DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS
STATISTICS DIVISION
UNITED NATIONS

System of Environmental Economic Accounting

SEEA Central Framework 2028 update

Draft Guidance Note
Issue D4: Consideration of water as a produced asset (in the SEEA Central Framework)

Version 2: 8 September 2025

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Executive Summary

This Guidance Note addresses Issue D4 "*Consideration of water as a produced asset (e.g. water in artificial reservoirs)*" in the SEEA Central Framework (SEEA-CF) update list.

Currently, the SEEA-CF classify all water, including that in artificial reservoirs, as a natural resource, with production recorded when water is abstracted from a water body. This treatment, however, overlooks the significant human effort and capital required to create and manage reservoirs. It also means that the treatment of water differs from that of other natural resources that enter the economy.

The paper proposes reclassifying water in artificial reservoirs as a **produced asset**, specifically as an **inventory** as defined by the 2025 SNA of the product "Natural water" (CPC 1800). The primary arguments for reclassification are:

- Substantial human intervention is required to create and manage the water in reservoirs, including the use of labour, capital, and goods and services. This process displaces water in time and space, making it an inventory that is produced in one period and used in another.
- This approach aligns with the treatment of other assets, such as plantation forests, which are considered produced assets, unlike natural forests, and with other natural resources that are displaced in time and space by human activity. For example, iron in the ground, which becomes the product "Iron ore" (CPC 1410) when it is removed from the ground.
- Reclassifying the water more accurately reflects the economic activities associated with water management. Without the reservoir and its management, the water would not be available for later distribution, which is essential in areas with low water availability or highly variable availability

The proposed reclassification has several implications for the Physical Supply and Use Tables (PSUT). The key change is the creation of a new **"Inventory"** column in the PSUT:

- Water entering artificial reservoirs would be recorded as the use of a natural resource by the reservoir's operator (e.g., the water supply industry, ISIC 36).
- Losses from the Inventory, such as those from evaporation and seepage, would be recorded as a use by the water supply industry.

PSUTs are provided to compare the existing treatment with the proposed treatment. PSUTs for the proposed treatment for "wet" and "dry" years are used to illustrate these changes in the PSUT and how they more comprehensively capture the flow of water and the role of reservoirs. Suggested text for the SEEA-CF update is also provided

The changes to PSUT are a rearrangement of the data included in the existing SEEA-CF water PSUT and asset account. These accounts have been widely compiled, and the technical challenge of producing the proposed PSUT is no greater than that for the existing accounts.

The adoption of the proposal will require clear guidance on the definition of artificial reservoirs, the treatment of water in artificial canals, managed aquifer recharge (where water is injected into a natural aquifer) and return flows (from the economy to the environment).

The treatment of water in artificial reservoirs is relevant to other issues in the SEEA-CR update, including water valuation (Issue D7), the treatment of losses (Issue B2), and the linkages between the SEEA-EA and SEEA-CF (Issue A1).

1. Description of the issue

1. Issue D4 is "Consideration of water as a produced asset (e.g. water in artificial reservoirs)" in the SEEA Central Framework issue update list. Issue D4 is described as:

> "*This was also an issue during the SEEA CF 2012 revision, which may need to be revisited. Currently the SEEA CF does not consider water (such as in artificial reservoirs) as a produced asset, but instead only records production at the point the water is abstracted from a water body (natural or artificial). Further discussion is needed on the appropriate recording, considering also the link to the SNA production boundary.*"

2. Artificial reservoirs are of four surface water asset classes defined in the SEEA-CF (Annex 1). The others are (1) rivers and streams, (2) lakes, and (3), snow, ice and glaciers. The SEEA-EA has the same classification, but "snow, ice and glaciers" is renamed "Polar-alpine (cryogenic)". Artificial reservoirs are defined in the SEEA-CF as purpose-built reservoirs used for the storage, regulation, and control of water resources (para 5.477). Other human-built infrastructure, such as pipes, canals and drains, are connected to artificial reservoirs and water treatment facilities.

3. Artificial reservoirs are defined elsewhere. For example, the International Commission on Large Dams (ICOLD)[1] defines them as an "artificial barrier that has the ability to impound water for the purpose of storage or control of water".

4. The current SEEA Central Framework (SEEA-CF) treats water as a natural resource regardless of the source from which it is extracted. That is, water extracted from a lake, river, artificial reservoir, or the ground is all considered a natural resource. Production is recorded at the point where water is abstracted from any water body (natural or artificial). This treatment, as noted in the description in the update list, was debated in previous SEEA revisions[2],[3] and aligns with the 2008 SNA, but overlooks the significant human intervention required to create and manage artificial reservoirs.

5. The paper re-examines this issue for the SEEA-CF update, motivated by conceptual advances in ecosystem and water accounting and the recent update to SNA 2025, and the adoption of the 2021 SEEA-Ecosystem Accounting (SEEA-EA). The SEEA-Water[4], which pre-dates the SEEA-CF and SEEA-EA, also needs consideration.

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[1] https://www.icold-cigb.org/ Note; ICOLD also maintains a register of large dams.

[2] Nagy, M., Alfieri, A., and Vardon, M. 2009. Water in artificial reservoirs a produced asset? 14th Meeting of the London Group on Environmental Accounting. Canberra, 27-30 April 2009. https://www.researchgate.net/publication/242784852_Water_in_artificial_reservoirs_-_A_produced_asset

[3] Obst, C. 2010. Issue #16: The treatment of water in artificial reservoirs.

[4] https://seea.un.org/content/seea-water

6. There are close links between the data recorded in water asset accounts and ecosystem accounts, and the treatment of water as a produced asset is a cross-cutting issue for linking the SEEA-EA and SEEA-CF, Issue A1 in the SEEA Central Framework update. For example, in the measurement of ecosystem assets, which includes all water bodies, ecosystem condition and the measurement and recording of final and intermediate water-related ecosystem services. Notably, the IUCN Global Ecosystem Typology (GET) highlights the high-level distinction between natural rivers and streams, lakes, and artificial freshwater bodies (a subset of which includes artificial reservoirs), suggesting that these are fundamentally different ecosystem assets. Additionally, a new ecosystem service, water storage, may be relevant. This issues not the focus of paper but are explored to some extent in Annex 2.

7. The treatment of water in artificial reservoirs as a produced asset is also related to other issues in the SEEA-CF update. Firstly, the valuation of water, Issue D7. Valuation studies have primarily treated water in artificial reservoirs as a natural resource. Secondly the treatment of losses, Issue B2, because water in artificial reservoirs is lost through evaporation and subsurface seepage.

8. Discussion of water accounts and the links between the SNA, SEEA-CF and SEEA-EA can be confused by the terminology used. To minimise confusion, definitions of water stocks and flows from the 2025 SNA, SEEA-CF, SEEA-EA and the Central Product Classification (CPC) are provided as Annex 1 to this paper. This includes the definition of the product "Natural water" (CPC 1800). Discussions with water industry experts and other stakeholders can also be hindered by their use of different terms or the same terms with varying meanings.

9. One reason for the confusion is that in addition to the SEEA, there are other water accounting frameworks in use around the world[5]. These include the Water Account+ (WA+)[6]and those developed by individual countries – both national and subnational, for example, in Australia and California – and by water suppliers, other business, and in academia. In general, these frameworks can be mapped into SEEA[7].

[5] Vardon, M. J., Thi Ha Lien Le, Martinez-Lagunes, R., Pule, O. P., Schenau, S., May, S., & Grafton, R.Q. (2025) Accounting for water: A global review and indicators of best practice for improved water governance. Ecological Economics. https://doi.org/10.1016/j.ecolecon.2024.108396

[6] Karimi, P., Bastiaanssen, W. G. M., & Molden, D. (2013). Water Accounting Plus (WA+) – a water accounting procedure for complex river basins based on satellite measurements. *Hydrology and Earth System Sciences*, *17*(7), 2459–2472

[7] Vardon, M., Martinez-Lagunes, R., Gan, H., and Nagy, M. (2012). The System of Environmental-Economic Accounting for Water: Development, Implementation and Use. In Godfrey, J. and Chalmers, K. (Eds) International Water Accounting: Effective Management of a Scarce Resource. Edward Elgar. https://doi.org/10.4337/9781849807500

10. This Guidance note is the result of several years of development through the London Group, with papers related to the topic presented in 2022[8] and a position paper presented in 2024[9]. The Report of the 2024 London Group Meeting[10] noted:

"*There was support for treating water in reservoirs as a produced asset and for updating the tables to reflect this new treatment* —particularly by clarifying the table explanations, the description of the new water storage service, and the subdivision of the water supply industry (ISIC 36) into water storage and water distribution."

2. Review of existing measurement and research

11. A substantial body of work exists on the measurement of water resources, water-related ecosystem services, and water accounting[11]. Water asset accounts are one of the most commonly produced environmental-economic accounts, with around 50 countries producing them. Measurement of surface water, including the amount in artificial reservoirs and the flows into and out of artificial reservoirs, is not a technical challenge, as is demonstrated by the come production of water asset accounts[12].

12. The treatment of water in artificial reservoirs as a produced asset has not been explicitly developed in statistical frameworks. However, water as a natural resource is included in the water asset accounts, which includes artificial reservoirs and hence their opening and closing stocks and inflows and outflows. In addition, abstractions from artificial reservoirs are also recorded in the PSUT as supplied by the environment and disaggregated in the row. Although the issue has not been explicitly addressed, current practice indicates that measurement for accounts is possible. If water in artificial reservoirs is treated as a produced asset, then what is occurring is a rearrangement of the existing PSUT, and the water asset account remains unchanged.

13. A case study in Australia investigated how the treatment of water in artificial reservoirs affects the recording of flows in the SEEA-CF and SEEA-EA[13]. The recording of flows has

[8] https://seea.un.org/sites/seea.un.org/files/vardon.pdf

[9] https://seea.un.org/sites/seea.un.org/files/session_8_position_paper_water_accounting.pdf

[10] https://seea.un.org/sites/seea.un.org/files/2024_london_group_report_.pdf

[11] Vardon, M. J., Thi Ha Lien Le, Martinez-Lagunes, R., Pule, O. P., Schenau, S., May, S., & Grafton, R.Q. (2025) Accounting for water: A global review and indicators of best practice for improved water governance. Ecological Economics. https://doi.org/10.1016/j.ecolecon.2024.108396

[12] *Ibid*.

