Water Accounts with Policy: Analysis and Application of Water Accounting

Regional Training Workshop on the System of Environmental-Economic Accounting with a Focus on Water Accounting

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Putrajaya, Malaysia

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Statistics Canada
Outline

- Why integrated environment – economy data
- Application of water accounts to policy making
- Water accounts and policy: Some examples
Why integrated environment – economy data

“Major efforts should be made to augment the capacity to collect and analyse environmental data and information and to integrate it with economic data....”

“Lack of integrated water data is a systematic impediment to informed decision making related to the sustainable use of water resources. Data are needed to provide information not just about water quantity, both on the surface and underground, but also about its quality, social and economic relations as well as environmental dimensions.”

Conclusion from Session 6.4 “Data for All”
5th World Water Forum, 2009
40 years of environmental statistics at Statistics Canada

- Human Activity and the Environment; State, Pressure, Response
- OECD State of the Environment
- Spatial analysis; pilot surveys; EC State of the Environment Report
- Green Plan; Pilot Environmental Accounts
- 1992: Rio + Agenda21 SNA 1993
- CCME; Waste, E.P.E. surveys
- Kyoto Protocol 1997
- More accounts
- 2003: UN SEEA NRTEE ESDI
- Canadian Environmental Sustainability Indicators, ongoing surveys; SIP; QGHG
- Federal Sustainable Development Strategy
- SEEA-W; SEEA-CF SEEA-EEA
- Environmental Statistics Framework; M.E.G.S.
Why integrated environment – economy data

A – Because it is interesting?
C – Because life is increasingly complex?
D – Because we can?
E – Because everything is connected?
F – Because it is informative?
G – Because resources are becoming scarce?
H – Because we have to?
I – Because we owe it to future generation?
J – All of the above?
Application of accounts to policy

- Can accounts really inform policy?
- Will policy take accounts into account?
Policy analysis and application of water accounts

• Physical asset accounts are important tools for assessment of the economic situation
  • Physical asset accounts for water show how many water resources a country owns, and to which extent these are available for economic use via extraction.
  • They also show how the stocks evolves over time, and how it is affected by economic activities, for instance, how much have been extracted and how much has been added to the available stocks by new discoveries.

• Analysis of national security, self-sufficiency and commercial conditions
  • The asset accounts for water are useful for analysis of national security, self-sufficiency or the commercial conditions within all economic sector.
Electric power statistics, July 2016
Data on electric power for July are now available upon request.
Continue reading ➡

Coal and coke statistics, July 2016
Monthly data for July on the production and export volumes of coal by coal type and use are now available. Data are available at the national level and by coal-producing province.
Continue reading ➡
Canada's natural resource wealth, 2013

Released: 2015-03-26

The value of Canada's natural resource assets stood at $744 billion in 2013, down 13% from 2012. This followed a 29% decline a year earlier.

Energy resources accounted for 66% of the value of all natural resource assets in 2013, followed by minerals (19%) and timber (15%).

Energy resource assets consist of coal, crude bitumen, crude oil and natural gas. After decreasing by 30% the previous year, the value of these assets fell 7% from their 2012 level to $494 billion in 2013. Declines in the value of coal resources accounted for much of this change.

The value of mineral assets fell 38% to $138 billion in 2013, following a 31% decline a year earlier. In general, lower prices for mineral assets compared with the previous year contributed to the decline. The change in potash value was the largest contributor to the decrease.

The value of timber assets increased 9% in 2013, following a 15% decrease in 2012.
National wealth, Canada, 1976 to 2011
Notes: Natural wealth comprises natural resources assets and land. Produced wealth comprises produced non-financial assets.
Source: Statistics Canada, CANSIM table 378-0005
Direct and indirect GHG emissions from households, Canada, 2010

- Purchase of goods and services (indirect): 16.3%
- Motor fuels and lubricants (direct): 24.6%
- Electricity and other fuels (direct): 59.1%

Source: Statistics Canada, Environment, Energy and Transportation Statistics, special tabulation
Direct and indirect GHG emissions from households, Canada, 2010

![Graph showing direct and indirect GHG emissions from households, Canada, 2010]

- **Total direct plus indirect household GHG emissions**
- **GHG emissions intensity of household spending**
GHG emissions and GHG intensity, selected industries, Canada, 2010

Source: Statistics Canada, CANSIM tables 153-0114, 153-0115
Water use in Canada, 2011

- Agricultural (crops & animals), 5%
- Mining, 2%
- Electric power generation, transmission and distribution, 66%
- Manufacturing, 10%
- Households, 10%
- Other Industries, 3%
- Utilities, 3%
Water use by final demand category, 2011

- Personal expenditure (households) (4) - 54%
- Non-profit institutions serving households' consumption expenditure - 28%
- Government net current expenditure - 8%
- Gross fixed capital formation - 8%
- International exports - 2%
## Table 153-0116

### Physical flow account for water use
every 2 years (cubic metres x 1,000)

The data below is a part of CANSIM table 153-0116. Use the Add/Remove data tab to customize your table.

