

Environment Statistics in the State of Qatar 2022



منطقة أم باب, قطر

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His Highness
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Environment Statistics in the State of Qatar 2022

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Preface

National Planning Council (NPC) is pleased to present its sixth edition of the Environment Statistics Report 2022. The environmental development, being the fourth pillar of Qatar Vision 2030, has been distinctively embodied in the programs of the National Development Strategy to emphasize the importance of having integrated programs based on modern and comprehensive environmental statistics. Work is underway to establish a renewed environmental information base that will be a national reference based on the latest international standards, and a reliable source of environmental information to make knowledge-based decisions and provide the publics with a comprehensive report on the state of the environment.

The NPC obtains environmental data from several sources such as ministries and relevant public institutions. In order to provide these basic environmental data and indices in line with international standards to serve planners, workers, researchers and those interested in the environment, there must be a coordination between relevant ministries and institutions.

The report is prepared based on Qatar Environment Statistics National Framework emanating from the UN Environment Statistics Framework, and the DPSIR framework. This framework consists of the driving forces affecting the environment along with the pressures generated by the needs of these forces (population and economy) on the environment, state of the environment in light of these resulting pressures and impacts to meet such needs, and the role of the government and various sectors in protecting and managing the environment.

This report outlines the close cooperation with all key stakeholders, both governmental and non-governmental. National Planning Council avails this opportunity to extend its sincere thanks and appreciation to all ministries, government agencies and public and private institutions that have contributed to providing the statistical information contained in this report. The NPC hopes that those interested in this field will provide objective and constructive feedback that can contribute to the development of the next issues of this report and improve the quality of environment statistics in Qatar.

Abdulaziz bin Nasser Al Khalifa
Secretary General
National Planning Council

Acknowledgement

National Planning Council extends its sincere thanks and appreciation to the ministries, institutions and government agencies for their cooperation in providing the necessary data, which had a great impact on the preparation of the Environment Statistics Report in the State of Qatar. The NPC would also like to thank all those who contributed to the preparation of the report at all stages.

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Introduction

Qatar National Vision QNV 2030 pays special attention to the environment pillar, which is unparalleled in many Middle Eastern countries. It accords equal importance to the environmental development pillar with the rest of QNV's four pillars: human development, social development and economic development.

The Environment Statistics Report reflects NPC's effectiveness in publishing updated comprehensive environment statistics that serve as a national reference and an index of measurement of the environment sector's national strategy, which is the executive tool of QNV 2030. The report also helps in the establishment of a national environment database that serves as a beacon for researchers, planners, academics and entrepreneurs.

Objectives of the Environment Statistics Report

1. Provide statistical data on various environment elements and their distribution in Qatar, and monitor the environment indicators in terms of state of the environment and impact on the environment, among others.
2. Combine planning tools with the environment statistical indicators.
3. Monitor the value of Qatar's contributions and assistance to preserve the global environment.
4. Measure goods and services provided by the environment to the economy, and measure the impact of the economy on the environment.
5. Increase community awareness of the importance of preserving the environment, and support efforts to protect it.
6. Provide data on available and stocked natural resources and the safe extraction of those resources.
7. Provide data on environment pollutants by type, source and impact on the environment.
8. Provide information on the responses and actions taken to protect the environment in Qatar.
9. Contribute to the provision of data for indicators of Environmental Sustainable Development Goals, especially in the second and third tiers, which still require more effort at the level of methodologies and availability of data sources.

The report is divided into five chapters as follows:

Chapters	Domains
1. Environment indicators in the 2030 Sustainable Development Goals	1. Summary of environment indicators in the SDGs
2. Driving Forces	1. Geographical and natural characteristics of the State of Qatar 2. Population indicators 3. Economic indicators
3. Pressures on the environment	1. Land use 2. Water Demand 3. Power generation 4. Means of transport 5. Connection of completed buildings to public utilities 6. Wastewater from urban areas
4. State of the environment and impact on the environment	1. Climate, lunar/solar eclipses and earthquakes 2. Biodiversity 3. Water Resources 4. Solid waste 5. Hazardous waste 6. Power consumption 7. Air Quality 8. Greenhouse gases 9. Ozone-depleting substances 10. Environment Pollution-Related Diseases
5. Response activities for the environment protection and management	1. Expenditure on environment protection 2. Employees, Volunteers, Trainers and Participants in Various Environment Programs 3. Environmental compliance activities 4. Sustainability assessment and green buildings 5. Environmental awards 6. National entities and institutions that publish sustainability reports 7. Scientific research, academic projects and program research on various environmental activities 8. Environment-Related Legislation, Laws and International Agreements 9. New projects subject to environmental impact assessment 10. Environmental education 11. Environmental investment (green economy) 12. Natural Disaster Preparedness

Environment Data Sources

The environment statistics data is obtained from several sources: administrative records of data producers, general censuses and specialized environmental surveys.

1. Administrative Records Data from Environment-Protection Authorities

The environment statistics are collected from various environment-related ministries and government institutions and administrations based on their competence, and from private environment-related organisations and associations. The environment statistics are also collected from various statistical departments in the NPC, such as the Information Systems Dept. These public and private institutions concerned with the environment are contacted and visited in order to provide updates on environmental data and information, and to identify their emerging requirements.

2. General Census

The data on completed buildings and residential units connected to public utilities (water, electricity and sewage network) are collected through the general census which is conducted every 10 years.

3. Specialized Environmental Surveys

The environment data and information are collected through pre-prepared questionnaires that target several public and private agencies concerned with the environment. The District Cooling Survey was carried out targeting national private and public entities in various economic sectors which apply district cooling system for their own use or to provide cooling service for their customers.

This report targets decision-makers and program planners working in environment-related government agencies and institutions, universities and scientific research centers, media, environment protection and conservation activists, and environment-related regional and international organizations.

Chapter One

Environment Indicators in the 2030 SDGs



Environment Indicators in the 2030 SDGs

This chapter includes the prominent environmental indicators of the State of Qatar in the 2030 SDGs, which highlight the progress made over the years for the demographic, economic, educational and other intersections.

1. Summary of environment indicators in the 2030 Sustainable Development Goals

1-4-1 Proportion of population living in households with access to basic services

Table 1.1: Proportion of population living in households with access to basic services, 2017-2022

Basic Services	2030 SDG Indicator	2017	018	2019	2020	2021	2022
drinking water service	6.1.1 6.2.1	100%	100%	100%	100%	100%	100%
Sanitation service		100%	100%	100%	100%	100%	100%
Hygiene facilities		100%	100%	100%	100%	100%	100%
Electricity	7.1.1 7.2.1	100%	100%	100%	100%	100%	100%
Clean fuel		100%	100%	100%	100%	100%	100%
Mobility	9.1.1 11.2.1	100%	100%	100%	100%	100%	100%
Solid waste collection		100%	100%	100%	100%	100%	100%
Liquid waste collection	11.6.1 12.4.2 12.5.1	100%	100%	100%	100%	100%	100%
Healthcare		100%	100%	100%	100%	100%	100%
Education	4.1.1 9.C.1 17.6.1 17.8.1	100%	100%	100%	100%	100%	100%
Broadband Internet		100%	100%	100%	100%	100%	100%
Telecommunications		100%	100%	100%	100%	100%	100%
Transport routes	9.1.1	100%	100%	100%	100%	100%	100%
Banking services	8.10.1 8.10.2	100%	100%	100%	100%	100%	100%
Total population with access to all services		100%	100%	100%	100%	100%	100%

Source: National Planning Council

1-4-2 Proportion of total adult population with secure tenure rights, (a) with legally recognized documentation, and (b) who perceive their rights to land as secure, by sex and type of tenure.

Table 1.2: Number and percentage of adult owners (18 years and above) by sex, 2017-2020

Type of ownership	Nationality	Sex	2017	2018	2019	2020
Individual Ownership	Qataris	Male	5,292	6,071	12,114	15,260
		Female	3,333	3,467	8,787	8,968
		Total	8,625	9,538	20,901	24,228
	Non-Qataris	Male	73	87	94	124
		Female	136	114	181	170
		Total	209	201	275	294
	Total	Male	5,365	6,158	12,208	15,384
		Female	3,469	3,581	8,968	9,138
		Total	8,834	9,739	21,176	24,522
Collective ownership that includes owners, heirs, orphans, establishments and others	Qataris	Joint ownership by both sexes	126	87	19,425	18,796
	Non-Qataris		11	9	5	6
	Total		137	96	19,430	18,802

Source: Ministry of Justice and NPC calculations.

Table 1.3: Share of adult owners (18 years and above) by nationality, sex and type of property, 2017-2020

Type of Ownership	Nationality	Sex	2017	2018	2019	2020
Individual Ownership	Qataris	Male	6.4	7.2	13.9	17.0
		Female	3.7	3.8	9.3	9.2
		Total	5.0	5.4	11.5	12.9
	Non-Qataris	Male	0.00	0.00	0.01	0.01
		Female	0.04	0.03	0.04	0.04
		Total	0.01	0.01	0.01	0.01
	Total	Male	0.3	0.3	0.7	0.9
		Female	0.7	0.7	1.7	1.6
		Total	0.4	0.4	0.9	1.1
Collective ownership that includes owners, heirs, orphans, establishments and others	Qataris	Joint ownership by both sexes	0.1	0.0	10.7	10.0
	Non-Qataris		0.0	0.0	0.0	0.0
	Total		0.0	0.0	0.8	0.8
Gender parity index for Individual Ownership	Qatari ownership	Female/Male	0.6	0.5	0.7	0.5
	Non-Qatari ownership	Female/Male	0	0	4	4
	Total Ownership	Female/Male	2.33	2.33	2.43	1.78

Source: Ministry of Justice and NPC calculations.

1-5-1 Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population.

Table 1.4: Number of people infected by the Coronavirus and directly affected persons attributed to disasters per 100,000 population, 2017-2021

Sub-indicator	Sex	Age Group	2017	2018	2019	2020	2021
Directly affected people by disasters per 100,000 population	Male	All age groups	0	0	0	5,434.8	3,455.3
	Female		0	0	0	3,449.0	5,044.4
	Total		0	0	0	4,868.7	3,904.9
Directly affected people by disasters per 100,000 population by age group	Total	0 – 14 years	0	0	0	10,685.8	1,865.3
		15 – 64 years	0	0	0	3,767.7	1,114.8
		65 years and above	0	0	0	4,542.4	1,762.8

Source: Ministry of Public Health, Ministry of Interior and National Planning Council calculations.

Table 1.5: Number of deaths attributed to Coronavirus and disasters per 100,000 population, 2017-2021

Sub-indicator	Sex	Age Group	2017	2018	2019	2020	2021
Deaths due to disasters per 100,000 population	Male	All age groups	0	0	0	10.3	13.8
	Female		0	0	0	4.6	10.9
	Total		0	0	0	8.6	13
Deaths due to disasters per 100,000 population by age group	Total	0 – 14 years	0	0	0	0	0.2
		15 – 64 years	0	0	0	5.6	9.9
		65 years and above	0	0	0	327.1	338.9

Public Health, Ministry of Interior and National Planning Council Calculations.

