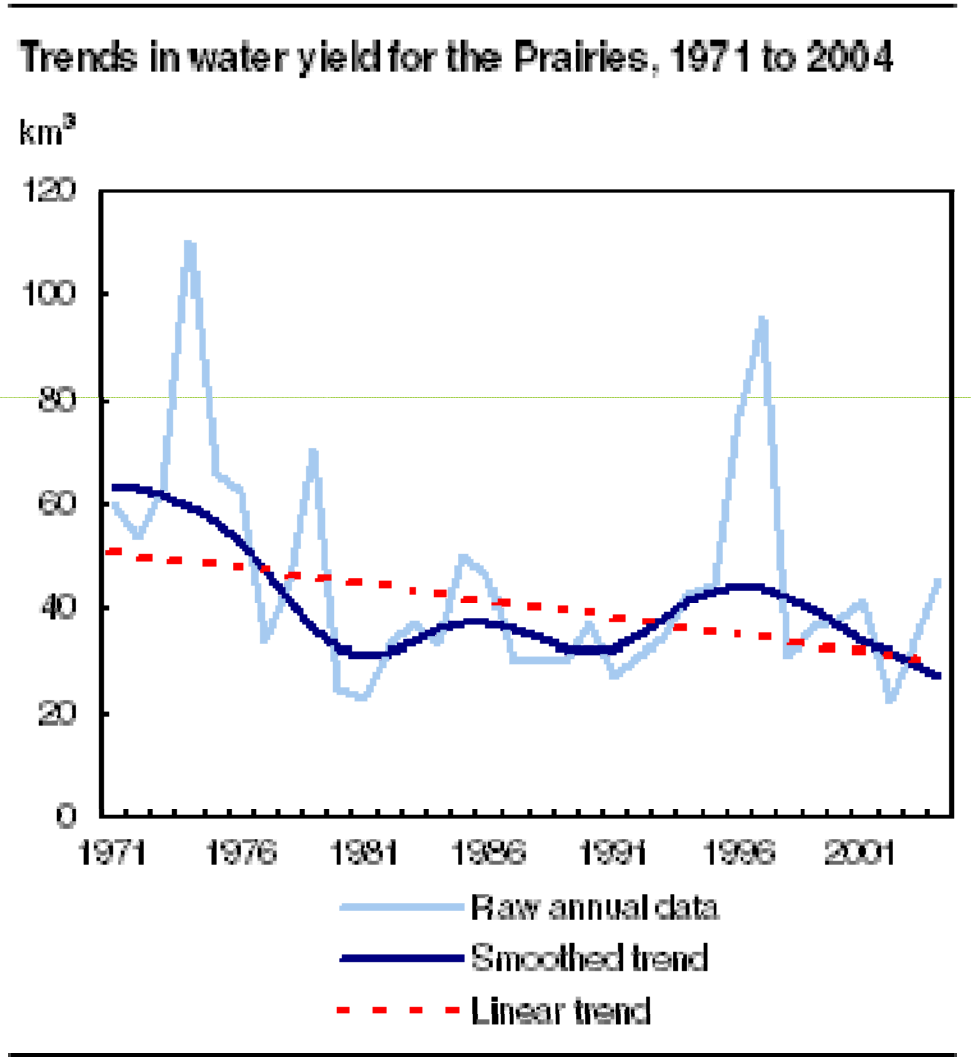
Selected agricultural activities, all major drainage areas and sub-drainage areas with agriculture	1971	1991	2001	2006
Average farm unit size (square kilometer)	1.8	2.4	2.6	2.9
Cattle density (number per square kilometre)	4.0	3.9	4.6	5.0
Chemical product expenses per total area (1992 $ per sq. km.)	65.5	231.9	373.5	391.0
Fertilized land area(10)	66,289.8	203,553.7	219,896.1	253,287.0
Fertilizer expenses per total area (1992 $ per sq. km.)	119.6	373.8	476.8	452.6
Trucks on farms (number)	335,854.3	481,514.1	450,353.0	465,830.9
Tractors on farms (number)	579,438.5	683,063.6	682,235.5	731,716.7
Automobiles on farms (number)	300,271.2	177,331.8	130,192.2	126,087.1

Source:
Statistics Canada. Table 153-0038 - Selected agricultural activities, all major drainage areas and sub-drainage areas with agriculture, every 5 years (square kilometres unless otherwise noted) (table), CANSIM (database), http://cansim2.statcan.gc.ca/cgi-win/cnsmcgi.exe?Lang=E&CNSM-Fi=CII/CII_1-eng.htm;

Statistics Canada CSERA Studies: Freshwater Supply and Demand in Canada



Statistics Canada CSERA Studies: Freshwater Supply and Demand in Canada



Statistics Canada CSERA Studies: Greenhouse Gas Emissions from Private Vehicles

- Greenhouse gas (GHG) emissions produced by private motor vehicles were almost one-third higher in 2007 than they were in the early 1990s.
- On a per capita basis, GHG emissions from private vehicles reached an average of 2 149 kg in 2007. This was 2% higher than the level in 2006 and 14% higher than the 1990 level of 1 887 kg per capita.

Statistics Canada CSERA Studies: Recycling by Canadian Households

- In 2007, the vast majority (95%) of Canadian households had access to recycling, up from 74% in 1994. Nearly all those with access chose to recycle (98%), although the extent of this recycling varied.
- Just over one-half (52%) of recyclers reported that they recycled all their recyclable waste, while 34% reported recycling the majority of their waste, and 15% said they recycled some, but not most, of their recyclable waste.

Eurostat Environmental Accounts

- Consumption patterns of households
- Dependency on natural resources / progress on decoupling economic growth from resource use
- Quantity and sources of waste generation
- Availability and use of water
- Contribution to climate change
- Production of toxic and environmentally harmful chemicals
- Biodiversity
- Etc.

Eurostat Environmental Accounts

- Environment accounts page
  - http://epp.eurostat.ec.europa.eu/portal/page/portal/environmental_accounts/introduction
- Online tables and graphs:
  - http://epp.eurostat.ec.europa.eu/portal/page/portal/environmental_accounts/data/main_tables
- Environmental statistics and accounts in Europe Table of Contents
  - http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-32-10-283/EN/KS-32-10-283-EN-TOC.PDF

Conclusion

- More formally incorporating measures of natural wealth and depletion in the national accounts would enable governments and citizens to better understand environmental risks and the economic condition of the nation.