Making every drop count:

Water Accounting Workshop[1]

[1] This workshop was developed by the United Nations Statistical Division (UNSD)

Introduction

What is the purpose of this workshop?

The purpose of this workshop is to familiarise you with water accounting practices, so that at the end of the workshop you are capable of taking water data and compile water accounts at both the national level and river basin level. The tables follow the standard tables from SEEA-Water, which is the international statistical standard for organising physical and monetary data into water accounts.

Is this workshop for me?

This workshop is applicable to anyone engaged in water statistics or accounting or those wishing to understand these statistics.

What are the objectives of this workshop?

The objectives of this workshop are to give you the skills and knowledge required to take water data and organise this data into Physical supply and use tables for water.

What do I need to do?

To complete this workshop you need to complete a number of standard tables from the SEEA-Water. The exercises relate specifically to Physical supply and use tables for water.

Before starting the workshop please read “Welcome to the Republic of Blue”. This provides background to the Republic of Blue which is an imaginary country. It should be noted, however, that the data and other information presented are consistent with real data from real countries.

You should complete the exercises in the order they are presented, as they contain references to previous work and are related. The module commences with an introduction providing a brief outline of the exercises in the module. Each exercise is slightly more complex than the previous one.

For each exercise read the story, which has facts about the “Republic of Blue”, or one of its cities. Following the story are a set of instructions and questions that need to be completed, for example completing a table or questions asking for information contained in a table. You should plan an hour to complete each exercise.

Are there any references books I can use?

There are two documents that you could refer to when completing these exercises. The first is the SEEA-Water and the second is the International Recommendations for Water Statistics (IRWS). These documents are available online:

- SEEA-Water: http://unstats.un.org/unsd/envaccounting/seeaw.asp
- IRWS: http://unstats.un.org/unsd/envaccounting/irws/

Can I reuse or copy this workshop material?

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Exercise 1: Northville: Completing the physical supply and use tables

Water supply and use in Northville

The physical flows of water in Northville are represented in Figure 3 and in Table 1. Note that the flows are shown in millions of meters cubed (=1,000,000 m^3) and that Table 1 is currently incomplete.

There are two water suppliers (ISIC 36) in the Northville area. One water supplier is for the town of Northville, supplying both industries and households, while the second supplies only farms with water for irrigation. Together these water suppliers (ISIC 36) abstract 229,000,000 m^3 of water. The water for irrigation is mostly supplied through open channels. Losses due to leaky pipes and from the open channels to groundwater are shown in the physical supply table (Line 5.a.2), but those due to evaporation are not shown in the physical supply and use tables. The supply of water losses from evaporation is large, because of the use of open channels.

The agricultural industry (ISIC 01) uses the largest amount of water (290,000,000 m^3, Line 3) as well as consuming the largest amount of water (249,000,000 m^3, Line 7).

The mining industry abstracts 9,000,000 m^3 of water from the environment (Table 1, line 1). Of this amount 3,000,000 m^3 is groundwater (Table 1, line 1.i.2) which has to be removed in order to allow the mining to occur (this is know as mine de-watering).

The electricity industry abstracts 2,000,000 m^3 (Table 1, line 1) for use as cooling water. All of the cooling water is returned to the environment. The electricity industry uses an addition 1,000,000 m^3 from the water supply industry (Table 1, line 2) for cleaning, drinking water and sanitation. The plant has its own sewerage treatment facilities and the water from this is used to maintain extensive gardens around the power plant, so there are no discharges to sewerage (ISIC 37).

Households use 29,000,000 m^3 of water in Northville (Table 1, line 3). A part of population lives away from the town centre, on farms or on rural residential properties, and these households rely mostly on groundwater (8,000,000 m^3, Table 1, line 1.i.2). These households also return some water to the environment (see Figure 3).

Figure 3: A map showing flows of water through Northville.