Table 1.6: Damage to critical infrastructure and (b) number of failures to basic services due to disasters, 2017-2021

Statement	2017	2018	2019	2020	2021
Number of critical infrastructure affected by disasters	0	0	0	0	0
Number of health facilities destroyed or damaged by disasters	0	0	0	0	0
Number of educational facilities destroyed or damaged by disasters	0	0	0	0	0
Number of critical infrastructure units and other facilities destroyed or damaged by disasters	0	0	0	0	0
Number of interruptions in basic services due to disasters	0	0	0	0	0
Number of interruptions in educational services due to disasters	0	0	0	0	0
Number of interruptions in health services due to disasters	0	0	0	0	0
Number of interruptions in other basic services due to disasters	0	0	0	0	0

Source: Ministry of Interior

1-5-2 Direct economic losses attributed to disasters in relation to Gross Domestic Product (GDP)

Table 1.7: Value of direct economic losses attributed to disasters as a percentage of GDP, 2017-2021

Indicator	2017	2018	2019	2020	2021	Goal by 2030
Value of direct economic losses attributed to disasters as a percentage of GDP	0.0	0.0	0.0	0.0	0.0	Reduce

Source: National Planning Council

1-5-3 Countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015-2030

Table 1.8: Availability of National Disaster Risk Reduction Strategies In line with the Sendai Framework for Disaster Risk Reduction (2017-2021)

Indicator	2017	2018	2019	2020	2021	Goal by 2030
Availability of national strategies for disaster risk reduction in line with the Sendai Framework for Disaster Risk Reduction (Yes = 1, No = 0)	1	1	1	1	1	1

Source: Ministry of Interior

1-5-4 Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies

Table 1.9: Proportion of local governments adopting and implementing local disaster risk reduction strategies in line with national disaster risk reduction strategies 2017-2021

Indicator	2017	2018	2019	2020	2021	Goal by 2030
Local governments that adopt and implement local disaster risk reduction strategies in line with national strategies*	1	1	1	1	1	1
Total number of local governments	1	1	1	1	1	1
Indicator	100%	100%	100%	100%	100%	100%

*Note: Doha is the State Central Government

Source: Ministry of Interior

3-9-2 Mortality rate attributable to unsafe water, unsafe sanitation and lack of hygiene (exposure to unsafe Water, Sanitation and Hygiene for all (WASH) services)

Table 1.10: Mortality rate per 100,000 population by cause of death 2017-2022

Cause of Death	2017	2018	2019	2020	2021	2022	Goal by 2030
Unsafe water	0	0	0	0	0	0	Reduce
Unsafe sanitation	0	0	0	0	0	0	Reduce
Lack of cleaning supplies	0	0	0	0	0	0	Reduce
Total	0	0	0	0	0	0	Reduce

5.a.1 (a) Proportion of total agricultural population with ownership or secure rights over agricultural land, by sex; and (b) share of women among owners or rights-bearers of agricultural land, by type of tenure

Table 1.11: Proportion of population with ownership or secure rights over agricultural land, by sex, 2017-2021

Sex	2017	2018	2019	2020	2021	Goal by 2030
Males	100%	100%	100%	100%	100%	100%
Females	100%	100%	100%	100%	100%	100%
Total	100%	100%	100%	100%	100%	100%

Source: Ministry of Municipality

Table 1.12: Proportion of female population with ownership or secure rights over agricultural lands, by type of land, type of tenure, owner's nationality and sex for the age group (18 years and above), 2017-2021

Type of Land	Type of Tenure	Sex	2017	2018	2019	2020	2021
Agricultural land (farms)	Individual ownership	Male	1,037	1,000	655	892	638
		Female	119	98	127	85	88
		Total	1,156	1,098	782	977	726
	Collective ownership	Total	154	150	462	246	290
Livestock ranches (Izbaas)	Individual ownership	Male	5,559	...	1,012	5,584	5,867
		Female	969	...	114	975	816
		Total	6,528	...	1,126	6,556	6,683
	Collective ownership	Total	2	...	128	2	132
Share of owners or rights holders in agricultural land (farms)	Individual ownership	Male	1.26	1.19	0.75	1.00	87.9
		Female	0.13	0.11	0.13	0.09	12.1
		Total	0.68	0.62	0.43	0.52	100.0
Share of owners or rights holders in livestock ranches (Izbaas)	Individual ownership	Male	6.77	...	1.16	6.24	87.8
		Female	1.09	...	0.12	3.50	12.2
		Total	3.81	...	0.62	3.50	100.0

...:Unavailable.

Ranch (Izbaa): is every building constructed to manage and practice activities related to livestock, plants or both. The building is usually built on relatively limited areas and is equipped to take care of animals, grow plants or both for a non-commercial purpose. These activities are often practiced there for personal interests (definition source: NPC)

Source: Ministry of Municipality and Environment and NPC calculations.

5.a.2 Countries where the legal framework (including customary law) guarantees women's equal rights to land ownership and/or control

Table 1.13: Availability of legal framework that guarantees women's equal rights to land ownership and/or control, 2017-2022

Sub-indicator	2017	2018	2019	2020	2021	2022	Goal by 2030
(a) Degree to which the legal framework (including customary law) guarantees women's equal rights to land ownership and/or control (1 = no evidence up to 6 = highest level of guarantees)	6	6	6	6	6	6	6
(b) Countries where the legal framework (including customary law) guarantees women's equal rights to land ownership and/or control (%)	100%	100%	100%	100%	100%	100%	100%

Source: Ministry of Justice and National Planning Council

6-1-1 Proportion of population using safely managed drinking water services

Table 1.14: Proportion of population using safely managed drinking water services, 2017-2022

Unit	2017	2018	2019	2020	2021	2022	Goal by 2030
Ratio	100%	100%	100%	100%	100%	100%	100%

Source: Qatar General Electricity & Water Corporation

6-2-1 Proportion of population using safely managed sanitation services, including a handwashing facility with soap and water

Table 1.15: Proportion of population using safely managed sanitation services, including a handwashing facility with soap and water, 2017-2022

Statement	Unit	2017	2018	2019	2020	2021	2022	Goal by 2030
Sanitation Services	%	100%	100%	100%	100%	100%	100%	100%
Hand washing facility with soap and water (hygiene)	%	100%	100%	100%	100%	100%	100%	100%
Proportion of population that defecate in the open	%	0%	0%	0%	0%	0%	0%	0%

Source: Public Works Authority

6-3-1 Percentage of safely treated wastewater

Table 1.16: Wastewater statistics by treated water, type of treatment, reuse and wastewater treatment ratio, 2017-2021

Statement	Characteristics	2017	2018	2019	2020	2021
Amount of wastewater collected (MCM/yr)		231.5	257.8	278.2	291.5	255.05
Treated wastewater by type of treatment (MCM/yr)	Primary treatment – Mechanical	0	0	0	0	0
	Secondary treatment	0.4	0.4	0.4	0.4	0.3
	Tertiary treatment (disinfection)	51.6	48.2	52	45.3	41.0
	Tertiary treatment (nitrogen and phosphorus removal)	179.7	209.3	225.9	246	212.0
	Total	231.7	257.9	278.3	291.7	253.2
Percentage of wastewater treated in wastewater plants %		98.9	99.4	99.6	99.7	99
Sewage water is not collected in the sewage network and is discharged without treatment (MCM)		2.4	1.6	1	0.8	0.700
Sewer sludge production (tons of dry solids per year)		41,554.1	37,687.6	39,096.1	40,959.7	41348.9
Use of treated wastewater (thousand cubic meters)	Agricultural Irrigation	69.5	79.7	86.1	89	77.16
	Irrigation of green areas	61	71.2	76.6	86.6	107.86
	Injection into underground reservoirs	63.9	66.9	79.7	78.1	54.70
	Discharge in lakes	33.8	38.2	33	32.3	13.40
	Discharge into the sea	0.5	0.5	0.7	0.1	0.11

Source: Public Works Authority and National Planning Council calculations.

6-4-1 Change in water-use efficiency over time

Table 1.17: Water Use Efficiency by Sectors, 2017-2021

Variable	Sector	Unit	2017	2018	2019	2020	2021
Amount of water used	Agriculture	MCM/ year	299.64	310.0	316.3	322.0	311.1
	Industry		21.8	35.8	44.2	39.2	40.2
	Municipal / Service*		406.0	408.0	527.6	527.6	582.9
	Total		727.4	753.8	888.1	888.7	934.1
Value added at constant prices 2015=100	Agriculture	Million QR	1,265.8	1,296.2	1,546.6	1,963.0	1,738.3
	Industry		333,424	357,921	339,762	303,040	349,150
	Municipal / Service*		279,535.6	256,608.5	276,602.3	305,879.1	261,244.1
	Total		614,225.0	615,826.1	617,910.6	610,881.8	612,132.6

Variable	Sector	Unit	2017	2018	2019	2020	2021
Water efficiency	Agriculture	QR/ m3	4.2	4.2	4.9	6.1	5.6
	Industry		15,295.0	10,003.4	7,690.4	7,734.6	8,689.6
	Municipal / Service*		688.5	628.9	524.2	579.8	448.2
	Total		844.0	816.8	695.5	687.1	655.0
Rate of change in water use efficiency	Agriculture	Rate	14%	-1%	17%	25%	-8%
	Industry		67%	-35%	-23%	1%	12%
	Municipal / Service*		44%	-9%	-17%	11%	-23%
	Total		31%	-3%	-15%	-1%	-5%

The industrial sector: includes the following economic activities (electricity, gas, water supply, sewage and waste management, mining and quarrying, manufacturing and construction).

The commercial sector: includes the following economic activities (wholesale and retail trade, transport and storage, accommodation services, financial and insurance, real estate and private household activities, as well as employers and production activities that are not distinct from private families).

Source: NPC, Kahramaa and Ashgal.

6-4-2 Level of water stress: freshwater withdrawal as a proportion of available freshwater resources

Table 1.18: Level of water stress: freshwater withdrawal as a proportion of available freshwater resources, 2017-2021

Statement	2017	2018	2019	2020	2021
Indicator	%229	%247	%280	%396	236%

Source: KAHARAMAA

6-5-1 Degree of integrated water resources management implementation (0–100)

Table 1.19: Degree of integrated water resources management implementation, 2017-2021

Statement	2017	2018	2019	2020	2021	Goal by 2030
Enabling environment	55	55	60	80	80	100
Establishments & companies	100	100	90	94	94	100
Management tools	87.5	87.5	90	88	88.9	100
Finance	85	85	85	100	100	100
Degree of integrated water resources management implementation (0-100)	82	82	81	90.5	90.7	100

Source: KAHARAMAA

6.b.1 Proportion of local administrative units with established and operational policies and procedures for participation of local community in water and sanitation management

Table 1.20: Proportion of local administrative units with established and operational policies and procedures for participation of local community in water and sanitation management, 2017-2022

Sub-indicator	2017	2018	2019	2020	2021	2022	Goal by 2030
Number of local administrative units with local participation policies and procedures	2	2	2	2	2	2	-
Total number of local administrative units in the country.	2	2	2	2	2	2	-
Index (%)	100	100	100	100	100	100	100

Source: KAHRAMAA and Ashgal

7-1-1 Proportion of population with access to electricity services

Table 1.21: Proportion of population with access to electricity services, 2017-2022

Type of Service	Unit	2017	2018	2019	2020	2021	2022	Goal by 2030
Indicator	%	100	100	100	100	100	100	100

Source: KAHRAMAA and Ashgal.

