

Session 4.1: Manual on the Basic Set of Environment Statistics: Water Resources

Regional Workshop on Environment Statistics and Climate Change
Statistics for the Caribbean Community (CARICOM) Region

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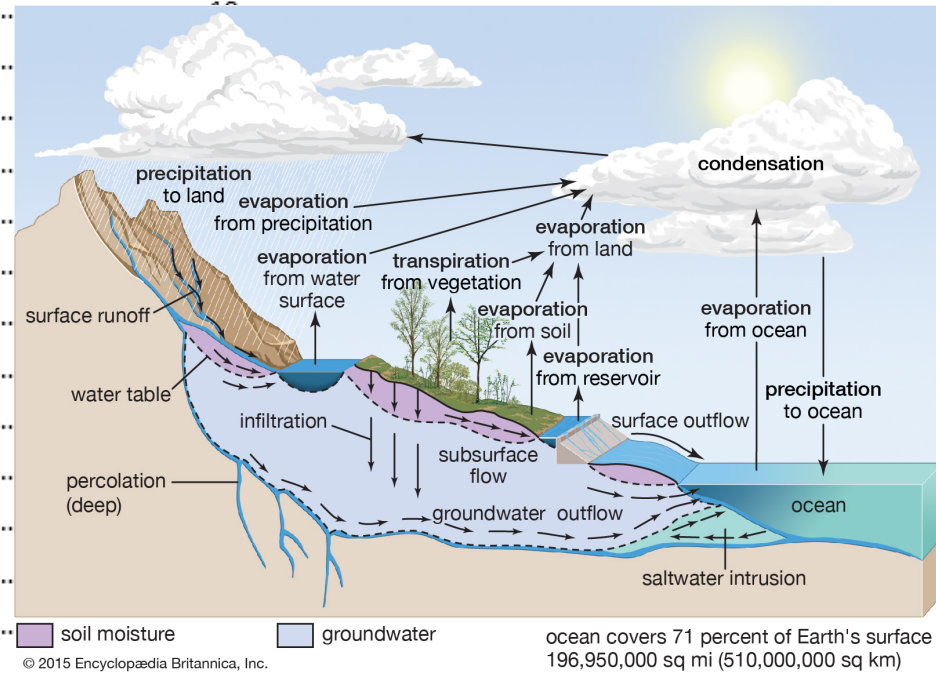


Available at: https://unstats.un.org/unsd/envstats/fdes/manual_bses.cshtml



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FDES Sub-Component 2.6 Water Resources

