# SEEA Technical Notes: Water Accounting

## DRAFT

### 1. Introduction

Water is essential for life. It is a key element in growing food, generating energy, producing many industrial products as well as in ensuring the integrity of ecosystems and the goods and services they provide. Increasing competition for freshwater between agriculture, urban and industrial use as well as population growth results in pressure on water resources, with many countries (or regions within countries) reaching conditions of water scarcity or facing limits to economic development. Moreover, water quality may deteriorate over time further limiting the availability of freshwater resources.

Because of the integral role that water plays in human life and economic activity, water accounting crosses a number of different types of accounts including physical flow accounts and asset accounts. The two core accounts for water concern the recording of flows of water through the economy in physical supply and use tables (PSUT) for water and the recording of stocks of water resources and changes in stocks in asset accounts for water.

This SEEA Technical Note introduces the key aspects of accounting for water within the SEEA framework. In Section 2 the general motivation for water accounting and the potential for derivation of aggregates and indicators from water accounts is described. In Section 3 the structures of the two core accounts are described and also the potential to compile combined presentations for water and thus organise information for the derivation of indicators.

In Section 4, possible extensions to the core accounts are described since each of the core accounts may be compiled at varying levels of detail (for example at different levels of industry or by river basin. Section 4 also introduces the potential to account for emissions to water and for water quality.

In Section 5, the basic steps required for the compilation of the core water accounts are outlined, together with a description of the key data sources. Significant material is available on the compilation of water accounts and this section provides a summary. In the final section, Section 6, links to relevant materials including to country examples are provided.

This technical note does not cover all potential areas of accounting interest in relation to water and its links to economic and other human activity. The additional areas include (i) accounting for water in marine environments (although abstraction of sea water is included); (ii) accounting for fish, other aquatic resources and sea-bed mineral resources; (iii) accounting for passive uses of water (such as for transportation and recreation); (iv) the valuation of water resources; and (v) accounting for water in the context of assessing ecosystems. Although these areas are not addressed directly in this technical note, the connections to accounting for these areas is summarised in Section 4.

## 2. Key aggregates and indicators

The integral role of water in development is widely recognized. It is not surprising that water is very high on the national and international development agenda, with several international agreements specifying targets on water supply and sanitation. The most notable is the inclusion of two indicators (proportion of population with sustainable access to an improved water source and proportion of population with access to improved sanitation) within a specific target in the Millennium Development Goals (MDGs), namely target 10 - to halve, by 2015, the proportion of people without sustainable access to safe drinking water and sanitation.

It is because water is critical and intimately linked with socio-economic development that it is necessary for countries to move away from sectoral development and management of water resources and to adopt an integrated overall approach to water management (United Nations and the World Water Assessment Programme, 2006). The motivation for water accounting is that only by integrating information on the economy, hydrology, other natural resources and social aspects can integrated policies be designed in an informed and integrated manner.

The SEEA Central Framework defines three key aggregates that emerge from PSUT for water. They are gross water input, net domestic water use and final water use (also referred to as water consumption). These aggregates can be derived at an economy wide or industry level and provide a strong set of indicators covering the abstraction of water from various water sources, the use of water by economic units (including households) and a key indicator of environmental pressure, final water use, which reflects the quantity of water no longer available for use.

Information from the SEEA framework can also be used to derive analytical measures relating to efficiency of use and decoupling of water use from economic activity. SEEA based data can also inform on the allocation and distribution of water. Using data from the standard national accounts framework, it may also be useful to organise data relating to the pricing of water, the full costs of supplying and treating water, payments for water rights and the extent of investment in infrastructure for water supply and sanitation.

The SEEA framework provides a comprehensive framework for the assessment of water related issues as they concern human and economic activity. More detail on aggregates and indicators is provided in SEEA Water.