7-1-2 Proportion of population with primary reliance on clean fuels and technology

Table 1.22: Proportion of population with primary reliance on clean fuels and technology, 2017 -2022

Type of Service	Unit	2017	2018	2019	2020	2021	2022	Goal by 2030
Clean Fuels	%	100	100	100	100	100	100	100
Clean Technology	%	100	100	100	100	100	100	100

Source: National Planning Council

7-2-1 Renewable energy share in the total final energy consumption

Table 1.23: Renewable energy share in the total final electricity consumption, 2017-2020

Type of Service		2017	2018	2019	2020	Goal by 2030
Sector	Lost Transmission and Distribution	2,694,696	2,786,404	2,772,002	2,774,269	-
	Loss of transport and distribution	2,831,204	3,258,544	3,440,493	3,433,881	
	Electricity consumption at generation plants	11,261,941	12,197,379	12,124,082	10,464,179	-
	Electricity consumption in industrial sector	32,095,345	32,765,544	31,536,113	33,802,149	-
	Domestic electricity consumption	46,188,490	44,962,923	44,015,730	43,527,946	-
Production	Total consumption (A)	43,459,957	45,065,903	46,434,716	45,826,447	-
	Total electricity production	45,554,730	47,912,684	49,872,690	49,258,957	-
Amount of renewable energy by type (MW per year)	The sun	10	5	7	8	Increase
	Waste incineration	40	40	41	41	Increase
	Total (B)	50	45	48	49	Increase
Total renewable and non-renewable total electricity consumption (MWr per year)		48,883,236	51,007,916	49,872,738	50,474,527	-
Renewable energy share in the total final electricity consumption (total consumptions) (%)		0.0001%	0.0001%	0.0001%	0.0001%	Increase

Source: KAHRAMAA and NPC calculations.

7.a.1 International financial flows to developing countries in support of clean energy research and development and renewable energy production, including in hybrid systems

Table 1.24: Value of Development Assistance for SDG 7, 2017-2021

SDG	SDG Title	Unit	2017	2018	2019	2020	2021	Goal by 2030
7	Clean and affordable energy	QR	623,031,444	104,798,152	82,759,556	92,524,695	245,065,560	Increase
		US\$	171,162,485	28,790,701	22,736,142	25,418,872	67,325,703	Increase

Source: Ministry of Foreign Affairs

9-1-1 Proportion of rural population who live within 2 km of an all season road

This indicator does not apply to Qatar.

11-1-1 Proportion of urban population living in slums, informal settlements or inadequate housing

Table 1.25: Proportion of urban population living in slums, informal settlements or inappropriate housing, 2017-2022

Sub-index	2017	2018	2019	2020	2021	2022
(a) Proportion of people living in slums	0%	0%	0%	0%	0%	0%
(b) Number of people living in slums	0	0	0	0	0	0

Source: National Planning Council

11-3-1 Ratio of land consumption to population growth rate

Table 1.26: Area of consumed land, population, annual growth rates and general average of the index, 2017-2021

Statement	2017	2018	2019	2020	2021
Area of consumed land (km2)	1193	1251	1394	1430	1,663
Population	2,724,606	2,760,170	2,799,202	2,833,679	2,748,162
Annual growth rate of consumed land	16%	5%	11%	3%	16%
Annual population growth rate	4%	1%	1%	1%	-3%
General Index	3.98	3.72	8.08	2.10	-5.40

* The area of urban land for the year 2016 was estimated by National Planning Council

Source: Ministry of Municipality

Source: National Planning Council

11-5-1 Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population

Table 1.27: Number of persons infected by Coronavirus and persons affected by disasters per 100,000 population, 2017-2021

Sub-indicator	Sex	Age Group	2017	2018	2019	2020	2021
Persons affected by disasters per 100,000 population	Male	All age groups	0	0	0	5,434.8	3,455.3
	Female		0	0	0	3,449.0	5,044.4
	Total		0	0	0	4,868.7	3,904.9
Persons affected by disasters per 100,000 population by age group	Total	0 – 14 years	0	0	0	10,685.8	1,865.3
		15 – 64 years	0	0	0	3,767.7	1,114.8
		65 years and above	0	0	0	4,542.4	1,762.8

Source: Ministry of Public Health, Ministry of Interior and National Planning Council calculations.

Table 1.28: Number of deaths attributed to Coronavirus and to disasters per 100,000 population, 2017-2021

Sub-indicator	Sex	Age Group	2017	2018	2019	2020	2021
Deaths attributed to disasters per 100,000 population	Male	All age groups	0	0	0	10.3	13.8
	Female		0	0	0	4.6	10.9
	Total		0	0	0	8.6	13
Deaths attributed to disasters per 100,000 population by age group	Total	0 – 14 years	0	0	0	0	0.2
		15 – 64 years	0	0	0	5.6	9.9
		65 years and above	0	0	0	327.1	338.9

Source: Ministry of Public Health, Ministry of Interior and National Planning Council calculations.

11-5-2 Direct economic loss related to global GDP, damage to critical infrastructure and number of disruptions to basic services, attributed to disasters.

Table 1.29: Value of direct economic loss related to global GDP, damage to critical infrastructure and number of disruptions to basic services, attributed to disasters, 2017-2021

Sub-indicator	2017	2018	2019	2020	2021
Value of loss (QR)	0	0	0	0	0
Number of disruptions	0	0	0	0	0

Source: Ministry of Interior

11-6-1 Proportion of municipal solid waste collected and managed in controlled facilities out of total municipal waste generated, by cities.

Table 1.30: Proportion of municipal solid waste collected and managed in controlled facilities out of total municipal waste generated, 2017-2021

Sub-indicator	2017	2018	2019	2020	2021	Goal by 2030
Quantity of municipal solid waste collected and managed in controlled facilities out of total municipal waste generated (metric tons)	8,156,591	6,598,691	7,648,844	10,303,367	11,478,372	-
Proportion of municipal solid waste collected and managed in controlled facilities out of total municipal waste generated, by cities %	100%	100%	100%	100%	100%	100%

Source: Ministry of Municipality

11-6-2 Annual mean levels of fine particulate matter (e.g., PM2.5 and PM10) in cities

Table 1.31: Air quality of particulate matter levels (PM10) by location, 2017-2022

Site	2017	2018	2019	2020	2021	2022
Aspire Zone	Normal	Normal	Clean	Clean	Clean	Normal
Qatar University	Normal	Below normal	Normal	Normal	Normal	Normal
Corniche	Normal	Below normal	Normal	Normal	Normal	Normal

Source : Ministry of Environment and Climate Change

* Annual limit is considered as the indicator description "normal"

Description of Air Pollution Index

<i>Clean</i>	<i>0 - 50</i>	<i>Limited pollution</i>	<i>151 - 200</i>
<i>Normal</i>	<i>51 -100</i>	<i>pollution</i>	<i>201 - 300</i>
<i>Below normal</i>	<i>101 -150</i>	<i>Severe pollution</i>	<i>301 - 500</i>

11-7-1 Average share of the built-up area of cities that is open space for public use for all, by sex, age and persons with disabilities

Table 1.32: Average share of the area that is open space for public use for all of total built-up area in cities, by sex and age group, 2015

Indicator		2015
Sex	Male	20.0
	Female	7.1
	Total	27.1
Age Groups	Under 15 years	4.0
	15 – 24 years	3.8
	25 years and above	19.3
	Total	27.1
Gender Parity Index		0.36

*: The area of open space has been allocated to the population according to their relative distribution by sex and age group, so that the share of each population segment of the area corresponds to its demographic weight.

Source: National Planning Council - Land Use Survey and Census 2015

Table1.33: Percentage of open spaces in public areas to total built-up area, 2015

Built-up buildings	Percentage of open spaces in public areas to total built-up area %	Total area of public open spaces (km2)	Population within geographical range	Total built-up buildings (km2)
Doha	23.51	40.08	587,058	170.47
Al Rayyan	33.00	103.04	969,880	308.50
Al Wakrah	25.73	34.50	253,184	134.06
Umm Slal	23.95	49.64	130,269	207.30
Al Khor	25.00	6.12	92,615	24.11
Al Shamal	25.00	2.47	6,053	9.99
Dukhan	32.00	0.56	6,749	1.71
Mesaieed	15.00	6.69	37,662	45.35
Lusail	28.00	7.55	1,338	26.87
Al Shihaniya	29.24	7.98	132,388	27.29
Total	27.06	258.63	2,217,196	955.65

Source: National Planning Council - Land Use Survey and Census 2015.

11.b.1 Number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015-2030

Table 1.34: Qatar's adoption and implementation of national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction, 2017-2022

Indicator	Unit	2017	2018	2019	2020	2021	2022
Qatar's adoption and implementation of national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction	Yes=1 No=0	1	1	1	1	1	1

Source: Ministry of the Interior.

Note: 1 = yes, and 0 = no.

11.b.2 Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies

Table 1.35: Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction, 2017-2022

Statement	Unit	2017	2018	2019	2020	2021	2022	Goal by 2030
Number of local governments that adopt and implement local disaster risk reduction strategies in line with national strategy*	No.	1	1	1	1	1	1	-
Total number of local governments	No.	1	1	1	1	1	1	-
Indicator	Ratio	100%	100%	100%	100%	100%	100%	100%

*Note: Doha is the State Central Government

Source: Ministry of Interior

12-3-1 Global Food Loss Index

a- Crop Loss

Table 1.36: Crop value by type of crop, 2017-2021

Type of Crop	Unit	2017	2018	2019	2020	2021
Tomato	Million QR	7.5	4.5	4.8	4.7	3.8
Cucumber	Million QR	7.5	2.9	3.5	4.6	2.9
Squash	Million QR	3.1	3.1	1.1	1.1	0.7
Cantaloupe	Million QR	3.9	2.0	1.4	0.9	0.9

Source: Ministry of Municipality

Table 1.37: Crop loss quantity by type of crop, 2017-2021

Type of Crop	Unit	2017	2018	2019	2020	2021
Tomato	Ton	964	1,497	1,615	1,752	1,808
Cucumber	Ton	585	967	1,135	1,247	974
Squash	Ton	216	549	222	210	181
Cantaloupe	Ton	...	...	...	...	...

