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Water Statistics in the GCC Countries: Recent Experiences

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Abstract

Environment Statistics are one of the priority statistical projects for the six countries composing the Gulf Cooperation Council (GCC). An important part of this project is Water Statistics Sector. The paper will describe progress in preparing harmonized statistics on water abstract, supply and use in the GCC, within the Framework for the Development of Environment Statistics.

Key words
GCC-Stat, water, abstracted, supply, design capacity

1. Introduction

Water is the backbone of life on earth and it is significant for all creatures and not only humans. Almost all human activities depend on or involve water as an essential factor or component. Thus, any water shortage or scarcity poses a challenge to nations and governments. The GCC countries are located in an arid region where water is not found in abundance, so solutions have to be found. Obtaining the right data is an imperative step towards an effective solution.

This paper describes the experience of the Statistical Centre for the Cooperation Council for the Arab Countries of the Gulf (GCC-Stat) in preparing the first set of harmonized water supply and use statistics. The project had two main aims – standardizing the collection of statistics related to water supply and use, and understanding the methods employed by the different Gulf countries to calculate water quantities in terms of resources types, supply sources and distribution. The first study covered the 2003-2014 period.

The data collection used a harmonized questionnaire based on international standards and distributed to all GCC countries. It included, 184 variables, of which twenty variables where selected for the regional publication, depending on the data availability in the six countries.

The paper is organized as follows:

- Section one shows some of the lessons learnt in preparing harmonized water statistics, including the importance of common topics, standard classifications and quality metadata;
- Section two provides an overview about water statistics in the GCC Countries;
- Section three discusses the methodology of data collection, results, discussion, lessons learnt and recommendations for future and summary are in chapters 4,5,6,7 respectively.

2. Overview of Water Statistics in the GCC Countries

2.1 GCC region and GCC-Stat

The Gulf Cooperation Council (GCC) was founded in 1981 by the six Arab Countries of the Gulf namely United Arab Emirates (UAE), Kingdom of Bahrain, Kingdom of Saudi Arabia (KSA), Sultanate of Oman, Qatar, and Kuwait. The Council has the objective of creating coordination between the member states on various levels, social, economic, political, security and defense.

GCC Stat is the Statistical Center for the Cooperation Council for the Arab Countries of the Gulf. This center was founded in June 2011. The mission of the center is to “Leverage the power of

statistical information to support decision making, research and dialogue within GCC nations and its vision is “a reliable source and a dynamic driver of the GCC Statistical System"[1].

To achieve this vision, GCC-Stat and the member states have agreed on a series of priority statistical development projects which all aim to improve the range of statistics available for the GCC. These projects are:

1. National accounts
2. Monetary, financial and balance of payments statistics
3. Prices and short-terms indicators
4. External trade
5. Labour market
6. Energy and Environment
7. Development, Progress and Sustainability indicators
8. Harmonized 2020 population census using administrative records
9. Administrative data
10. Statistical standards, classifications, methodology and data quality in the GCC region.
11. Ongoing assembly and dissemination of statistics
12. GCC-Stat institutional and other cross-cutting activities

2.2 Energy and Environment Statistics

Each of these projects has a Roadmap setting out the strategic aims for the project. The strategic aims of the Environment Statistics project are[1]:

1- Creating a “harmonized Environment Statistics System”[1] in accordance with international standards such as UN Framework for the Development of Environment Statistics (FDES), International Recommendations for water Statistics (IRWS) and System of Environment-Economic Accounting (SEEA).

2- The use of adopted questionnaires by all countries, such as those of UNSD or UNEP (United Nations Environment Programme).

3- Promoting the use of the Geographical Information system (GIS) as a platform for analyzing and publishing statistics related to the environment depending on chosen themes.

4- Disseminating environment statistics by GCC-Stat regularly.

[1] See GCC-Stat website - http://www.gccstat.org/en/calendar/roadmap

In addition to these specific objectives, one main role/objective of this project is to increase the range of environment statistics at the GCC level and within the countries.

The Environment project has a number of subprojects including waste statistics, system of Integrated Environmental and Economic Accounting (SEEA), air emissions and quality, sustainable development indicator, Land use and changes in land, marine environment and water statistics.

This paper concerns water statistics only. This subproject includes further subdivisions which are renewable freshwater resources, inland water stock, fresh water abstraction and use, water supply industry, waste water generation and treatment, population connected to waste water treatment fresh water and marine water quality and water infrastructure.

3. Methodology

The framework for the collection of water statistics in the GCC is based on the International Framework for the Development of Environment Statistics (FDES, 2013) and the International Recommendations for Water Statistics (UNSD, 2012). This framework was used to identify a set of data requirements. A series of international resources were used to prepare a list of variables and their definitions, relevant to the specific needs of the region. International resources included:

- UNSD (United Nation Statistics Division) Questionnaire for environment Sector
- FDES (Framework for the Development of Environment Statistics).
- IRWS (International Recommendations for water Statistics)
- WHO (World Health Organization).

In addition, some specific requirements related to GCC-Stat were also identified.

