System of Environmental Economic Accounting

Session 6: Asset accounts for other environmental resources

Regional Training Workshop on SEEA Asset Accounts for Sustainable Development

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Classification of environmental assets in SEEA CF

Table 5.1
Classification of environmental assets in the SEEA Central Framework

1	**Mineral and energy resources**
1.1	Oil resources
1.2	Natural gas resources
1.3	Coal and peat resources
1.4	Non-metallic mineral resources (excluding coal and peat resources)
1.5	Metallic mineral resources
2	**Land**
3	**Soil resources**
4	**Timber resources**
4.1	Cultivated timber resources
4.2	Natural timber resources
5	**Aquatic resources**
5.1	Cultivated aquatic resources
5.2	Natural aquatic resources
6	**Other biological resources** (excluding timber resources and aquatic resources)
7	**Water resources**
7.1	Surface water
7.2	Groundwater
7.3	Soil water

Asset accounts

Asset accounts	***Topics covered (detailed definition)***
Mineral and energy resources	Physical and monetary accounts for minerals and energy stocks (oil, natural gas, coal and peat, non-metallic minerals and metallic minerals) (CF 5.3)
Land	Physical and monetary accounts for land, land cover, land use and forest (CF 5.6)
Soil resources	**Area and volume of soil resources (CF 5.7)**
Timber resources	Physical and monetary accounts for timber resources (CF 5.8)
Aquatic resources	**Physical and monetary accounts for fish, crustaceans, molluscs, shellfish and other aquatic organisms such as sponges and seaweed as well as aquatic mammals such as whales. (CF 5.393) (CO2, pollutants) (CF 3.9)**
Other biological resources	**Cultivated animals and plants including livestock, annual crops such as wheat and rice, and perennial crops such as rubber plantations, orchards and vineyards. (CF 5.10)**
Water resources	**Stock of water resources (CF 5.11)**

Physical Asset Account: Accounting Structure

Table 5.2
General structure of the physical asset account for environmental assets (*physical units*)

	Mineral and energy resources	Land (including forest land)	Soil resources	Timber resources		Aquatic resources		Water resources
				Cultivated	Natural	Cultivated	Natural	
Opening stock of resources	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additions to stock of resources								
Growth in stock	na	Yes*	Soil formation Soil deposition	Growth	Natural growth	Growth	Natural growth	Precipitation Return flows
Discoveries of new stock	Yes	na	na	na	na	na	Yes*	Yes*
Upward reappraisals	Yes	Yes	Yes*	Yes*	Yes*	Yes*	Yes	Yes*
Reclassifications	Yes	Yes	Yes	Yes	Yes	Yes	Yes	na
Total additions to stock								
Reductions in stock of resources								
Extractions	Extractions	na	Soil extraction	Removals	Removals	Harvest	Gross catch	Abstraction
Normal reductions in stock	na	na	Erosion	Natural losses	Natural losses	Normal losses	Normal losses	Evaporation Evapotranspiration
Catastrophic losses	Yes*	Yes*	Yes*	Yes	Yes	Yes	Yes	Yes*
Downward reappraisals	Yes	Yes	Yes*	Yes*	Yes*	Yes*	Yes	Yes*
Reclassifications	Yes	Yes	Yes	Yes	Yes	Yes	Yes	na
Total reductions in stock								
Closing stock of resources	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Note: "na" means not applicable.

* An asterisk indicates that this entry is usually not significant for the resource or is typically not separately identified in the source data. In practice, not all cells that reflect the possibility of an entry here should be shown separately in published accounts for each type of resource.

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Accounting for soil resources

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Accounting for soil resources

- Why accounting for soil resources?
  - > information on the area and volume of soil resources lost due to soil erosion
  - > soil made unavailable by changes in land cover (e.g., soil covered by buildings or roads) and other causes (e.g., changes in soil structure due to compaction, acidity or salinity)
  - > for examination of the health of soil systems, and the connections between soil resources and production in agriculture and forestry
- Focus on the top layer of soil
- Research into the quantity and quality of soil has been a long-standing undertaking in many countries, but not linked to economic activity
- Accounts for:
  - > Area of soil resources
  - > Volume of soil resources