[13] Chen, Y. & Vardon, M. (2024). Accounting for water-related ecosystem services to provide information for water policy and management: an Australian case study. Ecosystem Services. https://doi.org/10.1016/j.ecoser.2024.101658

significant effects on the valuation of water flows (water-related ecosystem services, natural resources, and products)[14].

14. International experience, particularly through the SEEA CF and SEEA EA, has developed consistent approaches for compiling physical water asset accounts and SUT. Work by the United Nations Statistics Division (UNSD), Eurostat, and the OECD has resulted in manuals and compilation guides that underpin national implementation. This includes the International Recommendations for Water Statistics[15].

3. Alternative conceptual options and treatments

3.1 Definitions and frameworks

15. The 2025 SNA[16] Glossary defines: "*An asset is a store of value representing a benefit or series of benefits accruing to the economic owner by holding or using the entity over a period of time. It is a means of carrying forward value from one accounting period to another. All assets in the SNA are economic assets*."

16. The 2025 SNA identifies financial and non-financial assets. Two categories of non-financial assets are recognised: produced assets and non-produced assets. "*Produced assets are non-financial assets that have come into existence as outputs from production processes that fall within the production boundary of the SNA*" and "*Non-produced assets are non-financial assets that have come into existence in ways other than through processes of production*".

17. The 2025 SNA Glossary defines: "*Production is an activity, carried out under the responsibility, control and management of an institutional unit, that uses inputs of labour, capital, and goods and services to produce outputs of goods and services*."

18. The 2025 SNA Glossary also defines inventories as "*produced assets that consist of goods and services, which came into existence in the current period or in an earlier period, and that are held for sale, use in production or other use at a later date.*" In the 2025 SNA paragraphs 7.115–7.120 and 11.135–11.136 explain that inventories record the difference between production and use within a period. Goods enter inventories when not immediately sold or used, and withdrawals occur when demand exceeds production.

19. Under the 2025 SNA and SEEA-CF, water as a natural resource under non-financial assets, regardless of where it is and how it came to occur. For water in artificial

[14] Chen, Y., Wywroll, P., Burnett, P., Grafton, R.Q., & **Vardon, M**. (2025). Valuing and accounting for water-related ecosystem services for water pricing and management: An Australian case study. *Ecosystem Services*,

[15] https://seea.un.org/sites/seea.un.org/files/irws_en.pdf

[16] https://unstats.un.org/unsd/nationalaccount/docs/2025_SNA_Pre-edit.pdf

reservoirs, while the infrastructure (e.g., the dam) is a produced asset, and its operation requires labour and other goods and services. However, the water itself is still considered a natural resource that simply exists within the reservoir. This treatment is essentially the same as for rivers or lakes, where the water is naturally occurring. There is clearly a difference between water in lakes and water in reservoirs.

3.1 Arguments for the reclassification of water in artificial reservoirs as a produced asset

20. The traditional classification of reservoir water as a non-produced asset does not fully capture the realities of water management in artificial reservoirs. For the water to occur in reservoirs, substantial human intervention is required to create, manage, and maintain the water in the reservoirs. This intervention displaces the water in time and space, which is essential in areas where water availability is variable and in hot or arid climates. This intervention requires the use of produced capital, intermediate consumption, and labour, including the construction of dam walls and ongoing operational activities for water regulation (e.g. for hydro-electricity), quality control, and flow distribution (e.g., via pipes).

21. While the water is displaced in time and space, it is not transformed. However, this is like subsurface assets. For example, iron ore is in the ground and, using capital, intermediate consumption, and labour, comes to the surface and becomes a product, “Iron ore” (CPC 1410).

22. Artificial reservoirs create inventories as defined in the 2025 SNA. The water is produced in one period is used in another period. The purpose of artificial reservoirs is to store water when it is abundant and use it when it is scarce.

23. The SEEA-CF defines *artificial reservoirs*, which are purpose-built reservoirs used for storage, regulation and control of water resources. These are distinct from *lakes* which are, in general, large bodies of standing water occupying a depression in the earth’s surface (para. 5.477). The water in reservoirs that is intended for possible future supply (e.g., for drinking, irrigation, or hydroelectricity) is what is in scope of being considered produced. Structures built for water regulation, for example, flood mitigation and diversions for run-of-the-river hydroelectricity or hydroelectricity from lakes, are out of scope. For hydroelectricity from rivers or lakes, the treatment remains unchanged – the water is produced at the point of abstraction.

24. Building and maintaining artificial reservoirs and abstracting water from natural sources (e.g. rivers) involves the inputs of capital, labour and other goods and services, to produce another product, “Natural water” (CPC 1800), which aligns

with the definitions of production, produced assets and inventories in the 2025 SNA (see above).

25. Treating water in reservoirs as a produced asset (inventory) more accurately reflects the economic activities associated with its management; without the reservoir and its management, there would be no water to distribute later. Impounding the water also means that the water, the natural resource or final ecosystem service of water supply (as well as other water-dependent downstream ecosystem services, such as recreation), is not available to potential water users downstream of reservoirs.

26. The treatment of reservoir water as a produced asset and inventory aligns with the different treatment of plantation forests and natural forests used for timber production. Trees in plantation forests are treated as produced, with timber production recorded annually. In contrast, trees in natural forests that are ultimately harvested are treated as non-produced, and timber production is recorded at the time of felling. In this analogy, water in lakes and rivers would be non-produced assets (akin to natural forests), reservoir water, and produced assets (akin to plantation forests). A similar analogue is aquaculture production, where fish and shellfish take more than one year to be ready for sale.

3.2 Implications of reclassification for accounts

27. Reclassifying reservoir water as a produced asset has implications for the physical supply and use tables. It rearranges the existing PSUT by removing artificial reservoirs from environmental water sources and adds a column called “Inventory” to the economy. The flows from artificial reservoirs are currently included as a row under the surface water category and would need to be separated. The water flowing into the artificial reservoirs (e.g., from rivers) would be shown as use by the owner or operator of the reservoir (e.g., the water supply industry, ISIC 36). When the amount of water supplied by industry is lower than the amount provided to industries or households, the difference is added to the Inventory.

28. Including water in artificial reservoirs as a produced asset requires the recording of losses from this inventory, such as those due to evaporation, which can be significant, and seepage. These losses are in addition to losses in distribution (e.g., through burst and leaky pipes). The text on water losses in paragraph 3.212 of the SEEA-CF provides ambiguous guidance on accounting for these losses, but they are conventionally recorded as use by the water supply industry.

29. The water asset accounts already separately distinguish the additions and reductions to artificial reservoirs. Adding water to artificial reservoirs would mean including the water inventory on the national balance sheet.

30. The collection and storage of water from other sources would also result in additions to the inventory. This includes rainwater collection and the pumping and storage of groundwater by industry and households. For households, this would be own-account house production of "Natural water" (CPC 1800).

31. Water banking and managed aquifer recharge, the process of injecting surface water into sub-surface water or groundwater, which requires capital, labour and intermediate consumption, could mean the water injected would be treated as produced water. In this case, the water injected is from within the economy. The question is whether this is a return to the environment or is it the storage of the product "Natural water" (CPC 1800). The aquifer is natural, but the water was produced. If the water is stored for future use, then it could be an inventory, even though the aquifer is natural.

4. Recommendations on conceptual treatments

32. This section presents supply and use tables integrating the Central Framework and Ecosystem Accounting. For completeness, and due to their use in some countries, the tables for the SEEA-Water[17] are also referenced.

33. Two alternative accounting tables are presented: (1) reservoir water is treated as a produced asset, and (2) reservoir water is treated as a non-produced asset. In these tables water as a natural resource in the Central Framework is equated to the ecosystem service of water supply in the SEEA-EA (see Section 2, terminology)., while Annex 2 presents integrated SEEA-CF and SEEA-EA tables

4.1 Current tables in SEEA-CF, SEEA-Water and SEEA-EA

34. There are differences in the presentation of tables in the SEEA-CF and SEEA-Water. The SEEA-Water PSUT and the asset account are found in Supplementary Tables. A feature of the SEEA-Water PSUT is that the use table precedes the supply table. This presentation was used to enable water consumption (i.e., water abstracted from water resources but not returned to water resources, SEEA Water A3.9) to be calculated from the supply and use tables. The table also presents two views of water abstraction. Rows 1.a and 1.b split abstraction by water for own use and water for distribution, while rows 1.i to 1.ii show abstraction by water source. This presentation was used so that direct abstraction by industries, the own-account production of "Natural water" (CPC 1800), which in the SNA should theoretically be reallocated to the water supply industry, can be seen in the tables.

35. The SEEA-CF PSUT greatly expands the SEEA-Water table, spanning 4 pages, and presents, as is customary, the supply side of the table before the use side. The split

[17] https://seea.un.org/content/seea-water

presentation of abstraction by water source (surface water, groundwater, soil, etc) and abstraction for own use or distribution shown in the SEEA-Water PSUT is maintained on the use side and added to the supply side in the SEEA-CF. The recording of wastewater[18] is also expanded. A water consumption identity is not shown in the SEEA-CF. The recording of wastewater is also expanded in the SEEA-CF, but a water consumption identity is not shown. The amount of water abstracted that is transpired, evaporated or incorporated into products is separately shown, allowing the calculation of indicators from the accounts (e.g., water footprint). The differences between the PSUT in the SEEA-CF and SEEA-Water are not explained in the SEEA-CF, and the SEEA-CF makes only a few cross-references to SEEA-Water (pp. viii, 4, 70, and footnote 78, p. 217). The differences in table format have caused confusion.

