LG/16/13

16th Meeting of the London Group on Environmental Accounting
Santiago, 25 – 28 October 2010

Preparation of the "Glossy" publication on the System of Environmental-Economic Accounting for Water

Michael Vardon

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Michael Vardon
Australian Bureau of Statistics

Background

The idea of for a "glossy" publication grew out of discussion held between the UNSD and the World Water Assessment Programme (WWAP) that began at the 5th World Water Forum in March 2009. This idea was further developed and discussed at the UNCEEA meeting in June 2009 and subsequent discussions determined that a publication of 15-20 pages, including country experiences and examples of use should be prepared. The primary audience for the publication would senior managers and decision-makers, with a knowledge of either environmental statistics or water policy.

This draft evolved from the 1st draft prepared by Australian Bureau of Statistics and presented to the UNCEEA in June 2010. (see http://unstats.un.org/unsd/envaccounting/ceea/meetings/UNCEEA-5-27.pdf).

The 2nd draft, like the 1st draft, draws heavily on previously existing material and material supplied by countries, namely Austria, China, Mexico and the Netherlands. This material includes the Global Assessment of Water Statistics and Water Accounts, The International Recommendations for Water Statistics, material prepared for workshops and searchable archive of environmental accounts publications. We particularly acknowledge the support of: Michael Nagy (Austria); Gan Hong and Li Huaju (China); Sjoerd Schenau and Bram Edens (Netherlands); Raul Figueroa Diaz (Mexico); Wafa Aboul Hosn (ESCWA); Kristina Taboulchanas (ECLAC); Olcay Unver and Samantha Wauchope (WWAP); Alessandra Alfieri and Jeremy Webb (UNSD),

A final draft of the publication will be submitted to the UNCEEA Bureau for sign-off, along with a proposed publication date. This date will be determined jointly with WWAP and is likely to mid 2011 (and possibly coincide with World Water Week in August).

Unfortunately material from ESCWA sent after the UNCEEA meeting was not able to be included in the main body of the document at this time owing to the time constraints of the authors. WWAP has suggested that the addition of an African country to provide an example from each continent. However, this and comments from the June 2010 UNCEEA on the structure of the glossy have also not been included in this draft. The comments of UNCEEA are recorded below for your information.

Excerpt from the Minutes of the 5th Meeting of the UNCEEA which took place in New York in June 2010. The minutes are posted on the UNCEEA website http://unstats.un.org/unsd/envaccounting/ceea/meetings.asp.

Agenda item 12 – Implementation of SEEA-Water and International Recommendations for Water Statistics (IRWS) *(Australian Bureau of Statistics)*

Outcome and actions:

The UNCEEA:

- *Welcomed the proposal to develop a "glossy" publication on the System of Environmental-Economic Accounting for Water and recommended that the structure of this publication be aligned with that of the "glossy" publication on Sustainable Consumption and Production starting from the description of the policy issue and describing the accounts and data items that are needed to inform the particular policy issue.*

- *Members were invited to send suggestions and comments about the publication to ABS.*

Summary of discussion:

54. The UNCEEA considered the proposal to develop a "glossy" publication on the System of Environmental-Economic Accounting for Water useful to promote the SEEA to governments and other potential users. It recommended that the publication follow a similar structure than the glossy publication on Sustainable Consumption and Production starting from the description of the policy issue and describing the accounts and data items that are needed to inform the particular policy issue.

55. It welcomed the proposal to include the experience of Jordan, which is close to finalize its water accounts. UNCEEA members are requested to send additional comments and contributions directly to the ABS.

56. The UNCEEA was informed about the ESCWA-Water project that has been completed with the involvement of a number of countries in the region and, resources permitting, the implementation is expected to be expanded. ECLAC also informed the UNCEEA that they will be launching a project on the SEEA-Water implementation in selected countries of the region.

57. Under this agenda item, the UNCEEA was informed that the ISI 2011 has a Water Theme Day, co-organized by Eurostat and UNSD with four sessions and two workshops.

2nd Draft of "glossy" publication on SEEA – Water

Structure

1. Introduction
2. Main feature of the SEEA-Water
3. Implementation
4. Examples of implementation in countries
    - Australia
    - China
    - Jordan/ESCWA
    - Mexico
    - Netherlands
5. The way forward
6. Bibliography and resources

Annex I – list of countries undertaking water accounting
[Annex II – Material from ESCWA]

1. Introduction

1. The System of Environmental-Economic Accounting for Water (SEEA-Water; UN 2007) is a conceptual framework for organising data related to water. It describes key hydrological and economic concepts and defines a set of standard tables for presenting hydrological and economic information, which show the interaction between water and the economy as well as water resources in the environment. The SEEA-Water provides a direct link from hydrological data to the System of National Accounts (SNA), the framework used for macro-economic statistics throughout the world for more than 50 years and from which the accounting identity Gross Domestic Product (GDP) is derived.

2. Around the world water accounting takes a variety of forms, are prepared by a range of agencies and businesses, for a variety of purposes. The SEEA-Water consolidates the international experience of around 20 years of global experience in compiling water accounts in national statistical agencies who have worked closely with water management agencies to ensure that hydrological, economical and statistical concepts are aligned as closely as possible.

3. The SEEA-Water can be used to produce information for decision-making at a range of levels – national, state/provincial and river basin. However, it is mostly used at the national level to assess a range of issues including:

- Scenario modelling
- Water productivity

- Water price
- Identifying the industries using the most water
- Identifying the industries polluting water the most
- New heading Development and adoption

1.1 Development and adoption by the UN Statistical Commission

4. The SEEA-Water was developed between 2004 and 2007 by the United Nations (UN) Statistics Division with the assistance of countries and other international organisations. It consolidates the experiences and practices of countries and international organisations in the field of water accounts. The UN Statistical Commission adopted the SEEA-Water as an interim international statistical standard at its 38th Session in March 2007 1 . The SEEA-Water is an elaboration of the handbook Integrated Environmental and Economic Accounting 2003 (United Nations et al. 2003), commonly referred to as SEEA-2003, which describes the interaction between the economy and the environment and covers the whole spectrum of natural resources and the environment. The SEEA-Water was adopted as an interim standard pending the elevation of the overarching framework for environmental accounting, the SEEA, to an international statistical standard, which is expected in 2012.

5. The adoption in 2007 of the SEEA-Water by the statistical community addressed the need for more and better integrated information on water resources and water management. At the time of adoption it was recognised that the SEEA-Water provided a much-needed conceptual framework for organizing hydrological and economic information in support of integrated water resource management (IWRM)2. Following adoption of the SEEA-Water the number of countries producing or developing water accounts has increased from 22 countries in 2007 to 48 in 2009. Importantly the potential usefulness of the SEEA-Water has been recognised in other fora and in particular this was recognised in the conclusions of the "Data for All" sessions of the 5th World Water Forum (Istanbul, March 2009)3 and an OECD workshop on improving water information (Zaragoza, May 2010)4.

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[1] See section 37/108 of the Report of the 38th Session of the UN Statistical Commission E/CN.3/2007/30. On-line 19 May 2010: http://unstats.un.org/unsd/statcom/sc2007.htm

2 See paragraph 22 of the Report of the Committee of Experts on Environmental-Economic Accounting. 38th Session of the Statistical Commission, E/CN.3/2007/9. On-line 19 May 2010: http://unstats.un.org/unsd/statcom/sc2007.htm

[3] 5th World Water Forum, Istanbul Turkey 20-21 March 2009, Topic 6.4 Data for all. On-line 19 May 2010: http://unstats.un.org/unsd/envaccounting/workshops/wwf2009/lod.htm

[4] OECD Workshop on Improving the information base to better guide water resource management decision making, Zaragoza, Spain, 4-7 May, 2010. On-line 28 may 2010: http://www.oecd.org/document/43/0,3343,en_2649_37425_43685739_1_1_1_1,00.html

1.2 Relationship to other statistical standards

6. The SEEA-Water is part of a family of UN statistical standards. A key document, developed explicitly to support for the SEEA-Water as well as for harmonising international data collection activity related to water is the International Recommendations for Water Statistics (IRWS). The IRWS was adopted by the UN Statistical Commission in February 2010[5] and it provides more detailed guidance on the basic statistical data (covering hydrological, economic and social data) needed to populate the SEEA-Water standard tables. In addition, the IRWS explicitly defines a range of additional data that are useful for integrated water resource management (IWRM) and are currently collected by a range of countries and international organisations.

2. Main features of the SEEA-Water

7. A conceptual overview of the scope of SEEA-Water is presented in Figure 1. This figure is a simplified presentation of the physical flows of water within the inland water resources system (or the environment) and the economy represented in the figure as two separate boxes. Many of the flows, and in particular those within the economy, have matching monetary flows. A territory of reference may be a country, river basin or other type of spatial boundary (see Section 2.3 below).