Topic 2.6.1: Water resources				Topic 2.6.2: Abstraction, use and returns of water			
Inflow of water to inland water resources		<ul style="list-style-type: none"> ▪ National ▪ Sub-national ▪ By territory of origin and destination 	<ul style="list-style-type: none"> ▪ UNSD: IRWS ▪ UNECE Standard Statistical Classification of Water Use (1989) ▪ UNSD: MDG Indicator 7.5 Metadata ▪ FAO AQUASTAT ▪ SEEA Central Framework (2012) asset accounts ▪ SEEA Water ▪ UNSD: Environment Statistics Section-Water Questionnaire 	a. Total water abstraction	Volume	<ul style="list-style-type: none"> ▪ By type of source ▪ National ▪ Sub-national 	<ul style="list-style-type: none"> ▪ UNSD: IRWS ▪ UNECE Standard Statistical Classification of Water Use (1989) ▪ FAO AQUASTAT ▪ SEEA Central Framework (2012) ▪ SEEA Water ▪ UNSD: Environment Statistics Section-Water Questionnaire
1. Precipitation (also in 1.1.1.b)	Volume			b. Water abstraction from surface water	Volume		
2. Inflow from neighbouring territories	Volume			c. Water abstraction from groundwater			
3. <i>Inflow subject to treaties</i>	Volume			1. From renewable groundwater resources	Volume		
Outflow of water from inland water resources				2. From non-renewable groundwater resources	Volume		
1. Evapotranspiration	Volume			d. Water abstracted for own use	Volume		
2. Outflow to neighbouring territories	Volume			e. Water abstracted for distribution	Volume		
3. Outflow subject to treaties	Volume			f. Desalinated water	Volume		
4. Outflow to the sea	Volume			g. Reused water	Volume		
Inland water stocks				h. Water use	Volume		
1. Surface water stocks in artificial reservoirs	Volume	<ul style="list-style-type: none"> ▪ By ISIC economic activity ▪ National ▪ Sub-national 	<ul style="list-style-type: none"> ▪ National ▪ Sub-national 	<ul style="list-style-type: none"> ▪ By ISIC economic activity ▪ By tourists ▪ National ▪ Sub-national 	<ul style="list-style-type: none"> ▪ National ▪ Sub-national 		
2. Surface water stocks in lakes	Volume						
3. <i>Surface water stocks in rivers and streams</i>	Volume						
4. <i>Surface water stocks in wetlands</i>	Volume						
5. <i>Surface water stocks in snow, ice and glaciers</i>	Volume						
6. Groundwater stocks	Volume						
						i. <i>Rainwater collection</i>	Volume
						j. <i>Water abstraction from the sea</i>	Volume
						k. Losses during transport	Volume
						l. <i>Exports of water</i>	Volume
		m. <i>Imports of water</i>	Volume				
		n. <i>Returns of water</i>	Volume				
				<ul style="list-style-type: none"> ▪ By ISIC economic activity ▪ By destination (e.g., inland water, land, sea, ocean) ▪ National ▪ Sub-national 			

2. Introduction/Relevance

- Management of water resources in terms of quantities, distribution and quality is one of the **world's most important priorities** today.
- Water users span all sectors and economic activities; of these, agricultural uses for irrigation, livestock and food production place one of the **greatest pressures** on freshwater resources.
- Continued increases in demand result in increasing pressures on water and can lead to issues such as over-abstraction of groundwater resources.
- **Climate change** has potential impacts on water resource availability through more severe and frequent droughts and floods, changes in rainfall distribution, etc.



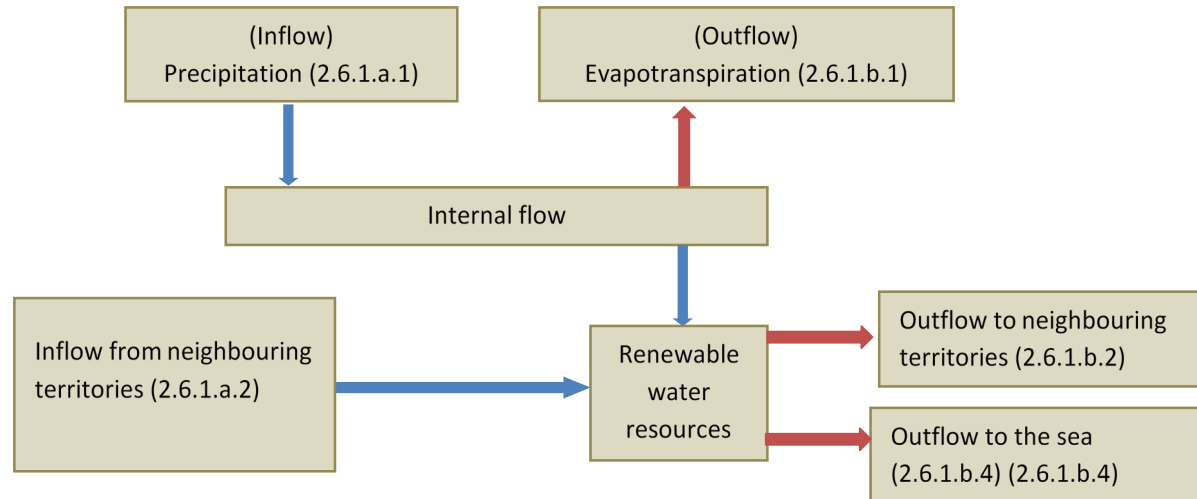
3. Definitions and description of the statistics