...: Unavailable

Source: Ministry of Municipality

b- Hifz Alnaema Center

Table 1.38: Number of beneficiaries from Hifz Alnaema project, 2017-2022

Indicator	2017	2018	2019	2020	2021	2022
Number of beneficiaries from Hifz Alnaema project,	372,409	468,581	431,359	204,153	203,546	358,870

Source: Hifz Alnaema Center

Table 1.39: Donations of food, beverages and supplies for Hifz Alnaema project, 2017-2022

Donations	2017	2018	2019	2020	2021	2022
Amount of donations of food and supplies (kg)	419,617	516,213	364,987	102,077	293,646	568,153
Amount of donations of beverages and supplies (liters)	37,355	61,122	658,581	94,306	48,368	92,274

Source: Hifz Alnaema Center

c- Non-Compliant Imported Food

Table 1.40: Quantity of imported food destroyed as per destruction requests/certificates of non-compliance with specifications (kg), 2017-2021

Food Item	2017	2018	2019	2020	2021
Fats and oils	5,932	2,200	2,700	1,300	0
Meat	12,443	12,165	8,748	175,204	550,952
Poultry	261,199	7,337	5,886	233,671	116,268
Fish	15,300	9822	650	2,108	3,053
Canned Food	228,528	168,061	86,507	32,463	142,908
Fruits and vegetables	172,832	373,349	2,190,416	858,445	1,516,413
Dairy products	95,222	53,485	5,150	2,900	11,723
Dry Food	55,325	59,492	37,569	8,505	4,375
Eggs	22,680	130	18,000	29,200	25,450
Bottled water	16,590	6,160	4,809	3,270	1,900
Food variety	154,692	58,006	701,885	394,080	507,331
Total	1,040,743	752,225	3,065,020	1,741,056	2,880,369

Source: Ministry of Public Health

12-4-1 Number of parties to international multilateral environmental agreements on hazardous waste, and other chemicals that meet their commitments and obligations in transmitting information as required by each relevant agreement

Table 1.41: Number of parties to international multilateral environmental agreements on hazardous waste, and other chemicals that meet their commitments and obligations in transmitting information as required by each relevant agreement, 2017-2022

Sub-indicator	2017	2018	2019	2020	2021	2022
Parties fulfil their obligations to transmit information as required under the Basel Convention on Hazardous Wastes and Other Chemicals (1=yes, 0=no)	1	1	1	1	1	1
(b) Parties meet their obligations to transmit information as required under the Minamata Convention on Hazardous Wastes and Other Chemicals (1 = yes, 0 = no)	1	1	1	1	1	1
(c) Parties meet their obligations to transmit information as required by the Montreal Protocol on Hazardous Wastes and Other Chemicals (1 = yes, 0 = no)	1	1	1	1	1	1
(d) Parties meet their obligations to transmit information as required under the Rotterdam Convention on Hazardous Wastes and Other Chemicals (1=yes, 0=no)	1	1	1	1	1	1
(e) Parties meet their obligations to transmit information as required under the Stockholm Convention on Hazardous Wastes and Other Chemicals (1 = yes, 0 = no)	1	1	1	1	1	1

Source: Ministry of Environment and Climate Change

Table 1.42: Environmental agreements related to hazardous wastes and other chemicals

Environmental Agreements	Logo	Date of signature or ratification
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal	 BASEL CONVENTION	The State of Qatar signed on 13/04/1996
Minamata Convention on Issues Related to Mercury Pollution in the Air, Soil and Water		The State of Qatar acceded to the Convention on 04/11/2020, which entered into force on 02/02/2021
Montreal Protocol on Substances that Deplete the Ozone Layer		The State of Qatar ratified in 2009
Rotterdam Convention on Hazardous Wastes		2004
Stockholm Convention on Hazardous Wastes	 Stockholm Convention	The State of Qatar signed on 10/03/2005

Source: Ministry of Environment and Climate Change

12-4-2 Hazardous waste generated per capita; and proportion of hazardous waste treated, by type of treatment.

Table 1.43: Hazardous waste generated per capita; and proportion of hazardous waste treated, by type of treatment, 2017-2021

Sub-indicator	2017	2018	2019	2020	2021	
(a) Amount of hazardous waste exported (tons)	248	...	143	113	12,664	
(b) Amount of hazardous waste imported (tons)	0	0	0	0	0	
(c) Hazardous waste generated, per unit of GDP (kg per 2015 fixed US\$)	0.1	0.09	0.09	0.16	0.15	
(d) Amount of hazardous waste generated (tons)	58,572	58,572	57,333	81,608	100,005	
(e) Hazardous waste generated per capita (kg per capita)	21.5	21.22	20.48	28.8	36.43	
(f) Amount of hazardous waste treated by type of treatment (tons)	Recycling	18,991.0	23,290.0	33,914.0	43,954.0	42,487.4
	Burning	3,997.0	7,072.0	7,774.0	11,787.0	5,497.7
	Landfill	32,958.0	35,098.0	29,989.0	33,852.0	44,060.0
	Other	3,974.0	0	0	0	578.4
	Total	59,920.0	65,460.0	71,677.0	89,593.0	92,623.5
(g) Relative distribution of treated hazardous waste by type of treatment (%)	Recycling	31.7%	35.6%	47.3%	49.1%	45.9%
	Burning	6.7%	10.8%	10.8%	13.2%	5.9%
	Landfill	55.0%	53.6%	41.8%	37.8%	47.6%
	Other	6.6%	0.0%	0.0%	0.0%	0.6%
	Total	100.0%	100.0%	100.0%	100.0%	100.0%
(h) Proportion of hazardous waste treated or disposed of (%)	100%	100%	100%	100%	100%	
(i) Amount of hazardous waste treated or disposed of (tons)	59,920.00	65,460.00	71,677.00	89,593.00	92,623.40	
(j) Amount of municipal waste collected (tons)	8,156,591	6,598,691	7,648,844	10,303,367	12,120,156	
(k) Amount of municipal waste recycled (tons)	42,116	37,379	13,863	12,725	21,698	

Source: Ministry of Municipality , Ministry of Environment and Climate Change and National Planning Council calculations.

12-5-1 National recycling rate and tons of materials recycled

Table 1.44: Amount of solid waste recycled, 2017-2021

Indicator	2017	2018	2019	2020	2021	Goal by 2030
Amount of solid waste recycled (tons)	42,116	37,379	13,863	12,724	21,698	Increase

Source: Ministry of Municipality , Ministry of Environment and Climate Change and National Planning Council

12-6-1 Number of companies publishing sustainability reports

Table 1.45: Total companies that adopt sustainable practices or social responsibility approach or publish Sustainability or Social Responsibility Reports, 2022

Type of Report	Type of Company	2022
Number of companies that publish sustainability or social responsibility reports from Qatar Stock Exchange and official websites of national authorities		
Sustainability or Social Responsibility Report	Large sized companies listed on Qatar Stock Exchange	11
	Large companies from official websites of national authorities	3
	Total	14
Number of companies* that adopt sustainable practices or social responsibility approach		
Companies that adopt sustainable practices or social responsibility approach	Large-sized companies	32
	Small & medium-sized companies	138
	Total	170

Note: Only companies applying for an operational permit from the Ministry of Environment and Climate Change are included.

Source: Compiled by National Planning Council and Qatar Stock Exchange

Platform link: <https://qse.arabsustainability.com/ara>

Table 1.46: Companies that publish environmental, social and corporate governance reports (ESG), 2017 -2022

Companies	2017	2018	2019	2020	2021	2022
Doha Bank	97%	100%	100%	14%	100%	...
Qatar & Oman Investment Company	97%	97%	...	...	...	...
Qatar International Islamic Bank	92%	92%	76%	...	...	...
Aamal Company	86%	92%	92%	97%	...	...
Qatar National Bank	92%	100%	100%	3%	100%	100%
Commercial Bank	...	...	100%	...	97%	94%
Ooredoo	...	...	...	81%	100%	...
Al Ahli Bank	...	...	...	...	100%	...
Gulf Warehousing Company	...	...	...	...	...	97%
Qatar Wuqood	...	...	...	...	...	94%
Baladna	...	...	...	...	...	13%

Note: The initiative was launched in 2017

*Each year, five companies are selected to be evaluated by Qatar Stock Exchange.

...: Unavailable

Source: Qatar Stock Exchange

Platform link: <https://qse.arabsustainability.com/ara>

12-8-1 Extent to which (i) global citizenship education and (ii) education for sustainable development are mainstreamed in (a) national education policies; (b) curricula; (c) teacher education; and (d) student assessment

Table 1.47: Extent to which (i) comprehensive education for citizens and (ii) education for sustainable development are mainstreamed in (a) national education policies; (b) curricula; (c) teacher education; and (d) student assessment, 2017-2022

Sub-indicator	2017	2018	2019	2020	2021	2022	Goal by 2030
(a) Extent to which global citizenship education and ESD education are mainstreamed in curricula (1=yes, 0=no)	1	1	1	1	1	1	1
(b) Extent to which global citizenship education and ESD education are mainstreamed in national education policies (1=yes, 0=no)	1	1	1	1	1	1	1
(c) Extent to which global citizenship education and ESD education are mainstreamed in student assessment (1=Yes, 0=No)	1	1	1	1	1	1	1
(d) Extent to which global citizenship education and ESD education are mainstreamed in teacher education (1=yes, 0=no)	1	1	1	1	1	1	1

Source: National Planning Council

13-1-1 Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population

Table 1.48: Number of persons infected by Coronavirus and persons affected by disasters per 100,000 population, 2017-2021

Sub-indicator	Sex	Age Group	2017	2018	2019	2020	2021
Persons affected by disasters per 100,000 population	Male	All age groups	0	0	0	5,434.8	3,455.3
	Female		0	0	0	3,449.0	5,044.4
	Total		0	0	0	4,868.7	3,904.9
Persons affected by disasters per 100,000 population by age group	Total	0 – 14 years	0	0	0	10,685.8	1,865.3
		15 – 64 years	0	0	0	3,767.7	1,114.8
		65 years and above	0	0	0	4,542.4	1,762.8

Source: Ministry of Public Health, Ministry of Interior and National Planning Council calculations.

Table 1.49: Number of deaths by Coronavirus and deaths by disasters per 100,000 population, 2017-2021

Sub-indicator	Sex	Age Group	2017	2018	2019	2020	2021
Deaths due to disasters per 100,000 population	Male	All age groups	0	0	0	10.3	13.8
	Female		0	0	0	4.6	10.9
	Total		0	0	0	8.6	13
Deaths due to disasters per 100,000 population by age group	Total	0 – 14 years	0	0	0	0	0.2
		15 – 64 years old	0	0	0	5.6	9.9
		65 years and above	0	0	0	327.1	338.9

Source: Ministry of Public Health, Ministry of Interior and National Planning Council calculations.

13-1-2 Number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction 2015-2030

Table 1.50: Qatar adopts and implements national disaster risk reduction strategies in line with the Sendai Framework for Disaster Risk Reduction, 2017-2022

Sub-indicator	2017	2018	2019	2020	2021	2022
Countries with legislative and/or regulatory provisions for disaster risk management (1 = yes; 0 = no)	1	1	1	1	1	1
(b) Degree of adoption and implementation of national disaster risk reduction strategies in line with the Sendai Framework (1 = yes; 0 = no)	1	1	1	1	1	1
(c) Countries that report a national disaster risk reduction strategy in line with the Sendai Framework to a certain extent (1 = yes; 0 = no)	1	1	1	1	1	1

Source: Ministry of Interior

13-1-3 Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies.