### Selected items [Add/Remove data]

**Geography = Canada**

<table>
<thead>
<tr>
<th>Sector</th>
<th>2009</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total, industries and households</td>
<td>38,836,120</td>
<td>35,350,913</td>
</tr>
<tr>
<td>Total, industries</td>
<td>35,159,287</td>
<td>31,777,873</td>
</tr>
<tr>
<td>Crop production [BS111]</td>
<td>2,045,300</td>
<td>1,501,614</td>
</tr>
<tr>
<td>Animal production [BS112]</td>
<td>279,586</td>
<td>267,789</td>
</tr>
<tr>
<td>Forestry and logging [BS11300]</td>
<td>346</td>
<td>525</td>
</tr>
<tr>
<td>Fishing, hunting and trapping [BS11400]</td>
<td>..</td>
<td>..</td>
</tr>
<tr>
<td>Support activities for agriculture and forestry [BS11500]</td>
<td>..</td>
<td>..</td>
</tr>
<tr>
<td>Oil and gas extraction [BS21100]</td>
<td>293,060</td>
<td>349,362</td>
</tr>
<tr>
<td>Coal mining [BS21210]</td>
<td>20,966</td>
<td>33,632</td>
</tr>
<tr>
<td>Metal ore mining [BS21220]</td>
<td>319,054</td>
<td>260,066</td>
</tr>
<tr>
<td>Non-metallic mineral mining and quarrying [BS21230]</td>
<td>103,073</td>
<td>135,477</td>
</tr>
<tr>
<td>Support activities for mining and oil and gas extraction [BS21300]</td>
<td>9</td>
<td>39</td>
</tr>
<tr>
<td>Electric power generation, transmission and distribution [BS22110]</td>
<td>26,213,561</td>
<td>23,497,215</td>
</tr>
</tbody>
</table>
Application of accounts to policy: Measuring the context

- Renewable water asset account: 3,500 km³ (water yield)

- Hydro-electric power generation: 3,000

- Timber productive forest land: 500

- Crop requirements: 85

- Total water intake: 35
  - Of which thermal electric power: 25
    - Of which municipal: 5
    - Of which irrigation: 2

Order of magnitude estimates based on stock and flow accounts. See Human Activity and the Environment (2010), Freshwater supply and demand in Canada (http://www.statcan.gc.ca/pub/16-201-x/16-201-x2010000-eng.htm) for more information.
But …

the 1% is important because flows are highly variable...

So who needs how much, where?
In Canada, there is as much variation between drainage areas as there is between countries worldwide.
...and they are variable in time.

A key message, therefore, is that space and time are both important dimensions to consider in a water accounting programme.
Water Use and Availability, by Drainage Area
Source: Environment Accounts and Statistics Division, Statistics Canada

Surface Fresh Water Intake to Streamflow Ratio
- Low (<10%)
- Moderate (10-20%)
- Medium-High (20-40%)
- High (>40%)

Policy analysis and application of water accounts

Figure 1.2.1 Grouping of information about water

Water and people

Water and the economy

Water and the environment

Water and risks
I. IMPROVING WATER SUPPLY AND SANITATION SERVICES
Policies that aim to ensure the population has access to safe water as well as to means of disposing wastewater (Targets 6.1, 6.2 and 6.3 (partial))

INFORMATION ON WATER AND PEOPLE
Information on the provision of drinking water and sanitation to the population

II. MANAGING WATER SUPPLY AND DEMAND
Policies that aim to improve water allocation to satisfy societal needs without compromising the needs of future generations or the environment (Targets 6.3, 6.4 and 6.5)

INFORMATION ON WATER AND THE ECONOMY
Information on the water cycle in nature and the economy

III. IMPROVING THE STATE OF THE ENVIRONMENT AND WATER RESOURCES
Policies that aim to preserve/improve the quality of water resources and aquatic ecosystems (Targets 6.3 and 6.6)

INFORMATION ON WATER AND THE ENVIRONMENT
Biophysical information on water related ecosystems, the services they provide and the factors affecting them

IV. ADAPTING TO EXTREME HYDROMETEOROLOGICAL EVENTS
Policies that aim to reduce the socioeconomic impact of water related disasters (Targets 6.5 and 6.6)

INFORMATION ON WATER AND RISKS
Information on extreme events related to water ecosystems and human response

## Policy analysis and application of water accounts

### Target 6.3 Water quality, wastewater treatment and re-use

<table>
<thead>
<tr>
<th>Statistics to inform proposed SDG Indicators</th>
<th>Accounts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Volumes of Pollution Release:</strong> The release of pollutants by different economic activities (i.e. households and industry type) and the pathway of their release</td>
<td>Emissions Accounts</td>
</tr>
<tr>
<td><strong>Volumes of waste-water and re-used water:</strong> Flows of wastewater between economic units and to the environment, including flows for treatment and re-use</td>
<td>PSUT</td>
</tr>
</tbody>
</table>

