2020

مـــركـــز الإحـــصـــاء
STATISTICS CENTRE

Water Statistics 2019

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Contents

Introduction

This publication presents water statistics in the Emirate of Abu Dhabi for the year 2019. It contains desalinated water statistics including production and consumption of desalinated water and water transmission system, in addition to water quality. It also contains wastewater statistics that includes wastewater quality and treatment plants capacity.

This report presents water statistics for the Emirate of Abu Dhabi for the year 2019, as it contains water statistics from non-traditional resources such as desalinated water, which includes water quality in the public network and coastal waters, as well as wastewater statistics. The following sources are the main providers of this data: Environment Agency Abu Dhabi, Department of Energy Abu Dhabi, and Abu Dhabi Sewerage Services Company.

The "Explanatory Notes" section at the end of this report provides an explanation of the key terms and technical concepts used in this publication.

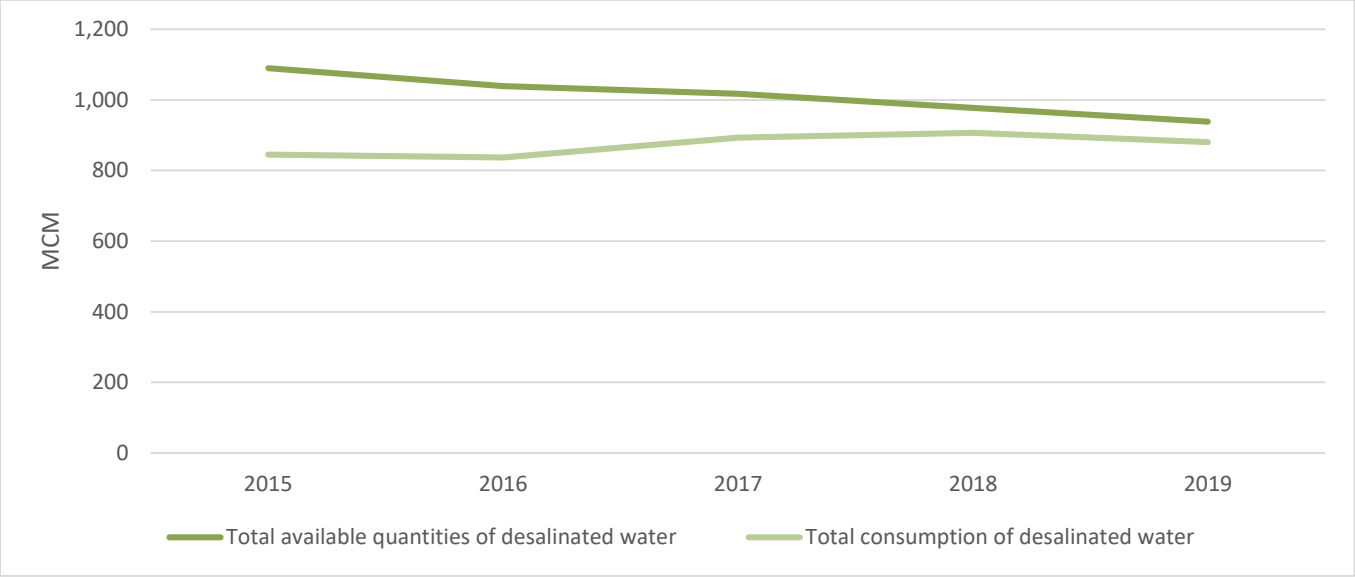
Desalinated water statistics

Economic development and population growth require more water supplies. Development plans aim at forecasting demand and supply of water resources. Water desalination industry enjoys great significance in the Emirate of Abu Dhabi to meet the growing demand. Data shows that the available desalinated water in the Emirate of Abu Dhabi in 2019-totaled **938** MCM, of which **880** MCM were consumed.

Consumption of desalinated water

Table 1.1 reveals that available desalinated water in Emirate of Abu Dhabi decreased in 2019 by 4% compared with 2018. The annual consumption of desalinated water decreased by 2.9% compared with 2018. The Total consumption of desalinated water accounted for 93.8% of the total available desalinated water in 2019.

