

Water Account

System of Environmental-Economic Accounting Central Framework (SEEA-CF)

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14-16 September 2016

** Adapted from the presentation prepared for the project entitled "Advancing the SEEA Experimental Ecosystem Accounting".*

Overview: Water Account

- 1. Learning objectives**
- 2. Review of Level 0 (5m)**
- 3. Level 1 (Compilers)**
 - Concepts (15m)
 - Group exercise & Discussion (30m)
- 4. Level 2 (Data providers)**
 - Data options, examples & issues (15m)
 - Group exercise & Discussion (15m)
- 5. Closing Discussion (10m)**



Learning objectives: Levels 1 and 2

- **Level 1:**

- Understand why Water Accounts are important and how they link to policy
- Understand the basic concepts of Water Accounting
- Understand how water is treated in the SEEA
- Learn the steps of compiling a Water Account

- **Level 2:**

- Understand the data options and sources
- Understand the important conceptual issues
- Be aware of how other countries have approached Water Accounting

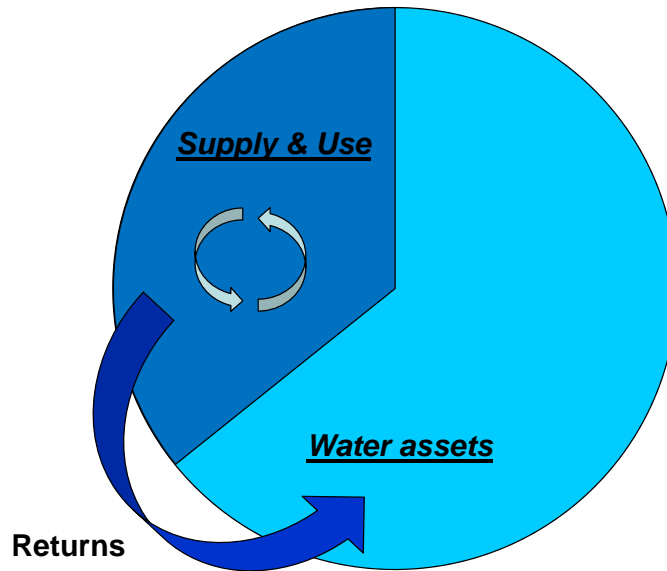


Water Account

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Level 0	Level 1 - Compilers	Level 2 – Data providers
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Level 0	Level 1 - Compilers	Level 2 – Data providers
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What?

- Availability (stocks) and changes (flows) of water resources
- Supply and use of water within the economy

Why?

- Policies on water security, water resources management
- Links to economic accounts
- Basis for SEEA-WATER, SEEA-EEA
- Indicators:
 - Total water use (by source, purpose, etc.)
 - Water intensity/productivity
 - Variability in water resources, trends (droughts, floods)

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Level 0

Level 1 - Compilers

Level 2 – Data providers

What does a Water Account look like?

Physical supply table for water

	Abstraction of water; production of water; generation of return flows					
	Agriculture, forestry and fishing	Mining and quarrying, manufacturing and construction	Electricity, gas, steam and air conditioning supply	Water collection, treatment and supply	Sewerage	Other industries, Households
(I) Sources of abstracted water						
Inland water resources						
Surface water						
Groundwater						
Soil water						
Total						
Other water sources						
Precipitation						
Sea water						
Total						
Total supply abstracted water						
(II) Abstracted water						
For distribution						
For own-use						
(III) Wastewater and reused water						
Wastewater						
Wastewater to treatment						
Own treatment						
Reused water produced						
For distribution						
For own use						
Total						
(IV) Return flows of water						
To inland water resources						
Surface water						
Groundwater						
Soil water						
Total						
To other sources						
Total return flows of which: Losses in distribution						
(V) Evaporation of abstracted water, transpiration and water incorporated into products						
Evaporation of abstracted water						
Transpiration						
Water incorporated into products						
Total supply						

Note: Dark grey cells are null by definition.

Physical use table for water

	Abstraction of water; Intermediate consumption; return flows						Final consumption	Flows to the rest of the world
	Agriculture, forestry and fishing	Mining and quarrying, manufacturing and construction	Electricity, gas, steam and air conditioning supply	Water collection, treatment and supply	Sewerage	Other industries, Households		
(I) Sources of abstracted water								
Inland water resources								
Surface water								
Groundwater								
Soil water								
Total								
Other water sources								
Precipitation								
Sea water								
Total								
Total use abstracted water								
(II) Abstracted water								
Distributed water								
Own use								
(III) Wastewater and reused water								
Wastewater								
Wastewater received from other units								
Own treatment								
Reused water								
Distributed reuse								
Own use								
Total								
(IV) Return flows of water								
Returns of water to the environment								
To inland water resources								
To surface waters								
To other waters								
To other sources								
(V) Evaporation of abstracted water, transpiration and water incorporated into products								
Evaporation of abstracted water								
Transpiration								
Water incorporated into products								
Total use								

Note: Dark grey cells are null by definition.