36. The water accounts in the SEEA-CF and SEEA-Water are, in practice, often modified. Many countries simplify the accounts, reducing the number of industries and flows recorded in the accounts[19]. This is due mainly to lack of data, but also because not all flows are relevant in all circumstances. Countries also present the data in different ways. For example, Australia presents the industries and households in rows and water flows in columns, subdividing agricultural water use by industry subdivision.

37. SEEA-EA shows the supply and use of the water-related ecosystem services. The SEEA-EA essentially expands the "environment" column in the SEEA-CF and SEEA-Water to encompass ecosystems. Annex 2 presents an example. In the SEEA-CF and SEEA-Water, the final ecosystem service of water supply is provided by a water body of some type (e.g., surface water or groundwater), which is shown in the rows rather than the columns, as it is affected by abstraction by industry or households. The difference between the SEEA-CF and SEEA-Water PSUT and the SEEA-EA PSUT is that in the SEEA CF and SEEA-Water water abstraction by industries is shown in the rows by water sources, while in the SEEA-EA abstraction from ecosystems (e.g. surface or groundwater) is shown in the columns and aggregated to one line in the row as the ecosystem service of water supply.

4.2 Proposed tables

38. Table 1 is the PSUT showing the current treatment of water in artificial reservoirs as a non-produced asset. This is accompanied by a diagram of the flows (Fig. 1). Building on the data used in Table 1 and Figure 1, the proposed PSUT for water as a produced

[18] Wastewater is a term that has different meanings in different contexts. Here we are using the term as defined in the SEEA-CF

[19] Vardon, M. J., Thi Ha Lien Le, Martinez-Lagunes, R., Pule, O. P., Schenau, S., May, S., & Grafton, R.Q. (2025) Accounting for water: A global review and indicators of best practice for improved water governance. Ecological Economics. https://doi.org/10.1016/j.ecolecon.2024.108396

asset, along with the accompanying diagram, is presented in Table 2 and Figure 2, respectively. This is for a wet year where the water in artificial reservoirs increases; an addition to the inventory of CPC 1800. Also provided are Table 3 and Figure 3, which are for a dry year and a decrease in inventory. The environment column could be split into water source type for all tables to provide more, or the natural resource row could be split to show sources of water, which is how it is presented it 2012 SEEA-CF PSSUT (Table 3.6, pp. 72-75).

Table 1. Current treatment, water as a non-produced asset, wet year, million m³

		Economy							Environment	
million m3		Agriculture, forestry and fishing	Mining	Manufacturing	Water supply in industry	Other industry	Households	ROW Import (supply) / Export (use)	Rivers, lakes, artificial reservoirs, soil groundwater,	**Total**
Supply										
Natural resource										
	Water								88	**88**
Products										
	Distributed water				74					**74**
Use										
Natural resource										
	Water	11	1		74	1	1			**88**
Products										
	Distributed water	26		2	4	8	34			**74**

Figure 1. Current treatment, water as non-produced asset, wet year, million m³

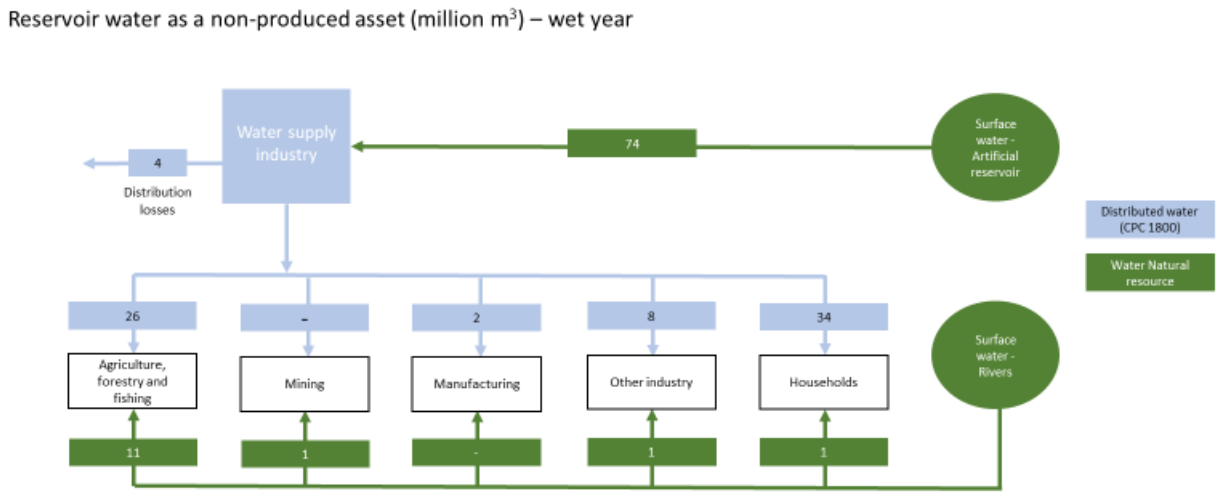


Table 2. Proposed treatment, water as produced asset, wet year, million m³

million m3		Economy								Environment	Total
		Agriculture, forestry and fishing	Mining	Manufacturing	Water supply	Other industry	Households	Inventory	RoW Import (supply) / Export (use)	Rivers, lakes, soil groundwater,	
Supply											
Natural resource											
	Water									277	**277**
Products											
	Distributed water				187						**187**
Return flow											
	Water				72						**72**
Use											
Natural resource											
	Water	11	1		263	1	1				**277**
Products											
	Distributed water	26		2	18	8	34	99			**187**
Return flow											
	Water									72	**72**

Figure 2. Proposed treatment, water as a produced asset, wet year, million m³

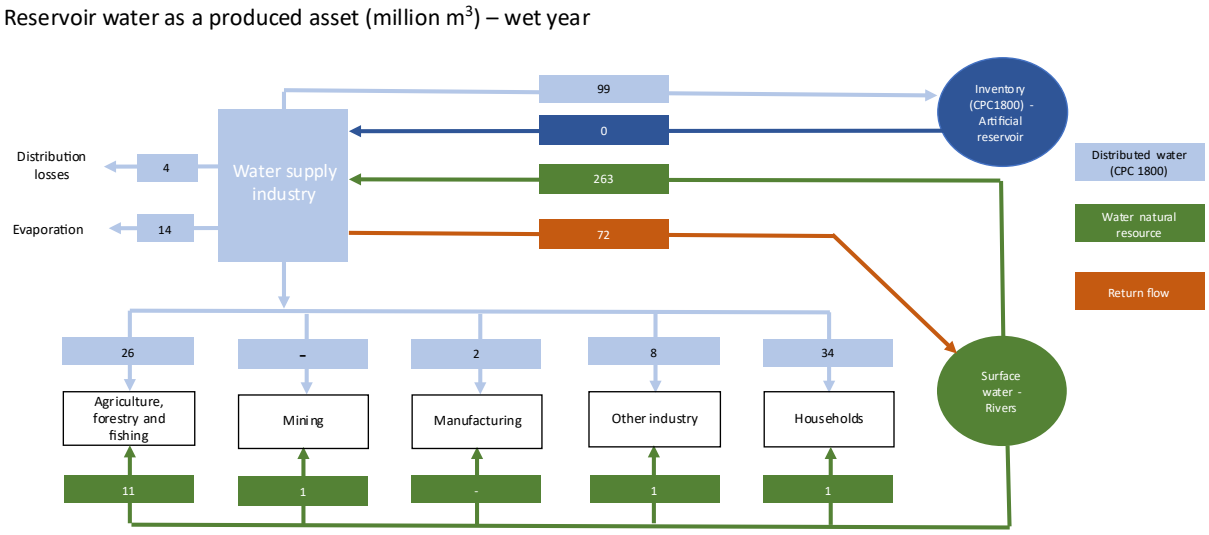
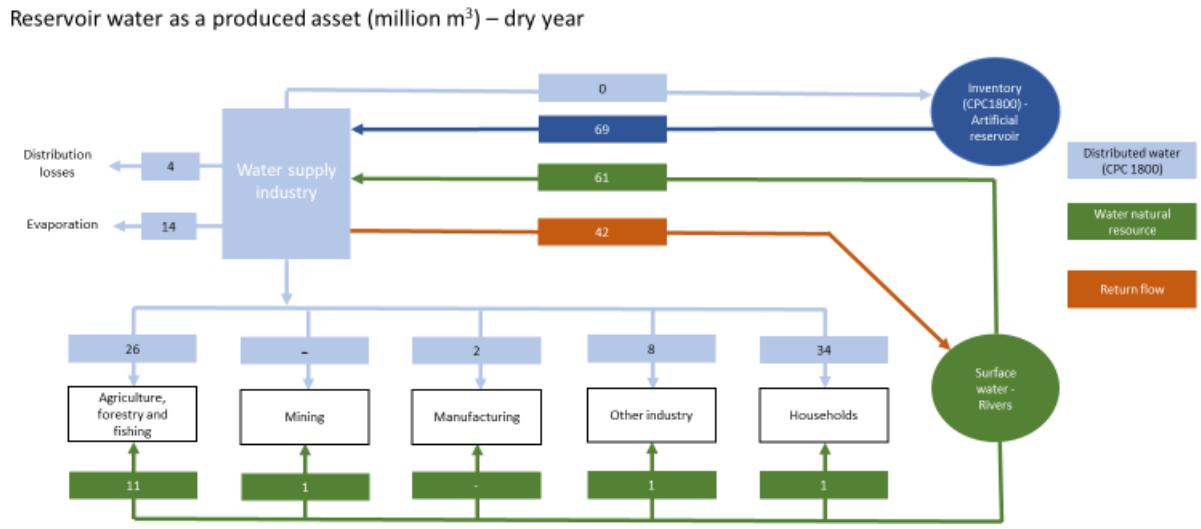


Table 3. Proposed treatment, water as a produced asset, dry year, million m³

million m3		Economy								Environment	Total
		Agriculture, forestry and fishing	Mining	Manufacturing	Water supply	Other industry	Households	Inventory	RoW Import (supply) / Export (use)	Rivers, lakes, soil groundwater,	
Supply											
Natural resource											
	Water									75	**75**
Products											
	Distributed water				61			27			**88**
Return flow											
	Water							42			**42**
Use											
Natural resource											
	Water	11	1		61	1	1				**75**
Products											
	Distributed water	26		2	18	8	34				**88**
Return flow											
	Water									42	**42**

Figure 3. Proposed treatment, water as produced asset, dry year, million m³



39. Table 1 is simpler than Table 2. In Table 1 only extractions from artificial reservoirs and rivers are shown from the environment. The water supply industry extracts 74 Mm³ of water as a natural resource from artificial reservoirs, and this is all converted into the product, CPC 1800, at the point of extraction. This water is then distributed to industries and households. Distribution losses (4 Mm³) are recorded as a use by

the water supply industry, and the remainder of the distributed water is used by industry (36 Mm^3) and households (34 Mm^3).