Figure 1: Total of available desalinated water



Source: Department of Energy- Abu Dhabi , Statistics Centre –Abu Dhabi

Consumption of desalinated water by region

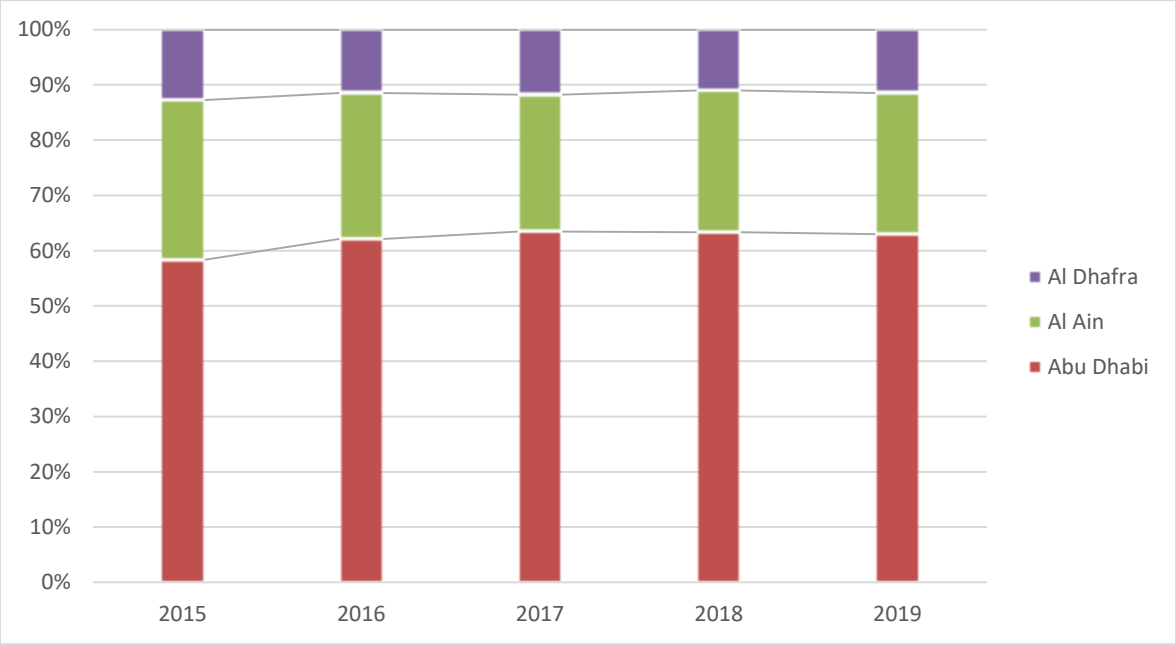
Table 1.1 shows the consumption of desalinated water in Abu Dhabi Emirate classified by region. Abu Dhabi city consumed the largest share at 63% of the total Emirate consumption, followed by the Al Ain region at 25.5% and Al Dhafra region at 11.5%.

Table 1.1: Consumption of desalinated water by region
(million cubic meter)

Region	2015	2016	2017	2018	2019
Total consumption	837.2	893.3	906.6	880.1	845.1
Abu Dhabi	520.1	566.7	573.9	554.4	493.4
Al Ain	220.8	221.4	232.6	224.4	243.7
Al Dhafra	96.4	105.1	100.1	101.2	108.0

Source: Department of Energy- Abu Dhabi

Figure 2: Desalinated water consumption by region



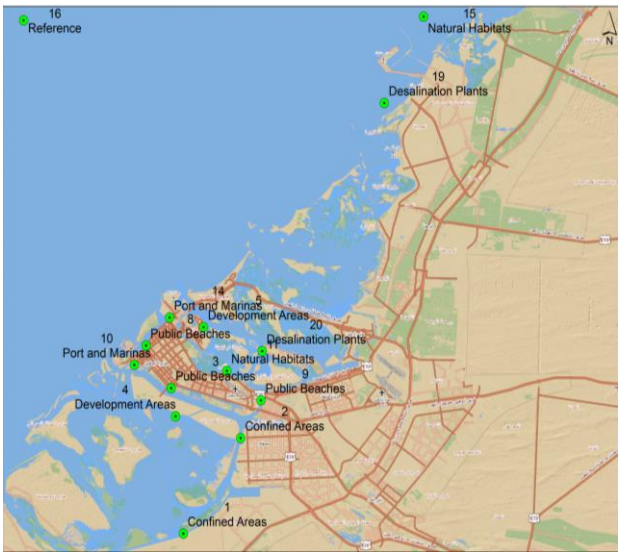
Source: Department of Energy- Abu Dhabi , Statistics Centre –Abu Dhabi

Marine water quality

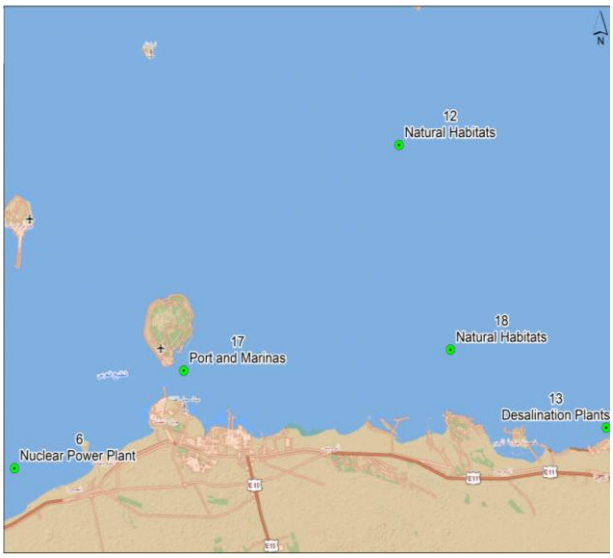
The territorial waters of the Emirate of Abu Dhabi are nutrient-rich. Nutrient inputs into the sea results from sand storms, dust, sewage discharges especially land runoff near-shore areas. Examples of important nutrients in the seawater essential for the life and growth of plants and phytoplankton include nitrites, nitrates, phosphates, and silicates. Generally, nutrients level rises in closed areas where it is difficult for water renewal to occur or in industrial zones, which have intensive human activities.

The salinity in the Arabian Gulf is relatively high because of the combined influences of restricted exchange of Gulf waters with the open ocean, the high evaporation rates caused by high temperatures, in addition to the desalination industry.

Marine water quality monitoring location



Abu Dhabi



Al Dhafra

The effort of the Emirate of Abu Dhabi Government to achieve and maintain sustainable development goals under the objective of sustainable conservation of oceans, seas and marine resources, management and protection of marine and coastal ecosystems and avoiding the negative impacts of pollution resulting from economic activities. The indicators of nutrient measurement in marine areas are one of the most important Statistical indicators to measure nutrients in marine waters as essential elements for the conservation of marine animals and plants.

Tables 1.4 - 1.5 presents readings of Abu Dhabi city marine waters quality in terms of temperature, acidity, salinity, dissolved oxygen, in addition to nutrients, such as phosphate, nitrates, and others. The readings have been taken at monitoring stations at certain depths in ten locations.