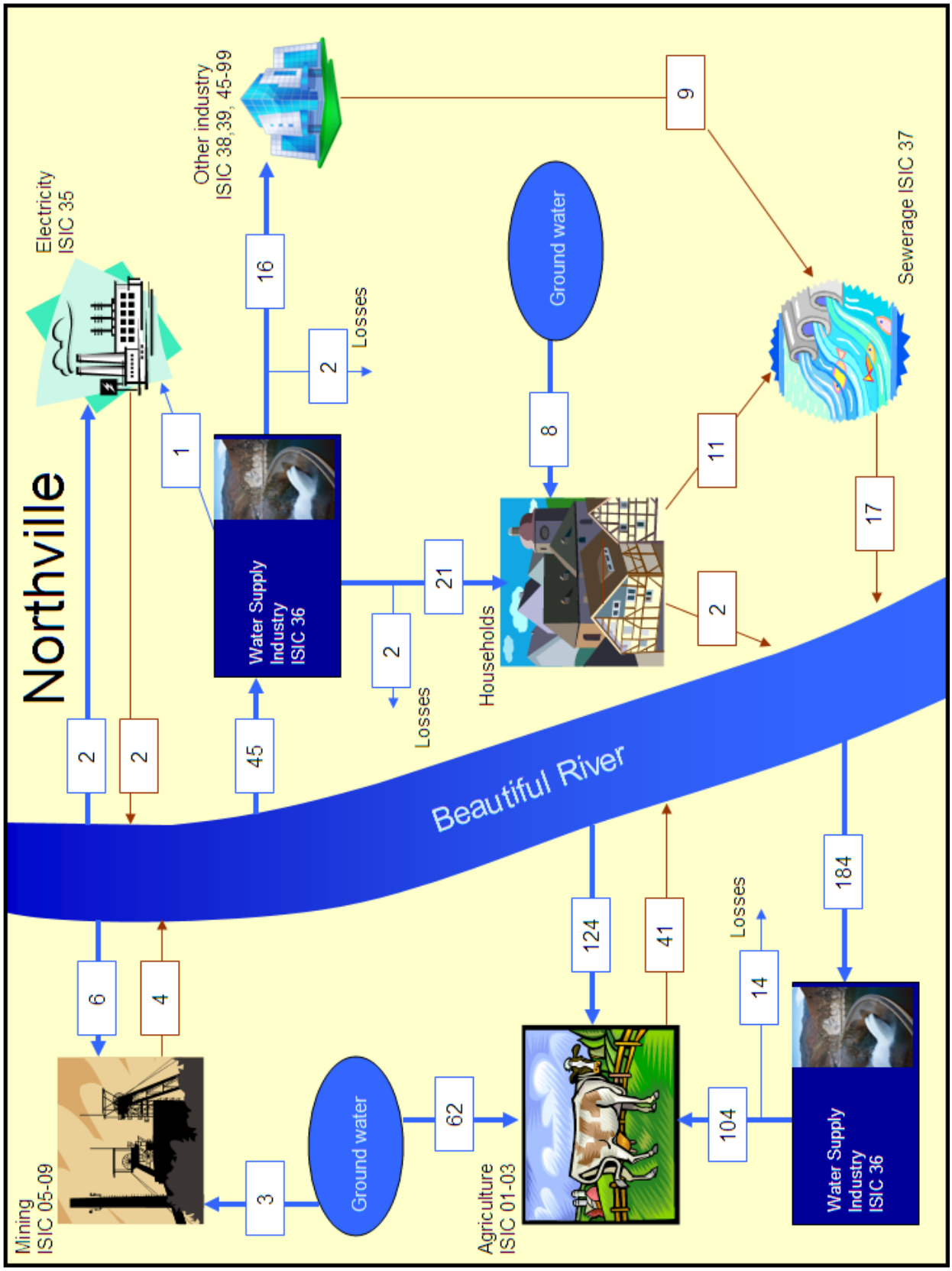

Table 1: Northville physical supply and use tables.