Level 0

Level 1 - Compilers

Level 2 – Data providers

What do you need to compile a Water Account?

- **Data:**
 - Water stocks by source
 - Supply (abstraction, production, return flows)
 - Use (abstraction, intermediate consumption, return flows);
- **Expertise:**
 - Statisticians
 - Hydrologists
 - Water industry specialists



Examples of water-related SDG indicators

- **6.1.1:** Proportion of population using safely managed drinking water services
- **6.3.1:** Percentage of wastewater safely treated
- **6.4.1:** Percentage change in water use efficiency over time
- **6.4.2:** Level of water stress: freshwater withdrawal as a proportion of available freshwater resources

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Learning objectives

Level 1:

- Understand why Water Accounts are important and how they link to policy
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Accounts and 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” of the 5th World Water Forum

Accounts provide a framework for arranging data. They enable data from different sources to be integrated. They also enable gaps and deficiencies in primary data sources to be identified and addressed.

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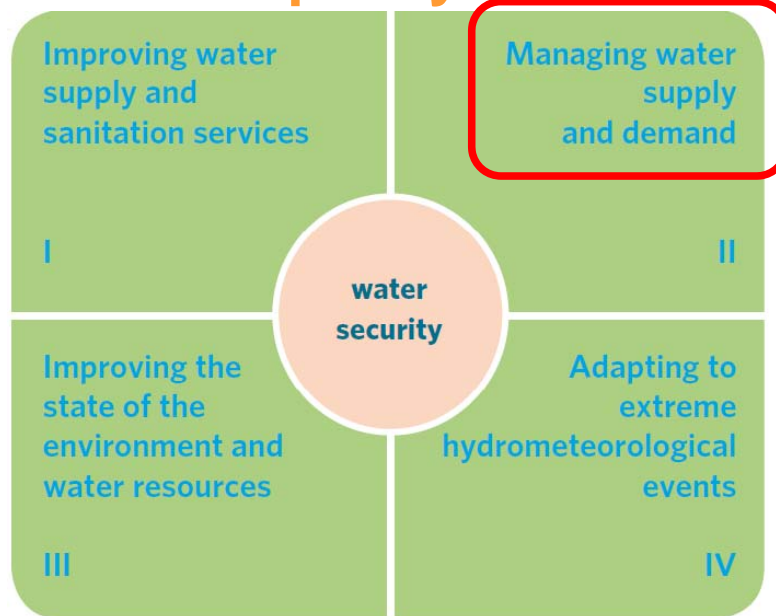


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Water policy issues



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* http://unstats.un.org/unsd/envaccounting/WWAP_UNSD_WaterMF.pdf



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Concepts

- The hydrological cycle
- Stocks, supply, abstraction and use

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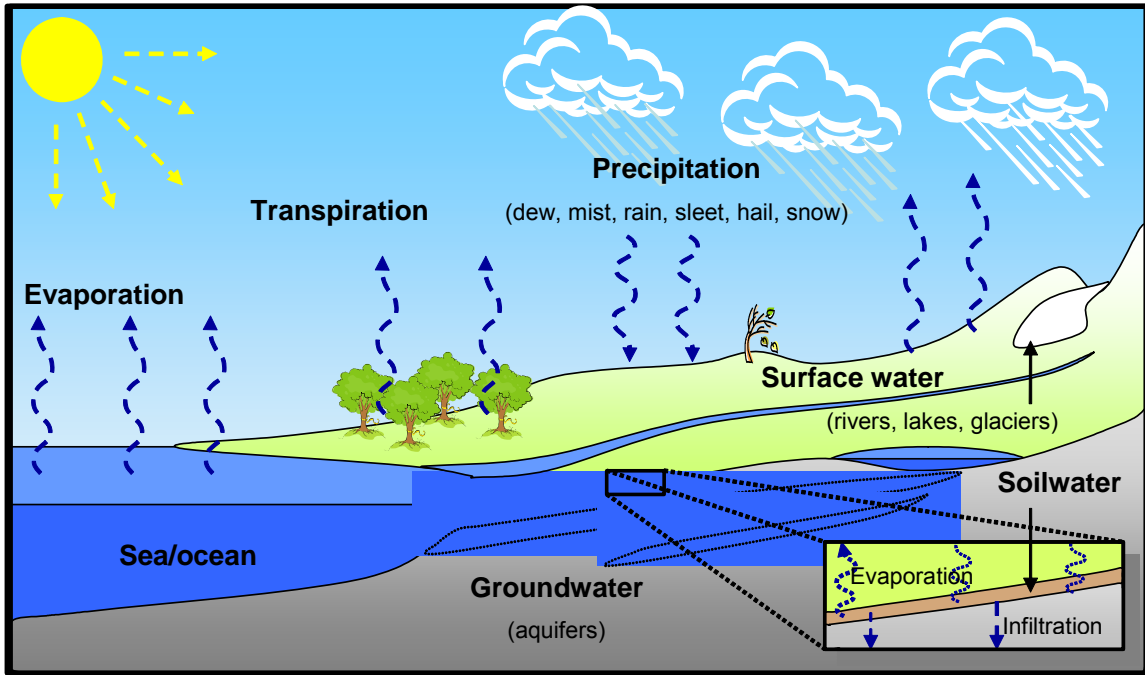