The salinity in marine waters in the city of Abu Dhabi in 2019ranged between 40.05 and 45.5 Practical Salinity Unit (psu). Regarding dissolved oxygen, most of the readings taken are between 4.8 and 5.2 mg/litre and these are ideal levels for supporting the life of marine living species.

Table 1.2: **Marine water quality - 2019**

Type	Name	Acidity	Salinity	Temperature	Dissolved oxygen (DO)
		pH	psu	C°	mg/l
Public Beaches	Al Bateen Beach	8.06	43.56	28.08	4.92
	Beach Corniche	8.06	42.54	28.63	5.11
	Fairmont Beach	8.04	44.15	28.06	4.88
Natural Habitats	Corals (Al Yasat)	8.04	44.39	26.80	5.02
	Ras Ghanadah - Corals	8.06	42.48	27.85	5.19
	Sea grass (Al Basam)	8.05	45.52	26.70	4.84
	(Butinah) Mangroves	8.03	44.30	26.43	5.15
Port and Marinas	Intercontinental Jetty	8.06	43.33	28.33	4.97
	Port Mina Zayed	8.06	42.83	28.58	5.00
	Ruwais	8.05	44.69	26.98	5.08
Desalination Plants	Mirfah	8.02	45.17	26.76	4.81
	Taweela	8.04	42.64	28.25	4.99
	Um Al Nar	8.06	44.61	28.77	4.92
Nuclear Power Plant	Barakah	8.04	45.01	26.94	5.09
Development Areas	Al Hudayriat Island	8.06	43.32	27.97	4.94
	Al Reem Island	8.05	43.26	28.34	4.93
Reference	Reference	8.08	40.05	28.02	5.15

Source: Environment Agency – Abu Dhabi

The following Indices reflect the effort of the Emirate of Abu Dhabi Government to achieve and maintain sustainable development goals under the objective of sustainable conservation of oceans, seas and marine resources, management and protection of marine and coastal ecosystems and avoiding the negative impacts of pollution resulting from economic activities. The indicators of nutrient measurement in marine areas are one of the most important Statistical indicators to measure nutrients in marine waters as essential elements for the conservation of marine animals and plants.

Table 1.5: Concentration of Nutrients in Marine water – 2019

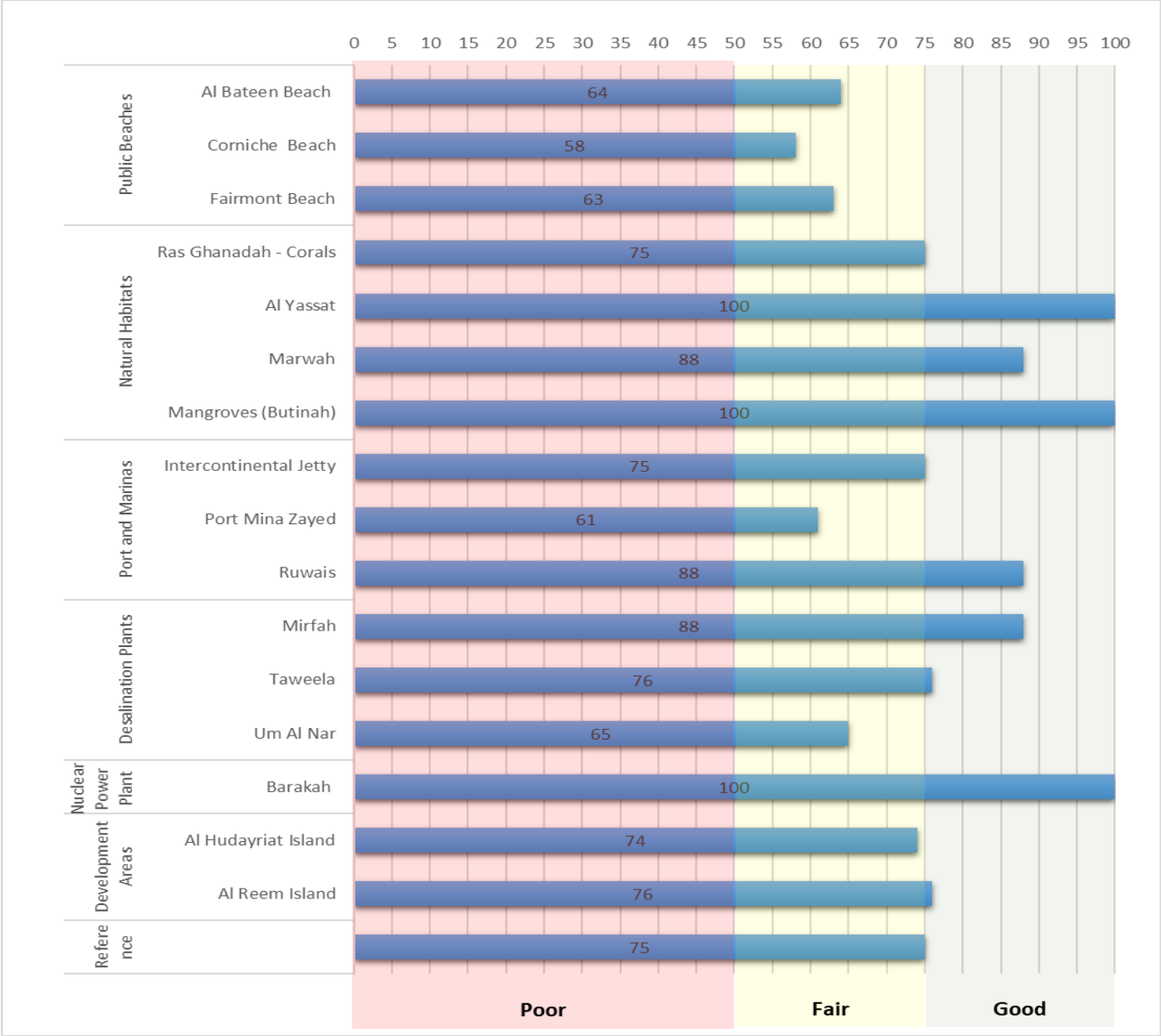
(microgram / litre)