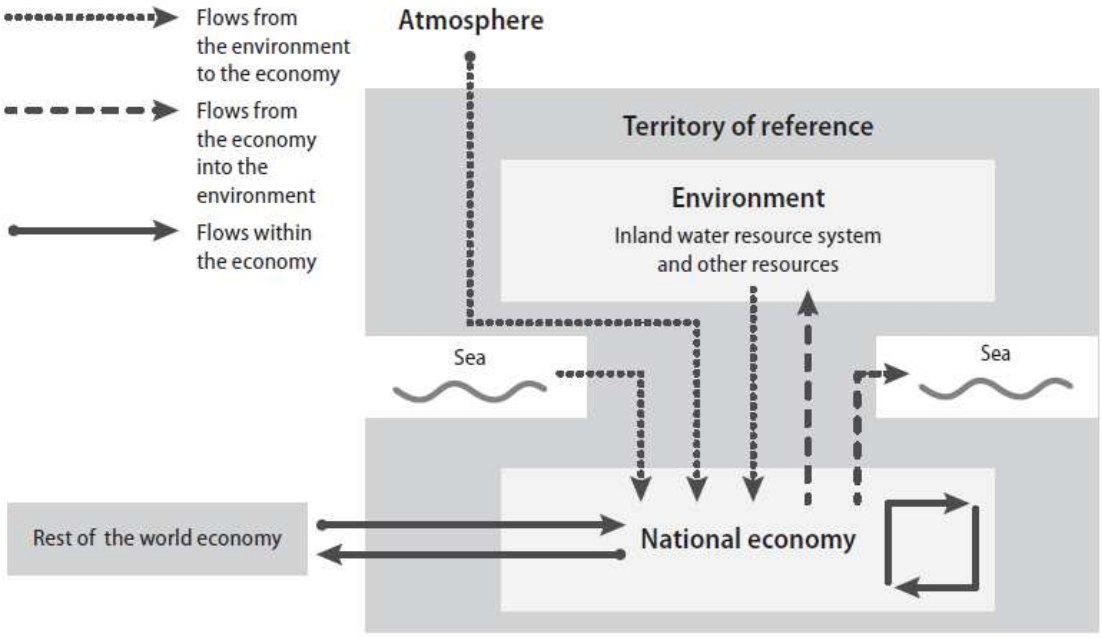
## 3. Core accounts for water

*The hydrological system and flows of water between the environment and the economy*

Water is in continuous movement through the processes of precipitation, evaporation, run-off, infiltration and flows to the sea. The natural cycle of water, the hydrological cycle, involves connections between the atmosphere, the oceans, and land surface and subsurface. The focus of the SEEA water accounts is the inland water system comprising surface water (rivers, lakes, artificial reservoirs, snow, ice and glaciers), groundwater and soil water within the territory of reference. Within this system water is abstracted, used and returned by humans as part of economic and other human activity. The PSUT for water and the asset account for water resources provide a structure for information on all of these flows and the related stocks of water resources.

The key flows between the environment and the economy are shown in Figure 1.

**Figure 1 Flows in the physical supply and use tables**




*Physical supply and use tables for water*

The PSUT for water records flows of water, in physical units, encompassing the initial abstraction of water resources from the environment into the economy, to the water flows within the economy in the form of supply and use by industries and households, and finally, flows of water back to the environment. Flows such as the evaporation of water from lakes and artificial reservoirs and flows between water bodies are considered flows within the environment and are recorded in the asset accounts. The SEEA Central Framework and SEEA Water provide an extensive description of the relevant accounting entries.

Physical supply and use tables can be compiled at various levels of detail, depending on the required policy and analytical focus and data availability. The core PSUT for is divided into five sections which organize information on (a) abstraction of water from the environment; (b) distribution and use of abstracted water across enterprises and households; (c) flows of wastewater and reused water (between households and enterprises); (d) return flows of water to the environment; and (e) evaporation, transpiration and water incorporated into products.

Table 1 shows the structure of the core PSUT for water. The structure reflects a basic set of industries and sources of water that should be part of a PSUT for water. Possible extensions to the core structure are described in Section 4.