- Definitions from:
 - International Recommendations for Water Statistics (IRWS)
 - OECD/Eurostat Joint Questionnaire
 - United Nations Statistics Division/United Nations Environment Programme Questionnaire
- The FDES covers all **inland water resources**, regardless of quality, (e.g., all freshwater, brackish water, saltwater and polluted water) but excludes marine water resources.
- **Water resources:**
 - Water that flows over or is stocked in inland water bodies, including surface water, groundwater and soil water.
 - Either renewable or non-renewable.
 - Renewable: replenished by precipitation and represented by the annual flow of surface water and groundwater.
 - Non-renewable: contained in groundwater bodies (usually deep aquifers) that have a negligible rate of recharge relative to the size of the aquifer (i.e., the storage or stock), and cannot be replenished.



3A. Water Resources (FDES Topic 2.6.1)

Evapotranspiration: volume of water that enters the atmosphere by vaporization of water into a gas through evaporation from land and water surfaces and transpiration from plants.



Inflow from neighboring territories: Volume of surface water and groundwater that moves into a territory from other territories



3A. Water Resources (Topic 2.6.1)

Stocks

Inland water stocks: Volume of water contained in surface water, groundwater and soil water within the territory of reference at a particular point in time. Includes freshwater, brackish water and saline water and water of all types of quality.

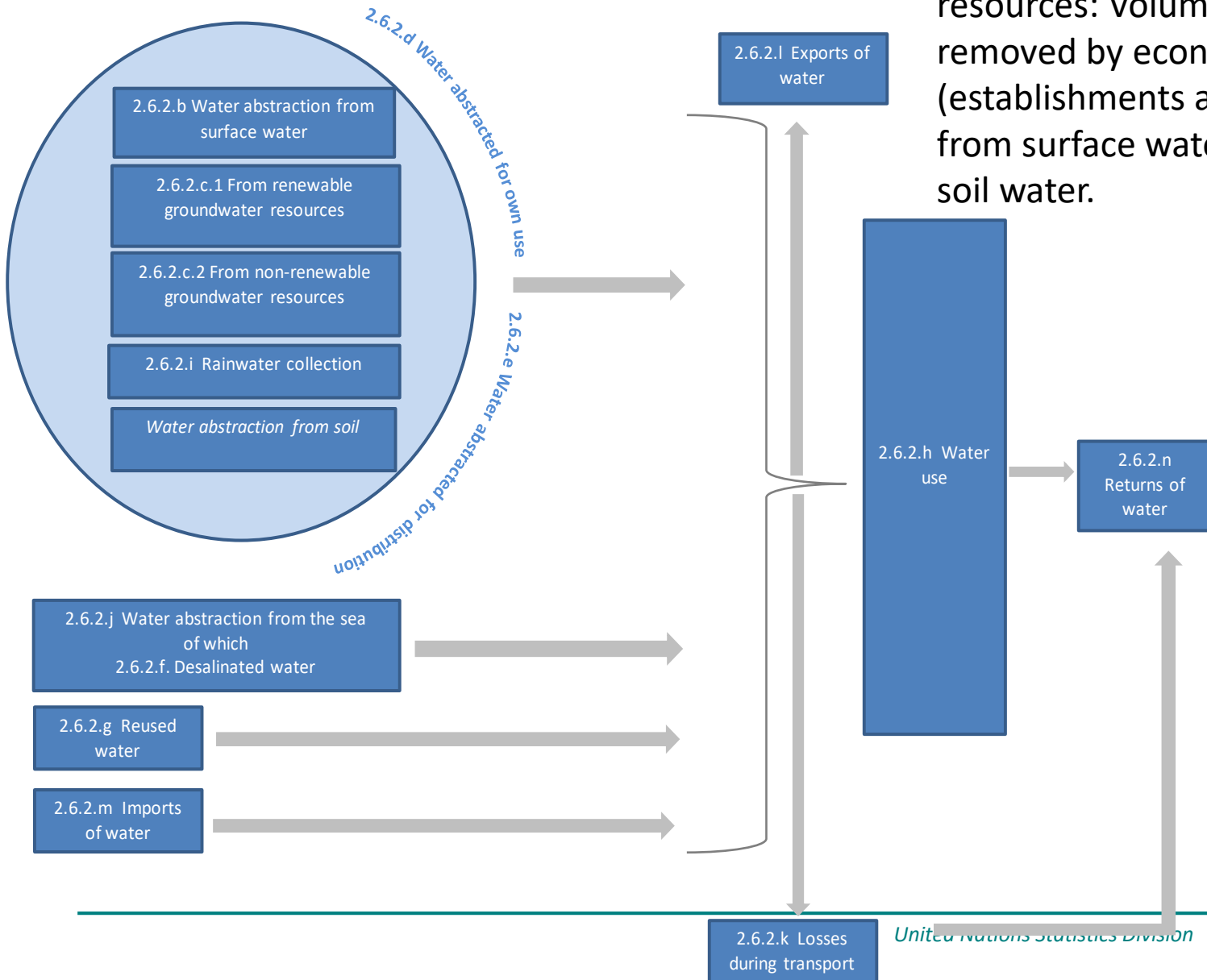
- Surface water stocks
 - Artificial reservoirs
 - Lakes
 - Rivers and streams
 - Wetlands
 - Snow, ice and glaciers
- Groundwater stocks (aquifers)