Type	Name	Phosphate PO_4	Silicate SiO_3	Nitrite NO_2	Ammonia NH_3
Public Beaches	Al Bateen Beach	74.17	225.08	5.17	21.67
	Corniche Beach	125.83	279.83	16.83	17.50
	Fairmont Beach	130.00	294.50	5.08	15.83
Natural Habitats	Corals (Al Yasat)	107.50	114.50	17.50	15.00
	Ras Ghanadah - Corals	64.17	178.08	8.08	18.33
	Sea grass (Al Basam)	120.00	133.50	4.50	30.00
	Mangroves (Butinah)	80.00	186.50	17.00	20.00
Port and Marinas	Intercontinental Jetty	43.33	392.42	9.50	15.83
	Port Mina Zayed	78.33	353.58	11.50	27.50
	Ruwais	75.00	172.50	14.75	27.50
Desalination Plants	Mirfah	147.50	118.75	12.25	27.50
	Taweela	40.83	194.25	8.83	7.50
	Um Al Nar	160.83	254.92	8.50	9.17
Nuclear Power Plant	Barakah	33.00	123.00	7.25	7.50
Development Areas	Al Hudayriat Island	65.83	278.83	9.75	11.67
	Al Reem Island	75.00	239.33	17.25	5.83
Reference	Reference	90.00	231.83	10.83	24.17

Source: Environment Agency – Abu Dhabi

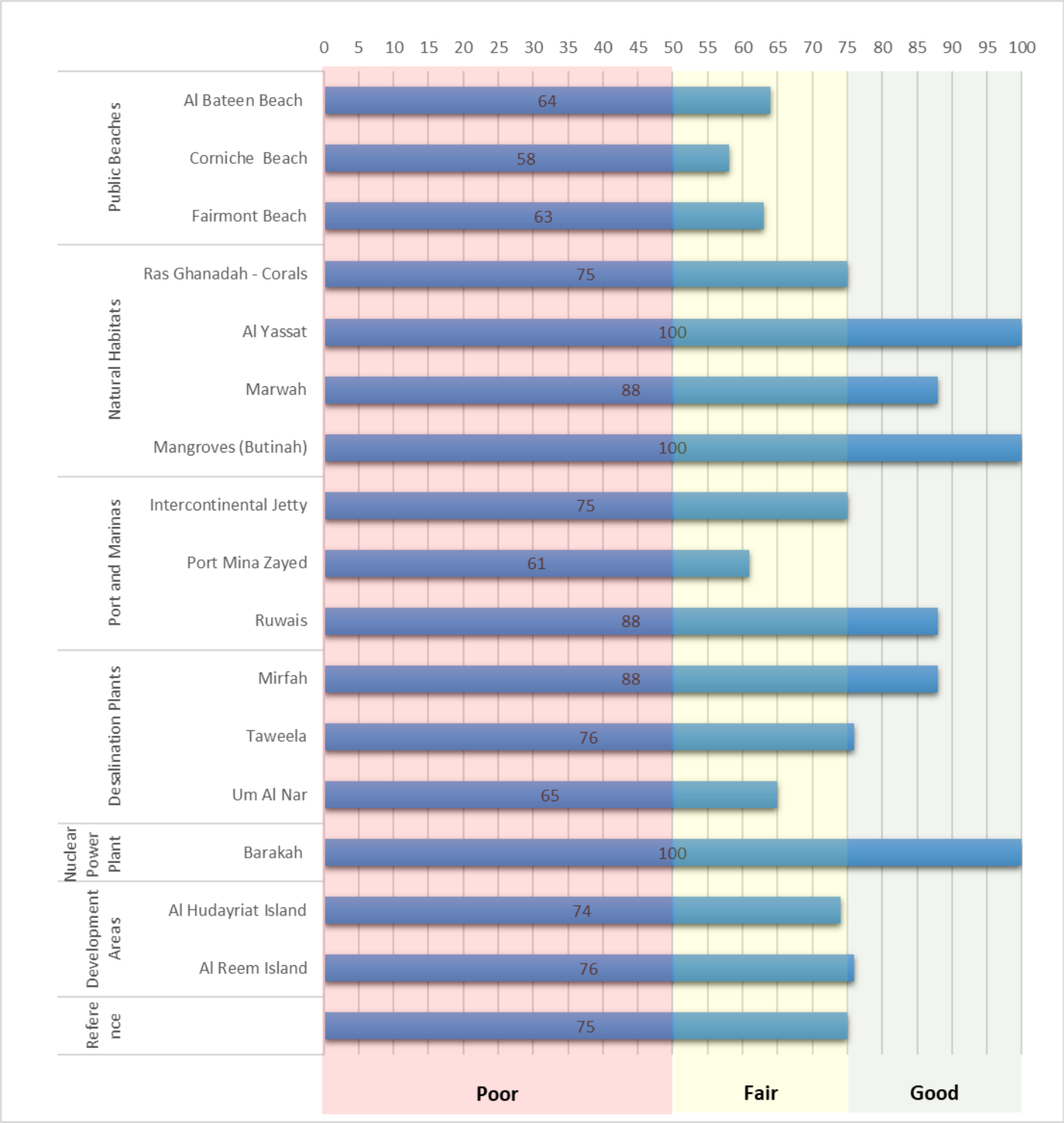
Monitoring programs rely on the continuous use of the marine water quality index to determine the state of marine water quality in relation to nutrient enrichment and the level of microbes and heavy metal deposits in water, as in Figs. 3, 4 and 5, respectively. The results are grouped into three categories to assess the situation: "Good" (75 ° and above), "Fair" (from 50 ° to 74 °) and "poor" (from 0 to 49 °).