Table 1.51: Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies, 2017-2022

Sub-indicator	2017	2018	2019	2020	2021	2022
(a) Proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies	100%	100%	100%	100%	100%	100%
(b) Number of local governments that adopt and implement local disaster risk reduction strategies in line with national strategies	1	1	1	1	1	1
(c) Number of local governments	1	1	1	1	1	1

Source: Ministry of Interior

13-2-1 Number of countries with nationally determined contributions, long-term strategies, national adaptation plans and adaptation communications, as reported to the UNFCCC secretariat.

Table 1.52: Policies and strategies that increase the country's ability to adapt to the adverse effects of climate change, enhance resilience to climate change and reduce greenhouse gas emissions, 2017-2022

Sub-indicator	2017	2018	2019	2020	2021	2022
(a) Number of countries that report adaptation (1=Yes, 0=No)	1	1	1	1	1	1
(b) Number of countries with biennial reports. Annex I Parties (1=Yes, 0=No)	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
(c) Number of countries with biennial updated reports. Non-Annex I Parties (1=Yes, 0=No)	1	1	1	1	1	1
(d) Number of countries with national adaptation plans (1=Yes, 0=No)	1	1	1	1	1	1
(e) Number of countries with national reporting. Annex I Parties (1=Yes, 0=No)	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
(f) Number of countries with national reporting. Non-Annex I Parties	1	1	1	1	1	1
(g) Number of NDC countries (1=Yes, 0=No)	1	1	1	1	1	1

Source: Ministry of Environment and Climate Change.

Table 1.53: International Environmental Agreements on Climate Change by Date of Signature, 1987-2017

International Environmental Agreements	Date of Signature
United Nations Framework Convention on Climate Change (UNFCCC)	22/01/1996
Kyoto Protocol.	11/01/2005
Vienna Convention for the Protection of the Ozone Layer.	22/01/1996
Montreal Protocol on Substances that Erode the Ozone Layer.	28/08/1987
Paris Agreement	23/06/2017

Source: Ministry of Environment and Climate Change.

13-2-2 Total greenhouse gas emissions per year

Table 1.54: Total greenhouse gas emissions, 2007

Sub-indicator	2007
Total non-LULUCF GHG emissions of Annex I Parties (metric tons equivalent to carbon dioxide)	NA
Total non-LULUCF GHG emissions of Non-Annex I Party (metric tons equivalent to carbon dioxide)	62,406,545.0

Source: Ministry of Environment and Climate Change.

13-3-1 Extent to which (i) global citizenship education and (ii) education for sustainable development are mainstreamed in (a) national education policies; (b) curricula; (c) teacher education; and (d) student assessment.

Table 1.55: Measures that have integrated climate change mitigation, adaptation, impact reduction and early warning in primary, secondary and tertiary curricula, 2017-2022

Sub-indicator	2017	2018	2019	2020	2020	2021	2022
(a) Extent to which global citizenship education and ESD education are mainstreamed in school curricula (1=Yes, 0=No)	1	1	1	1	1	1	1
(b) Extent to which global citizenship education and ESD education are mainstreamed in national education policies (1=Yes, 0=No)	1	1	1	1	1	1	1
(c) Extent to which global citizenship education and ESD education are mainstreamed in student assessment (1=Yes, 0=No)	1	1	1	1	1	1	1
(d) Extent to which global citizenship education and ESD education are mainstreamed in teacher education (1=Yes, 0=No)	1	1	1	1	1	1	1

Source: Ministry of Education and Higher Education.

13.a.1 Amounts provided and mobilized in United States dollars per year in relation to the continued existing collective mobilization goal of the \$100 billion commitment through to 2025.

Table 1.56: Amounts provided and mobilized in United States dollars per year in relation to the continued existing collective mobilization goal of the \$100 billion commitment through to 2025, for 2019

Indicator	Unit	2019	Goal by 2030
Value	Million US \$	100	100 billion

Source: Ministry of Foreign Affairs

14-1-1 (a) Index of coastal eutrophication; and (b) plastic debris density

Table 1.57: Concentration of natural nutrients in Qatari coastal waters by location, 2022

Nutrients by location	Salinity (practical salinity units)	Nitrite (mg/L)	Nitrate (mg/L)	Silicate (mg/L)	Phosphate (mg/L)	Total suspended solids (mg/L)	Chlorophyll A (µg/L)
Maximum nationally permissible limit	33 - 45	35.0	100.0	900.0	30.0	30.0	1.00
Khor Al Udeid		2.3	6.2	197.2		9.7	
Mesaieed	45.9	3.1	9.3	57.5	2.3	6.6	0.6
Al Wakrah	40.5	4.9	79.0	199.7	2.4	7.3	0.7
Ras Bufontas	38.6	2.9	8.9	144.4	7.0	7.9	0.8
Doha	39.4	2.0	20.5	374.4	3.5	8.4	0.5
Al Khor	37.6	3.4	9.3	75.3	6.7	7.7	0.9
Al Thakhira	40.4	1.9	1.7	36.6	3.3	7.6	0.8
Ras Laffan	40.0	1.5	5.2	23.5	4.5	7.1	0.7
Ras Rohn	38.1	1.6	14.1	163.2	6.1	7.1	1.2
Dukhan	37.7	3.7	6.3	118.8	2.9	8.9	0.3
Salwa	48.4	1.9	5.2	93.2	4.6	11.8	0.3

Source: Ministry of Environment and Climate Change.

b. Plastic debris density

Table 1.58: Marine debris and waste quantities by type in tons, 2017-2021

Year	Wood Residues	Coastal waste	Total	Goal by 2025
2017	...	3,650	3,650	Reduce
2018	12	2,816	2,828	Reduce
2019	258	1,638	1,896	Reduce
2020	78	1,860	1,938	Reduce
2021	315	617	932	Reduce

Source: Ministry of Municipality.

14-2-1 Proportion of economic zones managed using ecosystem-based approaches

Table 1.59: Proportion of economic zones managed using ecosystem-based approaches, 2017-2022

Sub-indicator	2017	2018	2019	2020	2021	2022
Number of countries using ecosystem-based approaches (1 = yes; 0 = no)	1	1	1	1	1	1
(b) Proportion of national exclusive economic zones managed using ecosystem-based approaches	100%	100%	100%	100%	100%	100%

Source: Ministry of Environment and Climate Change

14-3-1 Average marine acidity (pH) measured at agreed suite of representative sampling stations.

Table 1.60: Average marine acidity (pH) measured at agreed suite of representative sampling stations, 2017-2022

Locations	2017	2018	2019	2020	2021	2022	Nationally Allowed Limit
Khor Al Udeid	7.7	7.9	8.2	8.08	8.0	8.2	6.5 - 8.3
Mesaieed	8.1	8.1	8.1	8.24	7.8	8.3	6.5 - 8.3
Al Wakrah	8.1	7.6	8.3	8.29	8.4	8.5	6.5 - 8.3
Ras Bufontas	NM	7.9	8.0	8.15	8.1	8.5	6.5 - 8.3
Doha	8.0	8.0	7.8	8.09	8.1	8.4	6.5 - 8.3
Al Khor	7.8	8.2	8.2	8.13	8.3	8.4	6.5 - 8.3
Al Thakhira	7.8	8.1	8.2	8.14	8.1	8.3	6.5 - 8.3
Ras Laffan	7.9	8.2	8.2	8.20	8.1	8.3	6.5 - 8.3
Ras Rokn	7.8	8.4	8.2	8.07	8.0	8.3	6.5 - 8.3
Dukhan	7.9	7.7	8.2	8.05	8.1	8.2	6.5 - 8.3
Salwa	7.8	7.7	NM	NM	NM	8.3	6.5 - 8.3

NM: Not Measured.

ND: Not Detected.

The maximum permissible limit according to Qatari Law No. (3) of 2005 for average acidity is 6.5-8.3 grams per liter.

Source: Ministry of Environment and Climate Change.

14-4-1 Proportion of fish stocks within biologically sustainable levels

Table 1.61: Proportion of fish stocks within biologically sustainable level, 2017-2021

Sub-indicator	2017	2018	2019	2020	2021
(a) Proportion of fish stocks within biologically sustainable levels	59%	81%	85%	90%	90%
(b) Proportion of fully exploited fish stocks	34.1%	28.5%	22.3%	41.3%	21.1%
(c) Proportion of fish stocks not fully exploited	5.2%	7.0%	7.1%	21.5%	5.0%
(d) Proportion of fish stocks overexploited	15.8%	12.3%	14.9%	8.4%	8.6%
(e) Proportion of fish stocks at biologically sustainable levels (not overexploited)	31.5%	38.1%	34.8%	28.6%	54.6%
(f) Proportion of fish stocks not classified	13.4%	14.0%	20.9%	0.1%	10.7%
Total*	100%	100%	100%	100%	100%

Source: Ministry of Municipality.

14-5-1 Coverage of protected areas in relation to marine areas

Table 1.62: Coverage of protected areas in relation to marine areas, 2017-2020

Sub-indicator	2017	2018	2019	2020
(a) Coverage of protected marine area (km2)	720	720	720	720
(b) Coverage of protected areas in relation to marine areas (%)	6.2	6.2	6.2	6.2

Source: Ministry of Environment and Climate Change.

14-6-1 Progress by countries in the degree of implementation of international instruments aiming to combat illegal, unreported and unregulated fishing

Table 1.63: Progress made by the State of Qatar in implementing international instruments aiming to combating illegal, unreported and unregulated fishing, 2017-2019

Indicator	2019 - 2017
Progress made by the State of Qatar in implementing international instruments aiming to combating illegal, unreported and unregulated fishing	Qatar's fishing fleet is of a traditional type and operates only in Qatari territorial waters. The State does not have vessels operating outside territorial or international waters. In addition, the State's fishing ports have not received any fishing vessels operating outside Qatar's territorial waters.