Note there are two water suppliers in the Northville area

Physical use table — Physical Units

		Industries (by ISIC categories)							Households	Rest of the world	Total
		1-3	5-33, 41-43	35	36	37	38-39, 45-99	Industry total			
From the environment	**1. Total abstraction (=1.a+1.b=1.i+1.ii)**	186	9	2	229	0	0	426	8		43
	1.a. Abstraction for own use	186	9	0		0	0	197	8		20
	1.b. Abstraction for distribution	0	0	0		0	0	229	0		22
	1.i. From inland water resources:		9	2		0	0	426	8		43
	1.i.1 Surface water		6	2		0	0	361	0		36
	1.i.2 Groundwater		3	0		0	0	65	8		7
	1.i.3 Soil water		0	0		0	0	0	0		
	1.ii. From other sources										
	1.ii.1 Collection of precipitation		0	0		0	0	0	0		
	1.ii.2 Abstraction from the sea		0	0		0	0	0	0		
Within the economy	**2. Use of water received from other economic units of which:**	104	0		0		16	141	21	0	16
	2.a Reused water	0	0		0		0	0	0	0	
	2.b Wastewater to sewerage	0	0		0		0	20	0	0	2
	2.c Distributed water	104	0		0		16	121	21	0	14
3. Total use of water (=1 + 2)		290	9	3	229	20	16	567	29	0	59

Largest water use

Physical supply table — Physical Units

		Industries (by ISIC categories)							Households	Rest of the world	Total
		1-3	5-33, 41-43	35	36	37	38-39, 45-99	Total			
Within the economy	**4. Supply of water to other economic units**	0	0	0		0		151	11	0	16
	of which										
	4.a. Reused water	0	0	0		0		0	0	0	
	4.b Wastewater to sewerage	0	0	0		0		9	11	0	2
	4.c. Distributed water	0	0	0		0		142	0	0	14
To the environment	**5. Total returns (=5.a+5.b)**	41		2	18		0	82			8
	5.a. To inland water resources	41		2	18		0	82			8
	5.a.1 Surface water	41		2	0		0	64			6
	5.a.2 Groundwater	0		0	18		0	18			1
	5.a.3 Soil water	0		0			0	0			
	5.b To other sources (e.g. sea water)	0		0			0	0			
6. Total supply of water (=4+5)		41	4	2	16	17	9	223	13	0	24
7. Consumption (=3 - 6)		249	5	1	6	3	7	334	16	0	35

Note: Grey cells indicate zero entries by definition.

Largest water consumption

These are the losses. Note that these are from two sources. 14 from the supply to agriculture and 4 from the supply to households and other industries

Questions

1. How much water does agriculture (ISIC 01) abstract from the environment?

   186 million meters cubed (186,000,000 m3)

2. Of the water abstracted by agriculture (ISIC 01) how much is from groundwater?

   62 million meters cubed (62,000,000 m3)

3. In Northville, who supplies the wastewater to the sewerage industry (ISIC 37)

   Households and other industries (ISIC 38, 39, 45-99)

4. How much water do households receive from other economic units?

   21 million meters cubed (21,000,000 m3)

5. How much water could potentially be supplied as reused water by the sewerage industry (ISIC 37) rather than be returned to the environment?

   17 million meters cubed (17,000,000 m3)

6. If the sewerage industry (ISIC 37) was to supply reused water to other industries (ISIC 38, 39, 45-99) with 5,000,000 m3 of reused water, in what column and line would the supply be recorded?

   Line 4.a (supply of reused water), column for sewerage industry (ISIC 37). Line and column subtotals and totals would also have to be adjusted.

7. If other industries (ISIC 38, 39, 45-99) were to use 5,000,000 m3 of reused water, in what column and line would the supply be recorded?

   Line 2.a (use of reused water) in the column for other industries (ISIC 38, 39, 45-99). Line and column subtotals and totals would also have to be adjusted.