## Table 1 Physical supply and use table for water (cubic metres) of water)

**Physical supply table for water**

| | Abstraction of water; Production of water; Generation of return flows | | | | | | | Flows from the rest of the world | Flows from the environment | Total supply |
|---|---|---|---|---|---|---|---|---|---|---|
| | Agriculture, forestry and fishing | Mining & quarrying, Manufacturing and Construction | Electricity, gas, steam and air conditioning | Water collection, treatment and supply | Sewerage | Other industries | Households | Imports | | |
| **(I) Sources of abstracted water** | | | | | | | | | | |
| Inland water resources | | | | | | | | | | |
| Surface water | | | | | | | | | 440.6 | 440.6 |
| Groundwater | | | | | | | | | 476.3 | 476.3 |
| Soil water | | | | | | | | | 50.0 | 50.0 |
| Total | | | | | | | | | 966.9 | 966.9 |
| Other water sources | | | | | | | | | | |
| Precipitation | | | | | | | | | 101.0 | 101.0 |
| Sea water | | | | | | | | | 101.1 | 101.1 |
| Total | | | | | | | | | 202.1 | 202.1 |
| Total supply abstracted water | | | | | | | | | 1 169.0 | 1 169.0 |
| **(II) Abstracted water** | | | | | | | | | | |
| For distribution | | | | 378.2 | | | | | | 378.2 |
| For own-use | 108.4 | 114.6 | 404.2 | 61.2 | 100.1 | 2.3 | | | | 790.8 |
| **(III) Wastewater and reused water** | | | | | | | | | | |
| Wastewater | | | | | | | | | | |
| Wastewater to treatment | 17.9 | 117.6 | 5.6 | 1.4 | | 49.1 | 235.5 | | | 427.1 |
| Own treatment | | | | | | | | | | |
| Reused water produced | | | | | | | | | | |
| For distribution | | | | | 42.7 | | | | | 42.7 |
| For own use | | 10.0 | | | | | | | | 10.0 |
| **(IV) Return flows of water** | | | | | | | | | | |
| To inland water resources | | | | | | | | | | |
| Surface water | | | 300.0 | | 52.5 | 0.2 | 0.5 | | | 353.2 |
| Ground water | 65.0 | 23.5 | | 47.3 | 175.0 | 0.5 | 4.1 | | | 315.4 |
| Soil water | | | | | | | | | | |
| Total | 65.0 | 23.5 | 300.0 | 47.3 | 227.5 | 0.7 | 4.6 | | | 668.6 |
| To other sources | | 5.9 | 100.0 | | 256.3 | | 0.2 | | | 362.4 |
| Total Return flows | 65.0 | 29.4 | 400.0 | 47.3 | 483.8 | 0.7 | 4.8 | | | 1 031.0 |
| **(V) Evaporation of abstracted water, transpiration and water incorporated into products** | | | | | | | | | | |
| Evaporation of abstracted water | 76.2 | 43.2 | 2.5 | 1.8 | 0.7 | 3.6 | 10.0 | | | 138.0 |
| Transpiration | | | | | | | | | | |
| Water incorporated into products | | | | | | | | | | |
| **Total supply** | 267.5 | 314.8 | 812.3 | 489.9 | 627.3 | 55.7 | 250.3 | | 1 169.0 | 3 986.8 |

Note: Dark grey cells are null by definition.

## Table 1 (cont) Physical supply and use table for water (cubic metres) of water)

**Physical use table for water**

| | Abstraction of water; Intermediate consumption; Return flows | | | | | | Final consumption | Accumulation | Flows to the rest of the world | Flows to the environment | Total use |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Agriculture, forestry and fishing | Mining & quarrying, Manufacturing and Construction | Electricity, gas, steam and air conditioning | Water collection, treatment and supply | Sewerage | Other industries | Households | | Exports | | |
| **(I) Sources of abstracted water** | | | | | | | | | | | |
| Inland water resources | | | | | | | | | | | |
| Surface water | 55.3 | 79.7 | 301.0 | 4.5 | 0.1 | | | | | | 440.6 |
| Groundwater | 3.1 | 34.8 | 3.2 | 432.9 | | 2.3 | | | | | 476.3 |
| Soil water | 50.0 | | | | | | | | | | 50.0 |
| Total | 108.4 | 114.5 | 304.2 | 437.4 | 0.1 | 2.3 | | | | | 966.9 |
| Other water sources | | | | | | | | | | | |
| Precipitation | | | | 1.0 | 100.0 | | | | | | 101.0 |
| Sea water | | | 100.0 | 1.1 | | | | | | | 101.1 |
| Total | 0.0 | 0.0 | 100.0 | 2.1 | 100.0 | 0.0 | | | | | 202.1 |
| Total use abstracted water | 108.4 | 114.5 | 404.2 | 439.5 | 100.1 | 2.3 | | | | | 1 169.0 |
| **(II) Abstracted water** | | | | | | | | | | | |
| Distributed water | 38.7 | 45.0 | 3.9 | | | 51.1 | 239.5 | | | | 378.2 |
| Own use | 108.4 | 114.6 | 404.2 | 50.4 | 100.1 | 2.3 | 10.8 | | | | 790.8 |
| **(III) Wastewater and reused water** | | | | | | | | | | | |
| Wastewater | | | | | | | | | | | |
| Wastewater received from other units | | | | | 427.1 | | | | | | 427.1 |
| Own treatment | 12.0 | 40.7 | | | | | | | | | 52.7 |
| Reused water | | | | | | | | | | | |
| Distributed reuse | | | | | | | | | | | |
| Own use | | | | | | | | | | | |
| Total | 12.0 | 40.7 | | | 427.1 | | | | | | 479.8 |
| **(IV) Return flows of water** | | | | | | | | | | | |
| Returns of water to the environment | | | | | | | | | | | |
| To inland water resources | | | | | | | | | | 668.6 | 668.6 |
| To other sources | | | | | | | | | | 362.4 | 362.4 |
| Total return flows | | | | | | | | | | 1 031.0 | 1 031.0 |
| **(V) Evaporation of abstracted water, transpiration and water incorporated into products** | | | | | | | | | | | |
| Evaporation of abstracted water | | | | | | | | | | 138.0 | 138.0 |
| Transpiration | | | | | | | | | | | |
| Water incorporated into products | | | | | | | | | | | |
| **Total use** | 267.5 | 314.8 | 812.3 | 489.9 | 627.3 | 55.7 | 250.3 | | | 1 169.0 | 3 986.8 |