As discussed below, the requirements were converted into a series of Transmission Tables, which then formed the basis of the data collection.

3.1 Definitions and Classifications

The definition of the water variables was taken from IRWS and FDES. WHO definitions were used for variables measuring Drinking Water Quality. Following the format adopted by both the UNSD and the FDES, variables about water supply and water industry were designed to use the ISIC Rev 4 classification.

3.2 Data Variables

The variables were organized in a series of eight transmission tables, representing a different theme related to water statistics. The Transmission Tables used in this study are as follows:

- Renewable Fresh water Resources (TT 1)
- Inland water stocks (TT 1.2)
- Fresh water Abstraction and Use (TT 2)
- Water Supply Industry (TT 3)
- Waste water Generated and Treatment (TT 4)
- Population Connected to wastewater Treatment (TT 5)
- Freshwater Quality (TT 6)
- Marine water Quality (TT 7)
- Water Infrastructure (TT 8).

These tables were based on the relevant international standards and adjusted where necessary to meet the specific needs of the region. The detailed Transmission Tables (TT) showing the variables, and the relevant sources are shown in the Appendix.

3.3 Transmission Table Contents

This section describes the main variables required for each of the transmission tables.

3.3.1 Renewable Fresh water Resources (TT1)

This table assessed the freshwater resources and their availability in a country. Precipitation was the first variable in this table as renewable fresh water is mainly replenished by it which mean less evapotranspiration[2]. The table also assessed the inflow and outflow of water in terms of what flows to the sea or to neighboring countries. The outflow to neighboring countries is assessed in terms of what is secured by treaties or not.

The required variables were sourced from hydrological and/or meteorological monitoring and modelling.

[2] Evapotranspiration is a total actual volume of evaporation from the ground, wetlands and natural water bodies and transpiration of plants. Source: See UNSD website- http://unstats.un.org/unsd/environment/questionnaire2013.html

3.3.2 Inland water stocks (TT1.2)

This table measured inland water stocks in artificial reservoirs, lakes, rivers and streams, wetland, snow, ice and glaciers in addition to groundwater stocks and water rights. Although there are no permanent snow, ice, or glaciers in the GCC, this measure is considered as there are temporary snow falls in winter in some areas in the GCC.[3]

All variables of this tables should be provided by the institutions in charge of water resources. They should have the materials and tools to estimate surface water, groundwater, covered area with snow, type of snow, etc. Using some methods to estimate snow water equivalent using depth data and climate classes.

3.3.3 Fresh water Abstraction and Use (TT2)

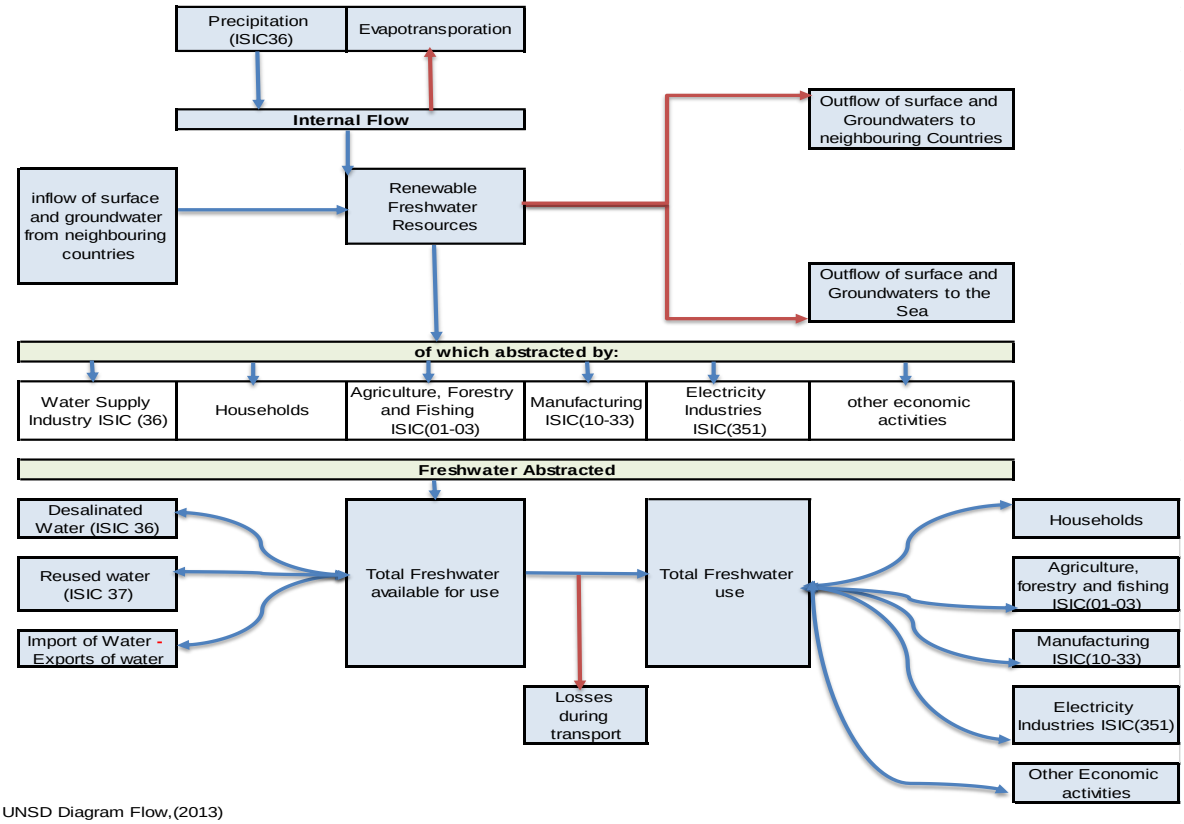
Water abstraction is the amount of water removed from any source in a given period of time. Fresh water can be abstracted from surface water as rivers or lakes, or from ground water via wells and springs. Both public and private bodies that provide water to public can extract fresh water. In addition, industries, households and farmers can also extract water directly.