### Target 6.4 Water efficiency and sustainable withdrawals

<table>
<thead>
<tr>
<th>Statistics to inform proposed SDG Indicators</th>
<th>Accounts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water Use:</strong> Data on Water abstraction and Final Water Use (for the economy as a whole and by industry based on ISIC)</td>
<td>PSUT</td>
</tr>
<tr>
<td><strong>Sustainability of withdrawals:</strong> Data on Total Renewable Water Resources and Total Water Withdrawals</td>
<td>Asset Accounts PSUT</td>
</tr>
</tbody>
</table>

### Target 6.6 Water-ecosystems

<table>
<thead>
<tr>
<th>Statistics to inform proposed SDG Indicators</th>
<th>Accounts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Wetlands:</strong> Extent, condition and provision of services</td>
<td>Ecosystem Accounts</td>
</tr>
</tbody>
</table>

### Target Contextual, policy relevant information on SDG targets

<table>
<thead>
<tr>
<th>Statistics to inform proposed SDG Indicators</th>
<th>Accounts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical information:</strong> Supply of water to households, generation of wastewater by households, water-system characteristics affecting households</td>
<td>PSUT</td>
</tr>
<tr>
<td><strong>Monetary information:</strong> Expenditure on household water supply and sanitation, expenditures by governments and investment in fixed capital for water supply and sanitation</td>
<td>Combined Presentations</td>
</tr>
</tbody>
</table>

### Target 6.5 IRWM

<table>
<thead>
<tr>
<th>Statistics to inform proposed SDG Indicators</th>
<th>Accounts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SEEA-Water is a tool for IRWM</strong> by bringing together different types of water information into one framework</td>
<td>SEEA-Water</td>
</tr>
</tbody>
</table>
Examples of policy applications

PLANNING FOR A SUSTAINABLE FUTURE: A FEDERAL SUSTAINABLE DEVELOPMENT STRATEGY FOR CANADA

CONSULTATION PAPER

Sustainable Development Office
Environment Canada

March 2010
Examples of policy applications

4. Goal: Water Availability

Canadians manage and use water resources in a manner consistent with the sustainability of the resource.

4.1 Target: Water Availability

Improve knowledge of water use and availability by sub-region in Canada by 2013.

Implementation Strategies

4.1.1 Advancing Knowledge and Communications

- Conduct research and survey work in order to fill in information gaps with respect to water use and availability. (NRCan)
  - Conduct and synthesize surveys such as the Municipal Water and Wastewater Survey (EC) and the CESI Industrial Water Use Survey, Survey of Drinking Water Plants and Agriculture Water Use Survey. (Stats Can working with EC)
  - Continue work on collection of hydrometric data through the Water Survey of Canada. (EC)
  - Continue the development and implementation of Water Availability Indicators. (EC)
  - Re-start the production of the water-use accounts to calculate water-use intensities by sector and embodied in trade. (Stats Can working with EC, NRCan)
  - Complete 15 assessments for Canada’s 30 key regional aquifers and produce a national groundwater inventory to help Canadians better understand and manage underground water resources. (NRCan)
- Promote federal water conservation and efficiency as part of infrastructure funding. (EC)
  - Promote voluntary water conservation and efficiency in the public sector. (EC)
  - Promote the development of national plumbing code for water efficiency through the Canadian Standards Association’s Canadian Advisory Council on Plumbing (CACP). (EC)
Examples of policy applications

High and Dry

Climate Change, Water, and the Economy
Smart water policy is fundamental to smart climate policy and smart development policy.

• While adopting policy reforms and investments will be demanding, the costs of inaction are far higher.

• The future will be thirsty and uncertain, but with the right reforms, governments can help ensure that people and ecosystems are not left vulnerable to the consequences of a world subject to more severe water-related shocks and adverse rainfall trends.
MAP ES.1 The Estimated Effects of Water Scarcity on GDP in Year 2050, under Two Policy Regimes

**Business as usual**

**Efficient water policies**

Note: The top map shows the estimated change in 2050 GDP due to water scarcity, under a business-as-usual policy regime. The bottom map shows the same estimate, under a policy regime that incentivizes more efficient allocation and use of water.
Examples of policy applications

Chapter 1

Shocks and Trends: Uncertain Water Supplies Meet Unquenchable Thirsts
General policy questions that can be addressed with SEEA-W

1. Material consumption
2. Material productivity
3. Calculation of direct and indirect intensities
4. Water use analysis
5. Water policy
6. Emissions analysis
7. Environmental assessment
8. Natural resource management
9. Multi-factor productivity
10. Footprint calculations
Water policy questions in Australia

1. Is water flowing to the highest value users?
2. Are water providers achieving full cost recovery?
3. Are water markets open and efficient?
4. Are water uses and the water supply infrastructure the supports this economically efficient and sustainable?
5. Is there consistency in water pricing across sectors and between jurisdictions?
6. Are environment and other public benefit outcomes being achieved?
7. What are the economic, environmental and social impact of changes in water resources allocation and use?

Source: 1994 – COAG Water Reform Framework
Discussion: Group exercise (Groups of 3-5)

1. What is the main water policy issue in your country/region?
2. Suggest some aspects of the water accounts that would be useful to address it?
3. Report:
   • The water issue you selected
   • Some aspects of the account you selected
   • Are national/regional data available in your country for these measures?
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Thank you for your attention

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