WT1: RENEWABLE FRESH WATER RESOURCES

H

Concept and Definition

Renewable freshwater (surface and groundwater) resources are replenished by precipitation (less evapotranspiration) falling over the territory of the country that ends up as runoff to rivers and recharge to aquifers (internal flow), and by surface waters and groundwater flowing in from other countries (inflow). Climatic, ecological, economic and other limitations to the availability of these resources for abstraction are reflected in the variable "regular freshwater resources at 95 percent of the time". The data shown in the table are usually based on hydrological/meteorological monitoring and modelling.

Sector Classifications:

Precipitation - Total volume of atmospheric wet precipitation (rain, snow, hail, dew, etc.) falling on the territory of the country over one year, in millions of cubic meters (mio m3).

Actual evapotranspiration - Total actual volume of evaporation from the ground, wetlands and natural water bodies and transpiration of plants. According to the definition of this concept in Hydrology, the evapotranspiration generated by all human interventions is excluded, except unirrigated agriculture and forestry. The 'actual evapotranspiration' is calculated using different types of mathematical models, ranging from very simple algorithms (Budyko, Turn Pyke, etc.) to schemes that represent the hydrological cycle in detail.

Internal flow - Total volume of river run-off and groundwater generated over the period of a year, in natural conditions, exclusively by precipitation into a territory. The internal flow is equal to precipitation less actual evapotranspiration and can be calculated or measured. If the river run-off and groundwater generation are measured separately, transfers between surface and groundwater should be netted out to avoid double counting.

Inflow of surface and groundwaters - Total volume of actual external inflow of rivers and groundwater, coming from neighboring countries. Boundary waters should be divided 50/50 between the two riparian countries, unless other water sharing agreements exist.

Renewable freshwater resources = Internal flow + Actual External Inflow of surface and groundwaters

Outflow of surface and groundwaters - Actual outflow of rivers and groundwater into neighboring countries and/or into the sea

Regular freshwater resources 95% of the time - Portion of the total freshwater resource that can be depended on for annual water development during 19 out of 20 consecutive years, or at least 95 percent of the years included in longer consecutive periods. This item yields information about the average annual long-term availability of freshwater for use in human activities.

Freshwater use refers to the quantity of freshwater that is actually used in a year by end users including water delivered by the water supply industry (ISIC 41), water directly abstracted for own use and water received from other parties. Excludes freshwater returned without use.

Renewable groundwater available for annual abstraction - Recharge less the long term annual average rate of flow required to achieve ecological quality objectives for associated surface water. It takes account of the ecological restrictions imposed to groundwater exploitability; other restrictions based on economic and technical criteria could also be taken into account in terms of accessibility, productivity and maximum production cost deemed acceptable by developers. The theoretical maximum of groundwater available is the recharge.

UNSD/UNEP 2001 and 2004 questionnaires on Environment statistics, Water section

Method of Computation

Renewable Freshwater Resources was compiled from questionnaires distributed to Member States/Associate Members through a UNSD/UNEP/CARICOM collaboration according to the categories mentioned above.

Indicator Relevance

This indicator yields information about the average annual long-term availability of fresh water for use in human activities, which is important information for future planning and early warning for any scarcity of water in future. It also helps in taking the proper decision in water management.

Data Assessment

All reporting Member States followed the internationally recommended definitions for water and types of water. This indicator is, therefore, regionally and internationally conceptually harmonized.

Only two of the reporting eighteen Member States/Associate Members of the Community provided data for this indicator and the data provided were not detailed, perhaps due to the fact that environment statistics is still relatively new to the Region.

Data Sources

In accordance with the decision that the UNSD would provide data on waste, water, land, and air to the CARICOM Secretariat, data for this indicator was collected from the UNSD instead of directly from Member States and Associate Members.

Please refer to **Appendix 1.12.1 (a)** for the original sources of the data, as specified by the UNSD, on water for Member States and Associate Members.

Evaluation

Data is presented in **Table 12.1** below for Jamaica and Trinidad and Tobago. *Precipitation* for Jamaica in 1990 was 21,212 million cubic meters and waterloss due to *actual evapotranspiration* (Total actual volume of evaporation from the ground, wetlands and natural water bodies and transpiration of plants) was 11,945 million cubic meters resulting in 9,267 million cubic meters of total renewable fresh water resources. *Outflow of surface and ground waters* was reported at 5,576 million cubic meters while *Renewable groundwater available for annual abstraction* was 3,418 million cubic meters and *regular freshwater resources 95% of the time* for Jamaica in 1990 was reported at 665 million cubic meters.

Data for Trinidad and Tobago during the period, 1998 to 2002 revealed fluctuations in the *Inflow of surface and groundwaters*. *Internal flow* or the total volume of river run-off and groundwater generated was reported at 6,662 million cubic meters in 1998 and this declined to 5,780 million cubic meters in 1999 followed by an increase of 13.6 per cent in 2000 to 6,565 million cubic meters after which another decline followed in 2001 to 3,085 million cubic meters and an increase of 70.7 per cent in 2002.

Table 12.1 Renewable Fresh Water Resources: 1990, 1998 - 2002

(mio m^3/y)

Country	Year	Precipitation (1)	Actual evapotranspiration (2)	Internal flow (3)=(1)-(2)	Actual external Inflow of surface and ground waters (4)	Total renewable fresh water resources (5)=(3+4)	Outflow of surface and ground waters	Renewable groundwater available for annual abstraction	Regular freshwater resources 95% of the time
JM									
	1990	21,212	11,945	9,267	0	9,267	5,576	3,418	665
TT									
	1998	12,060	5,398	6,662	n/a	6662	n/a		
	1999	11,085	5,305	5,780	n/a	5780	n/a		
	2000	11,449	4,884	6,565	n/a	6565	n/a		
	2001	8,729	5,644	3,085	n/a	3085	n/a		
	2002	10,164	4,898	5,266	n/a	5266	n/a		

WT2: WATER ABSTRACTION BY SOURCE: 1990, 1995 - 2005

H

Concept and Definition

Water abstraction is water removed from any source, either permanently or temporarily, during a specified period of time. It can be unsustainable if it exceeds the renewal of the resource. In addition, issues relating to the quality of water when it eventually returns to streams, rivers and lakes, are also of concern. Water used for cleaning, cooling and irrigation carries with it soluble salts, chemicals, soil particles and biological wastes, which could deteriorate the quality of the water. Given the already limited groundwater supply in most of the Member States of the CARICOM region, the resource should be properly managed and over-abstraction avoided.