Source: Ministry of Municipality

14-7-1 Sustainable fisheries as a proportion of GDP in small island developing States, least developed countries and all countries

Table 1.64: Sustainable fisheries as a proportion of GDP in small island developing States, least developed countries and all countries, 2017-2020

	2017	2018	2019	2020
Indicator	0.21	0.22	0.26	0.34

Source: National Planning Council

14.b.1 Degree of application of a legal/regulatory/policy/institutional framework which recognizes and protects access rights for small-scale fisheries

Table 1.65: Progress made by Qatar in the application of a legal/regulatory/policy/institutional framework which recognizes and protects access rights for small-scale fisheries, 2017-2019

Indicator	2017	2018	2019
Progress made by Qatar in the application of a legal/regulatory/policy/institutional framework which recognizes and protects access rights for small-scale fisheries	Continue to implement the Minister of Municipality and Environment's Resolution No. (274) on fish export.	Continue to implement Law No. (4) of 1983 on the exploitation and protection of living aquatic resources in Qatar.	Continue to implement Law No. (4) of 1983 on the exploitation and protection of living aquatic resources in Qatar.
	Continue to implement Law No. (4) of 1983 on the exploitation and protection of living aquatic resources in Qatar	Continue to implement Ministerial Resolution No. (22) of 2011 on the regulation of crab fishing.	Continue to implement Ministerial Resolution No. (22) of 2011 on the regulation of crab fishing.
	Continue to implement Ministerial Resolution No. (22) of 2011 on the regulation of crab fishing	Continue to implement Ministerial Resolution No. (55) on the regulation of kingfish fishing	Continue to implement Ministerial Resolution No. (55) on the regulation of kingfish fishing
	Continue to implement Ministerial Resolution No. (55) on the regulation of kingfish fishing	Continue to implement the Minister of Environment's Resolution No. (86) on the practice of some fishing activities.	Continue to implement the Minister of Environment's Resolution No. (86) on the practice of some fishing activities.
	Continue to implement the Minister of Environment's Resolution No. (86) on the practice of some fishing activities.	Organizing monthly meetings of the Aquatic Living Resources Committee, which includes representatives from all fisheries-related authorities.	Organizing monthly meetings of the Aquatic Living Resources Committee, which includes representatives from all fisheries-related authorities.
	Organizing monthly meetings of the Aquatic Living Resources Committee, which includes representatives from all fisheries-related authorities		Issuance of Ministerial Resolution No. (69) of 2019 on the conditions and controls of amateur fishery
			Issuance of Ministerial Resolution No. 147 of 2019 on the legal length of fish allowed to be caught and traded

Source: Ministry of Municipality.

14.c.1 Number of countries making progress in ratifying, accepting and implementing through legal, policy and institutional frameworks, ocean-related instruments that implement international law, as reflected in the United Nations Convention on the Law of the Sea, for the conservation and sustainable use of the oceans and their resources.

Table 1.66: Countries making progress in ratifying, accepting and implementing through legal, policy and institutional frameworks, ocean-related instruments that implement international law, as reflected in the United Nations Convention on the Law of the Sea, for the conservation and sustainable use of the oceans and their resources, 2017-2022

Sub-indicator		2017 - 2022
(a) Degree of implementation of the UN Convention on the Law of the Sea and its implementing agreements (%) = 1.2 + 2.2 + 3.2		81.5%
(b) Degree of ratification of and accession to the UN Convention on the Law of the Sea and its implementing agreements (%) = 1.1 + 2.1 + 3.1		100%
(c) Pursuing a national policy or having a national mechanism as a focal point or inter-agency/interdepartmental working group = 1.3 + 2.3 + 3.3		66.7%
(d) Degree of ratification and acceptance of the implementation of the instruments = (a) + (b)		83.3%
Instrument 1: 1982 UN Convention on the Law of the Sea	1.1 Ratification of the UN Convention on the Law of the Sea (1982) (1=Yes, 0=No)	1
	1.2 To what extent has your country implemented this tool through legal frameworks (e.g., through national legislation or executive actions)? Please indicate a score between 1 and 9, with 1 being "never" and 9 being "fully".	8
	1.3 Does your country have a national ocean policy and/or other national institution or mechanism, such as a national focal point or inter-agency/interdepartmental working group, with the responsibility of ensuring that ocean space problems are considered through an integrated, multidisciplinary and intersectoral approach? (1=Yes, 0=No)	1
Agreement relating to the Implementation of Part XI of the UN Convention on the Law of the Sea of 10 December 1982 (1994)	2.1 Agreement relating to the Implementation of Part XI of the UN Convention on the Law of the Sea of 10 December 1982 (1994) (1=Yes, 0=No)	1
	2.2 To what extent has your country implemented this tool through legal frameworks (e.g., through national legislation or executive actions)? Please indicate a score between 1 and 9, with 1 being "never" and 9 being "fully".	8
	3.2 Does your country have a national policy and/or institution or other mechanism, such as a national focal point or inter-agency/ interdepartmental working group, with the responsibility of ensuring that matters related to Part XI of the Convention are taken into account through an integrated, multidisciplinary and intersectoral approach? (1=Yes, 0=No)	1
Instrument 3: Agreement for the Implementation of the Provisions of the UN Convention on the Law of the Sea of 10 December 1981, relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (1995)	3.1 Agreement for the Implementation of the Provisions of the UN Convention on the Law of the Sea of 10 December 1981 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (1995) (1=Yes, 0=No)	1
	3.2 To what extent has your country implemented this tool through legal frameworks (e.g., through national legislation or executive actions)? Please indicate a score between 1 and 9, with 1 being "never" and 9 being "fully".	6
	3.3 Does your country have a national policy and/or institution or other mechanism, such as a national focal point or inter-agency/ interdepartmental working group, with the responsibility of ensuring that issues related to the UN Fish Stocks Convention are taken into account through an integrated, multidisciplinary and intersectoral approach? (1=Yes, 0=No)	0

*: All figures of the indicator from 2017 to 2022 are similar in value.

Source: Ministry of Environment and Climate Change and National Planning Council calculations

15-1-1 Forest area as a proportion of total land area

Table 1.67: Forest area as a proportion of total land area, 2010 and 2015

Statement	Unit	2010	2015
(a) Forest area as a proportion of total land area (%)	Ratio	0.06	0.08
(b) Forest area with Mangrove area	km2	7	9
	Hectare	700	900
(c) Area of Qatar with islands	km2	11,627.04	11,627.04
	Hectare	1,162,704	1,162,704

Source: Ministry of Environment and Climate Change.

15-3-1 Proportion of degraded land to total land area

Table 1.68: Area of degraded land by level of degradation, 2005

	2005
Indicator	91%

Source: Ministry of Environment and Climate Change.

15-4-1 Coverage by protected areas of important sites for mountain biodiversity

This indicator does not apply to the state of Qatar

15-4-2 Mountain Green Cover Index

This indicator does not apply to the state of Qatar

15-5-1 Red List Index

Table 1.69: Red List Index, 2017

Indicator	2017
Red List Index	0.83
Red List Index (upper limit)	1
Red List Index (lower limit)	0

Note: Value of the Red List Index ranges from (0) all species are classified as "of least interest", (1) all species are classified as "extinct".

Source: Ministry of Environment and Climate Change.

Target (15.6): Promote fair and equitable sharing of benefits arising from the utilization of genetic resources and promote appropriate access to such resources, as internationally agreed.

15-6-1 Number of countries that have adopted legislative, administrative and policy frameworks to ensure fair and equitable sharing of benefits.

Table 1.70: Adoption of legislative, administrative and policy frameworks to ensure fair and equitable sharing of benefits, 2017-2022

Indicator	2017	2018	2019	2020	2021	2022
Countries with legislative, administrative and policy framework or measures that have notified the ABS Clearing-House (1 = yes; 0 = no)	1	1	1	1	1	1
(b) Countries that are parties to the Nagoya Protocol (1 = yes; 0 = no)	1	1	1	1	1	1
Countries with legislative, administrative and policy framework or measures reported through the online reporting system on compliance with the International Treaty on Plant Genetic Resources for Food and Agriculture (PGRFA) (1 = yes; 0 = no)	1	1	1	1	1	1
(d) Countries that are contracting parties to the International Treaty on Plant Genetic Resources for Food and Agriculture (PGRFA) (1 = yes; 0 = no)	1	1	1	1	1	1

Source: Ministry of Environment and Climate Change.

15-7-1 Proportion of traded wildlife that was poached or illicitly trafficked.

Table 1.71: Proportion of traded wildlife that was poached or illicitly trafficked, 2017-2019

Statement		Unit	2017	2018	2019	Goal by 2030
Traded Wildlife	Legally	No.	2,840	1,232	989	Increase
	Illegally	No.	3	7	6	Reduce
	Total	No.	2,843	1,239	995	-
Proportion of illegally traded wildlife %	Ratio		0.1%	0.6%	0.6%	0.0%

Source: Ministry of Environment and Climate Change, National Planning Council calculations

15-8-1 Proportion of countries adopting relevant national legislation and adequately resourcing the prevention or control of invasive alien species

Table 1.72: Availability of relevant national legislation and adequately resourcing the prevention or control of invasive alien species, 2017-2022

Sub-indicator	2017	2018	2019	2020	2021	2022
Existence of legislation and regulatory structures, Law on the prevention or control of invasive alien species (1 = Yes, 0 = No)	1	1	1	1	1	1
Alignment of the objectives of the National Biodiversity Strategy and Action Plan (NBSAP) with Aichi Biodiversity Target 9 set out in the Strategic Plan for Biodiversity 2011-2020 (1 = yes, 0 = no)	1	1	1	1	1	1

Sub-indicator	2017	2018	2019	2020	2021	2022
Countries with allocations from the national budget to manage the threat of invasive alien species (1 = yes, 0 = no)	1	1	1	1	1	1
Countries receiving global funding with access to any funding from global financial mechanisms for projects related to the management of invasive alien species (1 = yes, 0 = no)	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable
Proportion of countries whose NBSAP targets are aligned with Aichi Biodiversity Target 9 of the Strategic Plan for Biodiversity 2011-2020 (%)	100 %	100 %	100 %	100 %	100 %	100 %
Proportion of countries with national budget allocations to manage the threat of invasive alien species (%)	100 %	100 %	100 %	100 %	100 %	100 %
Proportion of countries receiving global funding with access to any GFIM funding for projects related to the management of invasive alien species (%)	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable

Source: Ministry of Environment and Climate Change

15.9.1 (a) Number of countries that have established national targets in accordance with or similar to Aichi Biodiversity Target 2 of the Strategic Plan for Biodiversity 2011–2020 in their national biodiversity strategy and action plans and the progress reported towards these targets; and (b) integration of biodiversity into national accounting and reporting systems, defined as implementation of the System of Environmental-Economic Accounting

Table 1.73: Number of countries that have established national targets in accordance with or similar to Aichi Biodiversity Target 2 of the Strategic Plan for Biodiversity 2011–2020 in their national biodiversity strategy and action plans and the progress reported towards these targets, 2017-2022

Sub-indicator	2017	2018	2019	2020	2021	2022
Countries that have established national targets in accordance with or similar to Aichi Biodiversity Target 2 of the Strategic Plan for Biodiversity 2011–2020 in their national biodiversity strategy and action plans (1 = yes; 0 = no)	1	1	1	1	1	1

15.c.1 Proportion of traded wildlife that was poached or illicitly trafficked

Table 1.74: Proportion of traded wildlife that was poached or illicitly trafficked, 2017-2019

Statement	2017	2018	2019
Traded Wildlife	Legally	2,840	1,232
	Illegally	3	7
	Total	2,843	1,239
Proportion of illegally traded wildlife %	0.1%	0.6%	0.6%

Source: Ministry of Environment and Climate Change and National Planning Council calculations.