Figure 3: Eutrophication Index of marine water quality of Abu Dhabi Emirate 2019



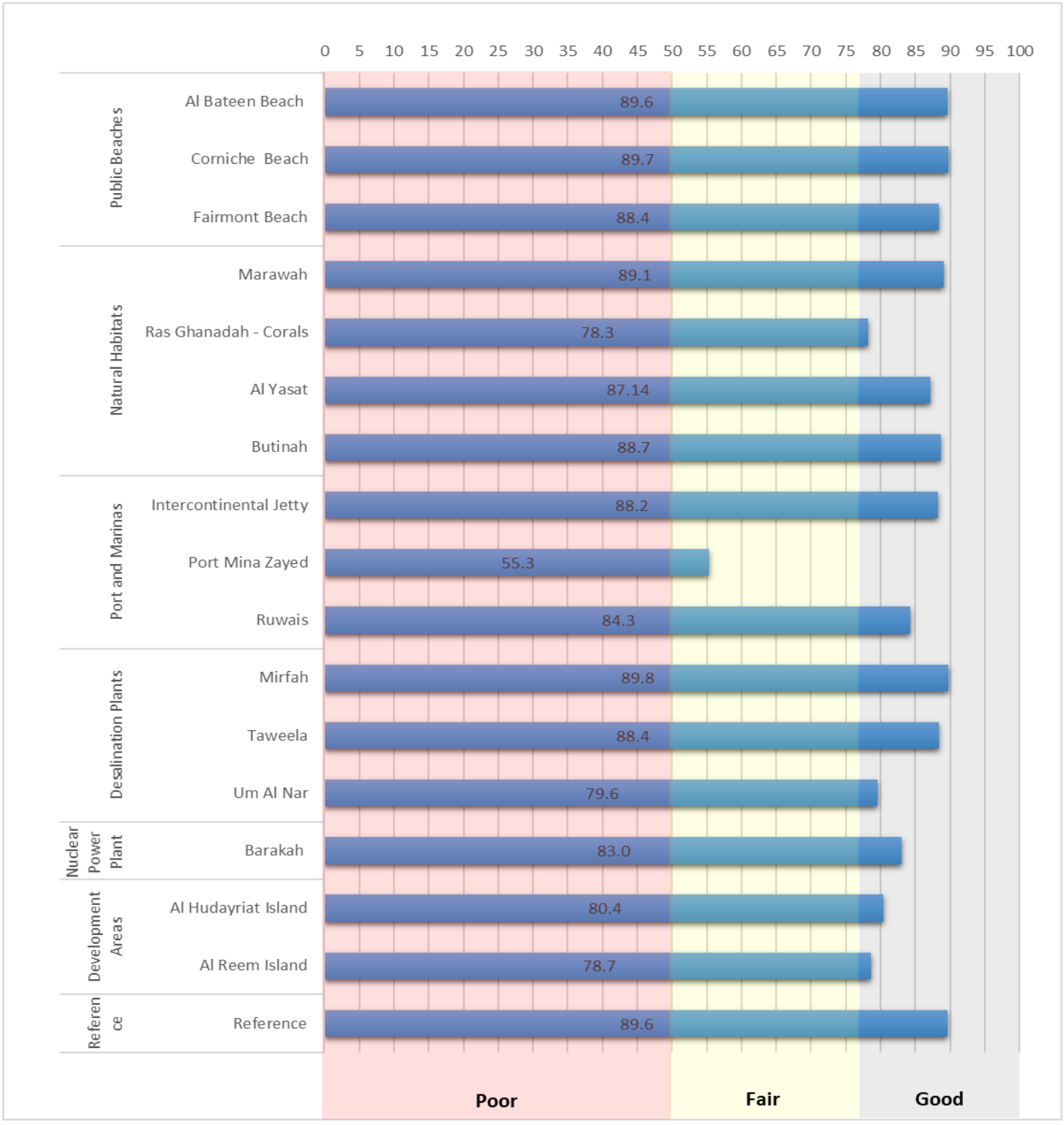
Source: Environment Agency – Abu Dhabi

Figure 4: Microbial Index of marine water quality of Abu Dhabi Emirate 2019



Source: Environment Agency – Abu Dhabi

Figure 5: Sediment Index of marine water quality of Abu Dhabi Emirate 2019



Source: Environment Agency – Abu Dhabi

Wastewater statistics

Quantity of wastewater

Wastewater treatment aims at reducing the pollution caused by different sources such as industry, and service and domestic activities. Wastewater treatment is one way of utilizing water and diversifying its sources, especially when water resources are scarce. Figure 5 shows the wastewater inflow, treated wastewater and treated wastewater reuse from 2012 to 2019. In 2019, the quantity of wastewater inflow totaled 312.2 MCM, an increase of 0.2% compared with 2018 as shown in table 2.1. Tables 2.2 and 2.3 illustrate that 96.4% of the total quantity of wastewater inflow was treated. Data shows that 62.5% of the treated wastewater was reused to irrigate green areas as shown in Figure 7.