The total volume of freshwater available for use is composed of *water abstracted from fresh (surface and ground) water resources* of the country, of water originating from other sources, such as imports of bulk water from other countries or desalinated water from non-fresh water resources, and the reuse of treated waste water (reclaimed water). Water that is returned without use (e.g. mine water) and water exported in bulk to another country are not considered to be available for use and are therefore subtracted from the total. Abstraction of freshwater is broken down by main water abstractor sectors/activities, according to the International Standard Industrial Classification of All Economic Activities, Third Revision (ISIC Rev.3). Please note that water abstracted directly from the atmosphere into storage tanks is not accounted for.

Definitions used in the collection of the indicator:

Fresh surface water is water which flows over, or rests on the surface of a land mass, natural watercourses such as rivers, streams, brooks, lakes, etc., as well as artificial watercourses such as irrigation, industrial and navigation canals, drainage systems and artificial reservoirs. Water abstracted through bank filtration is included under fresh surface water. Sea-water, and transitional waters, such as brackish swamps, lagoons and estuarine areas are considered non-fresh water and are not included here.

Fresh ground water is water which is being held in, and can usually be recovered from, or via, an underground formation. All permanent and temporary deposits of water, both artificially charged and naturally occurring in the subsoil, of sufficient quality for at least seasonal use are included. This category includes phreatic water-bearing strata, as well as deep strata under pressure or not, contained in porous or fractured soils. Ground water includes springs, both concentrated and diffused, which may be subaqueous.

Total water abstraction refers to water removed from any source, either permanently or temporarily, during a specified period of time. Mine water and drainage water are included. Water abstractions from ground water resources in any given time period are defined as the difference between the total amount of water withdrawn from aquifers and the total amount charged artificially or injected into aquifers. The amounts of water artificially charged or injected are attributed to abstractions from that water resource from which they were originally withdrawn. Water used for hydroelectricity generation is an in-situ use and should be excluded.

Gross freshwater abstracted is the total of fresh surface water and fresh groundwater abstractions over one year within the national territory.

Water returned without use refers to water abstracted from any fresh water source and discharged into fresh waters without use, or before use. Occurs primarily during mining and construction activities. Discharges to the sea are excluded.

Imports of water refer to the total volume of bulk fresh water that is imported from other countries as a commodity through pipelines or on ships. Bottled water is excluded.

Exports of water is the total volume of bulk fresh water that is exported to other countries as a commodity through pipelines or on ships. Bottled water is excluded.

Desalinated water is the total volume of water obtained from desalination processes. (From seawater, brackish water etc.)

Reused water is fresh water that has undergone waste water treatment and is deliverable to a user as reclaimed waste water. This means the direct supply of treated effluent to the user. Excluded is waste water discharged into a watercourse and used again downstream. Recycling within industrial sites is excluded.

Total freshwater made available for use = Gross freshwater abstracted - Water returned without use + Imports of water - Exports of water + Desalinated water + Reused water

Non-fresh water abstraction includes sea water and transitional water, such as brackish swamps, lagoons and estuarine areas.

UNSD/UNEP 2001 and 2004 questionnaires on Environment statistics, Water section

Method of Computation

Data for this indicator were compiled from questionnaires distributed to Member States/Associate Members through a UNSD/UNEP/CARICOM collaboration according to the categories mentioned above. Water abstraction is measured in millions of cubic meters (m^3) per year.

Indicator Relevance

This indicator measures the overall pressure on the fresh water resources, providing the proportion of water abstracted for all the economic sectors in relation to water resources. It gives an indication of the vulnerability of a country to water shortages and assesses the need for supply /demand adjustments in water management policies.
(http://www.un.org/esa/sustdev/sdissues/ consumption/cpp1224m11.htm)

Data Assessment

All reporting Member States followed the internationally recommended definitions for the indicator water extraction by source and as such it is regionally and internationally conceptually harmonized.

Only a total of fourteen Member States and Associate Members, four Member States provided data for this indicator.

Data Sources

In accordance with the decision that the UNSD would provide data on waste, water, land, and air to the CARICOM Secretariat, data for this indicator was collected from the UNSD instead of directly from Member States and Associate Members.

Please refer to **Appendix 1.12.2 (a)** for the original sources of the data, as specified by the UNSD, on waste of Member States and Associate Members.

Evaluation

Water Abstraction by Source for reporting Member States is presented in **Table 12.2** below for Belize, Jamaica, St. Vincent and the Grenadines and Trinidad and Tobago. The data on *Total fresh surface water* abstracted for Belize for the period 1995 to 2000 revealed an overall decline from 1,933 million gallons in 1995 to 1,903 in 2000 a decline of 2 per cent. *Total fresh ground water* abstracted for Belize however, revealed an overall increase for the same period of 14 per cent from 323 million gallons in 1995 to 368 million gallons in 2000. *Total gross fresh water abstraction* for this Member State which represents *Total of fresh surface water* and *fresh groundwater* abstractions increased overall by a minimal 1 per cent with declines reported in 1996 (2,225 million gallons), 1997 (2,184 million gallons) and 1999 (2,224 million gallons) and increases in 1998 (2,249 million gallons) and 2000 (2,270 million gallons) from 1995 (2,256 million gallons). Desalinated water for Belize during the reporting period averaged 49.8 million gallons and increased overall from 1995 (27.1 million gallons) to 2000 (84.7 million gallons). *Total freshwater made available for use* for Belize increased overall by 3.2 per cent.

Jamaica reported *Total gross fresh water abstraction* for the years 1990, 1999 and projected data for 2000. In 1990, *total gross fresh water abstraction* of 913 million cubic meters was reported consisting 63 million cubic meters of *fresh surface water* and 950

million cubic meters of *fresh ground water* and in 1999 *total gross fresh water abstraction* of 300 million cubic meters was reported consisting 114 million cubic meters of *fresh surface water* and 186 million cubic meters of *fresh ground water* a decline of 613 million cubic meters. In 2000, Jamaica projected *Total gross fresh water abstraction* at 1,437 million cubic meters. In 1995, of the total fresh surface water abstracted, 75 per cent was by *Agriculture, fishing and forestry activities* and 7 per cent by *Manufacturing industries*, 1 per cent by *Economic activities* and 17 per cent by *Households* and in 1996 280 million cubic meters of *total fresh surface water abstracted* was by Households.

St. Vincent and the Grenadines reported data on *fresh surface water* abstracted for 1990 and 1995 to 2003 and *Total gross fresh water abstraction* for 1990 and 1995 to 2000. *Total gross fresh water abstraction* increased by 21 per cent during the period 1990 (7.1 million cubic meters) to 2000 (8.5 million cubic meters) in this Member State.