40. If water in reservoirs is a produced asset, then a column within the economy is added to the PSUT, and extraction from the environment occurs when the water enters the reservoir. In Table 2 and Figure 2, this is 263 Mm^3 of water as a natural resource. As in Table 1, use of distributed water by industries other than the water supply industry and households remains at 36 Mm^3 and 34 Mm^3, respectively. Use by the water supply increases, with an additional 14 Mm^3 used through evaporation from reservoirs and 99 Mm^3 added to the inventory in artificial reservoirs. A return flow of 72 Mm^3 is shown. This is the water that leaves the reservoirs and returns to the environment, in this example, a river. The addition and return would match the entries in the water asset account for artificial reservoirs.

41. In dry years, less water flows into reservoirs, resulting in water being withdrawn from the inventory. Table 3 and Figure 3 show that the inventory supplies 27 Mm3 to industry and households, and 42 Mm3 returns to the environment.

4.3 Proposed text

42. The text from the 2012 SEEA-CF for the water PSUT is found in Annex 3. The proposed updated text is found in Annex 4. It is not included in the main body of this document to avoid confusion with the paragraph numbering. Line numbers are provided in Annex 4 to aid discussion.

5. Other considerations in advancing the issue

43. The existing guidance for water statistics and water accounting would need to be updated. For these, the guidance needed is limited to accounting treatment in PSUT, as stocks and flows are already included in the asset accounts. The water PSUT guidance would be updated to include inventories, the treatment of losses due to evaporation and water leakage from artificial reservoirs as a use by the water supply industry of “Natural water” (CPC 1800).

44. During the discussion of this issue over the past few years, it was recognised that the PSUT in the SEEA-CF, while a beautifully intricate account, could be placed in an annex, and a simplified version could be presented in the main text. This was a key point raised when a paper on the topic was given to the London Group in 2024.

45. The treatment of water as a produced asset has applied in Australian research. The treatment is yet to be tested by a national statistical office, and this would be the logical next step. Countries with well-established water accounting programs, such as Australia and the Netherlands, are well-positioned to do this.

Annex 1 Water accounting classifications and definitions.

Table A1. Asset definitions and classifications in SEEA-CF, SEEA-Water and SEEA-EA

2025 SNA	**SEEA Central Framework and SEEA-Water**	**SEEA Ecosystem Accounting – Global Ecosystem typology**	**Notes for determining the scope and definitions of water assets for valuation**
Definition			
Water resources (AN34) consist of surface and groundwater resources used for extraction to the extent that their scarcity leads to the enforcement of ownership and/or use rights, market valuation and some measure of economic control. If it is not possible to separate the value of surface water from the associated land, the whole should be allocated to the category representing the greater part of the total value	Water resources consist of fresh and brackish water in inland water bodies, including groundwater and soil water. (SEEA CF, para 5.474)		SNA recognizes the need to separate the value of water from land. Valuation is not considered in SEEA-CF
Classification			
	Surface water • Rivers and streams • Lakes • Artificial reservoirs • Snow, ice and glaciers	Freshwater • F1 Rivers and streams • F2 Lakes • F3 Artificial reservoirs • T6 Polar-alpine (cryogenic)	Direct correspondence between SEEA-Water, SEEA Central Framework and SEEA Ecosystem Accounting
	Groundwater	• SF1 Subterranean freshwater • SF1 Anthropocentric subterranean freshwater • FM1 Semi-confined transitional waters	SEEA Ecosystem Accounting sub-divides groundwater into three classes. In the SEEA-Water and SEEA Central Framework, groundwater includes all these sources and could be similarly divided.
	Soil water	• Water use in rainfed agricultural and cultivated forest ecosystems	The SEEA-Water and Central Framework only identifies soil water, which is found in all ecosystem types with soil. However, in practice the use of soil water is only estimated for rain-fed agricultural ecosystems. The use of soil water can be shown by the ecosystem types used in the SEEA Ecosystem Accounting.

Note: SEEA -EA/GET also includes Transitional TF1 Palustrine wetlands, MFT1 Brackish tidal systems, M1 Marine shelf, M2 Pelagic ocean waters, M3 Deep sea floors. The SEEA-Water and Central Framework does not explicitly recognize these assets although water assets consist "*of fresh and brackish water in inland water bodies, including groundwater and soil water"* (SEEA Central Framework para 5.474) and these would likely be recorded as abstractions from surface water (i.e. lakes). The SEEA-Water included seas and oceans as a source of water for desalinization and cooling water as well as receiving return flows from the economy and river outflows. The ocean accounts

described in SEEA Ecosystem Accounting do not consider marine ecosystems as a possible source of water.

Table A2. Definitions of water flows recorded in the SNA, SEEA-CF, SEEA-Water, and SEEA-EA

Abiotic flows as defined in SEEA-EA	
Abiotic flow	are contributions to benefits from the environment that are not underpinned by, or reliant on, ecological characteristics and processes. (SEEA-EA, para. 6.35)
Water supply-related ecosystem services defined in SEEA-EA	
Water supply service (water provisioning)	reflect the combined ecosystem contributions of water flow regulation, water purification, and other ecosystem services to the supply of water of appropriate quality to users for various uses including household consumption. (SEEA-EA, p. 131)
Water flows defined in SEEA Central Framework and SEEA-Water	
Water (natural resource)	Natural resources include all natural biological resources (including timber and aquatic resources), mineral and energy resources, soil resources and water resources. (SEEA Central Framework, paras 2.101, 5.18) Water abstraction is defined as the amount of water that is removed from any source, either permanently or temporarily, in a given period of time. (SEEA Central Framework, para 3.195)
Wastewater *SEEA-Water*	Water which is of no further immediate value to the purpose for which it was used or in the pursuit of which it was produced because of its quality, quantity or time of occurrence. However, wastewater from one user can be a potential supply of water to a user elsewhere. It includes discharges of cooling water. (EDG)
Wastewater *SEEA-CF*	Wastewater is discarded water that is no longer required by the owner or user. (SEEA Central Framework, para 3.86)
Recycled water *SEEA-Water*	The reuse of water within the same industry or establishment (on site).
Reused water *SEEA-Water*	Wastewater delivered to a user for further use with or without prior treatment. Recycling within industrial sites is excluded. (EDG)
Reuse water *SEEA-CF*	Reused water is wastewater supplied to a user for further use with or without prior treatment, excluding the reuse (or recycling) of water within economic units. (3.207)
Water in the Central Product Classification (CPC)	
Natural water (CPC 1800)	This subclass includes: potable and non-potable water, suitable for further use, including: • treated water (e.g., from desalination plants, water treatment plants) • untreated water (e.g., obtained directly from natural sources) This subclass also includes: • used water suitable for further use This subclass does not include: • sea water, cf. 16200 • steam and hot water, cf. 17300 • mineral waters containing added carbon dioxide, cf. 24410 • waters individually bottled as beverages, cf. 24410 • distilled water, cf. 34250 • sewage and other wastewater, i.e. water not suitable for further use, cf. 39990 (CPC, p. 197)
Bottled waters, not sweetened or flavoured (CPC 24410)	This subclass includes waters individually bottled as beverages, including: • aerated (carbonated) waters • mineral waters (natural or artificial) This subclass does not include: - ice and snow, cf. 17400 - natural water (i.e. non-bottled), cf. 18000 - sweetened or flavoured water, cf. 24490

Annex 2 Integrated SEEA-CF and SEEA-EA PSUT

1. To aid the integration of the SEEA-CF and SEEA-EA we propose an integrated SUT. These are provided for: (1) reservoir water as a produced asset, and (2) reservoir water as a non-produced asset. The integrated tables record final and intermediate ecosystem services, as well as products. The supply and use of wastewater (including return flows and reuse water) are not shown but could be added.
2. The SEEA-CF PSUT would simply delete the rows for the supply and use of final and intermediate water-related ecosystem services

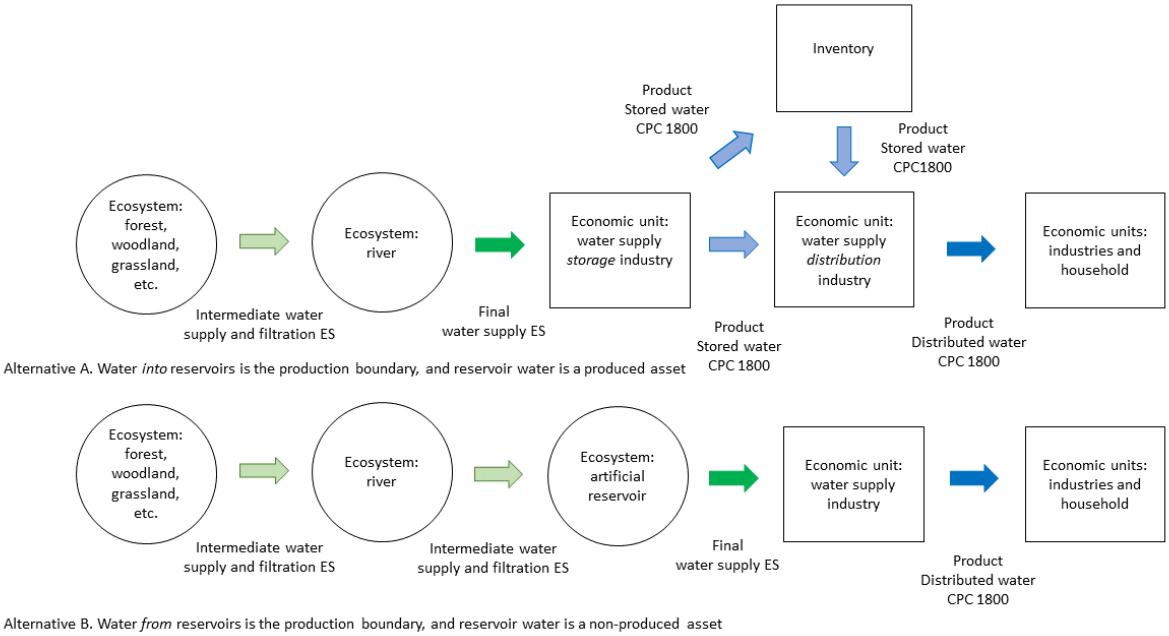


Figure A1. Alternative accounting treatments for (A) water as a produced and (B) water as a non-produced asset. The change in asset classification also changes the recording of the final water supply ecosystem service (ES) and the flow of water products stored and distributed water (CPC 1800) (After: Chen et al., 2025)[20].