Soil resources: considerations

- Soil types can be defined using combination of information on:
  - **Soil components**, the biogeochemical composition of the soil: minerals, liquids, gases and organic matter that are present in the soil
  - **Soil properties** reflect the physical, chemical and biological characteristics of the soil, e.g., porosity, texture, pH level and microbial biomass
- Classifications of soil types / groupings
  - FAO: Harmonized World Soil Database
  - FAO/UNESCO Soil Map of the World
- Measured through a series of inventory processes - **soil surveys**

Asset account for area of soil resources

- Measurement of the area of different soil types within a country
- Units: ha, km^2,…
- Restricted to land used for agriculture and forestry
- Changes due to:
  - > land cover (e.g., loss of soil resources for agriculture as a result of urban expansion);
  - > soil quality (e.g., after compaction or acidification);
  - > soil environment (e.g., due to desertification or land clearing).

Table 5.17
Physical asset account for area of soil resources (*hectares*)

	Type of soil resource	Total area
Opening stock of soil resources		
Additions to stock		
Due to changes in land cover		
Due to changes in soil quality		
Due to changes in soil environment		
Total additions to stock		
Reductions in stock		
Due to changes in land use		
Due to changes in soil quality		
Due to changes in soil environment		
Total reductions in stock		
Closing stock of soil resources		

Asset account for volume of soil resources

- Units: m^3
- Additions: soil formation, …
- Reductions: extraction, erosion, …
- Accounting for changing volumes of soil enable:
  - > assessment of the extent of erosion
  - > impact of major disasters such as flooding or drought
  - > provide information relevant to the assessment of soil depletion, i.e., the loss of soil resources due to economic activity

Table 5.18
Physical asset account for volume of soil resources (*cubic metres*)

	Type of soil resource
Opening stock of soil resources	
Additions to stock	
Soil formation and deposition	
Upward reappraisals	
Reclassifications	
Total additions to stock	
Reductions in stock	
Extractions	
Soil erosion	
Catastrophic losses	
Downward reappraisals	
Reclassifications	
Total reductions in stock	
Closing stock of soil resources	

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Accounting for aquatic resources

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Accounting for aquatic resources

- Asset accounts for aquatic resources organize information on the stocks and changes in stocks of the quantity and value of aquatic resources within a country's economic territory
  - > All aquatic resources are in scope, but in practice, limited to aquatic resources that are subject to commercial activity
- Both cultivated aquatic resources and natural aquatic resources
  - > Distinction based on the control, responsibility and management of an institutional unit
- Aquatic resources that are considered to live within the exclusive economic zone (EEZ)
  - > Migrating and straddling fish stocks are considered to belong to a country during the period when those stocks inhabit its EEZ

Aquatic resources: considerations

- Classification of aquatic resources
  - > Cultivated aquatic resources
    - For harvest (inventories)
    - For breeding (fixed assets)
  - > Natural aquatic resources

- FAO collects data on capture and aquaculture production of aquatic resources

Aquatic resources:

1. Freshwater fishes
2. Diadromous fishes
3. Marine fishes
4. Crustaceans
5. Molluscs
6. Whales, seals and other aquatic mammals
7. Miscellaneous aquatic animals
8. Miscellaneous aquatic animal products
9. Aquatic plants

Physical asset accounts for aquatic resources

- Total biomass of all species that are subject to harvesting activity or cultivated within national boundary
- Units: tonnes, kg, …
- Can be compiled by species if of relevance

Table 5.22
Physical asset account for aquatic resources (*tonnes*)

	Type of aquatic resource		
	Cultivated aquatic resources—fixed assets	Cultivated aquatic resources—inventories	Natural aquatic resources
Opening stock of aquatic resources	406	150	1 393
Additions to stock			
Growth in stock	19	192	457
Upward reappraisals			33
Reclassifications	40		11
Total additions to stock	59	192	501
Reductions in stock			
Gross catch/harvest		183	321
Normal losses	37	5	183
Catastrophic losses	4	2	9
Uncompensated seizure			7
Downward reappraisals	5		
Reclassifications	9		35
Total reductions in stock	55	190	555
Closing stock of aquatic resources	410	152	1 339

Accounting for other biological resources

- Other biological resources – mostly cultivated animals and plants, such as livestock, annual crops (wheat and rice), and perennial crops (rubber plantations, orchards and vineyards)
- Some natural biological resources: wild berries, fungi, bacteria, fruits and other plant resources, wild animals (deer, boar or moose)
- No prescribed tables, but same structure can be used

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Accounting for water resources

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Accounting for water resources

What is measured?