During the period 1999 to 2002, of the *Gross fresh surface water abstracted* in Trinidad and Tobago a greater per cent was abstracted for *Manufacturing industries activities* (60 per cent in 1999, 55 per cent in 2000, 95 per cent in 2001 and 68 per cent in 2002) than for *Agriculture, forestry and fishing activities* (40 per cent in 1999, 45 per cent in 2000, 5 per cent in 2001 and 32 per cent in 2002). This trend was also seen in data reported on for *Gross fresh groundwater abstracted* when *Manufacturing industries* activities abstracted an average of 94 per cent during the period 1999 to 2002. In 2003, all reported *total fresh surface water abstracted* (0.1 million cubic meters) and *Gross fresh groundwater* abstraction (3.0 million cubic meters) were for *Agriculture, forestry and fishing activities*.

Table 12.2 Water Abstraction by Source: 1990, 1995 - 2005

(mio m^3/y)

Country	Year	Fresh surface water abstracted (1) by: Public supply (ISIC 41)	Agriculture, fishing and forestry (ISIC 01-05)	Manufacturing industries (ISIC 15-37)	Production of electricity (ISIC 40)	Other economic activities	Households	Total
BZ								
	1995							**1932.7**
	1996							**1895.1**
	1997							**1846.1**
	1998							**1913.7**
	1999							**1889.4**
	2000							**1902.8**
JM								
	1990							**63**
	1995		**75%**	**7%**		**1%**	**17%**	
	1996						**280**	
	1999							**114**
	2000[A]							
VC								
	1990*							**7.1**
	1995*							**7.4**
	1996							**7.7**
	1997							**7.7**
	1998							**7.8**
	1999							**8.5**
	2000							**8.5**
	2001							**8.4**
	2002							**8.9**
	2003							**8.8**
TT								
	1999		**5.6**	**8.4**	**n/a**			**14.0**
	2000		**6.6**	**8.2**	**n/a**			**14.8**
	2001		**0.3**	**5.6**	**n/a**			**5.9**
	2002		**4.2**	**9.0**	**n/a**			**13.2**
	2003		**0.1**	_	**n/a**			**0.1**

Table 12.2 Cont'd. Water Abstraction by Source: 1990, 1995 - 2005

Country	Year	Fresh ground water abstracted (2) by: Public supply (ISIC 41)	Agriculture, fishing and forestry (ISIC 01-05)	Manufacturing industries (ISIC 15-37)	Production of electricity (ISIC 40)	Other economic activities	Households	Total
BZ								
	1995							**322.9**
	1996							**329.8**
	1997							**337.8**
	1998							**335.6**
	1999							**334.2**
	2000							**367.5**
JM								
	1990							**850**
	1995							
	1996							
	1999							**186**
	2000[A]							
VC								
	1990							
	1995							
	1996							
	1997							
	1998							
	1999							
	2000							
	2001							
	2002							
	2003							
TT								
	1999		**0.3**	**8.3**	**n/a**			**8.6**
	2000		**0.3**	**10.0**	**n/a**			**10.3**
	2001		**1.1**	**9.0**	**n/a**			**10.1**
	2002		**0.4**	**7.9**	**n/a**			**8.3**
	2003		**3.0**	**_**	**n/a**			**3.0**

Table 12.2 Cont'd. Water Abstraction by Source: 1990, 1995 - 2005

Country	Year	Total gross fresh water abstraction (3)=(1)+(2)	Water returned without use (4)	Net freshwater abstracted (=3-4)	Imports of water (5)	Exports of water (6)	Desalinated water (7)	Reused water (8)	Total freshwater made available for use (9)=(3)-(4)+(5)-(6)+(7)+(8)	Leakage during transport
BZ										
	1995	**2255.6**					**27.1**		**2282.7**	
	1996	**2224.9**					**28.7**		**2253.6**	
	1997	**2183.9**					**45.0**		**2228.9**	
	1998	**2249.3**					**52.4**		**2301.7**	
	1999	**2223.6**					**60.8**		**2284.4**	
	2000	**2270.3**					**84.7**		**2355.0**	
JM										
	1990	**913**			**0**	**0**	**0**			
	1995									
	1996									
	1999	**300**								
	2000[A]	**1,437**								
VC										
	1990[A]	**7.1**								
	1995[A]	**7.4**								
	1996[A]	**7.7**								
	1997[A]	**7.7**				**0.02**				
	1998[A]	**7.8**				**0.02**				
	1999[A]	**8.5**								
	2000[A]	**8.5**								
	2001									
	2002									
	2003									
TT										
	1999	**22.6**								
	2000	**25.1**								
	2001	**16.0**								
	2002	**21.5**								
	2003	**3.1**								

WT3: WATER USE BY SUPPLY CATEGORY AND ACTIVITIES

H

Concept and Definition

Total water supply is the volume of water supplied for final use, either as public water supply (by economic units belonging to ISIC 41), as self supply (where the abstractor is also the end user), or as other supply (where the abstractor supplies the water to a different end user). Public water supply is broken down by main groups of activities to which the water is supplied according to ISIC rev.3.

The *use* of water is wide and includes many economic activities, such as agriculture and forestry, fishing, manufacturing, hotels and restaurants, as well as households, and for recreation. It is important to know the breakdown of water use according to these different economic activities and households to determine how best to design polices for water resources management. Growing populations, as well as increased economic activities, have caused an increase in the demand for water resources. In the CARICOM region, the tourism industry is a major user of water and sustainable tourism policies and practices can be designed to monitor water use.

Water Supply Category and Activities

Water abstraction by water supply industry is water supplied by economic units engaged in collection, purification and distribution of water (including desalting of sea water to produce water as the principal product of interest, and excluding system operation for agricultural purposes and treatment of waste water solely in order to prevent pollution.) It corresponds to ISIC division 41. Deliveries of water from one public supply undertaking to another are excluded.

Irrigation water refers to water which is applied to soils in order to increase their moisture content and to provide for normal plant growth.

Self-supply is the abstraction of water for one's own final use including water drawn from village wells.

Other supply refers to any supply of water not specified elsewhere in particular, supplies from commercial and industrial establishments, whether marketed or not. This definition also includes the supply of reusable water.

Water losses during transport is the volume of water lost during transport between a point of abstraction and a point of use, and between points of use and reuse.