3. Figure A1 compares the alternative accounting treatments for water as a produced asset (Alternative A) and water as a non-produced asset (Alternative B). The alternative treatments shown in Figures 1A and 1B have significant impacts on the valuation of the water supply ES, with the volume of the ES changing depending on treatment, which has implications for how observed prices or replacement cost methods are used for water valuation[21]. The key difference between the alternative

[20] Chen, Y., Wywroll, P., Burnett, P., Grafton, R.Q., & Vardon, M. (2025). Valuing and accounting for water-related ecosystem services for water pricing and management: An Australian case study. Ecosystem Services,

[21] Ibid.

treatments is when the final ES is recorded, which is when water converts from a natural resource (ecosystem service) to a product, which is the production boundary, and the question of when (or if) water becomes a produced asset.

4. Alternative A (Fig. A1a) is when reservoir water is treated as a produced asset; hence the final water supply ES is recorded when the water flows into an artificial reservoir, while in Alternative B (Fig. A1b) the final water supply ES is recorded when water flows out of an artificial reservoir, and reservoir water remains a non-produced asset. Alternative B results in a simpler supply and use table, but this treatment masks the impact on water availability caused by reservoirs (e.g., evaporation) and does not show the connection between reservoirs and the ecosystems (e.g., the flows from terrestrial ecosystems to rivers to reservoirs). Alternative B also results in the final water supply ES used by the water supply industry equalling the volume of distributed water. We use an example to illustrate the difference in the recording of flows using the two treatments.

5. Examples of Treatments A and B are provided. Water as a produced asset, is shown in Figure A2 and Table A1, while Treatment B, water as a non-produced asset, is shown in Fig A3 and Table A2. Recording reservoir water as a produced asset results in an expanded supply and use table. An example is shown in Figure A2 and Table A1. In this, the water supply industry is split into the water storage and water distribution in the columns, and with the two associated water products, stored water, and distributed water (both CPC 1800) are split into rows. In this recording, the volume entering the reservoir equals the final water supply ES. In this example, 359 million m3. The chain of flows extends back: the river runs into the reservoir, other rivers run into rivers (1 million m3 from within the accounting area and 1 million m3 from upstream of the accounting area), and water runs off terrestrial ecosystem systems into rivers (but total run-off is not equal to the ecosystem service). In this example, 292 million m3 from Natural Woodland. The data in the systems described in Figures 2 and 3 and in Tables 1 and 2 are the same.

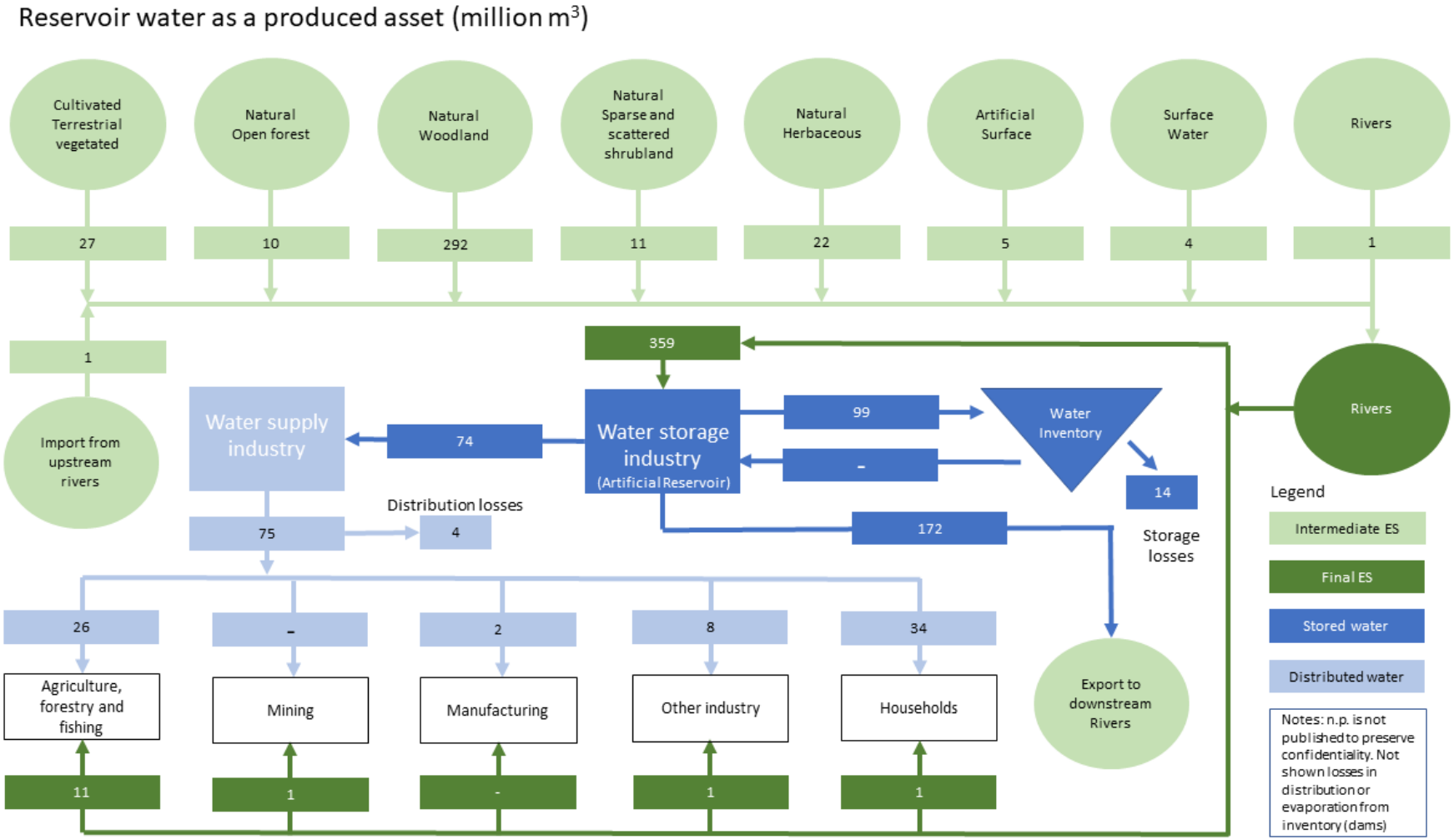


Figure A2. Water as a produced asset example

Table A1. Water as a produced asset example (proposed treatment)

			Economy									Environment									
ES or product		Units	Agriculture, forestry and fishing	Mining	Manufacturing	Water storage industry	Water distribution industry	Other industry	Households	Inventory	Import (supply) / Export (use)	Cultivated terrestrial Vegetated	Natural Open forest	Natural Woodland	Natural Sparse and scattered shrubland	Natural Herbaceous	Bare Surface	Surface Water	Rivers	Import (supply) / Export (use)	**Total**
Supply																					
Intermediate ES																					
	Water supply	million m3										27	10	292	11	22	5	4	1	1	**373**
Final ES																					
	Water supply	million m3																	373		**373**
Products																					
	Stored water	million m3				359															**359**
	Distributed water	million m3					74														**74**
Use																					
Intermediate ES																					
	Water supply	million m3																	373		**373**
Final ES																					
	Water supply	million m3	11	1		359		1	1												**373**
Products																					
	Stored water	million m3				14	74			99	172										**359**
	Distributed water	million m3	26		2		4	8	34												**74**

(Data matches that in Fig. A2)