Table 2.1: Quantity of wastewater inflow by region
(million cubic meter)

Region	2012	2013	2014	2015	2016	2017	2018	2019
Total	**275.5**	**295.0**	**322.7**	**344.4**	**335.6**	**319.6**	**311.6**	**312.2**
Abu Dhabi	203.7	219.7	237.2	259.4	254.1	242.6	237.7	237.6
Al Ain	58.4	60.5	71.2	71.5	67.7	64.4	62.8	63.7
Al Dhafra	13.4	14.8	14.3	13.5	13.8	12.6	11.1	10.9

Source: Abu Dhabi Sewerage Services Company (ADSSC)

Table 2.2: Quantity of treated wastewater by region
(million cubic meter)

Region	2012	2013	2014	2015	2016	2017	2018	2019
Total	**265.4**	**283.0**	**312.9**	**332.3**	**325.9**	**310.7**	**300.1**	**300.9**
Abu Dhabi	196.4	209.4	231.3	251.7	247.1	236.0	228.9	229.1
Al Ain	55.9	59.1	67.6	67.6	65.3	62.3	60.1	61.3
Al Dhafra	13.1	14.5	14.0	13.0	13.5	12.4	11.1	10.6

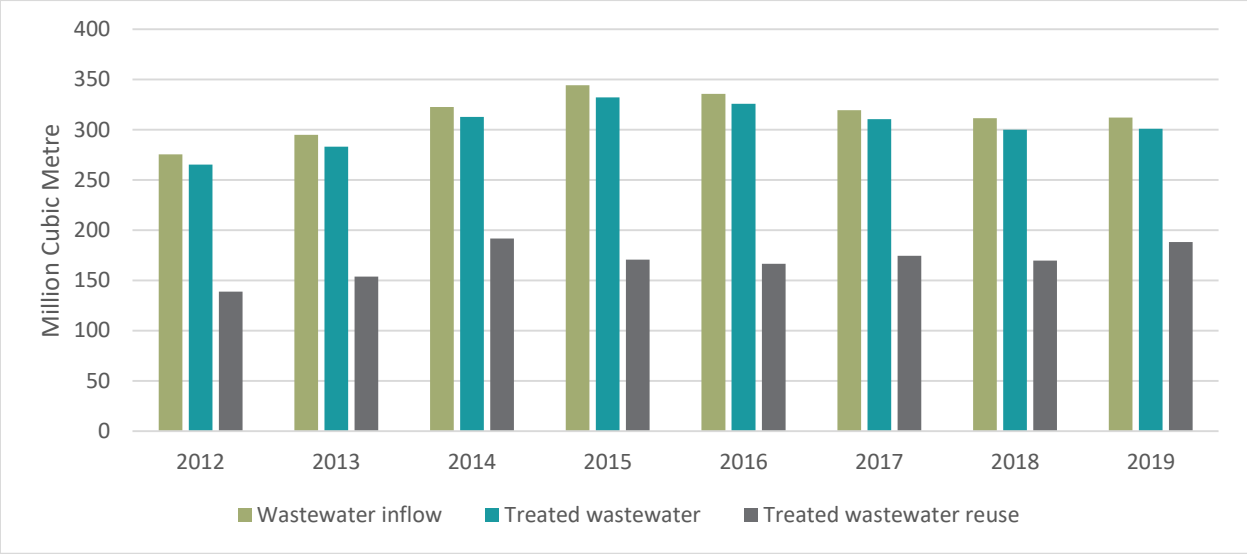
Source: Abu Dhabi Sewerage Services Company (ADSSC)

Table 2.3 : Quantity of treated wastewater reuse by region
(million cubic meter)

Region	2012	2013	2014	2015	2016	2017	2018	2019
Total	**138.8**	**153.8**	**191.7**	**170.8**	**166.5**	**174.4**	**169.6**	**188.2**
Abu Dhabi	75.4	86.5	115.6	95.7	91.1	101.8	99.7	117.2
Al Ain	54.8	58.0	66.0	64.6	63.7	61.3	59.4	60.6
Al Dhafra	8.6	9.3	10.1	10.5	11.7	11.3	10.5	10.5

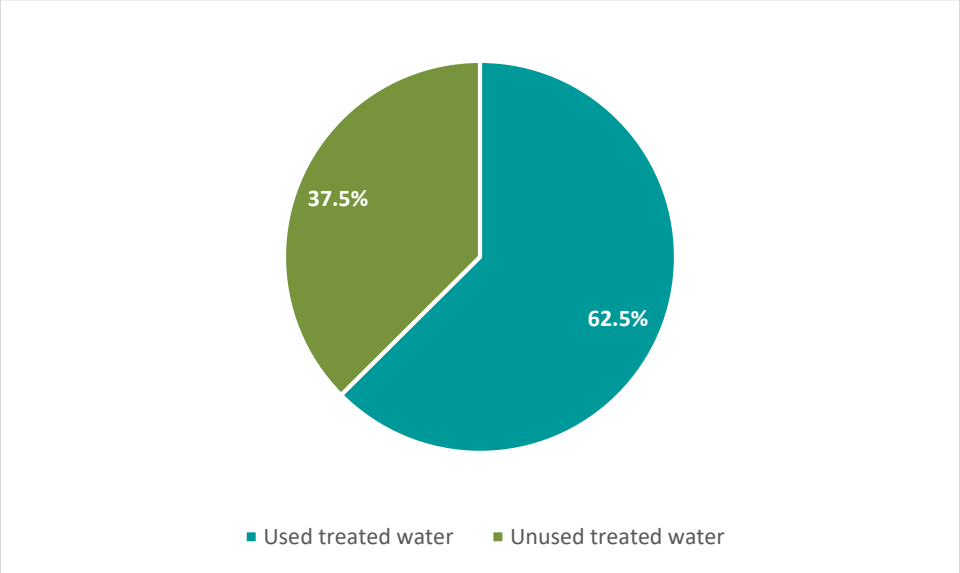
Source: Abu Dhabi Sewerage Services Company (ADSSC)