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The Hydrological Cycle

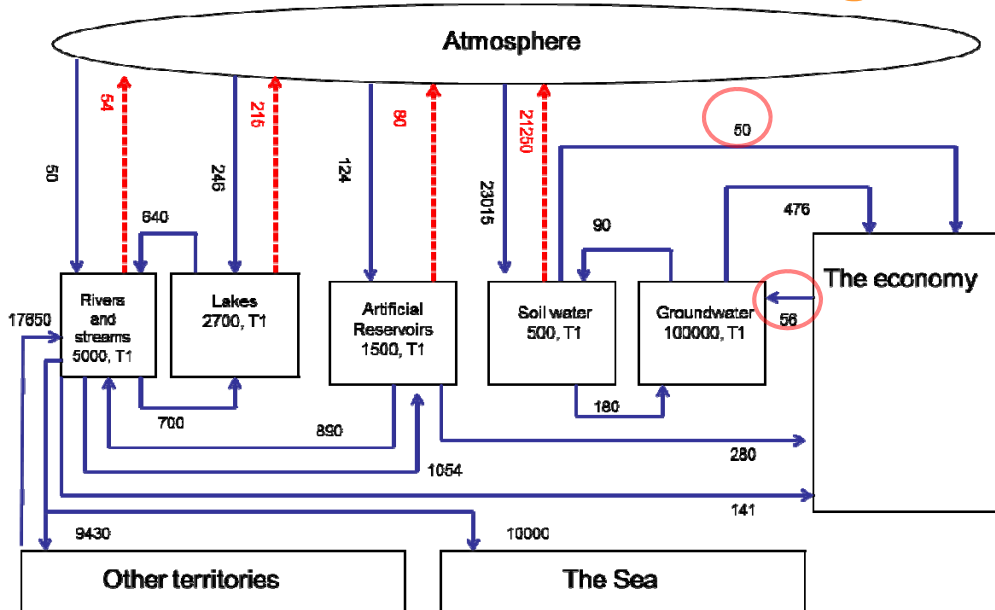


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Water stocks and flows diagram



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Water asset account (from diagram)

	Type of water resources						Total	
	Artificial reservoirs	Lakes	Rivers and streams	Surface water		Goundwater		Soil water
				Glaciers, snow and ice				
(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						-		-
<i>(G) Total additions to stock</i>	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
<i>(M) Total reductions in stock</i>	1,250	855	21,379	-		566	21,480	45,530
Closing stock	1,428		1,961			99,670	2,125	107,975

Water account - SEEA CF

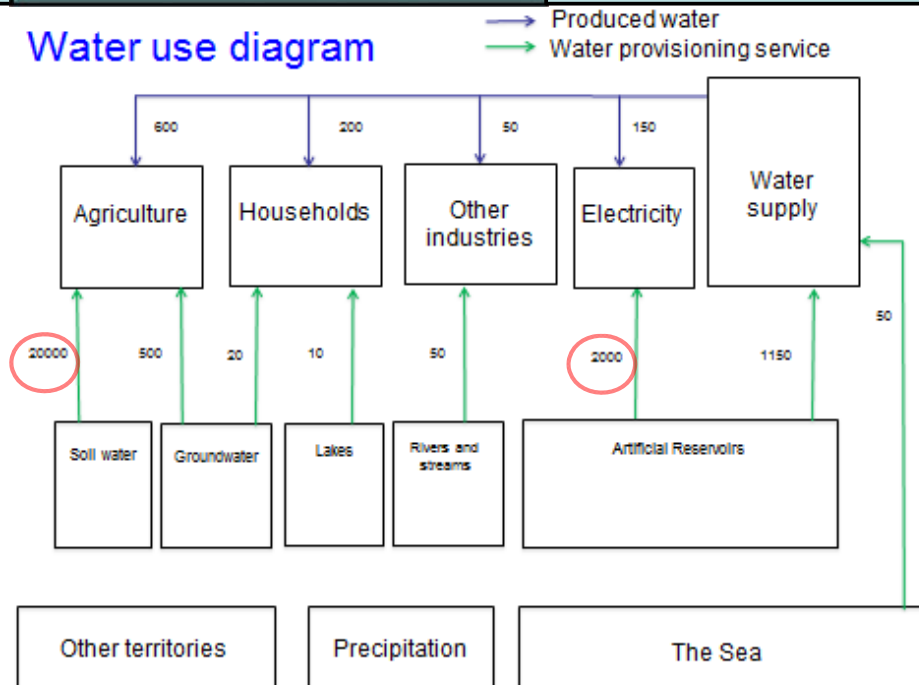


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Water use diagram



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Level 0

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Physical Water Use Table (from Diagram)