Total water supply refers to the delivery of water to users and abstraction for one's own final use. Total water supply excludes water used in hydropower generation. (Total public water supply + Self-supply + Other supply)
UNSD/UNEP 2001 and 2004 questionnaires on Environment statistics, Water section

Method of Computation

Water Use by Supply Category and Activities was obtained from questionnaires distributed to Member States/Associate Members through a UNSD/UNEP/CARICOM collaboration according to the categories mentioned above.

Indicator Relevance

Water is a resource essential to life. A sustainable use of water has to ensure a balance between abstraction and natural rate of recharge, in the long-term and a high level of environmental protection and a secure supply of high quality water for human consumption and economic purposes.

In many areas, groundwater abstraction exceeds recharging rates and the aquifer becomes overexploited. The consequent depletion of underground water resources can have a negative impact on biodiversity and the concerned aquatic ecosystems. At the same time, an unsustainable use of water undermines the basis for further economic development. Water demand varies considerably between regions, depending on natural conditions, economic and demographic structures. Water use for industry and domestic consumption are considerably higher in the developed countries than in the developing ones. In developing countries, water use for agriculture is the main consuming sector and water consumption for domestic purposes is increasing, particularly in newly urbanised agglomerations. *(http://www.un.org/esa/sustdev/sdissues/consumption/cpp1224m11.htm)*

Data Assessment

Three Member States provided data on Water Use by Supply Category and Activities and all countries followed the internationally recommended definition for this indicator. This indicator is, therefore, harmonized.

Data Sources

In accordance with the decision that the UNSD would provide data on waste, water, land, and air to the CARICOM Secretariat, data for this indicator was collected from the UNSD instead of from Member States and Associate Members.

Please refer to **Appendix 1.12.3 (a)** for the original sources of the data, as specified by the UNSD, on water of Member States and Associate Members.

Evaluation

Data on Water Use by Supply Category and Activities is presented in **Table 12.3** below for Belize, Jamaica and Trinidad and Tobago. For the period 1995 to 2000, *Total water supply* in Belize averaged 1,082

millions of cubic meters per year with *water losses during transport* averaging 1,202 millions of cubic meters per year.

Total public water supply for Jamaica was 300.45 millions of cubic meters in 1999, and increased significantly to 42,866 millions of cubic meters in 2000 falling slightly to 41,855 millions of cubic meters in 2001. *Total water supply including self-supply and other sources of supply* was reported at 913 millions of cubic meters in 1990 and was estimated to be 1,437 millions of cubic meters in 2000. In 1996, 85 per cent of Jamaica's population was connected to public water supply.

Trinidad and Tobago's *total public water supply* for the period 1999 to 2002 averaged 302 millions of cubic meters of which *Manufacturing industries* were supplied an average of 32 millions of cubic meters of water and *Agriculture, forestry, fishing* activities 5 millions of cubic meters. *Public water supply* to *households* averaged 140 millions of cubic meters for the period and *Water losses during transport* averaged 216 millions of cubic meters. In 1999, 70 per cent of the population was connected to public water supply and at the end of the period 67 per cent of the population was connected to public water supply.

Table 12.3 Water Use by Supply Category and Activities: 1990, 1995 - 2005

(mio m^3/y)

Country	Year	Total public water supply (ISIC 41) (1)						Self-supply (2)	Other supply (3)	Total water supply (4)= (1)+(2)+(3)	Water losses during transport *	Net freshwater delivered by water supply industry (ISIC 41) (=1-2) (=6+7+8+9+10)	Population connected to public water supply	Population supplied by water supply industry (ISIC 41)
		Economic activities					H/holds							
		Agriculture, forestry, fishing (ISIC 01-05)	Manufacturing industries (ISIC 15-37)	Production and distribution of electricity (ISIC 40)	Other economic activities	Total								
BZ														
	1995									**929**	**1,353**			
	1996									**919**	**1,335**			
	1997									**1,035**	**1,194**			
	1998									**1,129**	**1,173**			
	1999									**1,181**	**1,104**			
	2000									**1,301**	**1,055**			
JM														
	1990									**913**				
	1996												**85**	
	1999					**300**								
	2000					**42,866**				**1,437**[A]				
	2001					**41,855**								
TT														
	1999	**5**	**31**	**n/k**	**n/k**	**286**	**134**	**n/k**	**n/k**	**n/k**	**208**		**70**	**70**
	2000	**5**	**31**	**n/k**	**n/k**	**298**	**138**	**n/k**	**n/k**	**n/k**	**213**		**69**	**69**
	2001	**5**	**32**	**n/k**	**n/k**	**291**	**142**	**n/k**	**n/k**	**n/k**	**219**		**68**	**68**
	2002	**5**	**32**	**n/k**	**n/k**	**332**	**146**	**n/k**	**n/k**	**n/k**	**223**		**67**	**67**

WT4: WASTE WATER GENERATION

H

Concept and Definition

Total waste water generated is the quantity of water in cubic meters (m^3) that is discharged due to being of no further immediate value to the purpose for which it was used or in the pursuit of which it was produced because of its quality, quantity or time of occurrence.

Method of Computation

Waste Water Generation was obtained from questionnaires distributed to Member States/Associate Members through a UNSD/UNEP/CARICOM collaboration according to the categories mentioned above.

Indicator Relevance

The amount of *waste water generated* is linked to the amount of water used. For industries and households, the major part of the water used (except water that is contained in the product or otherwise irretrievable, water that is lost due to leakage, and evaporation) is returned to the environment as (treated or non-treated) waste water. The table asks for the estimated volume of waste water according to its origin (main economic activities defined by ISIC rev.3, and households), regardless to its pollutant content, its pathways and its destination.

Using water more effectively reduces both the need for high quality water and the amount of wastewater generated. Reducing the water sent to onsite wastewater treatment systems may improve the overall process performance by reducing the hydraulic loading and, in some cases, providing a more stable wastewater flow.

The choice to use water more efficiently reduces water needs and wastewater generation. An important first step to water conservation is to realize how much water various activities use.

Data Assessment

Of the eighteen Member States and Associate Members that usually report data, Trinidad and Tobago was the only country that provided data for this indicator. Data was provided on Household waste water generated only.

Trinidad and Tobago followed the internationally recommended definition on wastewater generated by households. This indicator is, therefore, harmonized.

Data Sources

In accordance with the decision that the UNSD would provide data on waste, water, land, and air to the CARICOM Secretariat, data for this indicator was collected from the UNSD.

Please refer to **Appendix 1.12.4 (a)** for the original sources of the data, as specified by the UNSD, on water of Member States and Associate Members.