8. The inland water resource system of a territory is composed of all water resources in the territory (surface water, groundwater and soil water) and the natural flows between them. The economy of a territory consists of resident water users who: extract water for production and consumption purposes; put in place the infrastructure to store, treat, distribute and discharge water; and discharge water back to the environment.

9. The SEEA-Water covers all of the stocks and flows associated with water. Stocks can be within the environment or within the economy, while flows of water can be within the environment, within the economy and between the environment and economy. The framework also covers the discharge of pollutants by the economy to the environment as well as addressing water quality. The stocks of water within the economy are generally small, limited to rainwater tanks and similar stores of water.

10. The SEEA-Water defines a series of accounting identities in order to allow consistent comparisons between areas and over time. This is necessary because some terms, and in particular water use and water consumption, are used to mean different things in different systems. By identifying these as a sum of particular data items, countries and international organisations are able to understand how their particular

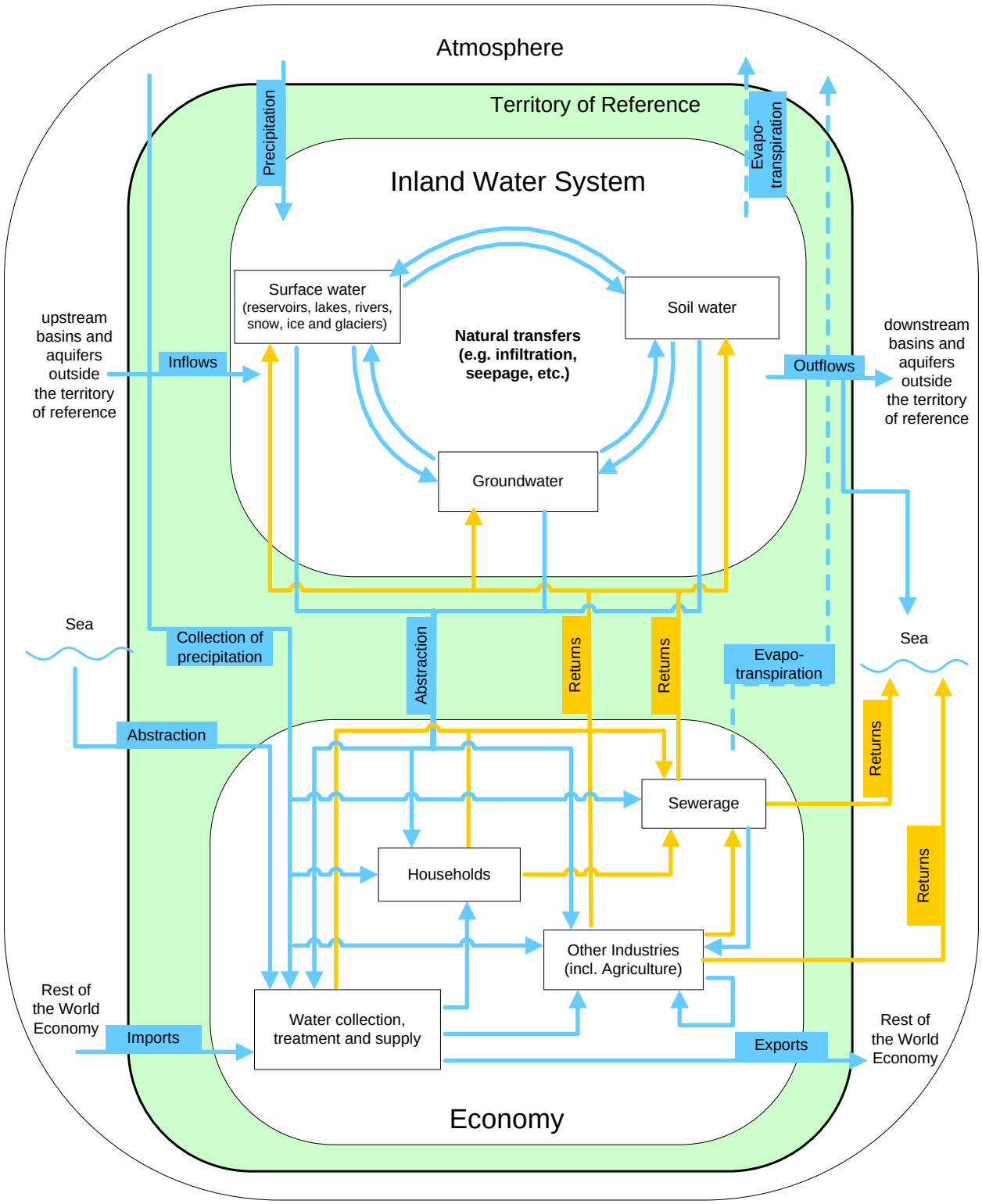
[5] See decision 41/108, paragraph (i) of the Report of the 41st UN Statistical Commission E/2010/24 and E/CN.3/2010/34. On-line 24 May 2010: http://unstats.un.org/unsd/statcom/doc10/Report-E.pdf

definitions relate to those in the SEEA-Water and over time these should harmonise with the SEEA-Water.

2.1 Stocks (Assets)

11. Stocks are the quantity of a particular product or natural resource at a point in time. Stocks are identified in both economic and environment statistics, although the terminology varies depending on the context, and they can be measured in physical and monetary terms. Physical stocks of water may also have different levels of water quality. Assets are usually associated with stocks that have economic values and in the SNA stocks are recorded in balance sheets in monetary terms for non-financial assets (produced and non-produced), financial assets and liabilities. In the SEEA-Water stocks are recorded in the asset accounts in physical terms (the volume of water).

Figure 1: Main flows within the inland water system and the economy.



Source: SEEA - Water.

2.3 River basins and other spatial boundaries

12. Water information for water management is required at many geographic levels, from the river basin, to the national and multi-national levels. The choice of the spatial reference for the compilation of water accounts ultimately depends on the data needed by users (for example decision-makers, analysts and researchers) and the resources available to data producers. The SEEA-Water recommends the river basin as the spatial unit for which the accounts should ideally be compiled.

13. In general, four types of spatial boundaries are used in water statistics:

- Physical boundaries
    - River basins and other surface water boundaries, such as sub-basins, drainage basins, water catchments, etc.
    - Aquifers and other sub-surface boundaries including, aquifer beds, complex aquifer-aquitard systems, groundwater provinces, groundwater regions, etc.
- Administrative regions (local, state/provincial and national governments)
- Service areas
- Accounting catchments

14. River basins or aquifers are fundamental to the hydrological cycle. These physical boundaries can span large areas, national administrative boundaries and countries. Aquifers and river basins vary in size depending and large river basins may contain smaller sub-basins (or catchments). Water can flow naturally between river basins or can be imported and exported by economic units located in different river basins, but within the one country.

15. It is recognised internationally that a river basin is the most appropriate spatial reference for Integrated Water Resource Management (for example Agenda 21, United Nations 1992, and the European Water Framework Directive 2000). This is because the people and economic activities within a river basin will have an impact on the quantity and quality of water in the basin, and conversely the water available in a basin will affect the people and economic activities that rely on this water.

16. An administrative region is a geographic area usually corresponding to a level of government (for example local, state/provincial or national). Administrative regions are usually responsible for planning and economic policies within their jurisdiction and as such different regions are likely to have different laws, regulations, institutional arrangements, and management practices relating to water.

17. Water suppliers or sewerage service providers, which may be government or non-government, will often have service areas that are related to the physical infrastructure, which they own or operate to supply water or sewerage services.

18. Accounting catchments are defined in the SEEA-Water because it is practical to define regions for the compilation of water accounts for which both economic and physical data are more easily available. As such these regions are statistical constructs or hybrids of administrative regions and river basins. Accounting catchments are used to provide the best possible match of economic, environmental and social data, which use a variety of spatial references.

19. In practice, an accounting catchment is an administrative region, composed of all or parts of several river basins or a river basin composed of all or parts of several administrative regions[6]. Usually whole administrative regions are added together to form the nearest approximation of a river basin or vice versa[7]. In defining accounting catchments it is necessary to compare river basins and administrative boundaries to determine the best possible match based on practical considerations of data availability and data collection. Over time the use of accounting catchments should lead to improvements in data collection and availability.

20. Each administrative region, river basin, service area or accounting catchment used for water statistics should have a unique identification code and name. If more than one spatial reference is used, then there should be more than one identification coding system, and the codes used should be distinct. When the relevant boundaries are available electronically, geographic information systems (GIS) can help clarify boundary issues related to water statistics.

2.4 Temporal (time) references

21. When compiling water accounts it is important that the reference periods for the different data items are aligned and the calendar year is a commonly used reference period. However, water and economic data may not be available for calendar years. For example, for national accounts, most countries use a financial year, while for water statistics countries may use a hydrological year. Financial and hydrological years may be the same as or different from calendar years.