Figure 6: Quantity of wastewater



Source: Abu Dhabi Sewerage Services Company

Figure 7: Percentage distribution of treated wastewater Usage



Source: Statistics Centre - Abu Dhabi

Wastewater treatment plants capacity

The total capacity of wastewater treatment plants amounted to 476 MCM in 2019 decreased 0.5% compared with 2018. The conventional treatment plants accounted for the largest share of wastewater treatment plants at 99.2%, while non- conventional plants represent 0.97% as presented in tables 2.4-2.6.

Table 2.4: Total Wastewater Treatment Plants Capacity by Region

(Million cubic metre)

Region	2012	2013	2014	2015	2016	2017	2018	2019
Total	**405.2**	**470.5**	**466.8**	**470.4**	**474.7**	**473.2**	**473.7**	**476.3**
Abu Dhabi	328.6	344.4	369.9	369.9	370.6	369.4	369.9	369.9
Al Ain	65.3	112.7	81.7	81.7	82.4	82.2	82.2	84.6
Al Dhafra	11.3	13.4	15.2	18.8	21.7	21.6	21.6	21.7

Source: Abu Dhabi Sewerage Services Company

Table 2.5: Total Conventional Wastewater Treatment Plants Capacity by Region

(Million cubic metre)

Region	2012	2013	2014	2015	2016	2017	2018	2019
Total	**404.7**	**469.2**	**461.6**	**465.3**	**469.9**	**468.7**	**469.2**	**471.7**
Abu Dhabi	328.6	343.8	365.4	365.4	366.4	365.4	365.9	365.9
Al Ain	65.0	112.3	81.3	81.3	82.2	81.9	81.9	84.4
Al Dhafra	11.1	13.1	14.9	18.6	21.3	21.3	21.3	21.4

Source: Abu Dhabi Sewerage Services Company

Table 2.6: Total Non-Conventional Wastewater Treatment Plants Capacity by Region

(Million cubic metre)

Region	2012	2013	2014	2015	2016	2017	2018	2019
Total	**0.6**	**1.3**	**5.3**	**5.3**	**4.8**	**4.5**	**4.5**	**4.5**
Abu Dhabi	0.0	0.6	4.6	4.6	4.2	4.0	4.0	4.0
Al Ain	0.3	0.4	0.4	0.4	0.2	0.2	0.2	0.2
Al Dhafra	0.3	0.3	0.3	0.3	0.4	0.3	0.3	0.3

Source: Abu Dhabi Sewerage Services Company

In 2019, the percentage of operated organic load to designed load was 66%, where the hydraulic load of plant operating capacity stood at 855 thousand cubic meters. The percentage of operated hydraulic load to designed load was 46%, where the Organic load stood at 171 thousand kilograms per day, as shown in table 2.7.

Table 2.7: Status of Sewage Treatment Plants by Design and Operating Capacity to Hydraulic and Organic Load – 2019

Region	Plant Design Capacity		Plant Operating Capacity		Plant Status	
	Hydraulic Load (m^3/d)	Organic Load (Kg BOD / d)	Hydraulic Load (m^3/d)	Organic Load (Kg BOD/d)	Operated Hydraulic Load to Designed (%)	Operated Organic Load to Designed (%)
Total	**1,304,807**	**368,883**	**855,209**	**170,997**	**66%**	**46%**
Abu Dhabi	1,013,537	259,397	650,822	122,428	64%	47%
Al Ain	231,800	91,728	174,530	43,880	75%	48%
Al Dhafra	59,470	17,758	29,857	4,689	50%	26%

Source: Abu Dhabi Sewerage Services Company

Wastewater quality

With the increasing demand on wastewater treatment and reuse in the Emirate of Abu Dhabi, the environmental monitoring level and health standards of wastewater treatment, reuse or disposal also increased. There are several parameters that examine in the process of wastewater treatment, such as the daily amount of dry sludge, the concentrations of biochemical oxygen demand and suspended solids. Table 2.8 shows that wastewater is basically treated to produce water that conforms to the international standards for irrigation of green spaces or disposal in the sea.

The tables below shows the daily average of some pollutants types, where the daily amount of sludge production increased by 4.1% to 152.6 tons in 2019. In addition, the percentage of biochemical oxygen demand (BOD) decreased by 3.9% in 2019 from 2018.

Table 2.9: Average daily amount of dry sludge by region

(Tons/day)

Region	2012	2013	2014	2015	2016	2017	2018	2019
Total	**164.7**	**119.2**	**134.4**	**113.8**	**114.1**	**137.2**	**146.6**	**152.6**
Abu Dhabi	115.6	92.8	105.5	79.9	80.1	101.7	115.4	115.9
Al Ain	42.0	21.4	25.0	29.1	29.2	28.5	29.1	32.1
Al Dhafra	7.1	5.0	3.9	4.8	4.8	7.1	2.1	4.6

Source: Abu Dhabi Sewerage Services Company

Table 2.10: **Average daily concentration of BOD by region**

(kg/day)

Region	2012	2013	2014	2015	2016	2017	2018	2019
Total	**168**	**128.5**	**156.3**	**143.4**	**190.5**	**174.4**	**165.5**	**159.1**
Abu Dhabi	125	99.7	107.3	97.1	142.7	135.3	131.7	129.5
Al Ain	33	17.7	39	40.6	40.3	30.8	28.2	25.2
Al Dhafra	10	11.1	10	5.7	7.5	8.3	5.5	4.4

Source: Abu Dhabi Sewerage Services Company

Explanatory Notes

Glossary

This publication contains certain terms specific to the environment and necessary when analyzing the environment statistics of Abu Dhabi Emirate. They include the following terms:

Biochemical oxygen demands (BOD)

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 [(1).]