Evaluation

Table 12.4 below presents data for Trinidad and Tobago for the period 1995 to 2002 on total waste water generated by Households. The data shows that there was an overall decline of 6.3 per cent in total waste water generated by Households from 1995 when 95 million cubic meters was reported to 2002 when 89 million cubic meters of waste water was generated.

Table 12.4: Waste Water Generation: 1995 - 2002

(1000 m^3/d)

Country	Year	Total waste water generated						
		Agriculture, forestry and fishing (ISIC 01-05)	Mining and quarrying (ISIC 10-14)	Manufacturing Industries (ISIC 15-37)	Production and distribution of electricity (ISIC 40)	Construction (ISIC 45)	Other economic activities	Households
TT								
	1995							95,192
	1996							83,259
	1997							72,019
	1998							83,490
	1999							81,745
	2000							80,000
	2001							84,596
	2002							89,183

WT5: WASTE WATER TREATMENT FACILITIES

H

Concept and Definition

The share of the resident population connected to public/urban waste water collecting system, to public/urban waste water treatment and to independent treatment facilities indicate the coverage and level of sanitation. The table also asks for the number and design capacity of waste water treatment plants according to the provided level of treatment to understand the infrastructure available for waste water treatment.

Waste water collection and treatment is often concentrated in urban settlements. The table includes selected variables on water supply and waste water treatment at city level.

Wastewater can be discharged directly into water bodies, or may be treated to remove some of the pollutants before being discharged. This table asks for details (number, design capacity) of the wastewater treatment infrastructure serving the population of the country, and covers urban treatment stations serving a larger population as well as independent treatment stations for a small number of households. The amount and type of pollutants removed will depend on the technical specifications of the wastewater treatment plant.

Waste Water Treatment Facilities

Population connected to waste water collecting system is the percentage/number of the resident population connected to the public waste water collecting systems (sewerage). Public waste water collecting systems may deliver waste water to treatment plants or may discharge it without treatment to the environment.

Population connected to waste water treatment is the percentage/number of the resident population whose waste water is treated at public waste water treatment plants.

Population connected to independent treatment (septic tanks) is the percentage of resident population whose waste water is treated in individual, often private facilities such as septic tanks.

*Waste water treated in public treatment plants refers to a*ll treatment of waste water in municipal treatment plants by official authorities, or by private companies for local authorities, whose main purpose is waste water treatment.

Biological treatment refers to processes which employ aerobic or anaerobic micro-organisms and result in decanted effluents and separated sludge containing microbial mass together with pollutants. Biological treatment processes are also used in combination and/or in conjunction with mechanical and advanced unit operations. To avoid double counting, water subjected to more than one type of treatment should be reported under the highest level of treatment only.

Method of Computation

Waste Water Treatment Facilities was obtained from questionnaires distributed to Member States/Associate Members through a UNSD/UNEP/CARICOM collaboration according to the categories mentioned above.

Indicator Relevance

Waste water is a major problem in many countries, especially in developing countries, because of a lack of wastewater treatment facilities or unaffordable technologies. There are three main types of waste water treatment, mechanical which facilitates the sedimentation of the coarsest particles, biological which enables the decomposition of biological matter contained in wastewater, and advanced which enables the removal of water-soluble nutrients and heavy metals.

Data Assessment

Of the eighteen Member States and Associate Members that usually report data, Belize, Dominica and Trinidad and Tobago were the only countries that provided data for this indicator. This may be due to the fact that environment statistics is new to Region.

Data Sources

In accordance with the decision that the UNSD would provide data on waste, water, land, and air to the CARICOM Secretariat, data for this indicator was collected from the UNSD.

Please refer to **Appendix 1.12.5 (a)** for the original sources of the data, as specified by the UNSD, on water of Member States and Associate Members.

Evaluation

Table 12.5 below shows data on Waste Water Treatment Facilities for two Member States Belize and Trinidad and Tobago. Data for Belize shows that in 1991 15.8 per cent of the population was connected to the waste water collecting system and this declined slightly to 15.1 per cent in 2000. The data on the percentage of the Population in Belize connected to waste water treatment declining slightly from 16 per cent in 1991 to 15 per cent in 2000. 19 per cent of the Population was connected to independent treatment (septic tanks) facilities as compared to 35 per cent in 2000 representing an increase of 16 per cent..

Available information for Trinidad and Tobago shows that the total Population connected to a waste water collecting system and waste water treatment facility was 233,283 in 2002.

Table 12.5: Waste Water Treatment Facilities: 1990-1991, 1995 - 2002

Country	Year	Population connected to waste water collecting system	Population connected to waste water treatment	Population connected to waste water collecting system	Population connected to waste water treatment	Population connected to independent treatment (septic tanks)	Waste water treatment plants		Design capacity of waste water treatment plants of which: Biological treatment
							of which: Biological treatment	Total	
		% of pop.	% of pop.	Number	Number	% of pop.	Number	Number	1000 m^3/d
BZ									
	1991	15.8	15.8			18.7		4	
	2000	15.1	15.1			34.7		6	
TT									
	1990*						12		
	1995*						12		95,192
	1996						12		83,259
	1997						12		72,019
	1998						12		83,490
	1999						12		81,745
	2000						12		80,000
	2001						12		84,596
	2002			233,283	233,283		12		89,183

WT6: WATER QUALITY OF SELECTED RIVERS

H

Concept and Definition

Information was collected on the water quality of selected rivers, lakes and coastal areas as measured at selected measuring stations. The tables include the most frequently measured parameters of ambient water quality, for which the annual mean concentrations are to be reported, accompanied by information on the selected water body and measuring station. The selection of the water bodies should be based on their national (economic, demographic, geographic, hydrologic) importance and on the quantity and quality of available measurements. The selection of the measuring station should be based on the availability of longer time series of measurements.

Water Quality

Biochemical Oxygen Demand (BOD_5) is the amount of dissolved oxygen required by organisms for the aerobic decomposition of organic matter present in water. This is measured at 20 degrees Celsius for a period of five days. The parameter yields information on the degree of water pollution with organic matter.

Dissolved Oxygen (DO) is the amount of gaseous oxygen (O_2) actually present in water expressed in terms of its presence in the volume of water (milligrams of O_2 per litre).

Chemical Oxygen Demand (COD) is the index of water pollution measuring the mass concentration of oxygen consumed by the chemical breakdown of organic and inorganic matter. This is a measure of potassium permanganate ($KMnO_4$) consumed, calculated in terms of oxygen equivalent.