	Use of water					Total use
	Agriculture, forestry and fishing	Electricity, gas, steam and air conditioning	Water collection, treatment and supply	Other industries	Households	
Sources of abstracted water						
Inland water resources						
Surface water	-	2,000	1,150	50	10	3,210
Groundwater	500	-	-	-	20	520
Soil water	20,000	-	-	-	-	20,000
Sea water	-	-	50	-	-	50
Total abstracted water	20,500	2,000	1,200	50	30	23,780
Abstracted water						
Distributed water (to other economic units)	-	-	1,000	-	-	
Use of water (from other economic units)	600	150	-	50	200	1,000
Own use	20,500	2,000	200	50	30	22,780
Total use of water (abstracted and distributed water)	21,100	2,150	200	100	230	23,780

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Compilation Group Exercise (30m)

- **Situation:**
 1. Have a simplified Stock and Flow Diagram
 2. Have a simplified Water Use Diagram
- **Objective (Groups of 3-5):**
 1. Compile a Water Asset Account
 2. Compile a Water Use Table
 3. Report results

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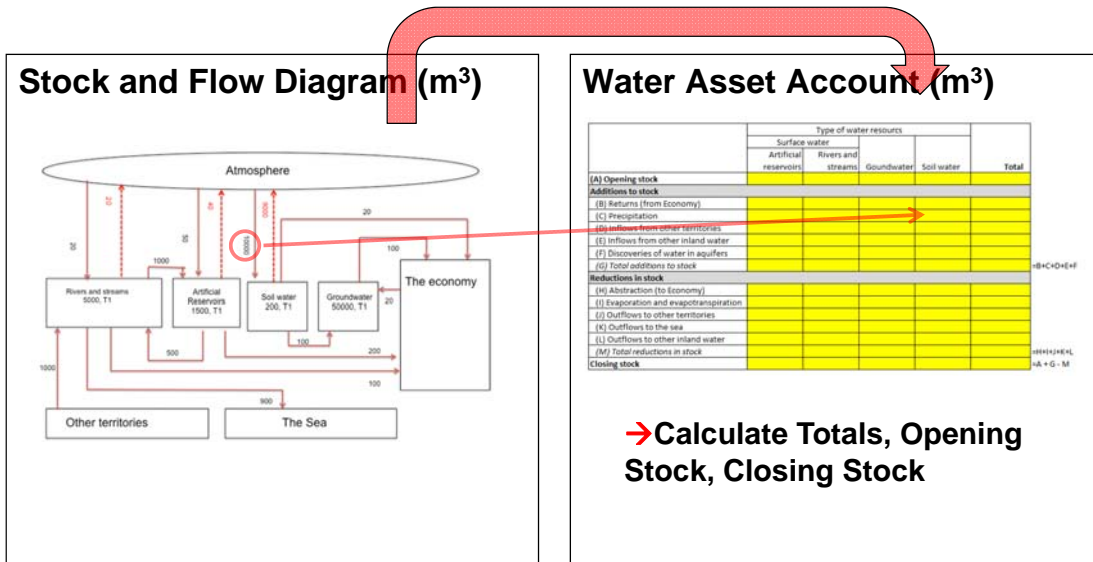


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Group Exercise: Exercise 1 – Water Asset Account



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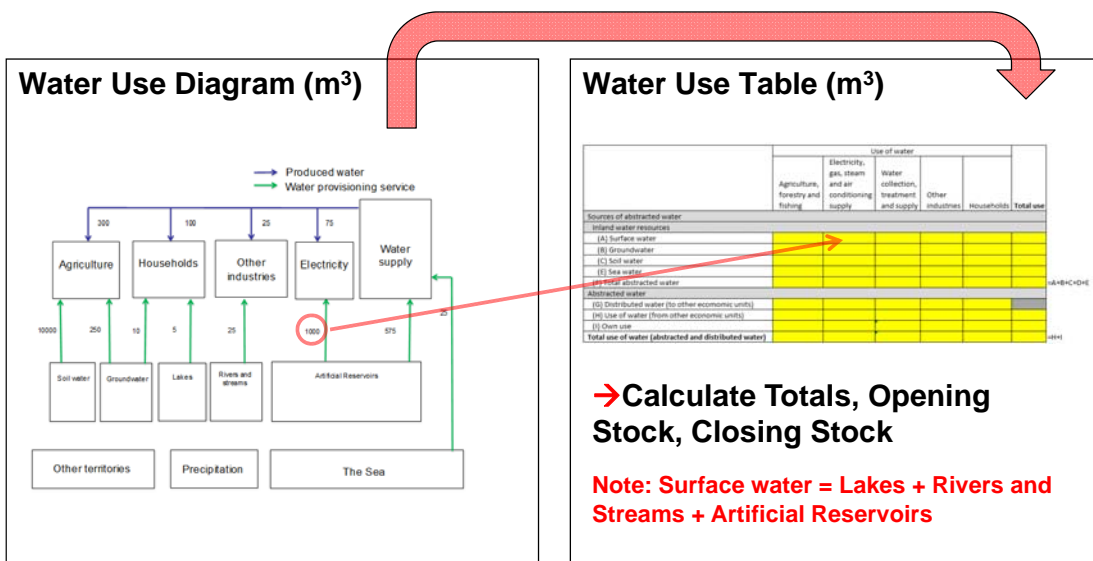


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Group Exercise: Exercise 2 – Water Use Table



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- Is everyone clear on the objectives?
- 30 minutes group work
- Please ask questions!
- Results:
 - Each group report:
 1. Opening and closing stock
 2. Total use of water
 - Bonus questions:
 1. What was the largest source of reductions in stock?
 2. What is the main use of water?