This transmission table requires data on water abstraction depending on activity. Economic activity of the water abstraction is defined according to International Standard Industrial Classification of All Economic Activities (ISIC Rev. 4). The table also deals with water quantities made available to be used through desalination, abstraction, net imports and reused. It covers the total amount of water used by ISIC grouping.

[3] Temperature drastically dipped in winter that cause snowfall in some areas in GCC Countries (e.g. Tabuk in KSA, Jabal Al akhdar, Jabal Shams and Al Hajar Mountain in Oman). During 2015-2016, all GCC countries witnessed snow fall, such as in Kuwait (al Salmiyah region), Bahrain, Sultanate of Oman in Samail, Saudi Arabia in Arar, United Arab Emirates and Qatar in Doha.

Some variables covering how water distributed to households were included. Figure 1 shows the cycle of abstraction, production, distribution and water use that is the framework for this transmission table.

Figure 1- Water Cycle of Abstraction, Production, Distribution and Use

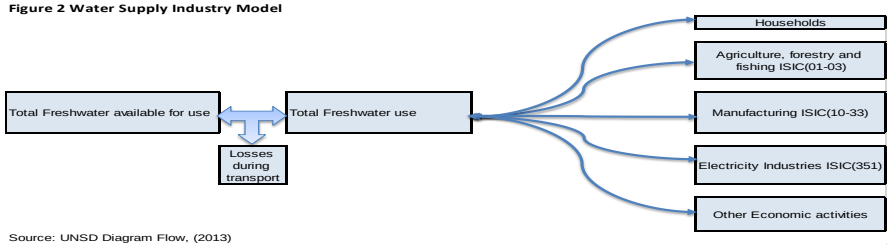


Source: UNSD Diagram Flow,(2013)

3.3.4 Water Supply Industry ISIC 36 (TT3)

This transmission table concerns the water supply industry. This refers to the public or private bodies responsible for providing water to public. Data requested are about amount of water supplied to users by the industry in accordance with the relevant ISIC Rev 4 groupings. It asks for data about waters losses and population of users that the industry serves. The percentage of population with access to fresh water is also covered in this table. An overview of the Water Supply Industry model is shown in Figure 2. However, information on water use is needed for this sector breakdown (as will be discussed in 4.2.6).

Figure 2 Water Supply Industry Model



Source: UNSD Diagram Flow, (2013)

3.3.5 Waste water Generated and Treatment (TT4)

This table dealt with the generation of waste water whether by economic activities or households. It also asked for data about wastewater discharge: directly or after treatment to remove pollutants.

The table requested data about quantities of wastewater generated, collected and treated. The required information on wastewater treatment included methods of treatments, sewage industry and other treatment plants on independent treatment facilities. It also made the distinction between primary, secondary and tertiary treatment.

3.3.6 Population Connected to wastewater Treatment (TT5)

The table required data about the proportion of the population connected to wastewater collection and/or treatment. It also requested information about the population with independent wastewater treatment, and those households not connected to wastewater treatment systems.

3.3.7 Freshwater Quality (TT6)

This covered freshwater quantity in terms of nutrients and chlorophyll, organic matter, pathogens, metals, organic contaminants, physical and chemical characteristics and plastic waste and other freshwater debris.

3.3.8 Marine water Quality (TT7)

This covered marine water quality in terms of nutrients and chlorophyll, organic matter, pathogens, metals, organic contaminants, physical and chemical characteristics, Red tide, oil production, plastic waste and other marine and coral bleaching.

3.3.9 Water Infrastructure (TT8)

This table requested data about facilities used to collect, conserve, treat, purify water and type of technology Used in terms of numbers and design capacity. It also covers height of dams and reservoirs, length of a flaj[4] and water distribution network and springs and groundwater aquifers coordinates.

3.4 Data Collection and Publication

The transmission tables described above formed the questionnaire. The final tables included a total of 184 variables.

[4] A flaj is a channel rifted in the ground for transferring water from a place to another or converting its course.
Source: MRMWR website:- http://www.mrmwr.gov.om/Library/Files/5english.pdf

3.4.1 Data Collection

Information from published sources (National Statistics Centers and concerned Water Authorities) for the 2003-2014 period was used to generate individual pre-populated questionnaires for each country.