Total Dissolved Solids (TDS) is the total weight of dissolved mineral constituents in water. Excessive amounts make water unsuitable for drinking or for use in industrial processes.

Total Phosphorus is the sum of phosphorus compounds in water measured in terms of phosphorus. Phosphorus is an element that, while being essential to life as a key limiting nutrient factor, nevertheless contributes - together with nitrogen - to the eutrophication of lakes and other bodies of water.

Total Nitrogen is the sum of inorganic and organic nitrogen compounds (excluding N_2) in water measured in terms of nitrogen. Nitrogen - together with phosphorus - contributes to eutrophication of water bodies.

Faecal Coliform is micro organisms found in the intestinal tract of human beings and animals. Their presence in water indicates faecal pollution rendering water unsuitable for drinking without prior treatment.

Method of Computation

Water Quality of Selected Rivers was obtained from questionnaires distributed to Member States/Associate Members through a UNSD/UNEP/CARICOM collaboration according to the categories mentioned above.

Indicator Relevance

The quality of water fit for human consumption can be measured via biological, physicochemical and chemical variables. A major cause of the deterioration of *water quality* is the discharge of industrial and household wastes into water bodies. Coastal zones, estuaries and shorelines of large lakes are particularly favoured for the location of highly polluting industries because they appear to be an easy solution for waste disposal.

The contaminants of major concern are toxins such as heavy metals and pesticides, organic matter, nutrient loadings such as fertilizer run-off, deposits from acid precipitation and pathogens such as coliform. Such contamination can lead to, inter alia, eutrophication and the spread of water borne diseases, and can therefore be detrimental to both human health and the health of aquatic ecosystems.

In the CARICOM Member States, a common threat to the water quality is the contamination of supply by human and livestock waste, industry-related pollution, and in some cases, pesticides and other agricultural chemicals. The domestic waste problem may be linked to inefficient waste water treatment plants in the region. In many instances waste is inadequately treated before being discharged into receiving water bodies. The leaching of pollutants into ground water supplies is also a concern in CARICOM Member States, as is, salt water intrusion into ground water supplies. Salt water intrusion into acquifers is a major issue in countries like Barbados which is heavily dependent on its ground water supply.

Pollutants in water bodies in CARICOM Member States come from either point or non point sources. Point sources of pollution include specific agricultural and industrial sites that discharge heavy metals such as lead, zinc, copper, and nutrients like phosphates. Petroleum products and domestic waste, mentioned previously, are also regarded as point source pollutants.

The major non-point sources of pollution in CARICOM Member States are agricultural runoff, storm-water run-off and percolation of contaminated water from solid waste landfills and sewerage systems. Pesticides and fertilisers are some of the deleterious components of contaminated agricultural runoff.

Data Assessment

Of the eighteen Member States and Associate Members that usually report data, Jamaica and Trinidad and Tobago were the only countries that provided data for this indicator.

Both Member States followed the internationally recommended definition for the collection of this indicator. This indicator is harmonized.

Data Sources

In accordance with the decision that the UNSD would provide data on waste, water, land, and air to the CARICOM Secretariat, data for this indicator was collected from the UNSD instead of from Member States and Associate Members.

Please refer to **Appendix 1.12.6 (a)** for the original sources of the data, as specified by the UNSD, on water of Member States and Associate Members.

Evaluation

The quality of water fit for human consumption can be measured via biological, physicochemical and chemical variables. Most of the water quality studies in the country have been restricted to the Caroni River Basin because it accounts for 30 per cent of the drinking water for the country. The Caroni River was identified as a major source of pollution for the Gulf of Paria, which is located along the west coast. Data is presented for Jamaica and Trinidad and Tobago in **Table 12.6** below.

Table 12.6: Water Quality of Selected Rivers: 1990, 1995 - 1998 and 2000 - 2002

Country	Year	Name of River	Name of Measuring station	Distance to mouth or downstream frontier: Mean	Sampling frequency (/year) Min	Sampling frequency (/year) Max	Sampling depth (m)	Annual average flow m^3/s	Biochemical oxygen demand (BOD_5) mg O_2/l	Dissolved oxygen (DO)	Total dissolved solids (TDS)	Total Suspended Solids (TSS) mg/l	Nitrate (NO_3) mg/l
JM (Wag Water River)	2001								a 0.1 - 9.27				
TT													
	2000 [1]	Maraval River	WASA Maraval Raw	5			0.3						5.9
	2001 [2]	Maraval River	WASA Maraval Raw	5			0.3						4.6
	1997 [3]	Caroni River		20				12.2	10	5	140	32	
	1990 [4]	Caroni River at W.T.P.							3	5			
	1995 [4]	Caroni River at W.T.P.							2	4			
	1996 [4]	Caroni River at W.T.P.							3	2			
	2000 [1]	Caura	WASA Caura Raw	4									1.2
	2001 [2]	Caura	WASA Caura Raw	4									1.9
	2000 [1]	Guanapo	WASA Guanapo Raw	8									1.2
	2001 [2]	Guanapo	WASA Guanapo Raw	8									1.4
	1998 [5 A]	Maracas	Mouth of Maracas Raw	8						5			
	2002	Oropuche River - La Fortune Pluck Road				2	0.5			2		35	
	1990 [4]	North Oropouche at W.T.P.							1.0	8.6			
	1995 [4]	North Oropouche at W.T.P.							0.7	8.2			
	2002 [B]	Godineau River - La Fortune Pluck Road				2	0.5			0		16	

Table 12.6: Water Quality of Selected Rivers: 1990, 1995 - 1998 and 2000 - 2002

Country	Year	Phosphates (PO_4)	Total Ammonia (NA_3)	Chloride (Cl)	pH	Temperature	Conductivity	Turbidity	Salinity	Copper	Zinc (Zn)
		mg/l		mg/l		°C	uS/cm	NTU	%	mg/l	mg/l
JM (Wag Water River)											
	2001										
TT											
	2000 [1]	0.1		23.7	6.9		1	5			0.02
	2001 [2]	0.1		20.4	7.6		1	2			
	1997 [3]				6.9	27	187	86			
	1990 [4]										
	1995 [4]										
	1996 [4]										
	2000 [1]	0.1		11.9	7.5		0.2	5.9			
	2001 [2]			15.2	7.8		0.3	0.4			
	2000 [1]			8.0	8.2		0.2	1.1			
	2001 [2]			9.3	7.8		0.3	0.6			
	1998 [5 A]				6.7	27		11	0.20		
	2002	0.6	0.2							4.0	8.0
	1990 [4]										
	1995 [4]										
	2002 [B]	0.5	0.2							0.7	3.0