	Type of water resources				Total
	Surface water		Goundwater	Soil water	
	Artificial reservoirs	Rivers and streams			
(A) Opening stock					
Additions to stock					
(B) Returns (from Economy)					
(C) Precipitation					
(D) Inflows from other territories					
(E) Inflows from other inland water					
(F) Discoveries of water in aquifers					
(G) Total additions to stock					
Reductions in stock					
(H) Abstraction (to Economy)					
(I) Evaporation and evapotranspiration					
(J) Outflows to other territories					
(K) Outflows to the sea					
(L) Outflows to other inland water					
(M) Total reductions in stock					
Closing stock					

	Agriculture, forestry and fishing	Electricity, gas, steam and air conditioning supply	Use of water			Total use
			Water collection, treatment and supply	Other industries	Households	
Sources of abstracted water						
(A) Surface water						
(B) Goundwater						
(C) Soil water						
(D) Sea water						
(E) Total abstracted water						
Abstracted water						
(G) Distributed water (to other economic units)						
(H) Use of water (from other economic units)						
(I) Own use						
Total use of water (abstracted and distributed water)						

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The answers

Water Asset Account

Opening Stock = 56,700 m³

Closing Stock = 57,410 m³

Largest source of reductions = Evaporation from Soil water

	Type of water resources				Total
	Surface water		Goundwater	Soil water	
	Artificial reservoirs	Rivers and streams			
(A) Opening stock	1,500	5,000	50,000	200	56,700
Additions to stock					
(B) Returns (from Economy)	-	-	20	-	20
(C) Precipitation	50	20	-	10,000	10,070
(D) Inflows from other territories	-	1,000	-	-	1,000
(E) Inflows from other inland water	1,000	500	100	-	1,600
(F) Discoveries of water in aquifers	-	-	-	-	-
(G) Total additions to stock	1,050	1,520	120	10,000	12,690
Reductions in stock					
(H) Abstraction (to Economy)	200	100	100	20	420
(I) Evaporation and evapotranspiration	40	20	-	9,000	9,060
(J) Outflows to other territories	-	-	-	-	-
(K) Outflows to the sea	-	900	-	-	900
(L) Outflows to other inland water	500	1,000	-	100	1,600
(M) Total reductions in stock	740	2,020	100	9,120	11,980
Closing stock	1,810	4,500	50,020	1,080	57,410

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The answers

Water Use Table

Total use of water
= 11,890 m³

The main use of
water is Soil Water
for Agriculture,
Forestry and
Fishing

	Use of water					Total use
	Agriculture, forestry and fishing	Electricity, gas, steam and air conditioning supply	Water collection, treatment and supply	Other industries	Households	
Sources of abstracted water						
Inland water resources						
(A) Surface water	-	1,000	575	25	5	1,605
(B) Groundwater	250	-	-	-	10	260
(C) Soil water	10,000	-	-	-	-	10,000
(E) Sea water	-	-	25	-	-	25
(F) Total abstracted water	10,250	1,000	600	25	15	11,890
Abstracted water						
(G) Distributed water (to other economic units)	-	-	500	-	-	500
(H) Use of water (from other economic units)	300	75	-	25	100	500
(I) Own use	10,250	1,000	100	25	15	11,390
Total use of water (abstracted and distributed water)	10,550	1,075	100	50	115	11,890

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Level 0

Level 1 - Compilers

Level 2 – Data providers

Learning objectives

Level 2:

- Understand the data options, sources and methods used
- Understand the important conceptual issues
- Be aware of how other countries have approached Water Accounting

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Level 0

Level 1 - Compilers

Level 2 – Data providers

Data options

- **Types of water data**
 - Stock
 - Supply
 - Use
- **Sources of national and global water data**

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Data options

- **Data sources by type:**
 - Survey data (e.g. agricultural survey)
 - Administrative data (e.g., water consumption)
 - Hydrological/meteorological data (e.g., rainfall)
 - Research data (e.g., case studies)

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Data options

- **Data sources by agency:**
 - Government agencies responsible for:
 - Water, meteorology, hydrology, statistics, agriculture, environment, energy (especially hydro-power), planning, finance, geology
 - National, state/provincial or local government
 - Water suppliers and wastewater treatment
 - Water research organisations (e.g. government agencies, universities)
 - Non-government organisations (e.g. water industry associations, farmer associations, conservation groups, etc.)