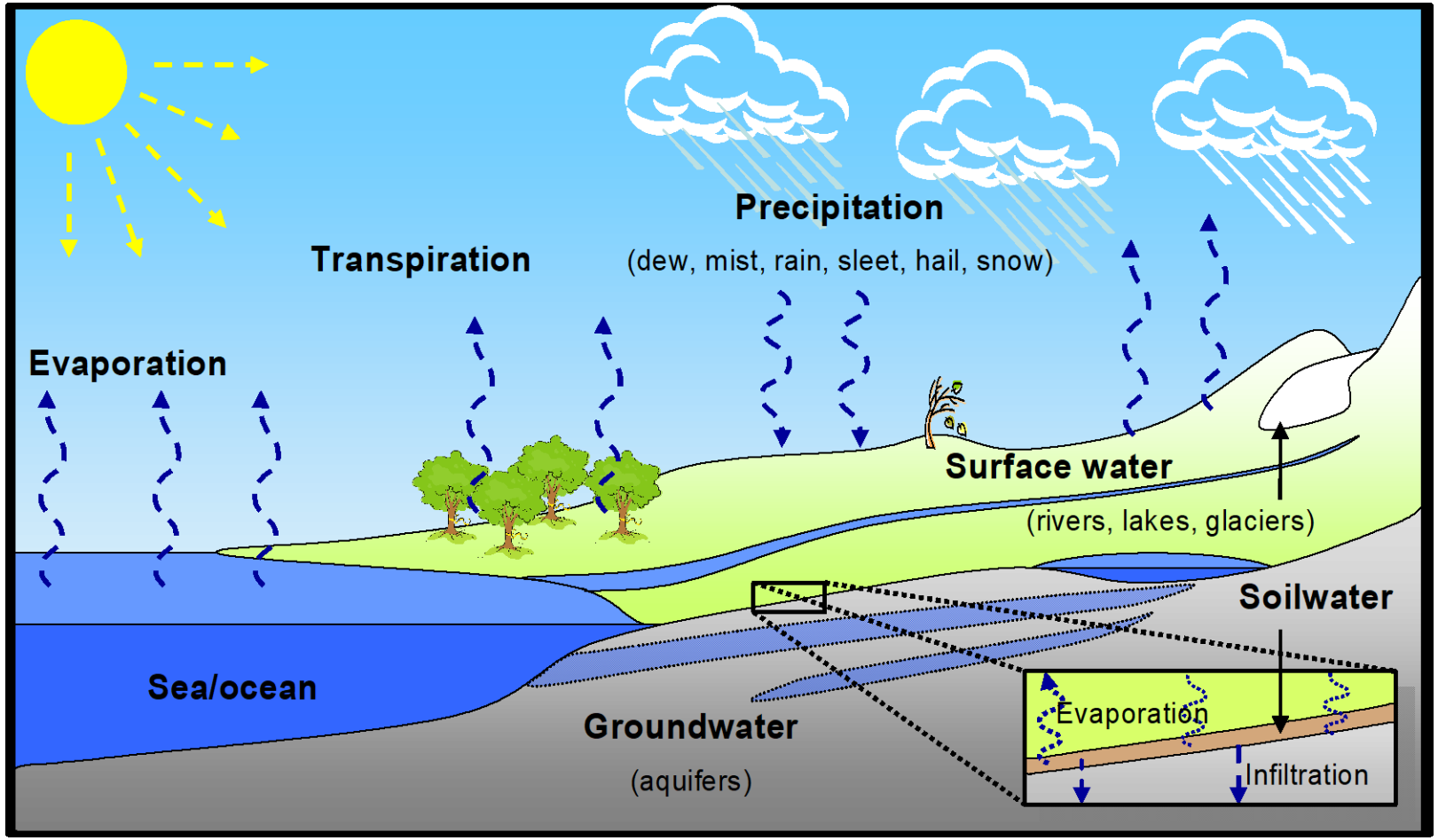
- Stock of water at the beginning and end of an accounting period
- Flows of water:
  - Abstracted by the economy
  - Returned by the economy
  - Added through precipitation
  - Evaporation and transpiration
  - Changes through flows between different water resources