[6] After SEEAW paragraph 2.90
[7] See Edens et al. 2007. Regional water accounts and the transformation of spatial data: http://unstats.un.org/unsd/envaccounting/londongroup/meeting11/LG11_SSWA_2a.pdf

22. As such, it is generally recommended that water accounts are developed for the time period used in the national accounts, which in the SNA is recommended to be the calendar year. This allows direct temporal comparability between economic and environmental aspects of water statistics.

23. Yearly water statistics will often hide seasonal variability in data which, in many cases are important to understand for water management purposes. Some water statistics, like precipitation and other meteorological and hydrological data, are compiled more frequently (for example daily, weekly or monthly) to address these needs.

3. Implementation of the SEEA-Water

24. In order to assess the use and implementation of the SEEA-Water (and other issues related to the compilation of water statistics) around the world, the UN Statistics Division undertook a Global Assessment of Water Statistics and Accounts in 2008. The results were reported in full to the UN Statistical Commission in 20098.

25. At the time of the Global Assessment, water accounting was being implemented, or planned to be implemented in 44 countries (see Table 1). The level of implementation varies greatly between countries, with 33 currently compiling water accounts, while 11 countries indicated that they will begin to compile water accounts in the next two years. Two countries have compiled accounts in the past but do not plan to continue with compilation. Since the Global Assessment an additional four countries have begun compiling environmental accounts bringing the total number of countries currently compiling or planning to compile accounts to 48. Annex 1 provides a list of these countries as well as the geographic and economic stage of development to which they are classified by the UN.

26. The number of countries producing water accounts and implementing the SEEA-W increased significantly between 2006 and 2008. The results of Phase I of the Global Assessment of Environment Statistics and Environmental-Economic Accounting9 in 2006 indicated that 22 countries were compiling water accounts and a further eight had plans to develop them. Two years later, in 2008, 33 countries were compiling water accounts and a further 11 had plans to implement them in the next two years.

27. The existence of water accounting programmes varies both by economic and geographical grouping. Water accounting programmes exist in 15 countries with developed economies, 17 countries with

[8] Report on the Global Assessment of Water Statistics and Water Accounts. Background document to the 40th Session on the UN Statistical Commission. On-line 19 May 2010: http://unstats.un.org/unsd/statcom/doc09/BG-WaterAccounts.pdf

[9] Global Assessment of Environmental Statistics and Environmental Economic Accounting (2007): http://unstats.un.org/unsd/statcom/doc07/Analysis_SC.pdf

developing economies and 1 country with economies in transition. The geographical distribution ranges from a maximum 14 countries in Europe and Northern America to three in Western Asia.

Table 1: Water accounting programmes by economic and geographic regions

	Number of countries *(1)*	*Number of countries currently compiling* *(2)*	*Percentage of countries currently compiling* *(3)=(2)/(1)*	*Number of countries planning to start compiling in the next 2 years* *(4)*	*Number of countries compiled in the past and will not continue* *(5)*	*Total* *(6) = (2)+(4)+(5)*	*Percentage of countries compiling, planning to compile, or compiled water accounts* *(7)=(6)/(1)*
Total countries responding to question	59	33	56%	11	2	46	78%
Economic regions							
Developed regions	28	16	57%	5	2	23	82%
Developing regions	31	17	55%	6	0	23	74%
Economic grouping:							
Developed economies	23	15	65%	4	1	20	87%
Transition economies	7	1	14%	2	1	4	57%
Developing economies	29	17	59%	5	0	22	76%
Geographical grouping:							
Africa	6	4	67%	2	0	6	100%
Central, Eastern, Southern South-Eastern Asia and Oceania	8	5	63%	1	0	5	63%
Europe and Northern America	26	14	54%	4	2	21	81%
Latin America and the	9	7	78%	0	0	7	78%
Western Asia	10	3	30%	4	0	7	70%

4. Examples of implementation in country

28. Below we present five examples of how water accounting is being implemented in countries – Australia, China, Jordan, Mexico and the Netherlands. [add South Africa?]

4.1 Australia

29. Water accounting in Australia is currently practiced by the Australian Bureau of Statistics (ABS), the Bureau of Meteorology (BoM) and at a business level. The ABS has so far produced three editions of the Water Account, Australia (ABS 2000, 2004, 2006), with the 4th edition expected in November 2010 and the 5th in November 2011. The data presented in the ABS is for the country as a whole as well as for each of the eight states and territories. The ABS has also prepared separate water accounts for the Murray-Darling Basin. The BoM has so far produced a pilot national account for four regions of Australia (BoM 2010), with additional regions expected to be added over time.

30. The water accounts produced by the ABS and BoM are conceptually aligned with the SEEA-Water but are presented in a different format. The ABS water accounts are equivalent to the physical and monetary

supply and use tables, while those of the BoM are like the asset account. The physical flows in the ABS water account are shown in Figure 2. The monetary flows can also be represented in the same diagram and be used to present simple charts to show the relationship between the volumes and values of water supplied and used in the economy (Fig.3. In this it can be seen that agriculture uses over 60% of the distributed water, while paying less than 10% of the total value of the water supplied, while households use just over 20% of the total volume, but provide nearly 60% of the payments.

Figure 3. Volume and value of distributed water used in the Australian economy.