3B. Abstraction, use and returns of water (FDES Topic 2.6.2)

Water abstraction from inland water resources: Volume of water that is removed by economic units (establishments and households) from surface water, groundwater and soil water.

2.6.2.a Total water abstraction



4. International sources and recommendations

4A. Classifications and groupings

- International Standard Industrial Classification of All Economic Activities (ISIC) for linking water statistics to the economy

4B. Reference to international recommendations, frameworks and standards

- Framework for the Development of Environment Statistics (FDES 2013)
- The United Nations Statistics Division/United Nations Environment Programme Questionnaire on Environment Statistics
- International Recommendations for Water Statistics (IRWS)
- System of Environmental-Economic Accounting for Water (SEEA Water)
- Guidelines for the Compilation of Water Accounts and Statistics



4. International sources and recommendations

4C. Sources of global and regional environment statistics and indicators series

- UNSD Environment Statistics and Indicators
<https://unstats.un.org/unsd/envstats/qindicators>
- FAO: AQUASTAT
<http://www.fao.org/nr/water/aquastat/data/query/index.html?lang=en>
- OECD database
<http://stats.oecd.org/>
- Eurostat Water Statistics main tables and database
<http://ec.europa.eu/eurostat/web/environment/water/main-tables>



5A. Data collection and sources of data: Water Resources (Topic 2.6.1)

- **Main producers:** National hydro and/or meteorological institutions (hydro meteorological institutions). Water and environmental authorities may provide some data.
- **Main type of data:** Often hydro meteorological institutions already produce water balances and/or quantification of water stocks.
- **Scope:** Water resources comprise all inland water resources of a country.
- **Statistical unit:** Inland water bodies => surface water bodies and aquifers.
- **Reporting unit:** areas designated to specific water authority, economic operators



5A. Data collection and sources of data: Water Resources (Topic 2.6.1)

- **Measurement unit:** For water volumes **cubic metres** (m³). When data are obtained from hydro meteorological institutions or other sources, often different units of measurement are used (for example height, e.g., mm of rainfall per year or flow, e.g., m³ average inflow/second).
- **Aggregation:** by type of resources, e.g., water body, **surface/non-surface**, kind of water bodies, **renewable/non-renewable** resource.
- **Temporal aspects:** Calendar year vs hydrological year; **long-term annual average** (LTAA). Frequency of compilation of data (e.g. daily for precipitation vs LTAA for renewable water resources).
- **Spatial aspects:** Aggregation of data based on natural areas (**watershed** or river basin) or **administrative areas**.
- **Validation:** Usually **conducted by hydro meteorological institutions** and experts.