The questionnaire was sent to the National Statistics Centre for validation. A period of one month was given to the centers to review and validate, before the questionnaire was returned to GCC-Stat for final checking.

3.4.2 Data Publication

Out of the original 184 variables from the Transmission Tables (TT), 20 were selected for publication due to their availability in six countries. These are shown in Table 1 below. The variables selected for publication came from a range of the Transmission Tables.

Table 1 -The variables which are covering in GCC-Stat water Statistics bulletin

Title of Table	Category
Renewable Freshwater Resources	Precipitation
Freshwater Abstraction and Use	Surface water abstracted
Freshwater Abstraction and Use	Desalinated water
Freshwater Abstraction and Use	Reused water
Freshwater Abstraction and Use	Groundwater abstracted
Freshwater Abstraction and Use	Total freshwater use (=14-15)
Water Supply Industry	Gross water supplied by water supply industry
Water Supply Industry	Losses during transport
Water Supply Industry	Net water supplied by water supply industry
Water Supply Industry	Households
Water Supply Industry	Agriculture, forestry and fishing
Water Supply Industry	Manufacturing
Water Supply Industry	Other economic activities
Wastewater Generation and Treatment	Volume of wastewater collected
Wastewater Generation and Treatment	Volume of wastewater treated
Population Connected to Wastewater Treatment	Population connected to wastewater collecting system
Population Connected to Wastewater Treatment	Population connected to wastewater treatment
Water Infrastructure	WWTP stations - Design Capacity
Water Infrastructure	Desalination stations - Design Capacity
Water Infrastructure	Dams - Design Capacity

The bulletin Water Statistics (نشرة احصاءات المياه في دول مجلس التعاون لدول الخليج العربية)in Gulf Cooperation Council Countries was prepared covering these 20 variables. The bulletin was sent to all the countries in July, 2016 for review and suggestion. Following feedback from member countries, the final bulletin was completed and is expected to be published in November, 2016.

4. Results

The results discussed in this section refer to the 20 variables shown in Table 1.

4.1 Renewable Freshwater Resources (TT1)

Only the precipitation variable was available for all six countries. For instance, some countries provided information for weather stations. Other countries provided the total amount in time series. There were differences in the unit used. Countries which provided information for weather stations, used millimeters while the other countries used million cubic meters. Thus, conversions had to be made to standardize the unit used.

4.2 Fresh water Abstraction and Use

4.2.1 Surface water Abstracted in GCC Countries (TT2)

Only three countries, UAE, KSA and Oman have dams and make use of surface water. This is due to the higher precipitation compared to other countries. These dams are mainly used for feeding groundwater and protection from floods by heavy rainfall. In addition, both KSA and Oman utilized dams for agriculture and drinking water.

The main challenge in calculating this variable was that figures and numbers were not published before in time series. Other challenges included the amount of water collected in dams not abstracted.

4.2.2 Groundwater Abstracted in GCC Countries (TT2)

The main observations concerning abstraction of groundwater were:

- Different terms for groundwater abstracted was published in the region such as (renewable and non-renewable, conventional, rate of groundwater abstracted).
- For some countries, the majority of groundwater is brackish groundwater. Only small quantities are considered as freshwater.

The challenges in calculating this variable were:

a- Double counting: Some amounts are calculated more than once under more than one category,

b- Collect sectorial abstraction of groundwater statistics: Total abstraction of Groundwater depends on the sectors (households, industry, agriculture, etc.). Water abstracted from groundwater directly by households and farmers cannot be calculated accurately due to the lack of water meters. Some of collected data was estimated by countries.

c- Collection of metadata: Data were provided for groundwater in general without specification of its sources and methodology.

4.2.3Desalinated Water Production (TT2)

All GCC countries collect and publish data about water desalination. Collecting data for this Transmission Table was not as challenging as the other variables. However, countries didn't specify or identify the source of water abstracted for the purposes of desalination whether it was brackish groundwater or seawater because the questionnaire did not include the source. (The questionnaire only concerns total production- as input to desalination plant). This work has been done for some countries during Technical Assistance Missions. Hence, comes the importance of national statistical center to record and concern about the water source abstracted to avoid double counting between Desalinated water abstracted and ground water abstracted.

4.2.4 Reused water (TT2)

Five of the six countries provided data about reused water, and they all used the same standards. In GCC countries, almost the amount of waste water treatment reused is for agriculture and Landscaping.

Nevertheless, data provided by the five countries only covered the period from 2012 to 2014 although stations had been built long before these dates.

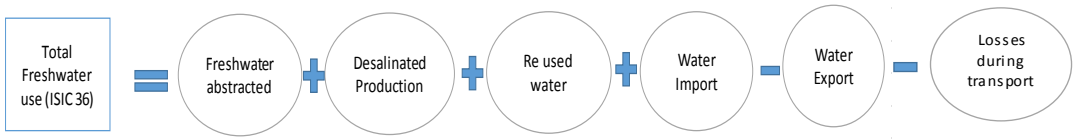
4.2.5 Total Freshwater Use (TT2)

Previous studies[5] had indicated that water production was less than water use/consumption. This was because total freshwater use was only of water produced in desalination plants, and ignored other sources in some countries.