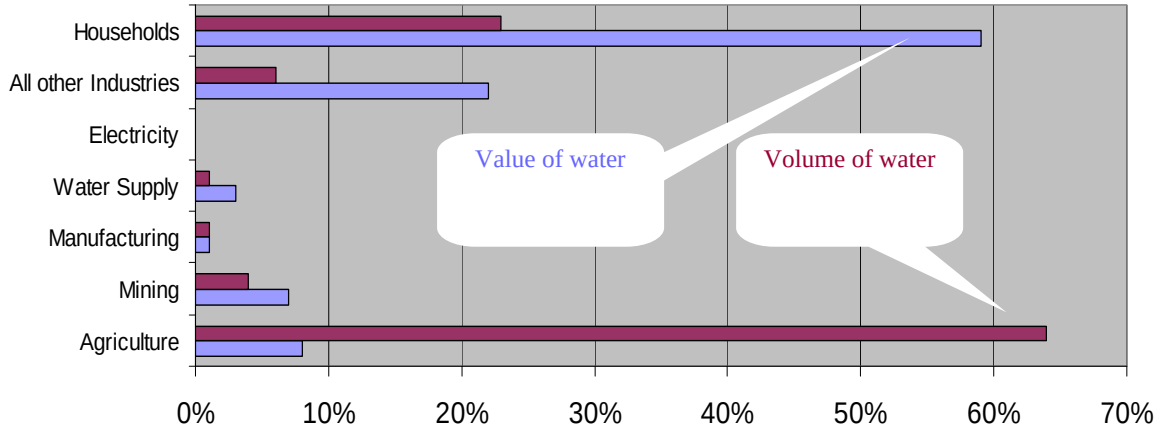
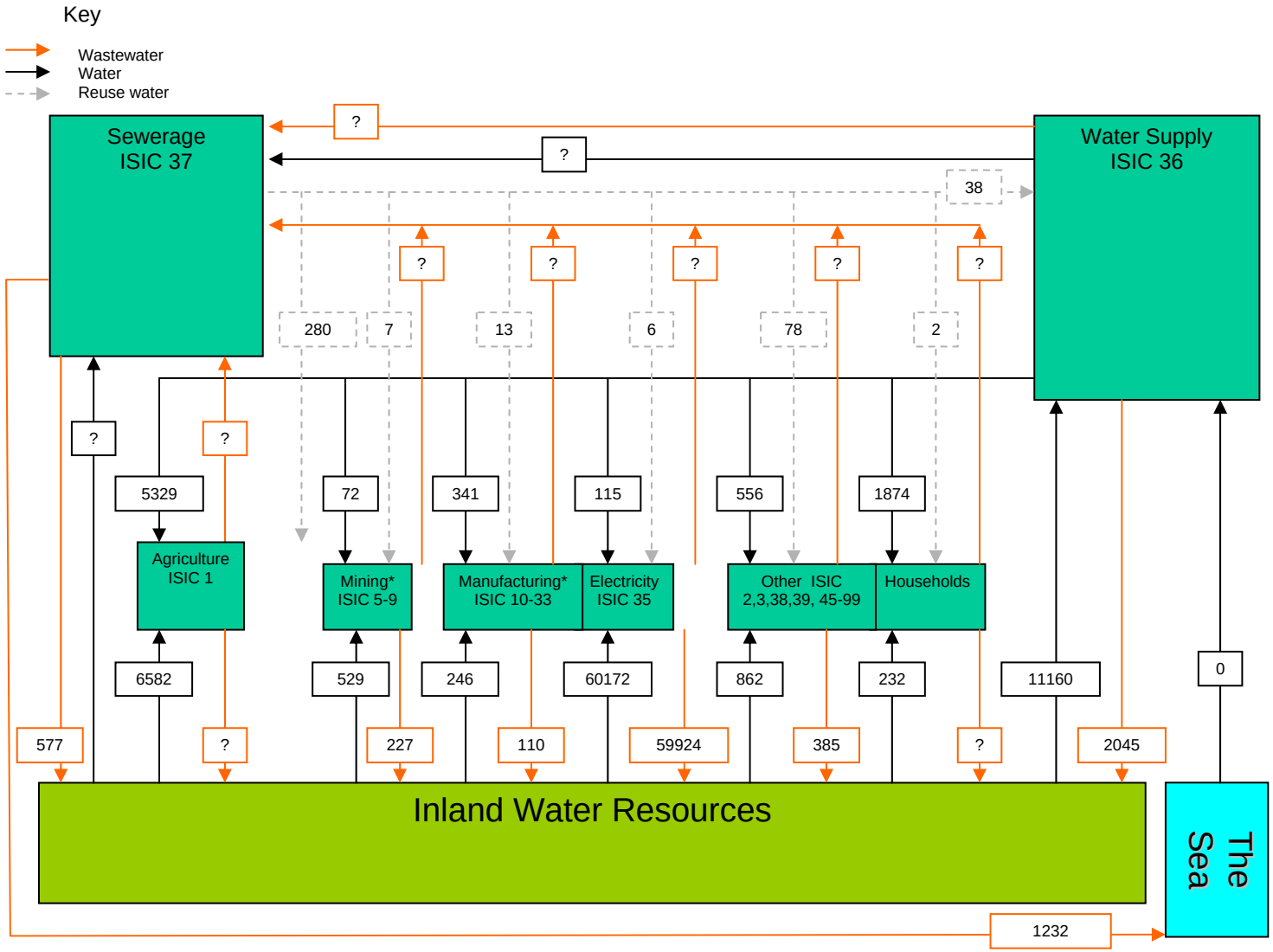
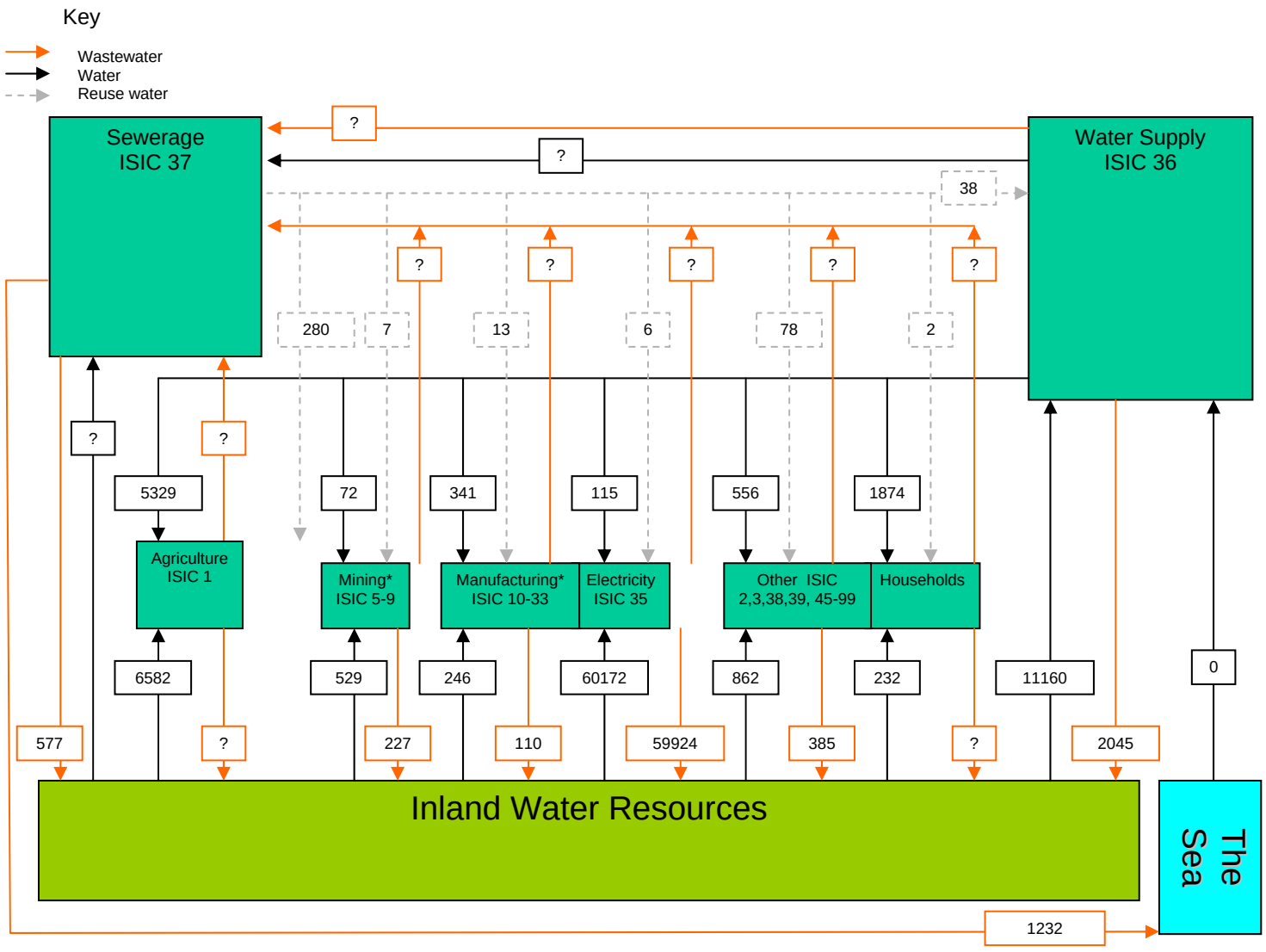


Figure 2. Flows of water shown in the ABS Physical Supply and Use Tables




Key
Wastewater
Water
Reuse water
Sewerage
ISIC 37
Water Supply
ISIC 36
?
?
38
?
?
?
?
?
280
7
13
6
78
2
?
?
5329
72
341
115
556
1874
Agriculture
ISIC 1
Mining*
ISIC 5-9
Manufacturing*
ISIC 10-33
Electricity
ISIC 35
Other ISIC
2,3,38,39, 45-99
Households
6582
529
246
60172
862
232
11160
0
577
?
227
110
59924
385
?
2045
Inland Water Resources
The Sea
1232

4.2 China

31. The China Water Accounting Project was initiated in November 2006 by the Chinese Ministry of Water Resources (MWR) with assistance from the National Bureau of Statistics (NBS) and the United Nations Statistics Division (UNSD). Rapid progress was made in China and pilot accounts have been published (Gan et al. 2009; in Chinese) and a summary of the work can be found in Gan et al. (in press).

32. The purpose of the China Water Accounting Project was to establish a water accounting framework based on the SEEA – Water, but adapted to fit the circumstances of China. Theoretical and applied research were conducted to develop this water accounting framework, which has the primary objective of supporting water resources management. A preliminary water accounting framework was developed and pilot accounts have been prepared at the national level as well as in four regions: the Beijing and Shanghai municipalities and the Haihe River and Taihu Lake basins. In addition, case studies have been undertaken on the valuation of water resources, the value of resource depletion and environmental degradation, and policy interventions. The development of water accounting is playing an important role in strengthening water resources management in China and in particular enables the construction of a range of indicators that can be used by decision-makers.

33. In the three years of the China Water Accounting Project substantial progress has made with the development of the China Water Accounting Framework. A summary of the achievements is found in Table 2.

Table 2. Main achievement of China SEEA-Water

contents	National level	Hai River basin	Tai Hu basin	Beijing	Shanghai
Asset accounts	●	●	●	●	
Stocks of river					●
Water quality accounts	●	●	●	●	●
Physical water supply and use tables	●	●	●	●	●
Emission accounts	●	●	●	●	●
Hybrid account for supply and use of water	●	●	●	●	●
Economic accounts	◎				

Note: ● = finished and; ◎ = partly finished.

34. The most developed of the Chinese water accounts are the physical supply and use tables and the asset account. The limitations of the basic data have meant that the economic components of the accounts, and in particular the hybrid accounts, are still at an early stage of development and still lack some of the data required to populate them.

35. China's water accounts have been used to establish a statistical indicator system and a process to enable the regular publication of data on natural resources and the environment. The process involved inter-department collaboration between the National Bureau of Statistics, Ministry of Water Resources, Ministry of Land & Resources, Ministry of Environmental Protection, Ministry of Housing and Urban-Rural Development and Ministry of Industry and Information Technology. In this process six working groups were established to develop indicators for energy, water, land, forestry, discharge of pollutants and investment in pollution abatement and control.

36. Using this process and the SEEA-Water as well as the experiences of other countries a preliminary statistical indicator system for water resources was developed which includes 20 indicators in four categories[10] (Table 3). The indicators cover economic, environmental and social aspects of water and many are derived directly from the water accounts.

[10] Working group of statistical indicator system for water resources, Preliminary Statistical Indicator System for Water Resources in China, 2009.