Table 12.6: Water Quality of Selected Rivers: 1990, 1995 - 1998 and 2000 - 2002

Country	Year	Total Organic Carbon (TOC)	Total phosphorus	Total nitrogen	Faecal coliform	Faecal coliform	Dissolved Organic Carbon (DOC)	Dissolved and Dispersed Petroleum Hydrocarbon (DDPH)
		mg/l	mg P/l	mg N/l	MPN/100ml**	Counts/100ml	mg/l	mg/l
JM (Wag Water River)			a	a	a			
	2001		0.027 - 0.899	0.003 - 0.447	50 - 1600			
TT								
	2000 [1]	1.1					1	
	2001 [2]	1.33					1	
	1997 [3]		1			2,000		
	1990 [4]				9,260			
	1995 [4]				4,500			
	1996 [4]							
	2000 [1]	0.47					0.9	
	2001 [2]	1.53					0.1	
	2000 [1]	1.1					1.3	
	2001 [2]	1.6					0.8	
	1998 [5 A]					24,000		
	2002							
	1990 [4]				2,839			
	1995 [4]				180			
	2002 [B]							

WT7: WATER QUALITY OF SELECTED COASTAL AREAS H

Concept and Definition

The data include the most frequently measured parameters of ambient water quality, for which the annual mean concentrations are to be reported, accompanied by information on the selected water body and measuring station. The selection of the water bodies should be based on their national (economic, demographic, geographic, hydrologic) importance and on the quantity and quality of available measurements. The selection of the measuring station should be based on the availability of longer time series of measurements.

Water Quality

Biochemical Oxygen Demand (BOD_5) is the amount of dissolved oxygen required by organisms for the aerobic decomposition of organic matter present in water. This is measured at 20 degrees Celsius for a period of five days. The parameter yields information on the degree of water pollution with organic matter.

Dissolved Oxygen (DO) is the amount of gaseous oxygen (O_2) actually present in water expressed in terms of its presence in the volume of water (milligrams of O_2 per litre).

Chemical Oxygen Demand (COD) is the index of water pollution measuring the mass concentration of oxygen consumed by the chemical breakdown of organic and inorganic matter. This is a measure of potassium permanganate ($KMnO_4$) consumed, calculated in terms of oxygen equivalent.

Total Dissolved Solids (TDS) is the total weight of dissolved mineral constituents in water. Excessive amounts make water unsuitable for drinking or for use in industrial processes.

Total Phosphorus is the sum of phosphorus compounds in water measured in terms of phosphorus. Phosphorus is an element that, while being essential to life as a key limiting nutrient factor, nevertheless contributes - together with nitrogen - to the eutrophication of lakes and other bodies of water.

Total Nitrogen is the sum of inorganic and organic nitrogen compounds (excluding N_2) in water measured in terms of nitrogen. Nitrogen - together with phosphorus - contributes to eutrophication of water bodies.

Faecal Coliform is micro organisms found in the intestinal tract of human beings and animals. Their presence in water indicates faecal pollution rendering water unsuitable for drinking without prior treatment.

Method of Computation

Water Quality of Selected Coastal Areas was obtained from questionnaires distributed to Member States/Associate Members through a UNSD/UNEP/CARICOM collaboration according to the categories mentioned above.

Indicator Relevance

See *Water Quality of Selected Rivers* for indicator relevance.

Data Assessment

Trinidad and Tobago was the only Member States that provided data for this indicator. The Member States followed the internationally recommended definition for the collection of this indicator. This indicator is, therefore, harmonized.

Data Sources

In accordance with the decision that the UNSD would provide data on waste, water, land, and air to the CARICOM Secretariat, data for this indicator was collected from the UNSD instead of directly from Member States and Associate Members.

Please refer to **Appendix 1.12.7 (a)** for the original sources of the data, as specified by the UNSD, on water of Member States and Associate Members.

Evaluation

Data for Trinidad and Tobago is presented in **Table 12.7** below on the Water Quality of Selected Coastal Areas for the years 1997, 1998 and 2002.

Table 12.7: Water Quality of Selected Coastal Areas: 1997, 1998 and 2002

Country	Year	Name of the estuary/ coastal location	Name of Measuring station	Depth (m)		Sampling frequency (/year)		Sampling depth (m)	Chlorophyll-a (Chl-a)	Total phosphate (TPO_4)	Ammonia (NH_3)	Copper
				Mean	Max	Min	Max			mg P/l	mg N/l	mg/l
TT												
	1998 [A 1]	Maracas Bay	In Front of Lifeguard Hut					0.7				
	1997 [B]	Gulf of Paria	# 7 Caroni Swamp	1	1	2	2	1.0	0.001			
	1998 [B]	Gulf of Paria	# 7 Caroni Swamp	1	1	2	2	1.0	0.003			
	1997 [B]	Gulf of Paria	# 8 Caroni River	1	1	2	2	1.0	0.020			
	1998 [B]	Gulf of Paria	# 8 Caroni River	1	1	2	2	1.0	0.007			
	1997 [B]	Gulf of Paria	# 5 Pt. Lisas	1	1	2	2	1.0	0.004			
	1998 [B]	Gulf of Paria	# 5 Pt. Lisas	1	1	2	2	1.0	0.011			
	1997 [B]	Gulf of Paria	#2 Guapo Bay	1	1	2	2	1.0	0.002			
	1998 [B]	Gulf of Paria	#2 Guapo Bay	1	1	2	2	1.0	0.007			
	1997 [B]	Gulf of Paria	#4 Point-a-Pierre	1	1	2	2	1.0	0.004			
	1998 [B]	Gulf of Paria	#4 Point-a-Pierre	1	1	2	2	1.0	0.011			
	1997 [B]	Gulf of Paria	#9 Port-of-Spain	1	1	2	2	1.0	0.001			
	1998 [B]	Gulf of Paria	#9 Port-of-Spain	1	1	2	2	1.0	0.002			
	2002 [B]	Godineau River Mouth		1	1	0	2	1.0		0.2	0.7	4.0