5B. Data collection and sources of data: Abstraction, Use and Returns of Water (Topic 2.6.2)

- **Main producers:** **Water authorities** and regulators, environmental authorities, **municipalities, industries, and agricultural and irrigation authorities**, and national statistical offices. Issues of overlap and non-comparability in the production of primary data about water abstraction.
- **Main type of data:** **Water surveys and administrative data sources.**
- **Scope:** **All water abstracted and used** at national, sub-national, regional and/or river basin level.
- **Statistical unit:** **Establishments and households.**
- **Reporting unit:** **Public and private enterprises** and establishments and **municipalities** that abstract, supply and/or use water. Also households for self-abstraction on their own land.



5B. Data collection and sources of data: Abstraction, Use and Returns of Water (Topic 2.6.2)

- **Measurement unit:** For water volumes **cubic metres** (m³). However, for the collection of primary data, other units may be used.
- **Aggregation:** Type of water source; **use; economic activity**; recipient for water returns.
- **Temporal aspects:** Periodicity of primary data production on water abstraction **usually annual**, but occasionally **quarterly or monthly**. Compiled data normally disseminated annually.
- **Spatial aspects:** Important to disaggregate by basin or catchment areas or sub-national administrative units for policy user.
- **Validation:** **Validation will need to be carried out by NSOs** after receiving data from primary producers.
 - Check of expected order of magnitude
 - **Consistency of time series**
 - Cross-data checks, calculation of water balances and water use balances



6A. Uses and dissemination

Mauritius compendium 2017: Water statistics

Table 2.34 - Water balance, 2008 - 2017

Mm³

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Rainfall (Precipitation)	4,441	4,444	3,368	3,633	3,023	3,965	3,905	4,433	3,536	3,991
<i>Surface runoff</i>	2,665	2,667	2,021	2,180	1,814	2,379	2,343	2,660	2,122	2,395
<i>Evapotranspiration</i>	1,332	1,333	1,010	1,090	907	1,189	1,172	1,330	1,061	1,197
<i>Net recharge to groundwater</i>	444	444	337	363	302	397	390	443	353	399

Source : Water Resources Unit, Ministry of Energy and Public Utilities



Table 2.36 - Fresh water abstractions¹ by source, 2008 - 2017²

Source	Mm ³									
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Gross fresh surface water abstraction	497	511	513	449	460	487	489	467	473	468
<i>Reservoirs</i>	137	150	152	104	121	136	141	157	158	144
<i>Rivers and streams</i>	360	361								
Gross ground water abstraction	119	121								
Total	616	632								

Source: Water Resources Unit, Ministry of Energy and Public Utilities

¹ For agricultural, domestic and industrial purposes.

² Hydrologic year (i.e. From November n-1 to October n, where n is the year)

Table 2.37 - Fresh water abstractions¹ by sector, 2008 - 2017

Sector	Mm ³									
	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Gross fresh surface water abstraction	497	511	513	449	460	487	489	467	473	468
<i>Water supply industry (Central Water Authority)</i>	107	112	110	94	97	112	115	122	124	130

Table 2.40 - Daily per capita domestic and potable water consumption, 2008 - 2017

Year	Daily per capita domestic water consumption	Daily per capita potable water consumption	Litres/day		
			2008	2009	2010
2008	164	214	7	5	5
2009	170	222	338	344	333
2010	173	227	145	147	142
2011	166	218	133	133	130
2012	164	214	7	7	7
2013	165	216	5	7	5
2014 ¹	161	210			
2015 ¹	163	213			
2016 ¹	166	217	612	620	610
2017 ²	174	226			