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Data options

- **Global data sources**

- Data on water and land cover are available from international agencies or research organisations:

- FAO Aquastat <http://www.fao.org/nr/water/aquastat/main/index.stm>
- WHO World Climate Data and Monitoring Program (WCDMP) http://www.wmo.int/pages/prog/wcp/wcdmp/index_en.php
- WMO World Hydrological Cycle Observing System (WHYCOS) <http://www.whycos.org/whycos/>

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Guidelines on methods

- International Recommendations for Water Statistics (IRWS)
- Guide to Meteorological Instruments and Methods of Observation
- Guidelines on the Role, Operation and Management of National Hydrological Services
- International Benchmarking Network for Water and Sanitation Utilities
- A System of Integrated Agricultural Censuses and Surveys
- ISO (e.g. ISO 19115 for geographic information)
- Statistical Data and Metadata Exchange (or SDMX)
- World Meteorological Organisation Core Metadata Standard
- Infrastructure for Spatial Information in the European Community (INSPIRE)
- Global Annual Assessment of Sanitation and Drinking Water
- MDG reporting standards (for water supply and sanitation)

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Common problems in compilation of water accounts

- **Classification of units to industry** especially those engaged in multiple activities (e.g. water supply, sewerage and hydro-electricity generation)
- In most countries national accounts do not separate the **water supply and sewerage industries**
- Recording of **losses in distribution** and the flows for use of water in **hydro-electricity** and water for **cooling**
- Boundary between **environment and the economy**, especially artificial reservoirs
- **Spatial referencing** – economic data refers to administrative boundaries while hydrological data refers to river basins
- **Confidentiality** of business data
- Data **quality**
- **Scale** of data (national level data may hide regional variation)
- **Seasonality**: Annual averages may hide seasonal variation and **extremes** (e.g., floods and droughts)

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Some Global and country examples

- **UNEP-WCMC**: Composite map of global ecosystem assets (Freshwater component)
- **Australia**: Water Accounts
- **Canada**: Freshwater Supply and Demand
- **Samoa**: Water Accounts

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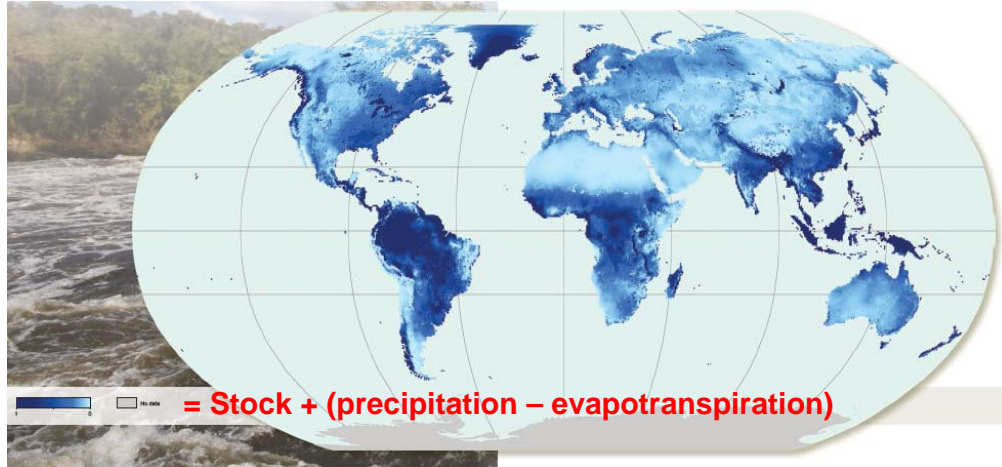


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UNEP-WCMC: Composite map of global freshwater resources



Source: Dickson, Blaney et al. (2014)