Note: Dark grey cells are null by definition.

*Asset accounts for water*

Asset accounts for water resources focus on the inflows and outflows of water to and from the land surface and subsurface, and on the destination of these flows. The SEEA Central Framework and SEEA Water provide an extensive description of the relevant accounting entries.

The core asset accounts for water present information on the stock of water in the inland water system at the beginning and end of an accounting period, whether it is in artificial reservoirs, lakes or rivers, or stored as groundwater or soil water. The accounts then record the flows of water as it is abstracted, consumed, increased through precipitation, or changed through flows to and from other countries and returns to the sea.

The structure of the core asset account for water resources is shown in Table 2.

**Table 2: Physical asset account for water resources** (Cubic metres)

| | Type of water resource | | | | | | Total |
|---|---|---|---|---|---|---|---|
| | Surface water | | | | Groundwater | Soil water | |
| | Artificial reservoirs | Lakes | Rivers and streams | Glaciers, snow and ice | | | |
| **Opening stock of water resources** | 1 500 | 2 700 | 5 000 | | 100 000 | 500 | 109 700 |
| **Additions to stock** | | | | | | | |
| Returns | 300 | | 53 | | 315 | | 669 |
| Precipitation | 124 | 246 | 50 | | | 23 015 | 23 435 |
| Inflows from other territories | | | 17 650 | | | | 17 650 |
| Inflows from other inland water resources | 1 054 | 339 | 2 487 | | 437 | 0 | 4 317 |
| Discoveries of water in aquifers | | | | | | | |
| *Total additions to stock* | 1 478 | 585 | 20 240 | | 752 | 23 015 | 46 071 |
| **Reductions in stock** | | | | | | | |
| Abstraction | 280 | 20 | 141 | | 476 | 50 | 967 |
| for hydro power generation | | | | | | | |
| for cooling water | | | | | | | |
| Evaporation & actual evapotranspiration | 80 | 215 | 54 | | | 21 125 | 21 474 |
| Outflows to other territores | | | 9 430 | | | | 9 430 |
| Outflows to the sea | | | 10 000 | | | | 10 000 |
| Outflows to other inland water resources | 1 000 | 100 | 1 343 | | 87 | 1 787 | 4 317 |
| *Total reductions in stock* | 1 360 | 335 | 20 968 | | 563 | 22 962 | 46 188 |
| **Closing stock of water resources** | 1 618 | 2 950 | 4 272 | | 100 189 | 553 | 109 583 |

*Combined presentations for water*

Within water accounting, the interest lies in linking the abstraction and use of water in physical terms with estimates of output and value added by industry and the total final consumption of households. The presentation of physical and monetary information in the same account allows for the derivation of consistent indicators for evaluating the impact on water resources of changes in the economy due, for example, to changes in economic structure. Using combined accounts in economic models permits the analysis of possible trade-offs between alternative water policies and economic strategies. (The potential links to economic models are described further in SEEA Applications and Extensions.)

The core combined presentation for water is presented in Table 3. For the monetary part of the combined supply table, two water-related products are identified: natural water and sewerage services. Depending on data availability, other products may be incorporated, for example those relating to irrigation water. The monetary part also includes estimates of total supply of products (i.e., including the output of non-water products) for each industry, thus providing an indication of the relative significance of the output of water-related products as part of total industry output.