[5] See GCC- SU website- http://www.gcc-sg.org/ar-sa/CognitiveSources/DigitalLibrary/Lists/DigitalLibrary/1410682304/الإحصاءات.pdf
- http://www.gcc-sg.org/ar-sa/CognitiveSources/DigitalLibrary/Lists/DigitalLibrary/1368873088/الإحصاءات.pdf

In addition, the total GCC number couldn't be derived because the statistics available in GCC countries were not consistent. For example, statistics available about water use in some countries were of desalinated water produced without considering the loss during distribution to the sectors, while others used total freshwater available for use.

Using the UNSD model of Freshwater use, as shown in the figure below, it was now possible to provide a more accurate picture of water production and use.



Source: UNSD Questionnaire . (2013)

4.2.6 Water Supply Industries (ISIC 36) (TT 3)

Providing harmonized industrial sector statistics requires the consistent application of the Water Supply Industry Model as shown in Figure 2 above. Countries varied in the application of the model, especially in the division of sectors. Some countries divided the sectors in accordance with the required classification, while others did not. In addition, one country did not have standardized data within the country and countries did not always provide information about the methodology used in their calculations.

4.2.7 Waste water Generation and Treatment (TT4)

Only two variables were available - volume of wastewater collected and volume of wastewater treated.

In addition, countries were inconsistent in the unit they used, so conversion had to be done.

Data provided were inaccurate in some countries. For example, the total amounts of wastewater collected was bigger than the capacity of the station. This was a problem in published data, but the countries corrected it after being notified by us and followed up by our expert.

4.2.5 Population Connected to waste water Treatment (TT5)

Countries did not specify or provide the methodology used by them to calculate the numbers; therefore, it was not possible for us to verify the accuracy of the numbers given.

4.2.8 Water infrastructure (TT 8)[6]

Three variables were available - capacity design of desalination plants, waste water treatment plants and dams. Countries provided data in accordance with relevance to their own situation.

5. Discussion

The original project aimed through the use of transmission tables to collect 184 variables related to Water Production and Use. In practice, only 20 variables were able to be disseminated. In some cases (e.g. Desalinated water), it was possible to produce Harmonized GCC level statistics. In other cases, it was not possible to produce Harmonized GCC level statistics, as not all countries had the required information.

The final report is expected to be published in November 2016. This report will provide information on variables from 7 of the 8 themes. For some themes, e.g. Renewable Freshwater Resources, there was a limited range of variables. However, the final published report will provide a good overview of water abstract, supply and use in GCC.

6. Lessons Learnt and Recommendations for the Future

The process of compiling and analyzing data for this project has been enlightening as it has shed light on the gaps to be bridged in order to create harmonized water statistics in GCC countries. Lessons Learnt include:

- It was noticed that countries used different classifications, as in case of using ISIC classification discussed in part 3. In future it will be necessary to unify standards.
- It was also noticed that there were cases of inconsistent Units used in calculating capacity or amounts. GCC-Stat will work with countries to ensure unified units are applied in the future.
- GCC-Stat will also work with countries to improve the quality and range of metadata
- Countries in the region are progressing in their use of international standards (e.g. FDES). GCC-Stat will continue to support countries in the implementation of international standards
- Water statistics use data from a number of different sources. To ensure harmonized data within International standards in water statistics, countries will be encouraged to set up

[6] Transmission Tables 6 and 7 were not completed/filled by all countries and so are not discussed in this paper.

specialized teams should follow up, monitor and record water statistics in compliance with variables suggested in the questionnaire used in this project.

- Countries in the region have had different experiences in producing environment statistics, especially water statistics. GCC-Stat will support the exchange of knowledge and expertise between GCC national statistics centers.
- GCC-Stat will continue to work with countries to improve the quality of water statistics. Support in the completion of transmission tables and questionnaire will be provided to countries as needed through publication, workshops and case studies.

7. Summary

The Water statistics project is one of the projects executed by GCC-Stat aiming at improving the range of harmonized statistics available for the GCC countries. Data and statistics were collected from the six countries by the means of a questionnaire developed by GCC-Stat in compliance with International standards. Statistics provided by the countries in terms of water resources, water abstracted and use, waste water generated and treatment and water infrastructures have enabled us to identify challenges and pinpoint areas in need of improvement and unification among all the countries.