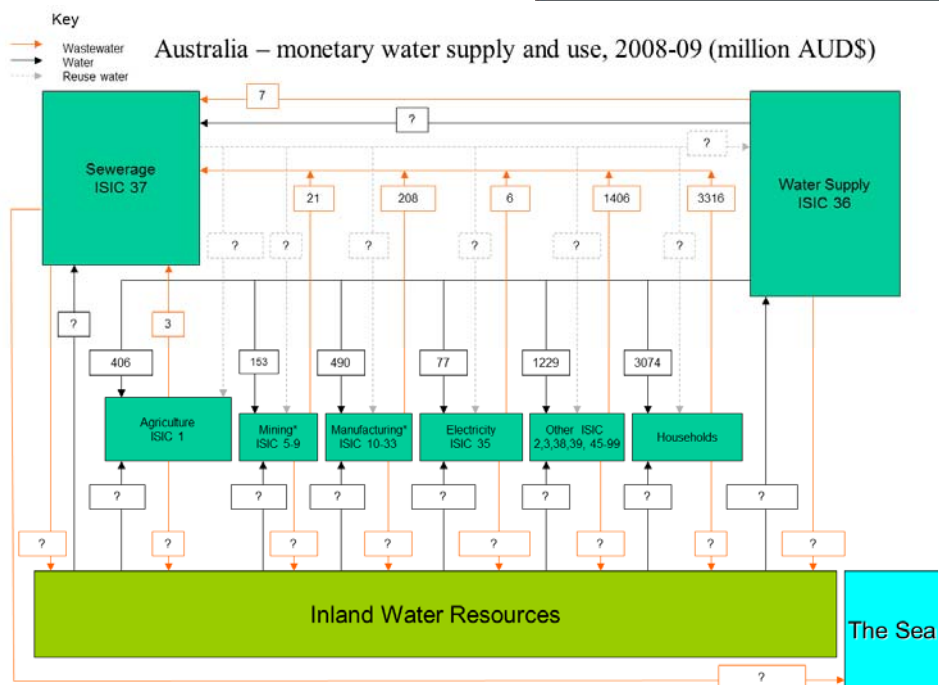
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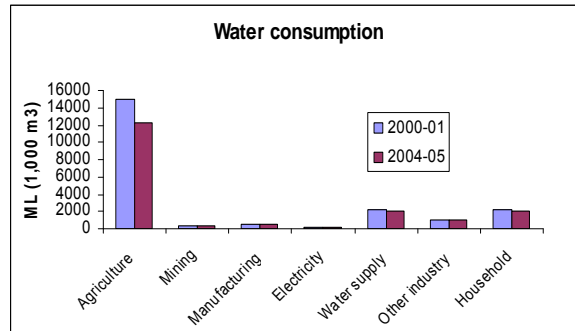
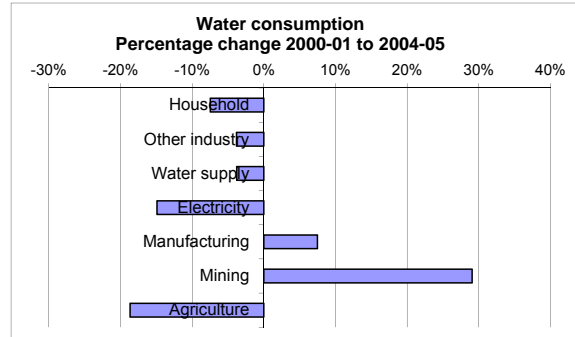
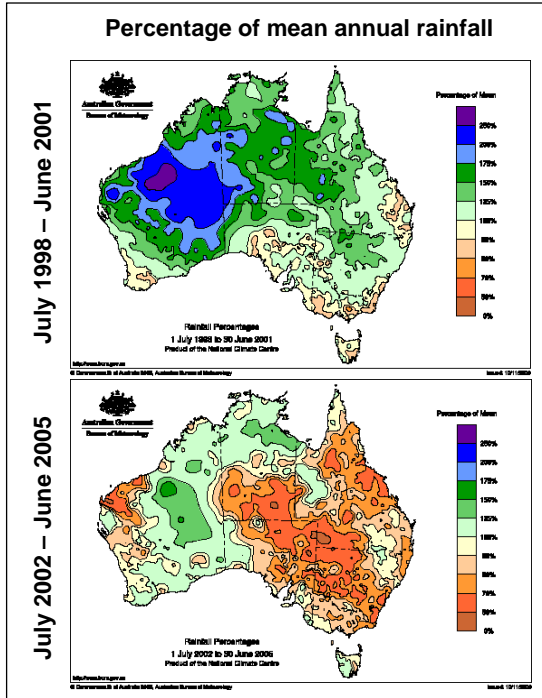


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Australia's water accounts are not just tables

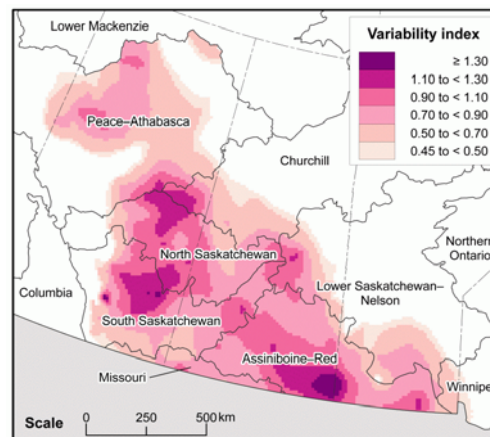
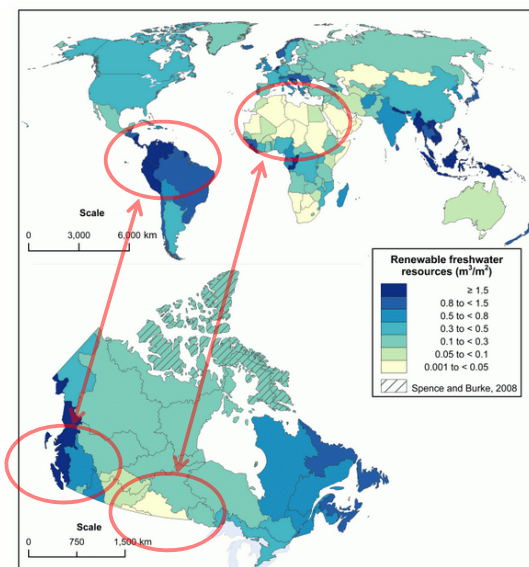