Chapter Two

The Driving Forces



Driving Forces

This chapter includes key economic, demographic and social developments in Qatar. It also includes changes in lifestyle accompanying these developments, especially in recent years, and the subsequent construction boom, and the unprecedented increase in the number of populations in the state. This chapter highlights some demographic and economic indicators. The population development is the main driver that affects the rapid evolution and change in land use and urban, industrial and agricultural expansion.

1. Geographical and Natural Characteristics

1.1 Geographical Location

The State of Qatar lies between latitudes $27^{\circ} 24'$ and $10^{\circ} 26'$ north of the equator and longitudes $45^{\circ} 50'$ and $40^{\circ} 51'$ east of Greenwich line. Qatar is a peninsula situated in the middle of the west coast of the Arabian Gulf and extends northward into the Arabian Gulf waters.

1.2 Area

Qatar is about 160 km long from the south to the far north and about 89 km wide from east to west. Its total area is about 11,627 square kilometers.

1.3 Islands

Scientifically speaking, an island is a piece of land surrounded by water from all sides, regardless whether this water is sea, lake, river or ocean. Islands are formed in several ways; namely tectonic, volcanic or they emerge as a result of coastal erosion, ice, coral accumulation or sedimentation. Islands are usually classified into continental islands and oceanic islands. Qatar has a number of islands, including Halul, Shraouh, Ashat, Al Bashiriyah, Al Safliyah, Al Aaliyah and Rokn.

Table 2.1: Qatari islands by area and distance from coastline, 2021

Islands	Area (km ²)	Distance from coastline (km)
Halul	1.5	90.0
Al Aaliyah	1.8	7.0
Al Safliyah	1.0	5.0
Shraouh	1.0	63.0
Ashat	6.0	10.0
Al Bashiriyah	5.0	1.5

Islands	Area (km ²)	Distance from coastline (km)
Rokn	1.4	2.0
Banana	0.1	3.2
Al-Khor (Bin Ghannam)	0.2	1.0
Pearl	5.3	0.5
Al-Nakheel	0.04	0.9
Total	23.34	184.1

Source: GIS Network

1.4 Surface and Topography

Qatar Peninsula is made up of a rocky flat surface peppered with some hills that reach a height of 100 meters above sea level. The bulk of the State is a sand desert clothed with short shrubs that are covered with sand and unstable pebbles. One can notice the moving sand dunes, which are around 40 meters high, in the southern part of the State, and in the northeastern coast near Ras Laffan. The northern part of the State is relatively low, gradually increasing to rise toward the west and southwest.

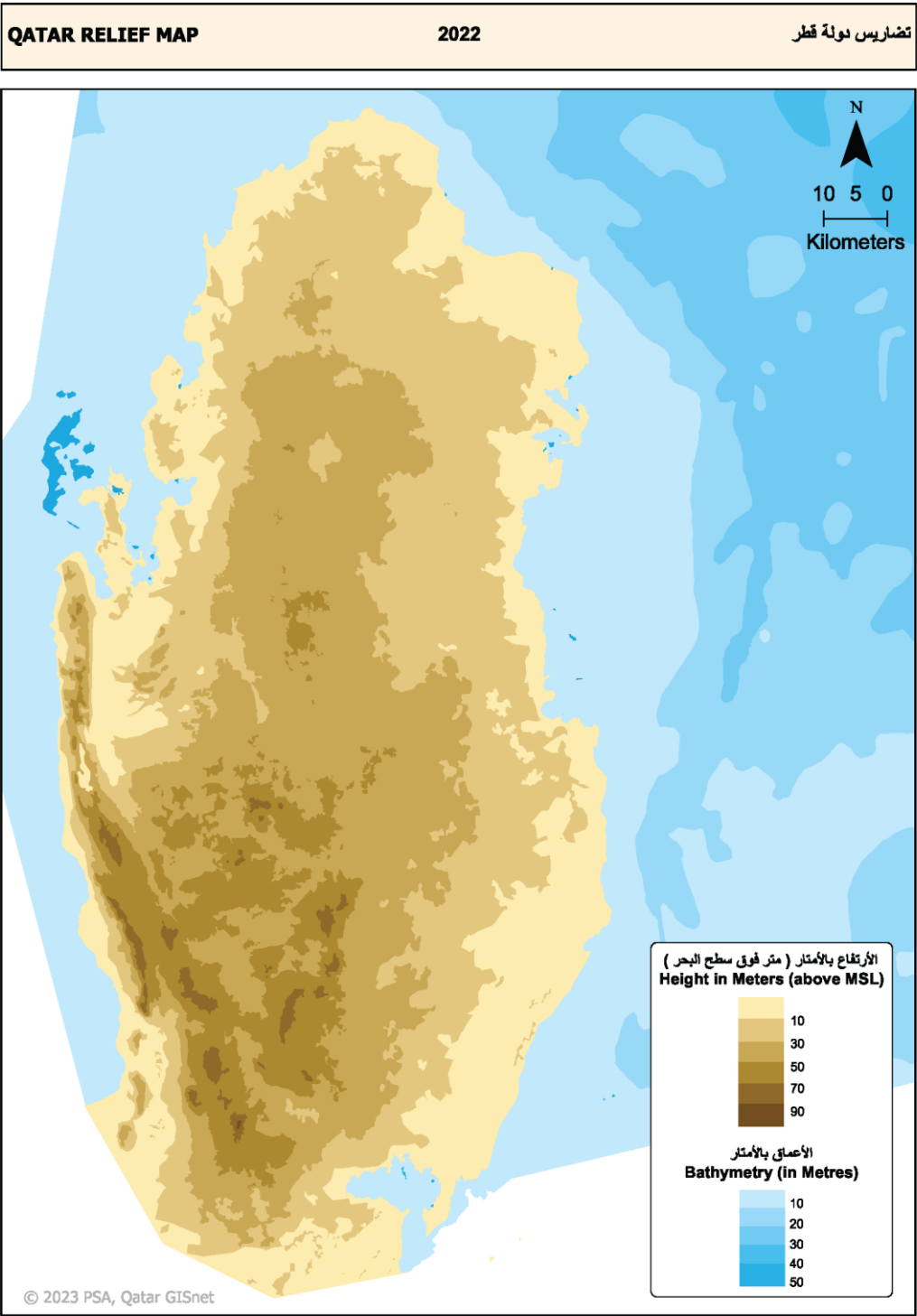
1.5 Climate

The climate of Qatar is of a desert nature with high temperatures especially in the summer. The mean high temperatures in the summer are characterized with a relatively high humidity, especially in coastal areas. Winter in Qatar is warm in general with a drop in temperatures to low levels from time to time. Qatar suffers from scarcity of rainfall throughout the year.

1.6 Administrative Divisions of Municipal Boundaries

The administrative boundaries of municipalities are divided into eight municipalities, namely, Doha, Al Rayyan, Al Wakra, Umm Slal, Al Khor, Al Shamal, Al Dhaayin and Al Shihaniya. Al Shihaniya Municipality is the largest municipality area wise (28% of total area), whereas Doha Municipality is the smallest (1.2% of total area).

Map 2.1: Topography of the State of Qatar 2022

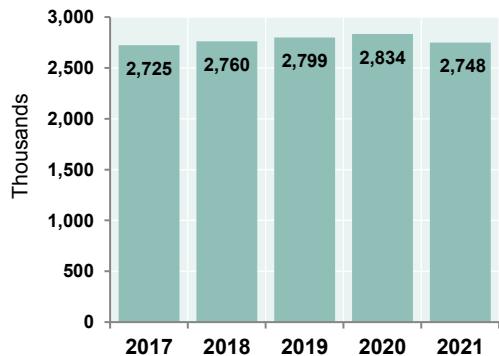


2. Population Indicators

2.1 Population and Annual Growth Rate

The estimated population of the State of Qatar reached two million seven hundred thousand people in 2021. The population is rising, with an annual growth rate of 0.2% during 2017 and 2021. Monitoring population growth rates is very crucial, as the increase or decrease affects the demand for natural resources, electricity, water and economy, in addition to the expected amounts of consumption of food commodities and waste resulting from daily consumption.

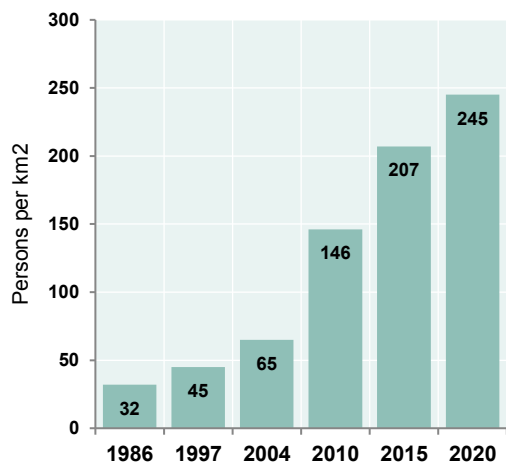
Figure 2.1: Mid-Year Population Estimates 2017 - 2021



2.2 Population Density

In the administrative division of municipal boundaries, we notice that Al Shihaniya Municipality came first in terms of area with 28.4% of total area of Qatar, whereas Doha Municipality came last with 1.9% of total area of Qatar. As for the distribution of population by municipalities, Doha Municipality was the largest in terms of population distribution (41.7% of total population). In addition, it also had the highest population density rate (5,344.1 people per km²). The lowest population by municipality was in Al Shamal Municipality by 0.6% of total population, i.e., 19 people per km².