References:

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Appendix

Transmission Tables (TT)- The variables requested for the GCC-Stat Water Statistics Bulletin

Number of Table in Questionnaire	Title of Table	Category	Unit	Category Reference
1	Renewable Freshwater Resources	Precipitation	mio m^3/y	FDES
1		Actual evapotranspiration	mio m^3/y	FDES
1		Internal flow (=1-2)	mio m^3/y	UNSD/UNEP
1		Inflow of surface and groundwaters from neighbouring countries	mio m^3/y	FDES
1		Renewable freshwater resources (=3+4)	mio m^3/y	UNSD/UNEP
1		Outflow of surface and groundwaters to neighbouring countries	mio m^3/y	FDES
1		Of which: Secured by treaties	mio m^3/y	FDES
1		Not secured by treaties	mio m^3/y	UNSD/UNEP
1		Outflow of surface and groundwaters to the sea	mio m^3/y	FDES
1.2	Inland Water Stocks	Surface water stocks in artificial reservoirs	mio m^3/y	FDES
1.2		Surface water stocks in lakes	mio m^3/y	FDES
1.2		Surface water stocks in rivers and streams	mio m^3/y	FDES
1.2		Surface water stocks in wetlands	mio m^3/y	FDES
1.2		Surface water stocks in snow, ice and glaciers	mio m^3/y	FDES
1.2		Groundwater stocks	mio m^3/y	FDES
1.2		Water rights	mio m^3/y	FDES

Number of Table in Questionnaire	Title of Table	Category	Unit	Category Reference
2	Freshwater Abstraction and Use	Surface water abstracted	mio m^3/y	FDES
2		Groundwater abstracted	mio m^3/y	FDES
2		From renewable groundwater resources	mio m^3/y	FDES
2		From non-renewable groundwater resources	mio m^3/y	FDES
2		Water abstracted for own use	mio m^3/y	FDES
2		Water abstracted for distribution	mio m^3/y	FDES
2		Water abstracted (=1+2)	mio m^3/y	FDES
2		Water supply industry	mio m^3/y	(ISIC 36)
2		Households	mio m^3/y	UNSD/UNEP
2		Agriculture, forestry and fishing	mio m^3/y	(ISIC 01-03)
2		Manufacturing	mio m^3/y	(ISIC 10-33)
2		Electricity industry	mio m^3/y	(ISIC 351)
2		Other economic activities	mio m^3/y	UNSD/UNEP
2		Desalinated water	mio m^3/y	FDES
2		Reused water	mio m^3/y	FDES
2		Water use	mio m^3/y	FDES
2		Rainwater collection	mio m^3/y	FDES
2		Water abstraction from the sea	mio m^3/y	FDES
2		Imports of water	mio m^3/y	FDES
2		Exports of water	mio m^3/y	FDES
2		Returns of water	mio m^3/y	FDES
2		Total water available for use (=3+10+11+12-13)	mio m^3/y	FDES
2		Losses during transport	mio m^3/y	FDES
2		Total freshwater use (=14-15)	mio m^3/y	UNSD/UNEP
2		Households	mio m^3/y	UNSD/UNEP
2		Public Network - Drinking Water	mio m^3/y	GCC Stat add it
2		Public Network - Other use	mio m^3/y	GCC Stat add it
2		Water Truck - Drinking Water	mio m^3/y	GCC Stat add it
2		Water Truck - Other use	mio m^3/y	GCC Stat add it
2		Wells - Drinking Water	mio m^3/y	GCC Stat add it
2		Wells - Other use	mio m^3/y	GCC Stat add it
2		Other - Drinking Water	mio m^3/y	GCC Stat add it
2		Other - Other use	mio m^3/y	GCC Stat add it
2		Agriculture, forestry and fishing	mio m^3/y	(ISIC 01-03)
2		*of which for:* Irrigation in agriculture	mio m^3/y	UNSD/UNEP
2		Manufacturing	mio m^3/y	(ISIC 10-33)
2		Electricity industry	mio m^3/y	(ISIC 351)
2		Other economic activities	mio m^3/y	UNSD/UNEP

Number of Table in Questionnaire	Title of Table	Category	Unit	Category Reference
3	Water Supply Industry (ISIC 36)	Gross water supplied by water supply industry	mio m^3/y	(ISIC 36)
3		Losses during transport by	mio m^3/y	ISIC 36
3		Net water supplied by water supply industry (=1-2) (=4+5+6+7+8)	mio m^3/y	(ISIC 36)
3		Households	mio m^3/y	UNSD/UNEP
3		Agriculture, forestry and fishing	mio m^3/y	(ISIC 01-03)
3		Manufacturing	mio m^3/y	(ISIC 10-33)
3		Electricity industry	mio m^3/y	(ISIC 351)
3		Other economic activities	mio m^3/y	UNSD/UNEP
3		Total population supplied by water supply industry	%	(ISIC 36)
3		Urban population supplied by water supply industry	%	(ISIC 36)
3		Rural population supplied by water supply industry	%	(ISIC 36)
4	Wastewater Generation and Treatment	Total wastewater generated	1000 m^3/d	FDES
4		by: Agriculture, forestry and fishing	1000 m^3/d	ISIC (01-03)
4		Manufacturing	1000 m^3/d	(ISIC 10-33)
4		Electricity industry	1000 m^3/d	(ISIC 351)
4		Other economic activities	1000 m^3/d	UNSD/UNEP
4		Households	1000 m^3/d	UNSD/UNEP
4		Volume of wastewater collected	1000 m^3/d	FDES
4		Volume of wastewater treated	1000 m^3/d	FDES
4		Wastewater treated in urban wastewater treatment plants	1000 m^3/d	UNSD/UNEP
4		Of which: Primary treatment	1000 m^3/d	UNSD/UNEP
4		Secondary treatment	1000 m^3/d	UNSD/UNEP
4		Tertiary treatment	1000 m^3/d	UNSD/UNEP
4		Wastewater treated in other treatment plants	1000 m^3/d	UNSD/UNEP
4		Of which: Primary treatment	1000 m^3/d	UNSD/UNEP
4		Secondary treatment	1000 m^3/d	UNSD/UNEP
4		Tertiary treatment	1000 m^3/d	UNSD/UNEP
4		Wastewater treated in independent treatment facilities	1000 m^3/d	UNSD/UNEP
4		Non-treated wastewater	1000 m^3/d	UNSD/UNEP
4		Sewage sludge production (dry matter)	1000 t	FDES