The monetary part of the combined supply table records additional entries to illustrate the conversion of measures of output in basic prices to measures of output in purchasers' prices. This step enables an accounting balance to be maintained with the use table in monetary terms.

The physical flows in the combined supply table reflect volumes of water supplied between economic units, including volumes of wastewater to sewerage (shown along an of which row), as well as total returns to the environment. The bulk of the supply of water appears in the columns corresponding to the Water collection, treatment and supply industry and the Sewerage industry. Flows relating to hydropower are shown explicitly, reflecting the relative significance of these flows within the total physical flows of water.

The monetary part of the combined use table shows the intermediate consumption and final use of the two primary water-related products. Total intermediate consumption for each industry and total final consumption for households and government are also shown to provide an indication of the significance of the use of water as part of total consumption.

It is useful to incorporate in the monetary part of the combined use table, estimates of gross fixed capital formation (investment) for water supply and treatment operations. These entries are made for each relevant industry in additional rows in the table.

The physical part of the combined use table shows the volume of water abstracted from the environment, including amounts retained for own use, and amounts received by economic units.

## Table 3 Combined presentation for water data

| | Industries (by ISIC categories) | | | | | | | Rest of the world | Taxes less subsidies on products, trade and transport margins | Actual final consumption | | Capital Formation | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ISIC 1-3 | ISIC 5-33, 41-43 | ISIC 35 | ISIC 36 | ISIC 37 | ISIC 38,39, 45-99 | Total industry | | | Households | Government | | |
| **1. Supply of water products** (Currency units) | | | | | | | | | | | | | |
| Natural water | | 13 | 1 | 6 570 | 14 | 7 | 6 605 | 1 | - 2 | | | | 6 604 |
| Sewerage services | | | | | 5 022 | | 5 022 | 2 | 14 | | | | 5 038 |
| **2. Total supply of products** | 170 737 | 267 143 | 195 769 | 6 570 | 5 036 | 6 478 288 | 7 123 543 | | | | | | |
| **3. Intermediate consumption and final use** (Currency units) | | | | | | | | | | | | | |
| Natural water | 406 | 643 | 88 | 1 004 | 100 | 1 229 | 3 470 | 4 | | 3 074 | 60 | | 6 608 |
| Sewerage services | 3 | 229 | 1 | 13 | 1 | 1 406 | 1 653 | 3 | | 3 316 | 66 | | 5 038 |
| Other products | 145 597 | 125 181 | 180 683 | 2 360 | 1 718 | 5 842 990 | 6 298 529 | | | 605 817 | 50 096 | | 1 284 442 |
| **4. Gross value added** (Currency units) | 24 731 | 141 090 | 14 997 | 3 193 | 3 217 | 632 663 | 819 891 | | | | | | 819 891 |
| **5. Employment** | 371 | 2 211 | 61 | 41 | 43 | 8 204 | 10 931 | | | | | | 10 931 |
| **6. Supply of water** (Millions m3) | | | | | | | | | | | | | |
| Supply of water to other economic units | | | | 378 | | | | | | | | | 378 |
| Total returns | 65 | 29 | 400 | 47 | 484 | 1 | 1 026 | | | 5 | | | 1 031 |
| **7. Use of water** (Millions m3) | | | | | | | | | | | | | |
| Total Abstraction | 108 | 115 | 404 | 440 | 100 | 2 | 1 169 | | | | | | 1 169 |
| *of which:* Abstraction for own use | 108 | 115 | 404 | 50 | 100 | 2 | 780 | | | 11 | | | 791 |
| Use of water received from other economic units | 39 | 45 | 4 | | | 51 | 139 | | | 240 | | | 378 |
| **8. Gross fixed capital formation** (Currency units) | | | | | | | | | | | | | |
| For water supply | 582 | 16 | 819 | 2 872 | | | 4 289 | | | | | | 4 289 |
| For water sanitation | | | | | 2 874 | | 2 874 | | | | | | 2 874 |
| **9. Closing Stocks of fixed assets for water supply** (Currency units) | 6 112 | 84 | 9 871 | 25 347 | | 17 | 41 431 | | | | | | 41 431 |
| **10. Closing Stocks of fixed assets for water sanitation** (Currency units) | | | | | 37 457 | | 37 457 | | | | | | 37 457 |
| **11. Water consumption** (Millions m3) | 76 | 43 | 3 | 2 | 1 | 4 | 128 | | | 10 | | | 138 |

Note: Dark grey cells indicate zero entries by definition.