37. Table 3. Indicator system for water resources in China

	Indicators	Unit	Sources
	State of Water Resources		
1	Annual total quantity of water resources	km^3	Ministry of Water Resources of China (MWR)
2	Precipitation	mm, km^3	MWR
3	Annual amount flow to sea	km^3	MWR
4	Comparison between current year total quantity of water resources and normal	%	MWR
5	Average water resources amount per capita	m^3	MWR, National Bureau of Statistics of China (NBS)
6	Rate of water resources development and utilization	%	MWR
	Water use by industries and households		
7	Total annual water usage	km^3	MWR
8	Total annual water consumption	km^3	MWR
	Efficiency of water use		
9	Water use per capita	m^3	MWR, NBS
10	Water use per 10,000 Yuan of GDP	m^3	MWR, NBS
11	Water use per 10,000 Yuan of added industrial output value	m^3	MWR, NBS
12	Water use per m^3 of irrigated farmland	m^3	MWR
13	Leakage rate of pipelines and networks in urban	%	Ministry of Housing and Urban-Rural Development of China(MOHURD)
14	Integrated water price of 35 important cities	Yuan	National Development Reform Commission
	Water-resources protection and ecological remediation		
15	Wastewater discharge and emission to river/lake	10^8 tons	MWR, MOHURD, Ministry of Environment Protection of China
16	Criterion compliance rate of water function zone	%	MWR
17	Percentages of river length of different water quality classes	%	MWR
18	Degree of groundwater overexploitation	km^3、10^4km^2	MWR
19	Degree of water and soil erosion and recovery	10^4 km^2	MWR
20	Total discharge of sediment of main rivers	10^8 tons	MWR

Source: System of Environmental-Economic Accounting for Water in China (Gan et al 2009)

4.3 Jordan/ESCWA

[To be added – see annex 2]

4.4 Mexico

38. The National Water Information System (SINA) is defined in the National Water Law as a basic tool for water policy design and evaluation in Mexico. The SINA is based on the information related to water that is produced by the different areas of government in Mexico. A partnership between the different data producers is essential for the SINA, and in particular, the partnership between National Water Commission of Mexico (CONAGUA) and the national statistics office of Mexico (INEGI).

39. The SEEA-Water and the IRWS have provided the framework for organising the information in SINA. Preliminary physical use and supply tables have been prepared for Mexico for 2006 (Table 4). The tables are based on the SEEA-Water standard tables, but the industry breakdown has been simplified and soil water is omitted. The tables were prepared jointly by CONAGUA and INEGI. The tables show all the flows of water within the economy and this information can now be combined with information on economic output, production and use to generate SEEA-Water hybrid tables, which in turn can be used to derive economic indicators such as water productivity. Additional data on water can be found in CONAGUA (2010) and INEGI (2009).

40. The data used to produce the physical supply and use tables came from a range of sources and the tables are being prepared for the years 2001 through 2009 to try to identify trends over this time. The construction of the tables helped to identify specific data gaps and data deficiencies and this was then used to design a data collection strategy to improve the quality of future accounts. A similar approach to identifying data gaps and data deficiencies is being used in the preparation of the other SEEA-Water standard tables (for example the asset account and hybrid account).

41. In addition to national physical supply and use tables, tables are also being prepared for specific regions of the country, such as the Lake Chapala region, a highly water stressed area of the country. The production of sub-national accounts is particularly important for Mexico given the widely varying climate (that is very dry in the north and very wet in the south) and the location of various activities (some parts of Mexico, such as the area around Mexico City, are more industrialised than others).

Table 4. Preliminary Mexico SEEA-Water physical supply and use tables

Physical use table

		ISIC Classification							
		1-3	3, 38-99	35		36	37		
		Agriculture, livestock and aquaculture	Industry and services	Thermoelectricity	Hydroelectricity	Public water supply	Sewerage	Housholds	Total
from the environment	**1. Total abstractions**	**59 400**	**2 972**	**4 209**	**140 295**	**10 703**	**2 589**	**39**	**220 207**
	1.a Abstractions for own use	**59 400**	**2 972**	**4 209**	**140 295**			**39**	**206 915**
	1.b Abstraction for distribution					**10 703**			**10 703**
	1.i From water resources	**59 400**	**2 972**	**4 209**	**140 295**	**10 703**		**39**	**217 618**
	1.i.1 Surface water	**39 720**	**1 606**	**3 751**	**140 295**	**3 891**		**14**	**189 277**
	1.i.2 Groundwater	**19 680**	**1 366**	**458**		**6 812**		**25**	**28 341**
	1.i.i. From other sources						**2 589**		**2 589**
	1.i.i.1 Stormwater						**2 589**		**2 589**
Within the economy	**2. Use of water received from other economic units**	**4 124**	**1 491**	**62**	**0**	**0**	**3 915**	**4 305**	**13 898**
	3. Total water use (=1+2)	**63 524**	**4 463**	**4 271**	**140 295**	**10 703**	**6 504**	**4 344**	**234 105**

Physical supply table

		ISIC Classification							
		1-3	3, 38-99	35		36	37		
		Agriculture, livestock and aquaculture	Industry and services	Thermoelectricity	Hydroelectricity	Public water supply	Sewerage	Households	Total
Within the economy	**4. Supply of water to other economic untis, of which:**	**0**	**1 797**	**0**	**0**	**5 246**	**3 379**	**3 475**	**13 898**
	4.a Reused water		**1 357**				**3 379**		**4 737**
	4.b Wastewater to sewerage		**439**					**3 475**	**3 915**
To the environment	**5. Total returns**	**36 315**	**2 140**	**4 058**	**140 295**	**5 457**	**3 124**	**187**	**191 577**
	Losses	**21 556**				**5 457**			**27 013**
	Treated wastewater		**874**				**2 346**		**3 220**
	Untreated wastewater	**14 759**	**1 266**	**4 058**			**778**		**20 861**
	6. Total supply of water (=4+5)	**36 315**	**3 937**	**4 058**	**140 295**	**10 703**	**6 504**	**3 663**	**205 474**
	7. Consumption (=3-6)	**27 209**	**527**	**214**	**0**	**0**	**0**	**682**	**28 631**

4.5 Netherlands

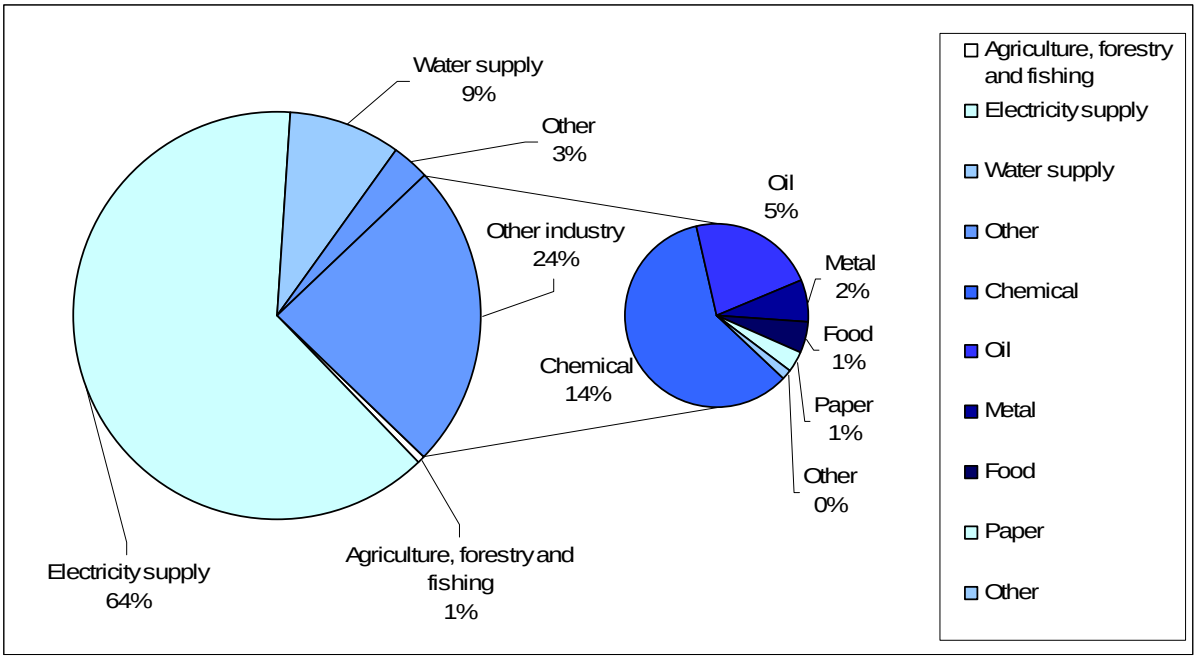
42. Water plays a key role in the Dutch economy and society and national policies are in place to reduce water pollution and protect ground and surface water bodies. Integrating water data with economic information in the form of accounts makes it possible to monitor water conservation policies.