Number of Table in Questionnaire	Title of Table	Category	Unit	Category Reference
5	Population Connected to Wastewater Treatment	Population connected to wastewater collecting system	%	UNSD/UNEP
5		Population connected to wastewater treatment	%	UNSD/UNEP
5		of which at least secondary treatment	%	UNSD/UNEP
5		Population with independent wastewater treatment (e.g., septic tanks)	%	UNSD/UNEP
5		Population not connected to wastewater treatment (100% - (2) - (4))	%	UNSD/UNEP
6	Freshwater quality (Topic 1.3.2)	Nutrients and chlorophyll - Concentration of nitrogen	mg N/l	FDES/WHO
6		Nutrients and chlorophyll - Concentration of phosphorus	mg P/l	FDES/WHO
6		Nutrients and chlorophyll - Concentration of chlorophyll A	mg chl-a/l	FDES
6		Nutrients and chlorophyll - Maximum allowable levels	mg chl-a/l	FDES/WHO
6		Organic matter - Biochemical oxygen demand (BOD)	mg O2/l	FDES
6		Organic matter - Chemical oxygen demand (COD)	mg O2/l	FDES/WHO
6		Organic matter - Maximum allowable levels	mg O2/l	FDES/WHO
6		Pathogens - Concentration of faecal coliforms	MPN/100ml	FDES/WHO
6		Pathogens - Maximum allowable levels	MPN/100ml	FDES/WHO
6		Metals (e.g., mercury, lead, nickel, arsenic, cadmium) - Concentrations in the sediment and freshwater	mg/l	FDES/WHO
6		Metals (e.g., mercury, lead, nickel, arsenic, cadmium) - Concentrations in freshwater organisms	mg/l	FDES/WHO
6		Metals (e.g., mercury, lead, nickel, arsenic, cadmium) - Maximum allowable levels	mg/l	FDES/WHO
6		Organic contaminants (e.g., PCBs, DDT, pesticides, furans, dioxins, phenols, and radioactive waste) - Concentrations in the sediment and freshwater	mg/l	FDES/WHO
6		Organic contaminants (e.g., PCBs, DDT, pesticides, furans, dioxins, phenols, and radioactive waste) - Concentrations in freshwater organisms	mg/l	FDES/WHO
6		Organic contaminants (e.g., PCBs, DDT, pesticides, furans, dioxins, phenols, and radioactive waste) - Maximum allowable levels	mg/l	FDES/WHO
6		Physical and chemical characteristics - pH/Acidity/Alkalinity	6.5 - 8.5	FDES/WHO
6		Physical and chemical characteristics - Temperature	C°	FDES/WHO
6		Physical and chemical characteristics - Total suspended solids (TSS)	mg/l	FDES/WHO
6		Physical and chemical characteristics - Salinity	mg/l	FDES/WHO
6		Physical and chemical characteristics - Dissolved oxygen (DO)	mg/l	FDES/WHO
6		Plastic waste and other freshwater debris - Amount of plastic waste and other debris	mg/l	FDES