Source: Central Water Authority

¹ Revised

² Provisional

6A. Uses and dissemination: Potential presentation/dissemination formats

Precipitation, monthly and long-term average, Guyana October 2016

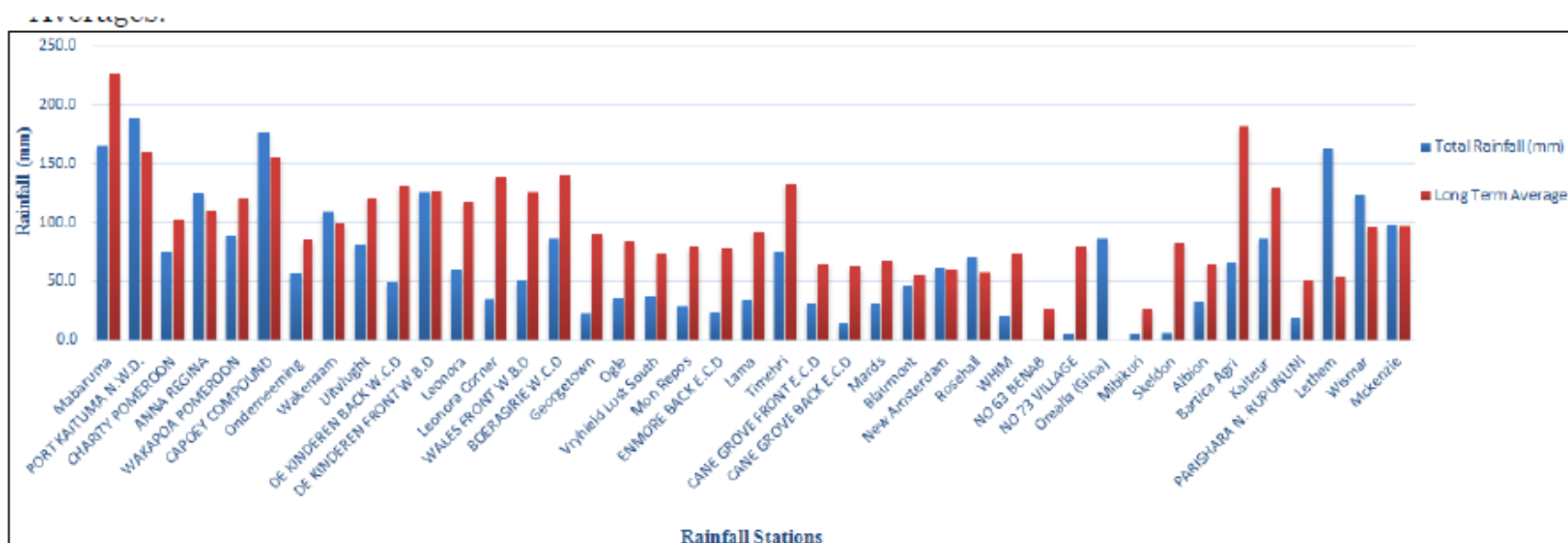


Figure1: Comparison of the accumulated rainfall and the long-term averages for selected stations for October, 2016.



6C and 6D. Uses and dissemination: Indicators

- Water productivity =
$$\frac{\text{Gross Domestic Product (GDP)}}{\text{Total annual freshwater abstraction (FDES 2.6.2.a)}}$$
- SDG Indicator 6.4.1: Change in water-use efficiency over time => under development, will measure the output over time of a given major sector per volume of water withdrawn.
- SDG Indicator 6.4.2: Level of water stress: freshwater withdrawal as a proportion of available freshwater resources (also known as water withdrawal intensity) =
$$\frac{\text{total freshwater withdrawn by all major sectors (TWW)}}{\text{total renewable freshwater resources,actual (TRWR)-environmental water requirements(Env.)}} * 100$$



Thank you for your attention!

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