Table 12.7: Water Quality of Selected Coastal Areas: 1997, 1998 and 2002

Country	Year	Zinc	pH	Temperature	Turbidity	Salinity	Dissolved oxygen (DO)	Total phosphorus	Total nitrogen	Faecal coliform	Dissolved and Dispersed Petroleum Hydrocarbon (DDPH)
		mg/l		°C	NTU	%	mg/l	mg P/l	mg N/l	MPN/100ml**	mg/l
TT											
	1998 [A 1]		8	28.5	1.9	26.8	5.2			120	
	1997 [B]							0.030	0.219		0.37
	1998 [B]							0.023	0.302		1.22
	1997 [B]							0.024	0.476		0.87
	1998 [B]							0.044	0.676		7.94
	1997 [B]							–	0.017		0.72
	1998 [B]							0.069	0.807		0.84
	1997 [B]							0.024	0.371		0.37
	1998 [B]							0.043	0.301		6.39
	1997 [B]							0.029	0.231		3.07
	1998 [B]							0.073	0.922		25.85
	1997 [B]							0.026	0.329		0.87
	1998 [B]							0.031	0.271		6.39
	2002 [B]	11.0									

Appendix 1.12
Sources of Water Data

1.12.1 (a): Sources of Data for Table 12.1 - Renewable Fresh Water Resources: 1990, 1998 - 2002

Country	Data Source
JAMAICA	Statistical Institute of Jamaica
TRINIDAD AND TOBAGO	Water and Sewerage Authority

1.12.1 (b): Notes for Table 12.1 - Renewable Fresh Water Resources: 1990, 1998 - 2002

Country	Notes
TRINIDAD AND TOBAGO	n/a Not Available Info on outflow of surface and ground waters can't be calculated

1.12.2 (a): Sources of Data for Table 12.2 - Water Abstraction by Source: 1990, 1995 – 2005

Country	Data Source
BELIZE	Statistical Institute of Belize
JAMAICA	Statistical Institute of Jamaica
ST VINCENT AND THE GRENADINES	Central Water and Sewerage Authority
TRINIDAD AND TOBAGO	Water and Sewerage Authority

1.12.2 (b): Notes for Table 12.2 - Water Abstraction by Source: 1990, 1995 - 2005

Country	Notes
BELIZE	* Units are in million gallons.
JAMAICA	A Data refers to average production of water per day.
ST VINCENT AND THE GRENADINES	A Data refer to Fresh surface water.
TRINIDAD AND TOBAGO	A Includes Water abstraction by water supply industry, Agriculture, forestry and fishing, and Manufacturing industries only. n/a Not available n/app Not applicable The category for "Households" in does not contain any values since this category is not applicable to Table W3. This is due to the fact that the abstraction licences are mainly applied by the agricultural and industrial sectors; households are supplied by public water system.

1.12.3 (a): Sources of Data for Table 12.3 - Water Use by Supply Category and Activities: 1990, 1995 - 2005

Country	Data Source
BELIZE	Statistical Institute of Belize
JAMAICA	Statistical Institute of Jamaica
TRINIDAD AND TOBAGO	Water and Sewerage Authority

1.12.3 (b): Notes for Table 12.3 - Water Use by Supply Category and Activities: 1990, 1995 – 2005

Country	Notes
JAMAICA	A - Projected.
TRINIDAD AND TOBAGO	1. Total water into supply is based on actual flows recorded at the Water and Sewerage Authority's water treatment plants. 2. A nominal flow for agricultural use was assumed to be 14 Mld. 3. Consumption for Manufacturing industries was derived from actual flows recorded from meters installed. 4. The Domestic Demand was determined as follows (i) The number of domestic connections (A1, A2, A3 and A4) was determined from the Authority's record. (ii) The population served was estimated assuming occupancy of 4.0 capital/household. (iii) Demand was calculated based on levels suggested by London Economics (1) for each year. 5. Unaccounted for Water levels of 55% were assumed. This was based on investigations conducted by the Water and Sewerage Authority within District Metered Areas which it has established. 6. % population connected to the public water supply was determined from the population from 4(ii) above, and an estimated total population in 1998 of 1.283 million persons and an annual growth rate of 1.2% 7. Information on the period 1990 to 1998 can be estimated based on previous study done by the Japanese International Consultants Agency (JICA) in 1990 - copy to be located n/k Not known

1.12.4 (a): Sources of Data for Table 12.4 - Waste Water Generation: 1995 – 2002

Country	Data Source
TRINIDAD AND TOBAGO	Water and Sewerage Authority of Trinidad & Tobago

1.12.4 (b): Notes for Table 12.4 - Waste Water Generation: 1995 - 2002

Country	Notes
TRINIDAD AND TOBAGO	* Flows above are measured from domestic sewer systems flowing into the Water and Sewerage Authority owned and operated treatment plants. * Flows are estimated in cubic metres per day. X- Information not available.

1.12.5 (a): Sources of Data for Table 12.5 - Waste Water Treatment Facilities: 1990-1991, 1995 – 2002

Country	Data Source
BELIZE	CSO
TRINIDAD AND TOBAGO	Water and Sewerage Authority of Trinidad & Tobago

1.12.6 (a): Sources of Data for Table 12.6 - Water Quality of Selected Rivers: 1990, 1995 - 1998 and 2000 – 2002

Country	Data Source
JAMAICA	Statistical Institute of Jamaica
TRINIDAD AND TOBAGO	EMA (2001). Water Quality Monitoring at some Water Sources in North Trinidad Water and Sewerage Authority EMA (1998). ,Bacteriological Water Quality Monitoring at Maracas Beach, Trinidad IMA

1.12.6 (b): Notes for Table 12.6 - Water Quality of Selected Rivers: 1990, 1995 - 1998 and 2000 – 2002

Country	Notes
JAMAICA	a 2000 to 2002 data for 47 visits to six stations.
TRINIDAD AND TOBAGO	1 Data represents one observation for that year 2 Data represents the average of two observations for that year 3 Data represents the daily value over one month of monitoring (Aug 11 to Sept 10 1997) Source: EMA (2001). Water Quality Monitoring at some Water Sources in North Trinidad 4 Source : Water and Sewerage Authority 5 Data represents one observation for that year in the wet season A Source: EMA (1998). ,Bacteriological Water Quality Monitoring at Maracas Beach, Trinidad B Source : IMA

1.12.7 (a): Sources of Data for Table 12.7 - Water Quality of Selected Coastal Areas: 1997, 1998 and 2002

Country	Data Source
TRINIDAD AND TOBAGO	EMA (1998) Bacteriological Water Quality Monitoring at Maracas Beach, Trinidad Institute of Marine Affairs

1.12.7 (b): Notes for Table 12.7 - Water Quality of Selected Coastal Areas: 1997, 1998 and 2002

Country	Notes
TRINIDAD AND TOBAGO	A - Source: EMA (1998) Bacteriological Water Quality Monitoring at Maracas Beach, Trinidad B - Institute of Marine Affairs 1 - Data represents one observation for that year in the wet season