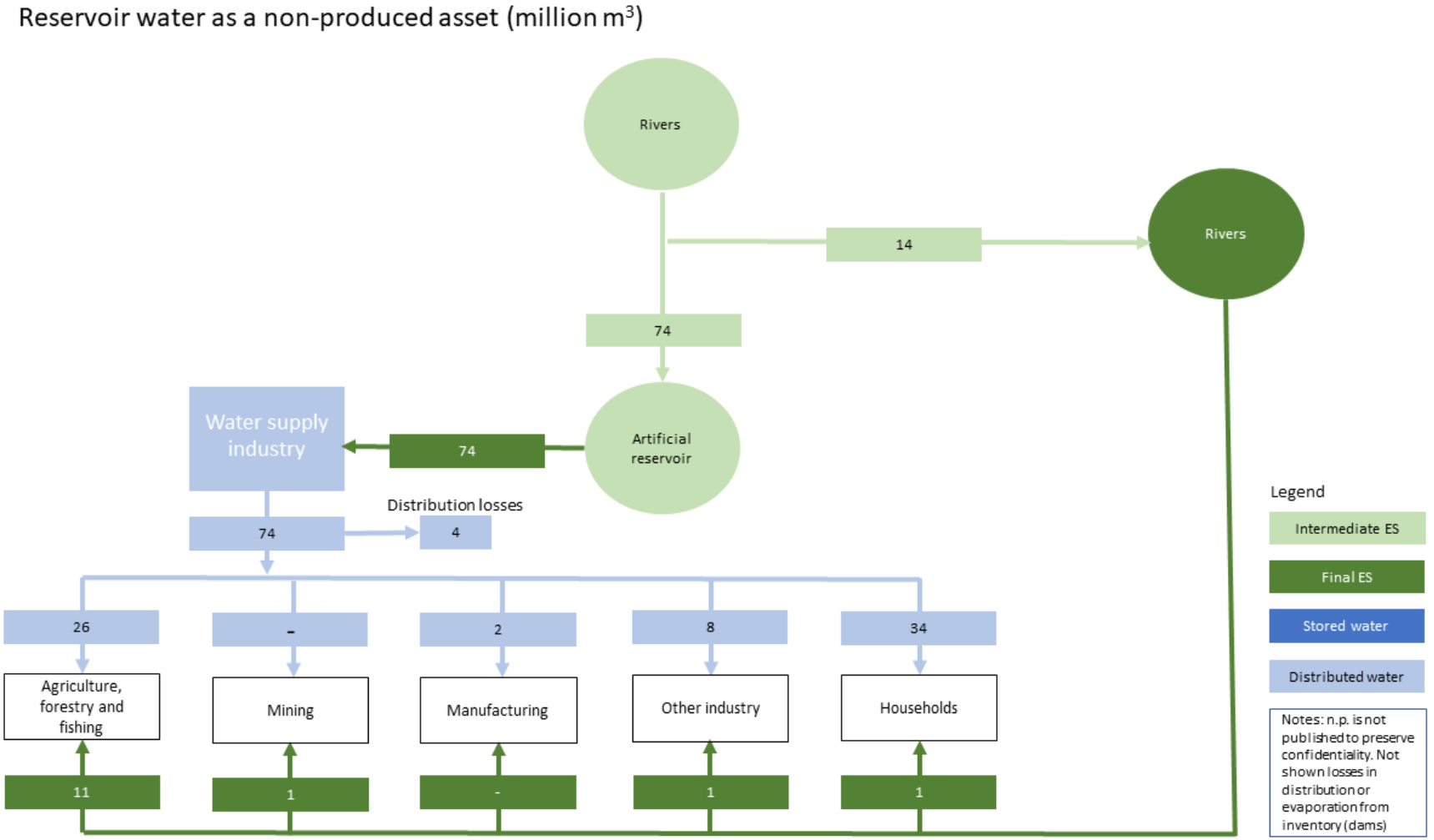


Figure A3. Water as non-produced asset example

Table A2. Water as a non-produced asset (Current Treatment)

			Economy									Environment										
ES or product		Units	Agriculture, forestry and fishing	Mining	Manufacturing	Water storage industry	Water distribution industry	Other industry	Households	Inventory	Import (supply) / Export (use)	Cultivated terrestrial Vegetated	Natural Open forest	Natural Woodland	Natural Sparse and scattered shrubland	Natural Herbaceous	Bare Surface	Surface Water	Artificial reservoirs	Rivers	Import (supply) / Export (use)	**Total**
Supply																						
Intermediate ES																						
	Water supply	million m3																		88		**88**
Final ES																						
	Water supply	million m3																	74	14		**88**
Products																						
	Stored water	million m3																				
	Distributed water	million m3					74															**74**
Use																						
Intermediate ES																						
	Water supply	million m3																	74	14		**88**
Final ES																						
	Water supply	million m3	11	1			74	1	1													**88**
Products																						
	Stored water	million m3																				
	Distributed water	million m3	26		2		4	8	34													**74**
	Nil by defintion																					
	Removed industry and product																					
	Added environmental asset																					

(Data matches that in Fig. A2)

6. Figure 2A and Table 2B show a subset of the flows in Figure 1A and Table 1A. With water treated as a non-produced asset, the recording of flows is more straightforward. This is the recording in the SEEA-CF and SEEA-Water. The Intermediate water supply ecosystem service from the vegetation is not shown, just the flow from rivers into reservoirs, reservoirs are explicitly recorded to the ecosystem types (they are already in the surface water classification of SEEA-EA, see Table 2), and the water storage industry and stored water are deleted from the tables. The losses from evaporation in reservoirs are not shown, nor the flows out of the reservoir exported downstream. The latter could be shown as return flows from the water supply industry.
7. Monetary tables consistent with the PSUT would be included. Valuation is a related discussion and is the subject of a separate issue paper (D7).

Annex 3 Current SEEA CF text on water PSUT

Section 3.5.3 Physical supply and use table for water

3.189 Physical supply and use tables can be compiled at various levels of detail, depending on the required policy and analytical focus and data availability. A basic PSUT for water contains information on the supply and use of water and provides an overview of water flows. The PSUT 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.

3.190 Table 3.6 presents the SEEA physical supply and use table for water. The columns of the PSUT are structured in the same way as the general PSUT represented by table 3.1.

3.191 The breakdown of the economic activities, classified according to the ISIC, distinguishes the following groups:

- ISIC divisions 01-03: Agriculture, forestry and fishing[1]
- ISIC divisions 05-33 and 41: Mining and quarrying; manufacturing; and construction, respectively
- ISIC division 35: Electricity, gas, steam and air conditioning supply
- ISIC division 36: Water collection, treatment and supply; sewerage, waste management and remediation activities
- ISIC division 37: Sewerage
- ISIC divisions: 38, 39 and 45-99: Other industries

3.192 Industry divisions ISIC 35, 36 and 37 are specifically identified because of their importance in the supply and use of water and provision of water-related services. ISIC division 35 covers users of water for hydroelectric power generation and cooling purposes. ISIC divisions 36 and 37 cover activities of the main industries for the distribution and treatment of water and wastewater.

3.193 Described directly below are the key components of the physical supply and use table for water.

Abstraction of water

3.194 The abstraction of water is recorded in part I of the supply table, entitled “Sources of abstracted water”, as being supplied by the environment. The same volume of water is recorded in part I of the use table, “Sources of abstracted water”, by the industry that undertakes the abstraction. Water may be abstracted from artificial reservoirs, rivers, lakes, groundwater and soil water. The capture of precipitation through, for example, the capture of water from the roofs of houses in water tanks, is recorded as abstraction through precipitation. Precipitation direct to the inland water system is recorded not in the PSUT but in the asset account for water resources.

3.195 ***Abstraction is defined as the amount of water that is removed from any source, either permanently or temporarily, in a given period of time***. Water used for hydroelectric power generation, is considered abstraction and is recorded as a use of water by the abstractor. Water abstracted but not used in production, such as water flows in mine dewatering, are recorded as natural resource residuals. Water abstraction is disaggregated by source and by industry.

3.196 Following the general treatment of household own-account activity, the abstraction of water by households for own consumption should be recorded as part of the activity of the water collection, treatment and supply industry (ISIC 36). In addition, there may be a range of different methods of water supply; for example, water supply to agricultural enterprises may be undertaken quite differently from water supply to urban areas. Additional columns may be included in the supply table in order to highlight different types of water abstraction covered under ISIC division 36.

3.197 Consistent with the treatment in the asset accounts for water resources, the water in artificial reservoirs is not considered to have been produced, i.e., it is not considered to have come into existence via a process of production. Consequently, abstraction from artificial reservoirs is recorded as abstraction from the environment and flows of precipitation into artificial reservoirs and flows of evaporation not recorded in the PSUT for water. These flows are recorded as part of the asset accounts for water resources as part of the overall accounting for the change in the stock of water resource is over an accounting period.

3.198 Abstraction of soil water refers to the uptake of water by plants and is equal to the amount of water transpired by plants plus the amount of water that is embodied in the harvested product. Most abstraction of soil water is used in agricultural production and in cultivated timber resources but in theory the boundary extends to all soil water abstracted for use in production to include, for example, soil water abstracted in the operation of golf courses[2]. Abstraction of soil water is calculated based on the area under cultivation using coefficients of water use. Different coefficients should be used for different plants and should take into consideration location effects (e.g., soil types, geography and climate).

3.199 In principle, an amount of abstracted water is retained at the end of each accounting period for use in the next accounting period, for example, in storage tanks. However, this volume of water is relatively small in comparison with the overall flows of water during an accounting period and is also small relative to the stock of water held in the total inland water system. Therefore, in practice and by convention, the net change in the accumulation of abstracted water over an accounting period is assumed to be zero.

Distribution and Use of Abstracted Water

3.200 Water that has been abstracted must be either used by the same economic unit that abstracts it (and in this case is referred to as abstracted water for own use) or distributed, possibly after some treatment, to other economic units (referred to as abstracted water for distribution). Most of the water for distribution is recorded under ISIC division 36, Water collection, treatment and supply. However, there may be other industries that abstract and distribute water as a secondary activity.

3.201 Part II of the supply table, entitled “Abstracted water”, shows the supply of abstracted water by the industries undertaking the abstraction, differentiating between water abstracted for distribution and water abstracted for own use. This part of the supply table also records imports of water from the rest of the world. The total of water abstracted for own use, water abstracted for distribution, and imported water represents the total water available for use in the economy.

3.202 The use of this water is shown in part II of the use table, entitled “Abstracted water”, where the water available for use is recorded under the intermediate consumption of

industries, the final consumption of households and exports to economic units in the rest of the world.

3.203 The abstracted water received from other economic units is the amount of water that is delivered to an industry, households or the rest of the world by another economic unit. This water is usually delivered through systems of pipes (mains), but other means of transportation are also possible (such as artificial open channels and trucks).