43. The Netherlands probably have the longest tradition of producing water accounts, having produced water accounts since 1990. The methodology for compiling the water accounts is described in the report Dutch water flow accounts (Graveland, 2006), while the data of the water accounts can be found on StatLine, the electronic database of Statistics Netherlands (http://statline.cbs.nl/StatWeb/dome/?LA=NL).

44. The Dutch water accounts provide information on water abstraction, water supply and use by different industries and households, and emissions to water. The water accounts also distinguished four types of water: surface water, groundwater, tap water and 'other kinds of water'. (See Viwen 2010 for information on these categories)

45. The total water abstraction by the Dutch economy in 2008 was 14.3 billion m3. Figure 4 shows that almost two thirds of the water requirements of the Dutch economy come from the electricity supply industry. This industry abstracts all its water from surface water bodies, primarily for cooling purposes. The water supply industry is responsible for 9 percent of total water abstraction, with 61 percent abstracted from groundwater.

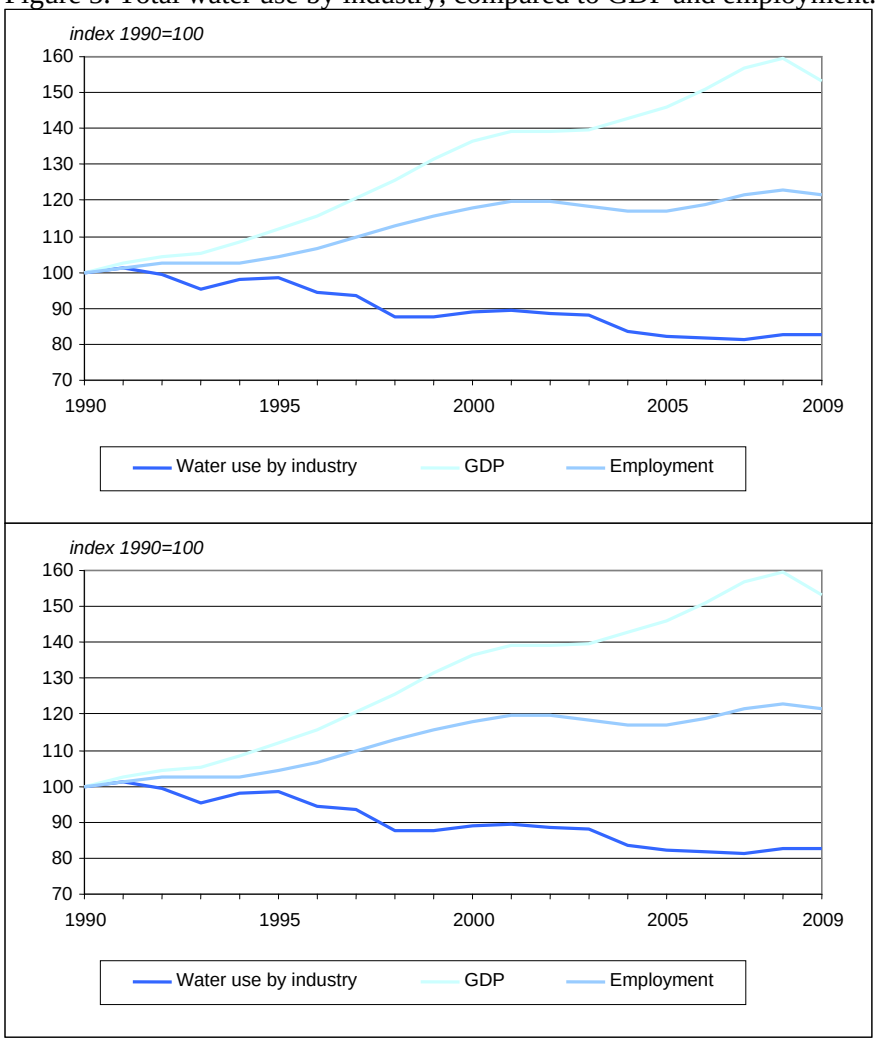
Figure 4. Water abstraction by the Dutch economy in 2008



46. Agriculture abstracts only 1 percent of total water in the Netherlands, which is very low compared to other countries. This is because the Netherlands has a temperate climate with rainfall distributed throughout the year and hence almost agriculture is rain-fed rather than irrigated. The biggest users of water within manufacturing are the chemical industry, followed by the oil production and the manufacture of metal products, food products and paper products industries.

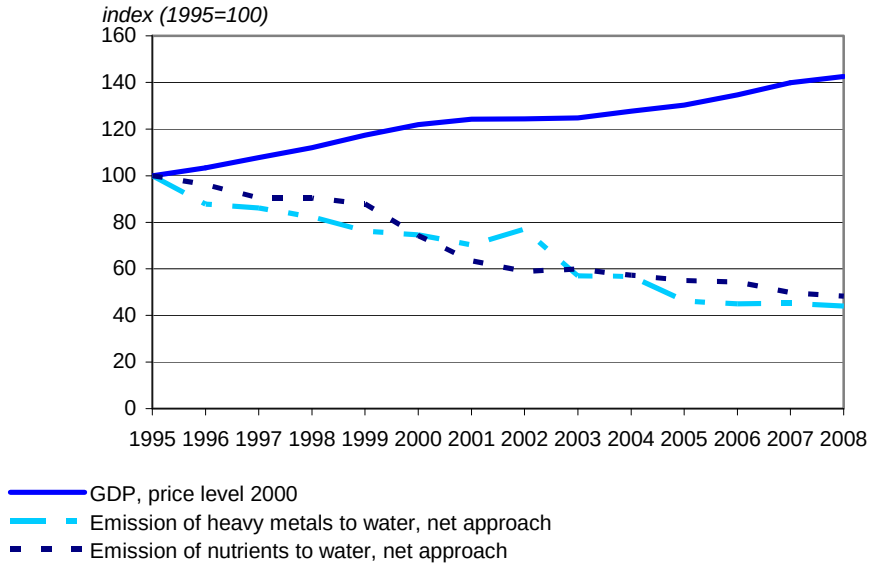
47. Since 1990 total water use by industry has decrease almost 20%, while employment has increased 20% and GDP by more the 50% (Fig. 5). The emissions of heavy metals and nutrients by industry has also decreased, with the levels of both of these pollutants about 60% below the level in 1995, while GDP growth over the same period was about 40% (Fig. 6). In the case of both total water use and emission of heavy metals and nutrients, economic growth has been “decoupled”.

Figure 5. Total water use by industry, compared to GDP and employment.



Source: VEWIN, 2010a, 2010b; CBS 2010

Figure 6. Emission of heavy metals and nutrients by industry compared to GDP



4.6 South Africa

[To be added?]

5. The way forward

48. The Global Assessment identified the factors impeding the compilation of water accounts. The two most common impeding factors were data availability (74%) and data quality (55%). The availability and quality of the data used to populate the accounting tables is a fundamental concern. While countries will often some of the data needed for the accounts, no country has access to all of the data needed to produce the full suite of accounts. As such the countries producing accounts rely on a range of estimation methods to populate particular cells in the tables. In some cases data may exist but the agency or agencies producing the accounts may not be able to access the data for legal, administrative or technical reasons.

49. One of the main challenges in the production of water accounts is the large number of agencies and the diverse range of professional disciplines (for example physical water scientists, economists, engineers, statisticians, and so on) that are involved in their production. This makes the legal and institutional frameworks, coordination and cooperation among different agencies a key issue for the success and sustainability of the water data collection and water accounting programmes in countries.

50. The growth in the number of countries producing water accounts may be attributed to the pressing need for integrated environmental and economic information as well as the adoption on the SEEA-Water as an interim international statistical standard by the UN Statistical Commission in 2007[11].

51. Continued growth in the implementation of SEEA-Water can be expected when international agencies, and especially UN agencies, OECD and Eurostat, begin to use the SEEA-Water for the collection, compilation and dissemination of water statistics. In addition, with the completion of the IRWS[12], countries will have access to more of the information needed to compile the accounts.

52. A critical factor for successful compilation and use of water accounts in countries will be ability of different agencies, and in national statistical offices and water management agencies, to work together in order to produce an integrated data system for water covering both the economic and environmental aspects of water.

53. Further growth in the use of water accounts can be expected as the compilers of accounts gain more experience with the theoretical framework and practical aspects of producing the accounts and as water

[11] Report of the 38th Session of the UN Statistical Commission (2007): http://unstats.un.org/unsd/statcom/doc07/Report-English.pdf
[12] Expert Group Meeting on International Recommendations for Water Statistics: http://unstats.un.org/unsd/envaccounting/irws/

managers and policy developers become familiar with the structure of the accounts and how they can be used in analyses at the regional and country levels.