## 4. Extensions and links

*Extensions to the core accounts*

There are a number of ways in which the core accounts might be extended to provide additional avenues for analysis and additional indicators. The following paragraphs highlight some options that might be considered.

In relation to asset accounts for water resources one extension is the preparation of accounts for particular regions within a country, data by river basin or catchment being the most obvious example. It may well be the case that underlying data on physical stocks and flows of water resources are collected or organised by river basin and hence population of such extended accounts may be quite feasible. The primary reflection of the extension is the recording of flows between river basins within a country in addition to inflows and outflows from other countries.

The compilation of PSUT for water by river basin may be more difficult since this would require information on the use of water by industries and households classified by river basin and generally economic data of this type are not classified spatially. However, it may be relevant to expand only certain parts of the PSUT by river basin, for example those parts recording abstractions from the environment and returns to the environment.

Extensions to the PSUT may focus on additional detail concerning certain industries and on households. For example, it may be relevant to consider water use in agriculture by type of agricultural output/activity (e.g. water used in growing crops compared to raising livestock). Other examples could relate to examination of water use in electricity generation, or in specific manufacturing processes.

For households, the topic of access to water and sanitation is likely to be of interest and in this situation incorporating additional data on water use by type of household (for example by income decile, by family size, by location) may be considered.

In both these extensions the approach to be taken is to incorporate additional columns in the PSUT reflecting the additional activities or type of households and allocate the more aggregated data appropriately. Since the PSUT should remain balanced at the more aggregated levels it is possible to prepare these types of extensions only for part of the PSUT. Thus, for example, it is not necessary to allocate abstractions from the environment by household type in order to expand the view of use of water by household type.

Extensions are also possible to the combined accounts to add in additional socio-economic variables that may underpin the derivation of additional indicators. For example, distinction may be made between the final consumption expenditure by households and the actual final consumption of households. The difference reflects expenditure by Governments to provide goods and services (in this case, water supply) to households. Thus, although these goods and services are purchased by Governments, the consumption is in fact that of households. This distinction allows an improved comparison of consumption over time and across countries, as it is not dependent on the arrangements in place to manage and finance water supply.

Depending on the purpose of analysis, additional information, for example, concerning emissions to water by industry and household, or on prices paid for water supply by different users, can be included within the general combined supply and use table framework to

provide a single reference point for relevant information. Economic data relating to payments for water rights, expenditure on environmental protection and resource management related to water supply and water sewerage activities and other economic data may also be considered.

Additions such as these demonstrate the capacity of combined supply and use tables to incorporate additional information based on a core structure.

*Other water accounts*

Although not considered a core account, accounts for emissions to water are a recognised account in the SEEA Central Framework and the SEEA Water. Particularly where there are concerns about the quality of water in various water sources, accounting for emissions to water, such as nitrogen and phosphorous, heavy metals and other substances, may be useful. The compilation of water emission accounts is described in the SEEA Central Framework section 3.6.4 and in the SEEA Water, section IV.

Beyond water emissions accounts it is possible to compile water quality accounts for specific water bodies. This type of accounting is still developing as the definition of metrics for different qualities of water have not yet been standardised. The main metrics used relate to the existence of metals and pesticides and salinity levels. Water quality accounts are discussed in SEEA Water, section VII.

*Links to other environmental-economic accounts*

Because water is such an integral environmental asset and input an even broader picture of the role of water may be obtained through consideration of information on water other environmental-economic accounts. For example,

- Accounting for fish and other aquatic resources is included in asset accounts for aquatic resources (including aquaculture), and asset accounts for mineral and energy resources include known deposits of sea-bed mineral and energy resources. See SEEA Central Framework sections 5.5 and 5.9.
- Accounting for passive uses of water, such as for transportation and recreation, can be done in the context of assessments of land use, discussed in SEEA Central Framework, section 5.6.
- Accounting for water resources may also be an important component in the broader objective of accounting for ecosystem condition and ecosystem services as described in SEEA Experimental Ecosystem Accounting. Since the focus of water accounting in the SEEA Central Framework is on the inland water system there may be interest in considering water in marine environments as part of extended ecosystem assessment.

In addition, there are important considerations around the valuation of water resources which has not been resolved but which may be an important focus for accounting work.