Water assets:

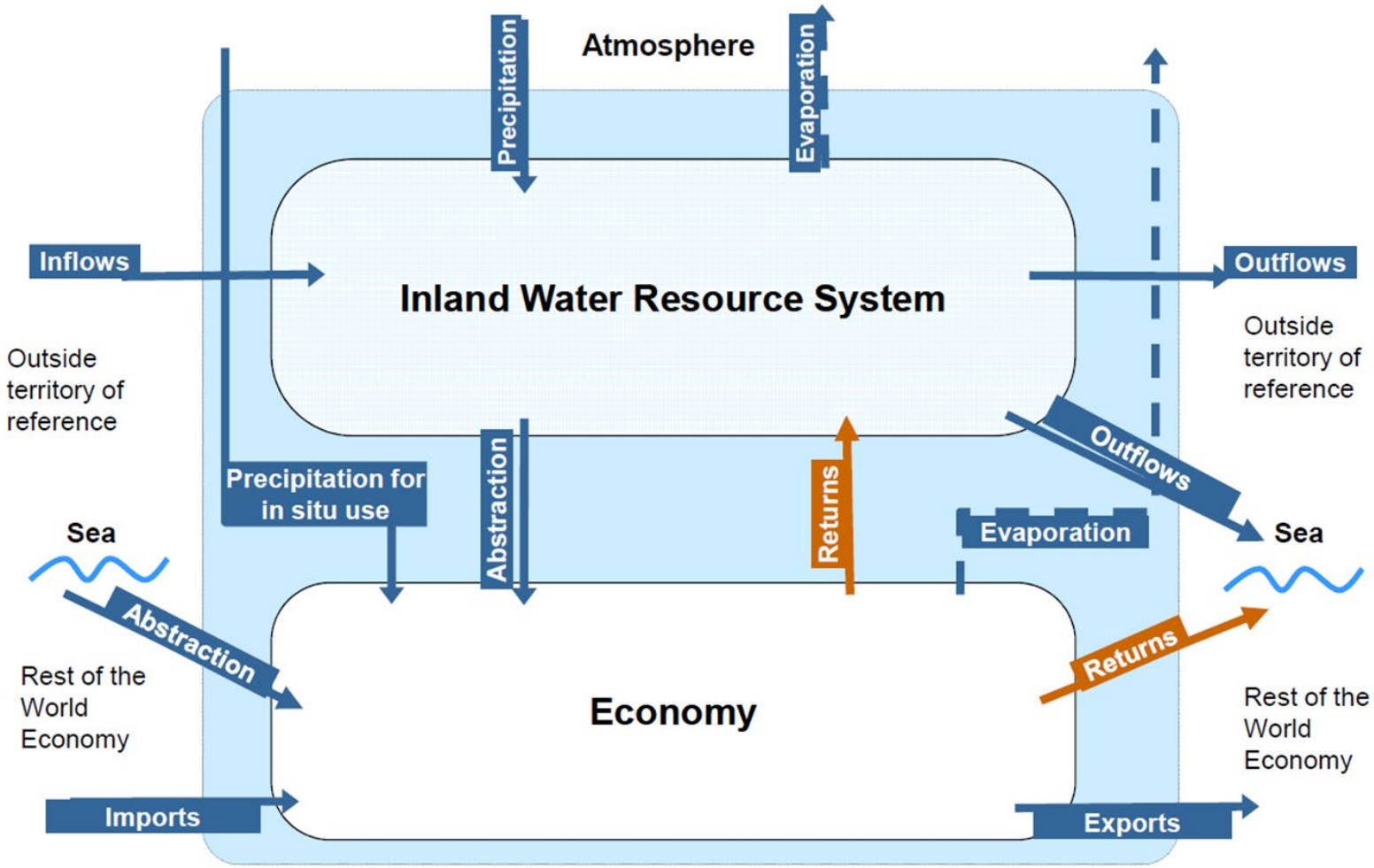
Classification of inland water bodies

Inland water bodies	
1	Surface water
1.1	Artificial reservoirs
1.2	Lakes
1.3	Rivers and streams
1.4	Glaciers, snow and ice
2	Groundwater
3	Soil water