MICROBIAL INDEX

The Microbial Index indicates the level of bacterial contamination in marine waters that can pose a threat to public health and is based on parameters that are microbiological indicators of human fecal contamination in marine water, including enterococci (EN) and fecal coliform (FC) bacteria.

EUTROPHICATION INDEX

The Eutrophication Index indicates the level of nutrient over-enrichment of the coastal waters and is based on parameters associated with eutrophication, including nutrients (nitrate, phosphate, and ammonia), chlorophyll-a, and dissolved oxygen.

EUTROPHICATION

Eutrophication is the increase the concentration of the essential elements of plant nutrition nitrogen and phosphorus in lakes and dams because of the introduction of organic pollutants in it, leading to the growth of fish and its reflection on aquatic organisms. This process is slow in nature unless accelerated by human. Shallow seawater and narrow artificial lakes, lakes and dams when exposed to pollution.

SEDIMENT INDEX

The Sediment Index indicates the extent of metal contamination in marine sediments and is based on levels of heavy metal contaminants in sediment. The heavy metal parameters that are used to calculate the Sediment Index (Chromium, Cobalt, Lead, Zinc, Nickel, and MWQ MONITORING SITES IN ABU DHABI Mercury)

Biological treatment:

It is a wastewater treatment employing aerobic and anaerobic microorganisms that results in decanted effluents and separate sludge containing microbial mass together with pollutants. Biological treatment processes are also used in combination or in conjunction with mechanical treatment [(1)]

Desalinated Water:

Total volume of water obtained from desalination of (i.e., seawater and brackish water … etc) [(1).]

Mechanical treatment:

It is the treatment of a physical and mechanical nature that results in decanted effluents and separate sludge. Mechanical processes are also used in combination and/or in conjunction with biological and advanced unit operations. Mechanical treatment includes processes as sedimentation, flotation, etc. (1).

Seawater:

On average, seawater in the world's oceans has a salinity of ~3.5 percent. This means that for every 1 litre (1000 ml) of seawater there are 35 grams of salts (mostly, but not entirely, sodium chloride) dissolved in it (3).

Sewage sludge production (dry matter)

The accumulated settled solids, either moist or mixed, with a liquid component because of natural or artificial processes, that have been separated from various types of waste water during treatment (3).

Total public water supply:

Water supplied by economic units engaged in collection, purification and distribution of water including desalting of seawater to produce water as the principal product of interest, and excluding system operation for agricultural purposes and treatment of wastewater solely in order to prevent pollution. It corresponds to ISIC division 41. Deliveries of water from one pubic supply undertaking to another are excluded (1).

Total reuse of freshwater:

Freshwater that has undergone wastewater treatment and is deliverable to a user as reclaimed wastewater. This means the direct supply of treated wastewater to the users. Excluded is wastewater discharged into watercourse and used again downstream (1).

Total wastewater generated:

Quantity of water in cubic meters, which have no purpose to use, or because of its presence, quantity, or quality in the time in which it is found.

Total wastewater treatment:

Process to render wastewater fit to meet applicable environmental standards or other quality norms for recycling or reuse (1).

Treated in other treatment plants:

Treatment of wastewater in any non-public treatment plants, i.e. industrial wastewater plants. Excluded from 'Other wastewater treatment' is treatment in under independent treatment facilities such as septic tanks (1).

Treatment in independent treatment facilities:

Individual private treatment facilities to treat domestic and other wastewater in cases where a public wastewater network is not available or not justified because it would produce no environmental benefits. Examples of such systems are treatment in wastewater tanks (1).

Wastewater treated in public treatment plants:

All treatment of wastewater in municipal treatment plants by official authorities, or by private companies for local authorities, whose main purpose is wastewater treatment [(1).]

Water transmission system availability:

Water Transmission System Availability is calculated in percentage in terms of the summation of the availabilities of transmission system components, such as pumps, water transmission lines, storage tanks, and surge vessels.

Data sources

The key sources of data used in the report are the Environment Agency - Abu Dhabi, Abu Dhabi Water and Electricity Company – ADWEC, Abu Dhabi Distribution Company, Al Ain Distribution Company, Abu Dhabi Water & Electricity Authority - ADWEA, Abu Dhabi Sewerage Services Company (ADSSC) and Abu Dhabi Transmission & Dispatch Company (TRANSCO).

The data are processed and passed to Statistic Centre – Abu Dhabi for further editing and compilation.

Notes on tables

Unless otherwise indicated, all figures released in this publication pertain to the Emirate of Abu Dhabi. Unless details in tables refer to regions, the figures relate to the total of the Emirate. Wherever "Abu Dhabi" is used in this publication, it refers to Abu Dhabi region and not to the whole Emirate.

Due to rounding, some totals may not equal the sum of components.

More information and next release

For more information about environmental statistics and other official statistics, please visit the statistics link on the SCAD website at www.scad.gov.ae

The next release is expected in November 2021 for 2020 data.

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"1. United Nations Economic and Social Commission for Western Asia (ESCWA). (2007). Compendium of environment statistics in the ESCWA region. New York"

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