Table 1: Answers

Physical use table

Gigalitres (=1,000,000 m3)

		Industries (by ISIC categories)							Households	Rest of the world	Total
		1-3	5-33, 41-43	35	36	37	38,39, 45-99	**Industry total**			
From the environment	**1 - Total abstraction (=1.a+1.b = 1.i+1.ii)**	**186**	**9**	**2**	**229**	**0**	**0**	**426**	**8**		**434**
	1.a Abstraction for own use	186	9	2	0	0	0	197	8		205
	1.b Abstraction for distribution	0	0	0	229	0	0	229	0		229
	1.i From inland water resources:	186	9	2	229	0	0	426	8		434
	1.i.1 Surface water	124	6	2	229	0	0	361	0		361
	1.i.2 Groundwater	62	3	0	0	0	0	65	8		73
	1.i.3 Soil water	0	0	0	0	0	0	0	0		0
	1.ii Collection of precipitation	0	0	0	0	0	0	0	0		0
	1.iii Abstraction from the sea	0	0	0	0	0	0	0	0		0
Within the economy	**2. Use of water received from other economic units**	**104**	**0**	**1**	**0**	**20**	**16**	**141**	**21**	**0**	**162**
	of which:							0			
	2.a Reused water	0	0	0	0	0	0	0	0	0	0
	2.b Wastewater to sewerage	0	0	0	0	20	0	20	0	0	20
	2.c Distributed water	104	0	1	0	0	16	121	21	0	142
3. Total use of water (=1+2)		**290**	**9**	**3**	**229**	**20**	**16**	567	**29**	**0**	**596**

Note: grey cells indicate zero entries by definition.

Physical supply table

Gigalitres (=1,000,000 m3)

		Industries (by ISIC categories)							Households	Rest of the world	Total
		1-3	5-33, 41-43	35	36	37	38,39, 45-99	**Industry total**			
Within the economy	**4. Supply of water to other economic units**	**0**	**0**	**0**	**142**	**0**	**9**	**151**	**11**	**0**	**162**
	of which:										
	4.a Reused water	0	0	0	0	0	0	0	0	0	0
	4.b Wastewater to sewerage	0	0	0	0	0	9	9	11	0	20
	4.c Distributed water	0	0	0	142	0	0	142	0	0	142
To the environment	**5. Total returns (= 5.a+5.b)**	**41**	**4**	**2**	**18**	**17**	**0**	**82**	**2**		**84**
	5.a To inland water resources	41	4	2	18	17	0	82	2		84
	5.a.1 Surface water	41	4	2	0	17	0	64	2		66
	5.a.2 Groundwater	0	0	0	18	0	0	18	0		18
	5.a.3 Soil water	0	0	0	0	0	0	0	0		0
	5.b To other sources (e.g. sea water)	0	0	0	0	0	0	0	0		0
6. Total supply of water (= 4+5)		**41**	**4**	**2**	**160**	**17**	**9**	**233**	**13**	**0**	**246**
7. Consumption (3-6)		**249**	**5**	**1**	**69**	**3**	**7**	**334**	**16**	**0**	**350**

Note: grey cells indicate zero entries by definition.

Answers

1. How much water does agriculture (ISIC 01) abstract from the environment?
    i. 186 million meters cubed (186,000,000 m3)
2. Of the water abstracted by agriculture (ISIC 01) how much is from groundwater?
    i. 62 million meters cubed (62,000,000 m3)
3. In Northville, who supplies the wastewater to the sewerage industry (ISIC 37)
    i. Households and other industries (ISIC 38, 39, 45-99)
4. How much water do households receive from other economic units?
    i. 21 million meters cubed (21,000,000 m3)
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    i. Line 4.a (supply of reused water), column for sewerage industry (ISIC 37). Line and column subtotals and totals would also have to be adjusted.
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    i. Line 2.a (use of reused water) in the column for other industries (ISIC 38, 39, 45-99). Line and column subtotals and totals would also have to be adjusted.