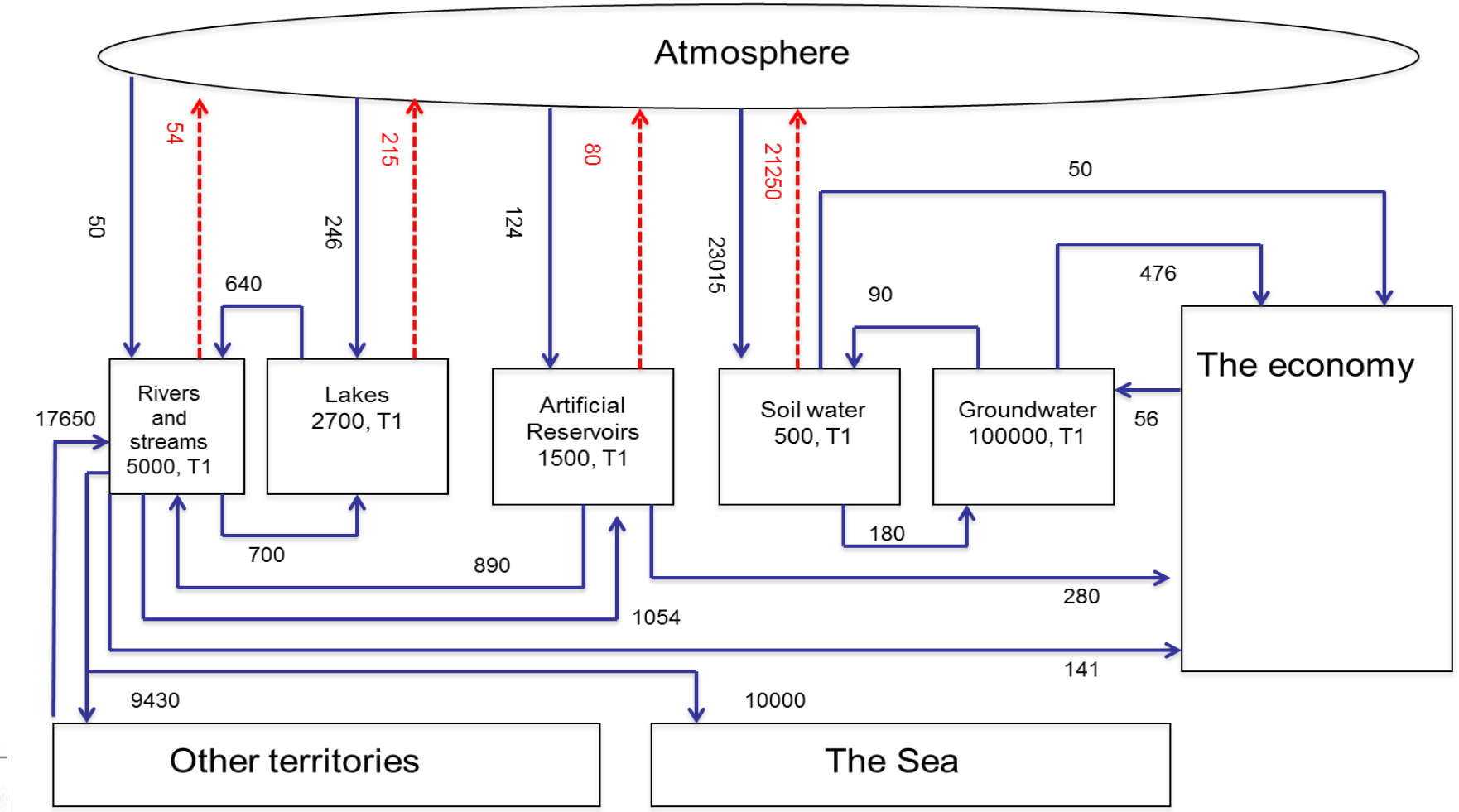
The hydrological cycle



Stock-Flow Model of SEEA Water (simplified)



Understanding Water Asset Accounts: Water asset account diagram



Physical asset account for water resources

- Additions:
  - > Returns
  - > Precipitation
  - > Inflows
  - > Discoveries (aquifers)
- Reductions:
  - > Abstraction
  - > Evaporation / transpiration
  - > Outflows
- Units: usually m^3
- Soil water may be difficult to measure

	Type of water resourcs						
	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**

THANK YOU

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