3.204 Within the economy, water is often exchanged between water distributors before being delivered to users. These water exchanges are referred to as intra-industry sales. There are cases, for example, where the distribution network of one distributor does not reach the water user and hence water must be sold to another distributor in order for it to be delivered. In principle, all intra-industry sales should be recorded following standard accounting principles. However, these exchanges are not recorded in the PSUT, as this would increase the total flows recorded even though there may be no additional physical flows of water; that is to say, the intra-industry sales are transactions of water in situ and the same physical flow of water occurs whether intra-industry sales take place or not. Nonetheless, depending on the volumes of water involved, it may be useful to present these intra-industry flows in a supplementary table

Flows of Wastewater and Reused Water

3.205 After accounting for the distribution and use of water, it is necessary to consider flows of wastewater between economic units. Wastewater is discarded water which is no longer required by the owner or user. Wastewater can be discharged directly into the environment (in which case it is recorded as a return flow), supplied to a sewerage facility (ISIC division 37) (in which case it is recorded as wastewater to sewerage) or supplied to another economic unit for further use (in which case it is recorded as reused water). Flows of wastewater include exchanges of wastewater between sewerage facilities in different economies. These flows are recorded as imports and exports of wastewater

3.206 In situations where wastewater flows to a treatment facility or is supplied to another economic unit, flows of water are recorded in part III of the supply table, entitled "Wastewater and reused water", and part III of the use table, entitled "Wastewater and reused water". Flows of wastewater are generally residual flows between economic units, since it is usually the case that the flow of wastewater to a sewerage facility is also accompanied by a payment of a service fee to the sewerage facility, that is to say, the sewerage facility does not purchase the wastewater from the discarding unit.

3.207 ***Reused water is wastewater supplied to a user for further use with or without prior treatment, excluding the reuse (or recycling) of water within economic units***. It is also commonly referred to as reclaimed wastewater. Reused water is considered a product when payment is made by the receiving unit.

3.208 Reused water excludes the recycling of water within the same establishment (on site). Information on these flows, although potentially useful for analysis of water-use efficiency, is not generally available. However, a reduction in the total volume of water used, while the same level of output is maintained, can provide an indication of an increase in water-use efficiency which, in turn, may be due to the reuse of recycled water within an industry.

3.209 Once wastewater is discharged into the environment (e.g., into a river), its re-abstraction downstream is considered not a reuse of water in the accounting tables, but rather a new abstraction from the environment.

Return Flows of Water to the Environment

3.210 All water that is returned to the environment is recorded as being supplied to the environment in part IV of the supply table, entitled "Return flows of water". In some cases, these flows will comprise flows of wastewater direct to the environment from industries and households, i.e., flows of wastewater not sent to treatment facilities. In other cases, these flows will comprise flows of water from treatment facilities following treatment. In the supply table, such flows are shown as being supplied by the various industries and households either to the inland water system or to other sources, including the sea. Corresponding volumes of water are recorded in part IV of the use table, entitled "Return flows of water", with the flows shown as being received by the environment..

3.211 Some return flows of water to the environment are losses of water. Consistent with the general definition of losses outlined in section 3.2, losses of water encompass flows of water that do not reach their intended destination or have disappeared from storage. The primary type of losses of water are losses during distribution

3.212 Losses during distribution occur between a point of abstraction and a point of use or between points of use and reuse of water. These losses may be caused by a number of factors including evaporation (e.g., when water is distributed through open channels) and leakages (e.g., when water leaks from pipes or distribution channels, including rivers in some cases, into the ground). In practice, when losses during distribution are computed as a difference between the amount of water supplied and the amount received, they may also include problems associated with water meters and theft.

3.213 Urban run-off, a significant flow of water, is that portion of precipitation on urban areas that does not naturally evaporate or percolate into the ground, but flows via overland flow, underflow or channels, or is piped into a defined surface-water channel or a constructed infiltration facility. Urban run-off that is collected by a sewerage or similar facility is recorded as the abstraction of water from the environment (and, by convention, attributed to the sewerage industry (ISIC division 37)) in the supply table. It may then be treated before returning to the environment or it may be treated and distributed as reused water. Urban run-off that is not collected by a sewerage or similar facility but flows directly to the inland water system is not recorded in the PSUT.

3.214 Although separate estimates for urban run-off may be available in some countries, these flows generally cannot be measured directly. Estimates may be obtained by measuring the difference between the volumes of wastewater discharged by economic units (industries and households) into sewers and the volumes of wastewater collected by the sewerage system.

Evaporation of Abstracted Water, Transpiration and Water Incorporated into Products

3.215 To fully account for the balance of flows of water entering the economy through abstraction and returning to the environment as return flows of water, it is necessary to record three additional physical flows: evaporation of abstracted water, transpiration and water incorporated into products.

3.216 Flows of evaporation are recorded when water is distributed between economic units after abstraction, for instance, during distribution via open channels or while in water storage tanks and similar structures. The transpiration of water occurs when soil water is absorbed by cultivated plants as they grow and is subsequently released to the atmosphere.

3.217 Amounts of water incorporated into products (e.g., water used in the manufacture of beverages) are shown as supplied by the relevant industry, commonly a manufacturing industry.

3.218 The supply and use of evaporation of abstracted water, transpiration and water incorporated into products is recorded in part V of the supply and use tables, entitled "Evaporation of abstracted water, transpiration and water incorporated into products". Ideally, these flows would be recorded separately, with the flows of evaporation of abstracted water and transpiration shown as going to the environment from the relevant water user, and the flows of water incorporated into products shown as retained in the economy, in the accumulation column. In practice, direct measurement of these flows, particularly as it relates to the distinction between transpiration and the water incorporated into cultivated plants, is usually not possible and hence a combined flow may be recorded.

Footnotes

[24] For certain analytical purposes, it may be relevant to distinguish among the uses of water by these different industries.

[25] Soil water abstracted by non-cultivated plants is not in scope of the PSUT but there may be interest in recording these flows, for example, in respect of natural timber resources.

Annex 4 Suggested text for water in artificial reservoirs as a produced asset.

The relevant text from the 2012 CF is mainly in Section 3.5.3. This text is found in Annex 3. Updates to this text are suggested in blue and ~~strikethrough~~ below.

3.189 Physical supply and use tables can be compiled at various levels of detail, depending on the required policy and analytical focus and data availability. A basic PSUT for water contains information on the supply and use of water and provides an overview of water flows. [suggest new paragraph]The PSUT is divided into five sections which organize information on (a) abstraction of water from the environment and inventories; (b) distribution and use of abstracted water across enterprises, 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.

3.190 Table 3.6 presents the SEEA physical supply and use table for water. The columns of the PSUT are structured in the same way as the general PSUT represented by table 3.1. (unchanged)

3.191 The breakdown of the economic activities, classified according to the ISIC, distinguishes the following groups:

- ISIC divisions 01-03: *Agriculture, forestry and fishing*
- ISIC divisions 05-33 and 41: *Mining and quarrying; manufacturing; and construction*,
    - respectively
- ISIC division 35: *Electricity, gas, steam and air conditioning supply*
- ISIC division 36: *Water collection, treatment and supply; sewerage, waste management and remediation activities*
- ISIC division 37: *Sewerage*
- ISIC divisions: 38, 39 and 45-99: *Other industries*
- Inventory

3.192 Industry divisions ISIC 35, 36 and 37 are specifically identified because of their importance in the supply and use of water and provision of water-related services. ISIC division 35 covers users of water for hydroelectric power generation and cooling purposes. ISIC divisions 36 and 37 cover activities of the main industries for the distribution and treatment of water and wastewater. It is useful to separate ISIC 36 into (a) water collection and (b) treatment and supply), to assist with integration with SEEA-EA [insert reference to the appropriate part of SEEA-CF or external references. E.g., and updated SEEA-Water].

New paragraph:

3.xx Inventory is the water held in artificial reservoirs. Large reservoirs are usually operated by ISIC 36. Smaller reservoirs (e.g. farm dams) may be operated by Agriculture (ISIC 01) and the rainwater tanks of households or other industries would also be included in the inventory. These smaller reservoirs vary in importance, and where they are insignificant, they can be ignored.

3.193 Described directly below are the key components of the physical supply and use table for water. (unchanged)

Abstraction of water

3.194 The abstraction of water is recorded in part I of the supply table, entitled "Sources of abstracted water", as being supplied by the environment. The same volume of water is recorded in part I of the use table, "Sources of abstracted water", by the industry that undertakes the abstraction. Water may be abstracted from ~~artificial reservoirs,~~ rivers, lakes, groundwater and soil water. The capture of precipitation through, for example, the capture of water from the roofs of houses in water tanks, is recorded as abstraction through precipitation. Precipitation direct to the inland water system is recorded not in the PSUT but in the asset account for water resources. Water abstracted from artificial reservoirs is not an abstraction from the environment, and is discussed later.

3.195 ***Abstraction is defined as the amount of water that is removed from ~~any source~~ rivers, lakes, groundwater and soil water, either permanently or temporarily, in a given period of time***. Water used for hydroelectric power generation, is considered abstraction and is recorded as a use of water by the abstractor. Water abstracted but not used in production, such as water flows in mine dewatering, are recorded as natural resource residuals. Water abstraction is disaggregated by source and by industry.

3.196 Following the general treatment of household own-account activity, the abstraction of water by households for own consumption should be recorded as part of the activity of the water collection, treatment and supply industry (ISIC 36). In addition, there may be a range of different methods of water supply; for example, water supply to agricultural enterprises may be undertaken quite differently from water supply to urban areas. Additional columns may be included in the supply table in order to highlight different types of water abstraction covered under ISIC division 36. (unchanged)

3.197 ~~Consistent with the treatment in the asset accounts for water resources, the water in artificial reservoirs is not considered to have been produced, i.e., it is not considered to have come into existence via a process of production. Consequently, abstraction from artificial reservoirs is recorded as abstraction from the environment and flows of precipitation into artificial reservoirs and flows of evaporation from the reservoirs are~~

~~not recorded in the PSUT for water. These flows are recorded in the asset accounts for water resources as part of the overall accounting for the change in the stock of water resources over an accounting period~~."