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Annex I: Countries compiling or planning to compile Water Accounts

Responding countries	Economy regions	Economy grouping	Geographical grouping	Countries with or planning water accounts (see footnotes)
Andorra	Developed Region	Developed economy	Europe and Northern America	Yes
Armenia	Developing Region	Transition economy	Western Asia	Planning
Australia	Developed Region	Developed economy	Central, Eastern, Southern South-Eastern Asia and Oceania	Yes
Austria	Developed Region	Developed economy	Europe and Northern America	Yes
Bahamas	Developing Region	Developing economy	Latin America and the Caribbean	Yes
Bahrain			Western Asia	Yes[1]
Botswana	Developing Region	Developing economy	Africa	Yes
Brazil	Developing Region	Developing economy	Latin America and the Caribbean	Yes[1]
Canada	Developed Region	Developed economy	Europe and Northern America	Yes
China	Developing Region	Developing economy	Central, Eastern, Southern South-Eastern Asia and Oceania	Yes
Colombia	Developing Region	Developing economy	Latin America and the Caribbean	Yes
Denmark	Developed Region	Developed economy	Europe and Northern America	Yes
Dominican Republic	Developing Region	Developing economy	Latin America and the Caribbean	Yes
Egypt	Developing Region	Developing economy	Africa	Yes
Estonia	Developed Region	Developed economy	Europe and Northern America	Planning
France	Developed Region	Developed economy	Europe and Northern America	Yes
Germany	Developed Region	Developed economy	Europe and Northern America	Yes
Greece	Developed Region	Developed economy	Europe and Northern America	Planning
Guatemala	Developing Region	Developing economy	Latin America and the Caribbean	Yes
Hungary	Developed Region	Developed economy	Europe and Northern America	Yes
Iraq	Developing Region	Developing economy	Western Asia	Yes
Israel	Developing Region	Developing economy	Western Asia	Yes
Italy	Developed Region	Developed economy	Europe and Northern America	Yes
Jordan	Developing Region	Developing economy	Western Asia	Yes
Lebanon	Developing Region	Developing economy	Western Asia	Planning
Mauritius	Developing Region	Developing economy	Africa	Planning

Responding countries	Economy regions	Economy grouping	Geographical grouping	Countries with or planning water accounts (see footnotes)
Mexico	Developing Region	Developing economy	Latin America and the Caribbean	Yes
Namibia	Developing Region	Developing economy	Africa	Yes
Netherlands	Developed Region	Developed economy	Europe and Northern America	Yes
New Zealand	Developed Region	Developed economy	Central, Eastern, Southern South-Eastern Asia and Oceania	Yes
Norway	Developed Region	Developed economy	Europe and Northern America	Planning
Occupied Palestinian Territory	Developing Region	Developing economy	Western Asia	Planning
Oman			Western Asia	Yes[1]
Panama			Latin America and the Caribbean	Yes[1]
Peru	Developing Region	Developing economy	Latin America and the Caribbean	Yes
Philippines	Developing Region	Developing economy	Central, Eastern, Southern South-Eastern Asia and Oceania	Yes
Portugal	Developed Region	Developed economy	Europe and Northern America	Yes
Romania	Developed Region	Transition economy	Europe and Northern America	Planning
Singapore	Developing Region	Developing economy	Central, Eastern, Southern South-Eastern Asia and Oceania	Yes
South Africa	Developing Region	Developing economy	Africa	Yes
Spain	Developed Region	Developed economy	Europe and Northern America	Yes
Sweden	Developed Region	Developed economy	Europe and Northern America	Yes
Switzerland	Developed Region	Developed economy	Europe and Northern America	Yes
Trinidad and Tobago	Developing Region	Developing economy	Latin America and the Caribbean	Yes
Tunisia	Developing Region	Developing economy	Africa	Planning
Turkey	Developing Region	Developing economy	Western Asia	Planning
Ukraine	Developed Region	Transition economy	Europe and Northern America	Yes
United Kingdom	Developed Region	Developed economy	Europe and Northern America	Planning

Yes[1] = Country has started post the conduction of the Global Assessment of Water Statistics and Water Accounts in 2008

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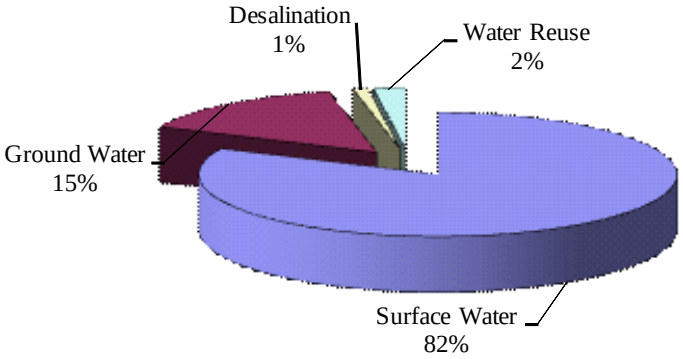
Annex II: Material supplied by the Economic and Social Commission for West Asia (ESCWA)

1. Introduction

The Economic and Social Commission for West Asia (ESCWA) region comprises 14 member countries: Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Oman, Palestine, Qatar, Saudi Arabia, the Sudan, the Syrian Arab Republic, the United Arab Emirates and Yemen (Fig.1), with varying endowments in natural resources. The region is rich in oil and gas resources, representing in 2008 51 per cent of the world proven oil reserves and 27 per cent of the world proven natural gas resources. [13] However, it suffers from water scarcity and aridity. The inland water surface covers only 1.6 per cent of the total ESCWA surface area. The region contains 0.56 per cent of the global renewable water resources. Surface water constitute 82% resources, ground water 15%, while water reuse and desalination represent 2 and 1 % respectively [14] .[1] (Fig. 2). Mean yearly precipitation is less than 100 mm per year in six ESCWA member countries, and between 100 and 300 mm per year in four other countries. Water is unevenly distributed and shortages in water supplies in summer are also observed in most regions.

Fig. 1 Map of the ESCWA region and its Water Issues

Fig. 2. Share of water resources in ESCWA in 2007



Therefore, developing the SEEAW for the region is of major importance and this was further supported by a recommendation from the ESCWA Statistical Committee [15] . The SEEAW is also a useful tool in support of decision makers on Integrated Water Resource Management (IWRM) in the region [16] and countries were encouraged to compile water accounts using harmonized concepts, definitions and classifications.

ESCWA and ECLAC implemented during 2007-2010 a development account project "Strengthening National Capacities in Environment Statistics, Indicators and Accounts Project (ESIAP) in support of progress toward achieving the internationally agreed development goals", in coordination UNSD, the regional statistical cooperation programme between the European Union and Mediterranean partner countries (MEDSTAT), the United Nations Environment Programme (UNEP) and other partners.

13UNESCWA, Statistical Abstract of the ESCWA Region, Issue 28 (2009).

14 UNESCWA. 2009. Compendium of Environment Statistics in the ESCWA Region.E/ESCWA/SD/2009/13

[15]ESCWA. 2004b. Report, the Statistical Committee on its Sixth Session, Beirut, 6-8 October 2004. E/ESCWA/SCU/2004/ig.1/6.

[16]UNSD 2007. System of Environmental-Economic Accounting for Water, Background document, Statistical Commission 38th Session 2007.

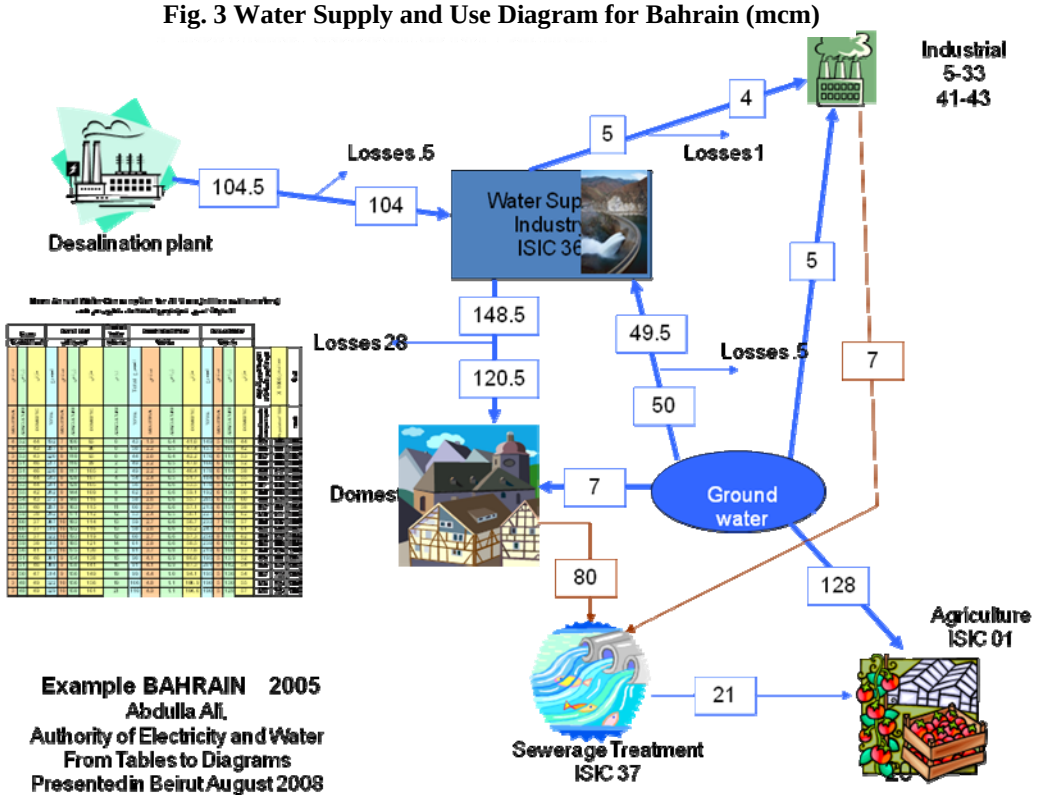
The project focused on the implementation of SEEAW and strengthening supporting statistics[17]. The focus on the water accounts and supporting statistics has been facilitated by the existence of internationally agreed methodologies, a global implementation strategy including training materials.