## 5. Compilation of water accounts

*Basic steps*

This section outlines some basic steps that are relevant in the compilation of water accounts. Both the SEEA Water and the International Recommendations for Water Statistics (IRWS) provide more complete guidance on the organisation of basic data and the preparation of accounts. Links to these documents and other related material are provided in Section 6.

Following the decision to produce water accounts and the allocation of resources for this, a general process for the compilation of water accounts may be followed. This is described below in nine steps noting, however, the components are not strictly sequential and some may be completed concurrently and it may be necessary to revisit certain steps through the compilation process. The nine steps are:

1. Define the accounts of interest, the desired geographical scope, the frequency of reporting (e.g. 3 yearly, annual, quarterly), the temporal basis (e.g. financial year, calendar year, hydrological year) and the desired level of industry and household detail.
2. Identify potential data sources and assess their suitability for accounts relative to the design choices made in Step 1. In this step the metadata associated with the data sources should be closely examined. Potential sources of data for water accounts are listed below.
3. Secure access to data, including the data themselves, associated metadata and the rights to disseminate the accounts that are derived from that data.
4. Import data and prepare data for analysis noting that concordances may be required between the classifications used in the imported data (which should be articulated in the metadata associated with the important data) and the classifications to be used in the SEEA based accounts.
5. Analyse data, including data quality, to identify data gaps, coherence between data sources, etc.; and make required adjustments for scope, definition, timing, classification as appropriate.
6. Prepare and edit draft accounts and tables including undertaking an analysis of time series where possible and recognising the likely need for multiple iterations in this step.
7. Disseminate accounts, including material to assist interpretation such as indicators, methodological notes and statements of data quality.
8. Archive data and related methodological and other documentation.
9. Review accounts, data sources, methods and systems, including actively seeking user feedback.

*Main data sources*

The compilation of accounts necessarily requires the integration of data from a wide range of sources. Following is a list of the most common sources of information for water accounting but since the national statistical and information systems of all countries can vary considerably it should be recognised that there is no ideal data source for particular accounting components. The appropriateness of particular data sources should be determined on the basis of the degree of alignment between the scope, timing, and classification of the source data and the target concept as articulated in the SEEA.

The most common sources of information include:

- Survey data: Data from surveys of enterprises, households are likely to be important in determining patterns of use of water. Targeted surveys of some industries, for example, agriculture, may be relevant depending on output requirements. Often the supply and treatment of water will be managed by a limited number of enterprises and hence surveys (or complete enumeration) of these enterprises on their activities (including abstraction, distribution and treatment) may be important data sources.
- Administrative data: It may be that the operation of water supply and treatment generates various administrative data set, for example, on readings from water meters. With appropriate privacy considerations such administrative data sets may be considered.
- Hydrological / meteorological data: These data are likely to provide the main information for the measurement of stocks and changes in stocks of water resources. Through direct measurement or the use of scientific models data from these sources will provide measurement of, among other things, surface and groundwater levels, river flows, precipitation, evapotranspiration, and natural transfers between water bodies.
- Economic / national accounts data: Data from the national accounts and related economic surveys will provide the basis for generating combined presentations and for comparing physical flows of water (as recorded in the PSUT for water) with corresponding measures of economic activity. As well, the national accounts can provide information on transactions associated with the abstraction, distribution and treatment of water include payments for water rights, water prices, costs of production and levels of investment and capital stock.
- Social data: Relevant social data include employment and population data. These are commonly obtained through household surveys of the labour force, and through population censuses and associated demographic statistics.

*Main measurement challenges*

As with all accounting work there are a range of measurement challenges centred on aligning the available data with the conceptual definitions and scope required for coherent accounts. For water accounting some particular challenges include

- Aligning data spatially where physical stock and flow information may be available at a river basin or catchment level while economic data are only available at a national or administrative region level.
- Accounting for losses of water during abstraction and distribution and the flows of water lost through theft.
- The recording of household activity, particularly in countries where abstraction of water for own use is prevalent.

## 6. References and links

*Conceptual materials and technical guidance*

SEEA Central Framework

SEEA Water

SEEA Experimental Ecosystem Accounting

International Recommendations for Water Statistics

Glossary of Hydrology

Training materials and guides

*Country examples* (suggestions only)

Australia

Botswana

Canada

China

Denmark

France

Mexico

Namibia

Netherlands

South Africa

Sweden