Replacement paragraphs:

3.xx In line with the SNA definition of produced assets and inventories, the water in artificial reservoirs is produced. When water enters an artificial reservoir, it becomes the product "Natural water" CPC 1800. The water produced in one year may be supplied in another year from the water inventory. Flows of water into artificial reservoirs (e.g. from rivers or direct rainfall) are a use of the natural resource water by the owner or operator of the reservoir. For large reservoirs, this will usually be the water supply industry (ISIC 36). Small reservoirs may be owned or operated by other industries and households.

3.xxx When inflows to artificial reservoirs exceed the amount supplied by, for example, the water supply industry (ISIC 36) in an accounting period, then ISIC 36 will supply product "Natural water" CPC 1800 to the Inventory. When inflows are less than the volume supplied then the balance is supplied by the Inventory. The same treatment would apply to other industries and households. For households, this production should be re-assigned to ISIC 36 following the general treatment of own-account household production.

3.xxy Evaporation from artificial reservoirs becomes a use of "Natural water" CPC 1800 by the water supply industry (ISIC 36) or the other operators of reservoirs (e.g. Agriculture, ISIC 01).

3.xyy Managed aquifer recharge, the injection of water into natural occurring groundwater, is also recorded as an addition to the Inventory.

3.198 Abstraction of soil water refers to the uptake of water by plants and is equal to the amount of water transpired by plants plus the amount of water that is embodied in the harvested product. Most abstraction of soil water is used in agricultural production and in cultivated timber resources but in theory the boundary extends to all soil water abstracted for use in production to include, for example, soil water abstracted in the operation of golf courses[22]. Abstraction of soil water is calculated based on the area under cultivation using coefficients of water use. Different coefficients should be used for different plants and should take into consideration location effects (e.g., soil types, geography and climate). (unchanged)

~~3.199 In principle, an amount of abstracted water is retained at the end of each accounting period for use in the next accounting period, for example, in storage tanks. However, this volume of water is relatively small in comparison with the overall flows of water during an accounting period and is also small relative to the stock of water held in the total inland water system. Therefore, in practice~~

[25] Soil water abstracted by non-cultivated plants is not in scope of the PSUT but there may be interest in recording these flows, for example, in respect of natural timber resources.

~~and by convention, the net change in the accumulation of abstracted water over an accounting period is assumed to be zero.~~

Distribution and Use of Abstracted Water

3.200 Water that has been abstracted must be either used by the same economic unit that abstracts it (and in this case is referred to as abstracted water for own use) or distributed, possibly after some treatment, to other economic units (referred to as abstracted water for distribution) or supplied to the Inventory. Most of the water for distribution is recorded under ISIC division 36, Water collection, treatment and supply. However, there may be other industries that abstract ~~and~~ distribute, or store water as a secondary activity.

3.201 Part II of the supply table, entitled "Abstracted water", shows the supply of abstracted water by the industries undertaking the abstraction, differentiating between water abstracted for distribution and water abstracted for own use. This part of the supply table also records imports of water from the rest of the world and Inventory. The total of water abstracted for own use, water abstracted for distribution, stored in the inventory, and imported water represents the total water available for use in the economy.

3.202 The use of this water is shown in part II of the use table, entitled "Abstracted water", where the water available for use is recorded under the intermediate consumption of industries, the Inventory, the final consumption of households, and exports to economic units in the rest of the world.

3.203 The abstracted water received from other economic units is the amount of water that is delivered to an industry, households or the rest of the world by another economic unit. This water is usually delivered through systems of pipes (mains), but other means of transportation are also possible (such as artificial open channels and trucks). Water supplied that was produced in previous accounting periods is shown as a supply by the inventory.

3.204 Within the economy, water is often exchanged between water distributors before being delivered to users. These water exchanges are referred to as intra-industry sales. There are cases, for example, where the distribution network of one distributor does not reach the water user and hence water must be sold to another distributor in order for it to be delivered. In principle, all intra-industry sales should be recorded following standard accounting principles. However, these exchanges are not recorded in the PSUT, as this would increase the total flows recorded even though there may be no additional physical flows of water; that is to say, the intra-industry sales are transactions of water in situ and the same physical flow of water occurs whether intra-industry sales take place or not. Nonetheless, depending on the volumes of water involved, it may be useful to present these intra-industry flows in a supplementary table (unchanged)

Flows of Wastewater and Reused Water

3.205 After accounting for the distribution and use of water, including the Inventory, it is necessary to consider flows of wastewater between economic units. Wastewater is discarded water which is no longer required by the owner or user. Wastewater can be discharged directly into the environment (in which case it is recorded as a return flow), supplied to a sewerage facility (ISIC division 37) (in which case it is recorded as wastewater to sewerage) or supplied to another economic unit for further use (in which case it is recorded as reused water). Flows of wastewater include exchanges of wastewater between sewerage facilities in different economies. These flows are recorded as imports and exports of wastewater. (unchanged)

3.206 In situations where wastewater flows to a treatment facility or is supplied to another economic unit, flows of water are recorded in part III of the supply table, entitled "Wastewater and reused water", and part III of the use table, entitled "Wastewater and reused water". Flows of wastewater are generally residual flows between economic units, since it is usually the case that the flow of wastewater to a sewerage facility is also accompanied by a payment of a service fee to the sewerage facility, that is to say, the sewerage facility does not purchase the wastewater from the discarding unit. (unchanged)

3.207 **Reused water is wastewater supplied to a user for further use with or without prior treatment, excluding the reuse (or recycling) of water within economic units**. It is also commonly referred to as reclaimed wastewater. Reused water is considered a product when payment is made by the receiving unit. (unchanged)

3.208 Reused water excludes the recycling of water within the same establishment (on site). Information on these flows, although potentially useful for analysis of water-use efficiency, is not generally available. However, a reduction in the total volume of water used, while the same level of output is maintained, can provide an indication of an increase in water-use efficiency which, in turn, may be due to the reuse of recycled water within an industry. (unchanged)

3.209 Once wastewater is discharged into the environment (e.g., into a river), its re-abstraction downstream is considered not a reuse of water in the accounting tables, but rather a new abstraction from the environment. (unchanged)

Return Flows of Water to the Environment

3.210 All water that is returned to the environment is recorded as being supplied to the environment in part IV of the supply table, entitled "Return flows of water". In some cases, these flows will comprise flows of wastewater direct to the environment from industries and households, i.e., flows of wastewater not sent to treatment facilities. In other cases, these flows will

comprise flows of water from treatment facilities following treatment. In the supply table, such flows are shown as being supplied by the various industries and households either to the inland water system or to other sources, including the sea. Corresponding volumes of water are recorded in part IV of the use table, entitled “Return flows of water”, with the flows shown as being received by the environment.

New paragraph:

3.xyz Water from artificial reservoirs can supply water to the environment. This can be either spillovers or intended releases for use downstream. Spillovers can be planned or unplanned. Planned spillovers are when water is released in expectation of inflows which may cause unplanned spillovers. Unplanned spillovers are when water flows over or around dam walls because the reservoir is full. Most large reservoirs are engineered to accommodate spillovers. Releases of water can be for use by industries or households. In some cases, water is released for environmental purposes. These flows are supplied by either the operator of the reservoir, typically the water supply industry (ISIC 36), or from the Inventory.

3.211 Some return flows of water to the environment are losses of water. Consistent with the general definition of losses outlined in section 3.2, losses of water encompass flows of water that do not reach their intended destination or have disappeared from storage. The primary type of losses of water are losses during distribution

3.212 Losses during distribution occur between a point of abstraction and a point of use or between points of use and reuse of water. These losses may be caused by a number of factors including evaporation (e.g., when water is distributed through open channels) and leakages (e.g., when water leaks from pipes or distribution channels, including rivers in some cases, into the ground). In practice, when losses during distribution are computed as a difference between the amount of water supplied and the amount received, they may also include problems associated with water meters and theft. (unchanged)

3.213 Urban run-off, a significant flow of water, is that portion of precipitation on urban areas that does not naturally evaporate or percolate into the ground, but flows via overland flow, underflow or channels, or is piped into a defined surface-water channel or a constructed infiltration facility. Urban run-off that is collected by a sewerage or similar facility is recorded as the abstraction of water from the environment (and, by convention, attributed to the sewerage industry (ISIC division 37) in the supply table. It may then be treated before returning to the environment or it may be treated and distributed as reused water. Urban run-off that is not collected by a sewerage or similar facility but flows directly to the inland water system is not recorded in the PSUT. (unchanged)

3.214 Although separate estimates for urban run-off may be available in some countries, these flows generally cannot be measured directly. Estimates may be obtained by measuring the difference between the volumes of

wastewater discharged by economic units (industries and households) into sewers and the volumes of wastewater collected by the sewerage system. (unchanged)

Evaporation of Abstracted Water, Transpiration and Water Incorporated into Products

3.215 To fully account for the balance of flows of water entering the economy through abstraction and returning to the environment as return flows of water, it is necessary to record three additional physical flows: evaporation of abstracted water, transpiration and water incorporated into products. Water evaporated from artificial reservoirs is recorded as use by the owner or operator of the reservoir.

3.216 Flows of evaporation are recorded when water is distributed between economic units after abstraction, for instance, during distribution via open channels or ~~while in water storage tanks and~~ similar structures. The transpiration of water occurs when soil water is absorbed by cultivated plants as they grow and is subsequently released to the atmosphere.

3.217 Amounts of water incorporated into products (e.g., water used in the manufacture of beverages) are shown as supplied by the relevant industry, commonly a manufacturing industry.

3.218 The supply and use of evaporation of abstracted water, transpiration and water incorporated into products is recorded in part V of the supply and use tables, entitled “Evaporation of abstracted water, transpiration and water incorporated into products”. Ideally, these flows would be recorded separately, with the flows of evaporation of abstracted water and transpiration shown as going to the environment from the relevant water user, and the flows of water incorporated into products shown as retained in the economy, in the accumulation column. Evaporation from artificial reservoirs is recorded as use by the owner or operator of the reservoir. In practice, direct measurement of these flows, particularly as it relates to the distinction between transpiration and the water incorporated into cultivated plants, is usually not possible and hence a combined flow may be recorded.