Given the unavailability of data and the different water issues in the countries to build a comprehensive SEEA in ESCWA member countries, priorities identified by countries pertained to physical flow accounts, assets accounts (physical stocks), monetary accounts (Fig. 1).

The project also identified environmental protection expenditures as another area of work in the region, with some countries like Jordan embarking with experimenting collecting data on environmental protection expenditure, with focus on water and sanitation expenditures[18]. As well as Energy accounts and Waste Accounts.

Until recently, three out of the 14 ESCWA countries compiled pilot studies water accounts: Jordan (Tables I to VI), Bahrain (Fig. 3), and Egypt. Other member countries such as Palestine Lebanon, and Oman are preparing their pilot water accounts for the upcoming year.

Fig. 3 Water Supply and Use Diagram for Bahrain (mcm)



Country experience in water accounts was presented by Lebanon and Jordan at the international World Water Forum, 20 - 21 March 2009, in Istanbul, Turkey in cooperation with UNSD and MEDSTAT. At the Gulf subregion, mainly Oman and Bahrain planned on including SEEA in the GCC national accounts strategy in 2010.

ESCWA promoted the System of Environmental Economic Accounting (SEEA) at high level policy-makers and enhanced capacity at the technical level in individual countries. In particular, ESCWA presented the SEEAW at the Arab Ministerial Council and enlarged the geographic scope from ESCWA (14 member countries) to Arab region (22 member counties) when cooperating with the League of Arab States at the "Second Meeting of Technical, Scientific, Advisory Committee to Council of Arab Ministers of Water in Egypt on 24-26 January 2010.

[17] UNESCWA. Framework for environmental economic accounting in the ESCWA region. 2009

[18] Public Environmental Expenditures. Case Study: Jordan. E/ESCWA/SDD/2009/WG.4/3 7 October 2009

SEEAW Standard Table I: Jordan Physical use table 2008 (mcm) (ESCWA Adaptation)

		Industries (by ISIC categories)								
		1-3	Industry	35	36	37	Total	Households	ROW	Total
From the environment	**1 - Total abstraction**	314.1	34.3	0.0	486.6	0.0	835.0	0.0		835.0
	1.a Abstraction for own use	314.1	34.3	0.0	0.0	0.0	348.4	0.0		348.4
	1.b Abstraction for distribution				486.6		486.6			486.6
	1.b.1 Freshwater resources				486.6		486.6			
	1.c.2 Desalinised groundwater									
	1.c.3 Desalinised sea water									
	1.i From water resources	314.1	34.3		474.9		823.3			823.3
	1.i.1 Surface water	77.5	0.0		258.4		335.9			335.9
	1.i.2 Groundwater	236.6	34.3	0.0	216.5	0.0	487.4			487.4
	1.i.2.1 Saline groundwater	0.0			0.0		0.0			0.0
	1.i.2.2 Fresh groundwater	236.6	34.3		216.5		487.4			487.4
	1.ii From other sources				11.7		11.7			11.7
	1.ii.1 Collection of precipitation						0.0			0.0
	1.ii.2 Abstraction from the sea				11.7		11.7			11.7
Within the economy	**2. Use of water received from other economic units**	267.3	3.4	0.0	0.0	119.5	390.2	179.6	0.0	569.8
	2.a Reused water	99.8	1.2	0.0	0.0		101.0	0.0		101.0
	2.b Wastewater to sewerage					119.5	119.5			119.5
	2.c Distributed water	167.5	2.2	0.0	0.0	0.0	169.7	179.6	0.0	349.3
3. **Total use of water** (=1+2)		581.5	37.7	0.0	486.6	119.5	1225.2	179.6	0.0	1404.8

SEEAW Standard Table II: Physical supply table 2008 (mcm) (ESCWA Adaptation)

		Industries (by ISIC categories)								
		1-3	Industry	35	36	37	Total	Households	Rest of the world	Total
Within the economy	**4. Supply of water to other economic units**	0.0	20.7	0.0	349.3	101.0	471.0	98.8	0.0	569.8
	4.a Reused water					101.0	101.0			101.0
	4.b Wastewater to sewerage	0.0	20.7	0.0	0.0		20.7	98.8		119.5
	4.c Distributed water				349.3		349.3		0.0	349.3
To the environment	**5. Total returns**	0.0	0.0	0.0	0.0	18.5	18.5	0.0		18.5
	5.a To water resources	0.0	0.0	0.0	0.0	18.5	18.5	0.0		18.5
	5.a.1 Surface water	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0
	5.a.2 Groundwater				82.6	18.5	18.5			18.5
	5.a.3 Soil water						0.0			0.0
	5.b To other sources (e.g. sea water)					0.0	0.0			0.0
6. Total supply of water		0.0	20.7	0.0	266.7	119.5	489.5	98.8		588.3
7. Consumption		581.5	17.0	0.0	137.3	0.0	735.7	80.8		816.5

SEEAW Standard Table III: Hybrid supply table 2008 (Thousand Dinars)

	Output of industries (by ISIC categories)							Imports	Taxes on products	Subsidies on products	Trade and transport margins	Total supply at purchaser's price
	1	2-33, 41-43	35 Total	35 *of which*: Hydro	36	37	38,39, 45-99	Total output, at basic prices					
1. Total output and supply (monetary units)					51.1	15.4		66.5					72.1
of which:						0							
1.a Natural water (CPC 1800)					51.1			51.1					51.1
1.b Sewerage services (CPC 941)						15.4		15.4	5.6				21
2. Total supply of water (physical units)		20.7			349.3	119.5		489.5					
2.a - Supply of water to other economic units		20.7			349.3	101		471					
2.b - Total returns						18.5		18.5					
3. Total (gross) emissions (physical units)													
Pollutants													

SEEAW Standard VI: Hybrid use table 2008

	Intermediate consumption of industries (by ISIC categories)								Actual final consumption				Capital formation	Exports	Total uses at purchaser's price
			35						Households			Government			
	1	2-33, 41-43	Total	of which: Hydro	36	37	38,39 45-99	Total industry	Final consumption expenditures	Social transfers in kind from Government and NPISHs	Total				
1. Total intermediate consumption and use (Million Dinars)					32.9	14.1		47.0	0			7.7			54.7
of which: Natural water (CPC 1800)					32.9	0.0		32.9				5.4	97.8		136.1
Sewerage services (CPC 941)					0.0	14.1		14.1				2.3	41.9		58.3
2. Total value added (Million Dinars)					18.2	1.3		19.5							19.5
3. Total use of water (mcm)	581.5	37.7			486.6	119.5		1,225.2							
3.a Total Abstraction	314.1	34.3			486.6	0.0		835.0							
of which: 3.a.1- Abstraction for own use	314.1	34.3			0.0	0.0		348.4							
3.b Use of water received from other economic units	267.3	3.4			0.0	119.5		390.2							

SEEAW Standard Table V: Gross and net emissions (mcm) in Jordan 2008	
Pollutant	Total
1. Gross emissions (= a + b)	38,206
1.a. Direct emissions to water (= 1.a.1 + 1.a.2 = 1.a.i + 1.a.ii)	
1.a.1. Without treatment	
1.a.2. After on-site treatment	
1.a.i. To water resources	
1.a.ii. To the sea	
1.b. To Sewerage (ISIC 37)	38,206
2. Reallocation of emission by ISIC 37	386
3. Net emissions (= 1.a + 2)	386

Data Source for 75% of WWTPs
INF. AVG.FLOW 152587M3/day=55694255M3/Year
EFF. AVG.FLOW 150995M3/day=55113175M3/Year
Annual INF. average of BOD"5"686mg/l=38206258930g=38206.26Ton
Annual EFF. average of BOD "5"7mg/l=385792225g=385.7922Ton

SEEAW Standard Table VI: Emissions to water (mcm) by ISIC 37 in Jordan 2008	
Pollutant	ISIC 37
4. Emissions to water (=4.a+4.b)	386
4.a. After treatment	386
To water resources	386
To the sea	
4.b.. Without treatment	
To water resources	
To the sea	