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Canada's Freshwater Supply and Demand

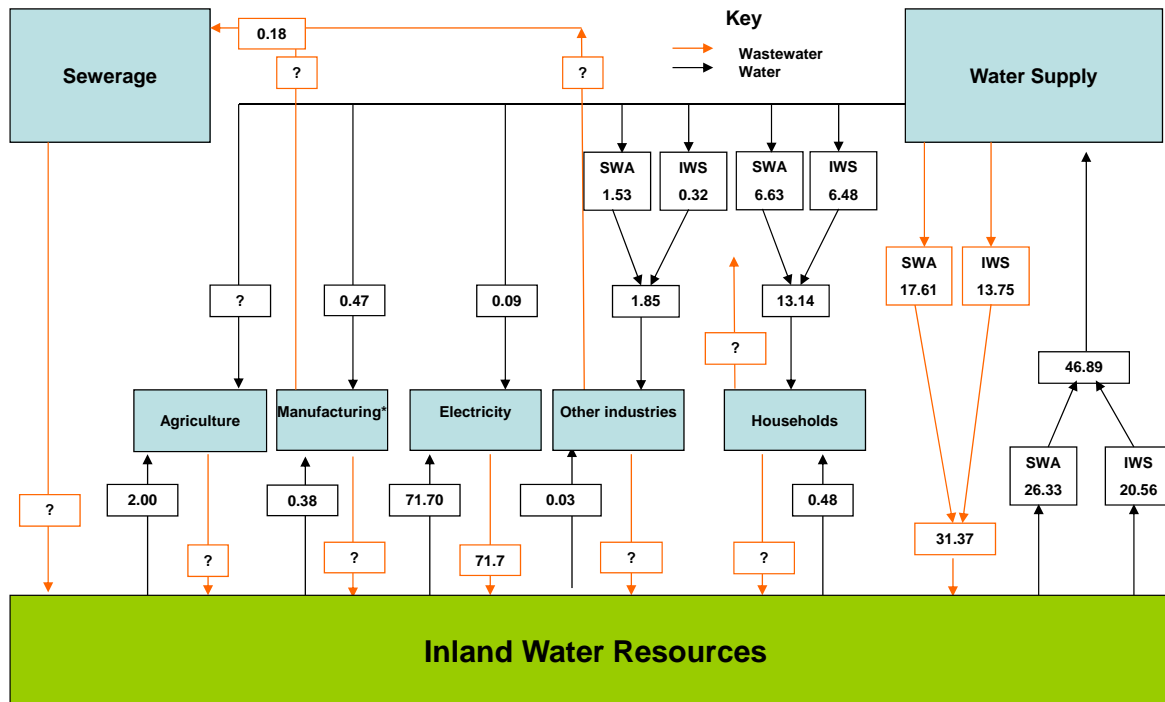


Note(s): Includes all or part of drainage regions 6, 9, 10, 11, and 12, the Peace-Athabasca, Missouri, North Saskatchewan, South Saskatchewan, and Assiniboine-Red.

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

Source: Statistics Canada, 2010

Experimental water accounts for Samoa, 2013-14 (Millions m³)



*Draft Experimental Water Accounts for Samoa, 2011-12 to 2013-14, version 1.2 (29 September 2015)

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Group exercise (15m) (Groups of 3-5)

1. What is the main water issue in your country?
2. Suggest **three** measures that could be used to address it?
3. Report:
 - The water issue you selected
 - The three measures you selected
 - Are **national** data available in your country for these measures?
4. Discussion:
 - What other measures could you suggest?
 - What other data sources could you suggest?



A lot of progress can be made quickly..

- It is not necessary to compile complete water accounts
 - Address national policy priorities with available data
- National data, global data and guidance are available to get started
 - Many countries already have much of the data needed to compile water supply and use tables and water asset accounts
 - Data are usually dispersed in many agencies
 - Agricultural agencies collect information on irrigation water, water ministries collect information to construct water balances, etc.
 - Cooperation in needed
 - Within statistical offices
 - Between statistical offices, water departments, economic/planning departments and agricultural departments
 - With the water supply industry
 - With the scientific and research communities
 - Between users and producers of information

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A lot of progress can be made quickly..

- For example, Samoa, China, Mexico, Jordan and Dominican Republic were all able to produce preliminary accounts within 6 months
- For many countries and agencies is a matter of re-arranging current data to match the format of the standard tables and to ensure they are consistent with the definitions and classifications of SEEA
- In this process data gaps and deficiencies may be identified and, if important enough, these can be addressed

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References

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Further Information

- [System of Environmental-Economic Accounting, Central Framework](#) (2012)