Number of Table in Questionnaire	Title of Table	Category	Unit	Category Reference
7	Marine w ater quality (Topic 1.3.3)	Nutrients and chlorophyll - Concentration of nitrogen	mg N/l	FDES
7		Nutrients and chlorophyll - Concentration of phosphorus	mg P/l	FDES
7		Nutrients and chlorophyll - Concentration of chlorophyll A	mg chl-a/l	FDES
7		Nutrients and chlorophyll - Maximum allowable levels	mg chl-a/l	FDES
7		Organic matter - Biochemical oxygen demand (BOD)	mg O2/l	FDES
7		Organic matter - Chemical oxygen demand (COD)	mg O2/l	FDES
7		Organic matter - Maximum allowable levels	mg O2/l	FDES
7		Pathogens - Concentration of faecal coliforms in recreational marine waters	MPN/100ml	FDES
7		Pathogens - Maximum allowable levels	MPN/100ml	FDES
7		Metals (e.g., mercury, lead, nickel, arsenic, cadmium) - Concentrations in the sediment and marine water	mg/l	FDES
7		Metals (e.g., mercury, lead, nickel, arsenic, cadmium) - Concentrations in marine organisms	mg/l	FDES
7		Metals (e.g., mercury, lead, nickel, arsenic, cadmium) - Maximum	mg/l	FDES
7		Organic contaminants (e.g., PCBs, DDT, pesticides, furans, dioxins, phenols, and radioactive waste) - Concentrations in the sediment and water	mg/l	FDES
7		Organic contaminants (e.g., PCBs, DDT, pesticides, furans, dioxins, phenols, and radioactive waste) - Concentrations in marine organisms	mg/l	FDES
7		Organic contaminants (e.g., PCBs, DDT, pesticides, furans, dioxins, phenols, and radioactive waste) - Maximum allowable levels	mg/l	FDES
7		Physical and chemical characteristics - pH/Acidity/Alkalinity	pH	FDES
7		Physical and chemical characteristics - Temperature	C°	FDES
7		Physical and chemical characteristics - Total suspended solids (TSS)	mg/l	FDES
7		Physical and chemical characteristics - Salinity	mg/l	FDES
7		Physical and chemical characteristics - Dissolved oxygen (DO)	mg/l	FDES
7		Physical and chemical characteristics - Density	kg/m³	FDES
7		Coral bleaching - Area affected by coral bleaching	X Y coord	FDES
7		Plastic waste and other marine debris - Amount of plastic waste and other debris in marine waters	Number	FDES
7		Red tide - Occurrence	Number	FDES
7		Red tide - Impacted area	X Y coord	FDES
7		Red tide - Duration	Time	FDES
7		Oil pollution - Area of oil slicks	X Y coord	FDES
7		Oil pollution - Amount of tar balls	Number	FDES

Number of Table in Questionnaire	Title of Table	Category	Unit	Category Reference
8	Water Infrastructure	Priciptation stations - Number	Number	GCC Stat add it
8		WWTP stations - Number	Number	GCC Stat add it
8		Of which: Primary treatment - Mechanical treatment	Number	GCC Stat add it
8		Secondary treatment - Biological treatment	Number	GCC Stat add it
8		Tertiary treatment - Advanced treatment	Number	GCC Stat add it
8		WWTP stations - Design Capacity	1000 m^3/d	GCC Stat add it
8		Of which: Primary treatment - Mechanical treatment	1000 m^3/d	GCC Stat add it
8		Secondary treatment - Biological treatment	1000 m^3/d	GCC Stat add it
8		Tertiary treatment - Advanced treatment	1000 m^3/d	GCC Stat add it
8		WWTP stations - Design Capacity	BOD	GCC Stat add it
8		Of which: Primary treatment - Mechanical treatment	BOD	GCC Stat add it
8		Secondary treatment - Biological treatment	BOD	GCC Stat add it
8		Tertiary treatment - Advanced treatment	BOD	GCC Stat add it
8		Desalination stations - Number	Number	GCC Stat add it
8		Multi-Stage Flash Distillation (MSF)	Number	GCC Stat add it
8		Reverse Osmose (RO)	Number	GCC Stat add it
8		Multiple effect distillation (MED)	Number	GCC Stat add it
8		Other	Number	GCC Stat add it
8		Desalination stations - Design Capacity	1000 m^3/d	GCC Stat add it
8		Multi-Stage Flash Distillation (MSF)	1000 m^3/d	GCC Stat add it
8		Reverse Osmose (RO)	1000 m^3/d	GCC Stat add it
8		Multiple effect distillation (MED)	1000 m^3/d	GCC Stat add it
8		Other	1000 m^3/d	GCC Stat add it
8		Water Quality stations - Number	Number	GCC Stat add it
8		Lakes - Number	Number	GCC Stat add it
8		Lakes - Surface area	ha	FDES
8		Lakes - Volume capacity	Mm^3	GCC Stat add it
8		Reservoirs - Number	Number	GCC Stat add it
8		Reservoirs - Design Capacity	Mm^3	GCC Stat add it
8		Dams - Number	Number	GCC Stat add it
8		Dams - Surface	ha	GCC Stat add it
8		Dams - Design Capacity	Mm^3	GCC Stat add it
8		Aflag - Length	km	GCC Stat add it
8		Springs - Number	Number	GCC Stat add it
8		Springs - Location	X Y coord	GCC Stat add it
8		Groundwater-Acquifers	Number	FDES
8		Renewable water	Number	GCC Stat add it
8		Freshwater - Volume	Mm^3	GCC Stat add it
8		Brackish - Volume	Mm^3	GCC Stat add it
8		Non-Renewable	Number	GCC Stat add it
8		Freshwater - Volume	Mm^3	GCC Stat add it
8		Brackish - Volume	Mm^3	GCC Stat add it
8		Water distribution Network	Length	GCC Stat add it
8		Water Truck - Number	Number	GCC Stat add it
8		Water Truck - Volume	Mm^3	GCC Stat add it
8		Wells	Number	GCC Stat add it