Figure 2.2: Population density from census years 1986 - 2020



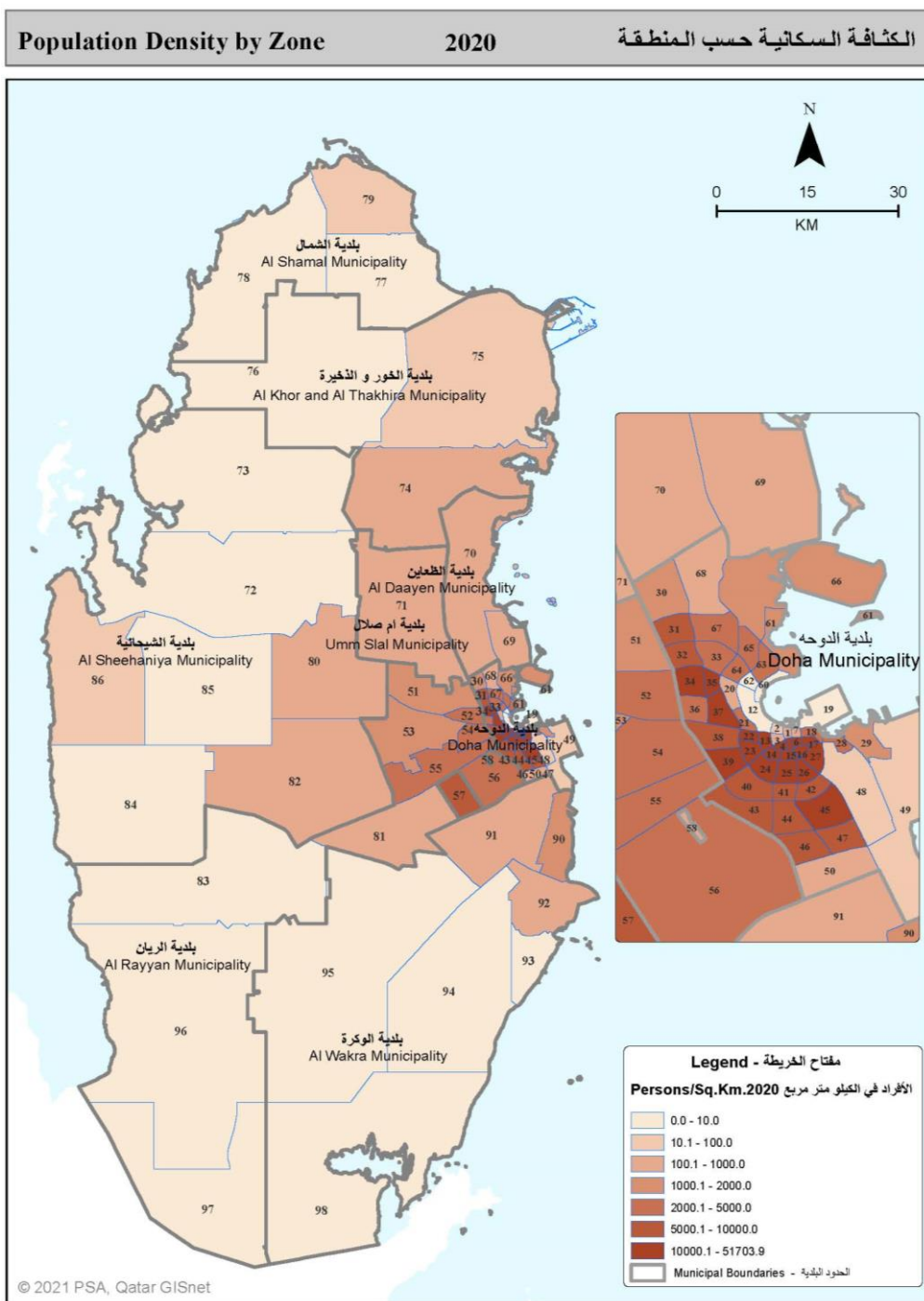
Statistics also show that the population density rate increased sevenfold between the 1986 and 2020 censuses, from 32 people per km² in the 1986 census to 245 people per km² in the 2020 census. We also notice a doubling in the average population density between the 2010 and 2020 censuses from 146 to 245 people per km².

Table 2.2: Population by municipality and density, Census 2020

Municipality	Area (km2)	Population	Population Density (person/km2)
Doha	222	1,186,023	5,344.1
Al Rayyan	2,450	826,786	337.5
Al Wakrah	2,559	265,102	103.6
Umm Salal	318	149,701	471.0
Al Khor	1,617	140,453	86.9
Al Shamal	863	16,730	19.4
Al Dhaayen	300	100,083	333.3
Al Shihaniya	3,308	161,240	48.7
Total	11,637	2,846,118	244.6

Source: National Planning Council - Census 2020

Map 2.2: Population density by zone, Census 2020



3. Economic Indicators

GDP growth is related to the growth of goods and services the demand for which has increased in the State of Qatar, especially recently. In 2021, however, the annual growth rate (at constant prices) of demand for these goods and services decreased by -0.03% during the period 2017-2021. Compared to 2020, the annual growth rate of demand for goods and services increased by 1.6% in 2021.

Table 2.3: GDP and GDP growth by economic activity (at current and constant prices, base year 2018=100), average and growth rate of annual per capita GDP, Consumer Price Index and inflation rate in Qatar, 2017-2021*

Indicator	2017	2018	2019	2020	2021
GDP at current prices (million QR)	568,401	667,339	641,991	525,657	654,025
GDP at constant prices (million QR)	659,199	667,339	671,932	648,027	658,338
GDP growth at current prices by economic activity (%)	6.2	13.8	-3.8	-18.1	24
GDP growth at constant prices by economic activity (%)	-1.5	1.2	0.9	-3.5	1.6
Average and annual per capita GDP growth rate at current prices (%)	2	12	-5	...	28
Consumer Price Index (base year 2018=100)	99.89	100.0	99.11	96.55	98.8
Per capita GDP at current prices (thousand QR)	215	242	229	186	238
Inflation rate in the country 2017-2021 at current prices (%)	0	0	-1	...	1

* Data for previous years has been updated from the source.

Source: National Planning Council, Economic Statistics Bulletin, Chapter of National Accounts.

The statistics in the following table shows the relative distribution of GDP growth by economic activity, where the largest growth was recorded in 2021 compared to 2017 in agriculture, forestry and fishing sector, where the rate reached 0.3% in 2021, and the annual growth rate reached 8% during the period 2017-2021.

The second largest growth was public administration and compulsory social security by 8% in 2021 compared to 2017, while the annual growth rate of this activity was 7% during the period 2017-2021. In the same context, the growth in financial and insurance activities increased by 9% in 2021 compared to 2017, with an annual growth rate of 5% during the period 2017-2021.

Table 2.4: Percentage distribution of GDP growth by economic activity at constant prices (base year 2018=100), 2017-2021

Economic Activity		2017	2018	2019	*2020	**2021	Annual growth rate 2017-2021
1	Agriculture, forestry and fishing	0.2	0.2	0.2	0.3	0.3	8%
2	Mining and quarrying	38.8	38.7	38.0	38.7	38.0	-1%
3	Manufacturing	7.7	8.2	8.0	7.8	8.0	1%
4	Electricity, gas, steam, air conditioning and air supply, water supply, sewage activities and waste management and treatment	0.9	0.8	1.0	0.8	0.8	-2%
5	Construction	12.1	12.3	12.1	12.1	12.1	0%
6	Wholesale and retail trade; and repair of motor vehicles and motorcycles	7.3	7.4	7.4	7.0	7.1	-1%
7	Transport & storage	3.6	3.9	4.2	2.9	3.2	-3%
8	Accommodation and food services activities	0.8	0.8	0.9	0.7	0.8	1%
9	Information and communication	1.4	1.4	1.4	1.6	1.7	4%
10	Financial and insurance activities	7.4	7.3	7.5	8.5	8.9	5%
11	Real estate activities	6.1	6.3	6.5	6.7	6.7	2%
12	Professional, scientific and technical activities, and administrative and support services activities	3.2	3.1	3.1	1.9	3.0	-1%
13	Public administration and compulsory social security	6.1	7.2	7.6	1.1	8.1	7%
14	education	1.9	1.7	1.7	1.2	1.8	-2%
15	Health and social work activities	2.2	1.7	2.1	1.7	2.1	-2%
16	Arts, entertainment, leisure and other service activities	1.4	1.2	1.3	1.0	1.3	-2%
17	Indirectly measured financial services	-3.8	-3.9	-4.1	-4.5	0.6	0%
18	Import duties	0.1	0.3	0.5	0.5	-4.8	0%
Total		100.0	100.0	100.0	100.0	100.0	0%

Source: National Planning Council, Economic Statistics Bulletin

Chapter Three

Pressure on the Environment



Pressure on the Environment

This chapter covers aspects of pressure on the environment resulting from meeting the different needs of population and economic developments and the subsequent developments in lifestyles, which in turn add to the pressure on the environment through increased emissions, waste and consumption of environment resources, such as water. It also covers the pressures on land use in various types and some of the demands of these requirements, such as the use of pesticides and fertilizers in agriculture. This chapter also includes the proportion of houses connected to sewage networks, the amount of pressure resulting from the environmental services and containment of pollutants, such as wastewater.

1. Land Use

1.1 Road Lengths

The land use indicators meet the important basic information required by governments, policy-makers, researchers, analysts and civil society organizations. Land use is a unique environmental source that defines the space in which economic activities and environmental processes occur. Land cover and land use are closely correlated, where land cover refers to the vital aspect of land cover, while land use refers to the function represented by the land use.

The land used in the roads contributes significantly to the transport process, as population and economic growth depends on transport in all its forms. Transport, in turn, needs corridors and roads that cut areas of state land in order to meet the needs of the population and the growing economy. Meeting these needs leads to an increase in demand for transport. Several studies have linked the amount of economic growth to the increased demand for transport and the accompanying repercussions on the environment, including the construction of roads and increased land use for this purpose.

The statistics of 2021 indicate that the total road lengths amounted to 2,817 km. In terms of road lengths by road type, the main road lengths reached 562 km, with an annual growth rate of 16% during the period 2017-2021, and the long tertiary roads reached 1,897 km, with an annual growth rate of 20% for the same period. Also, the length of secondary roads rose to 358 km, with an annual growth rate of 31% during the same period.

In terms of the relative importance of road lengths in Qatar, it is clear from the relative distribution of road lengths in the State of Qatar during the period 2017-2021, that tertiary roads had the lion's share of road lengths in 2017 with a percentage of 68.2% of total road lengths of all types. While in 2021, this percentage was 67.3%, and the main roads ranked second in relative importance at 20.0%, followed by secondary roads with 12.7%.

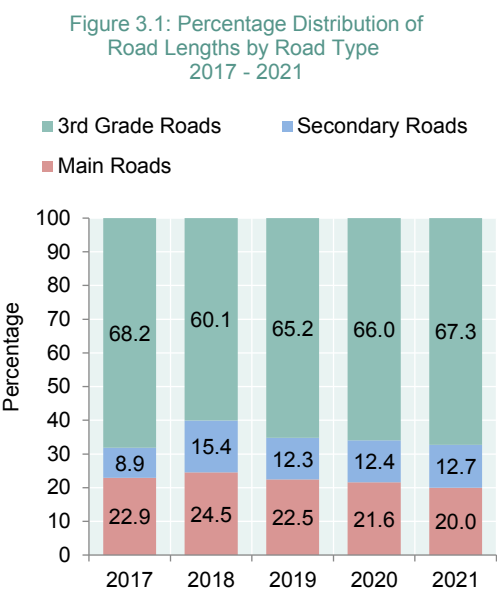


Table3.1: Road lengths by road type (km) 2017–2021

Road Type	2017	2018	2019	2020	2021	Annual Growth Rate 2017 & 2021
Main roads	309	389	500	539	562	20%
Secondary roads	120	245	274	308	358	37%
Tertiary roads	919	954	1,450	1,644	1,897	21%
Total	1,348	1,588	2,224	2,491	2,817	23%

Source: National Planning Council - Annual Statistical Abstract, Chapter of Transport Statistics.

1.2 Area of Annual and Perennial Crops

The increase in cultivated area is directly linked to the increase in population and economic prosperity, which in turn puts pressure on environmental resources through the consequences on the environment to provide agricultural requirements of water resources, which are already scarce in Qatar. In addition, this creates pressure on groundwater reserves as a result of over pumping, and pressure on the environment as a result of pesticide use in agricultural production.

In 2021, the share of uncultivated arable land area was 80.5% of total arable land, while the share of cultivated land area was 19.5% of total arable land. It is noted that the percentages are almost constant over the past few years.

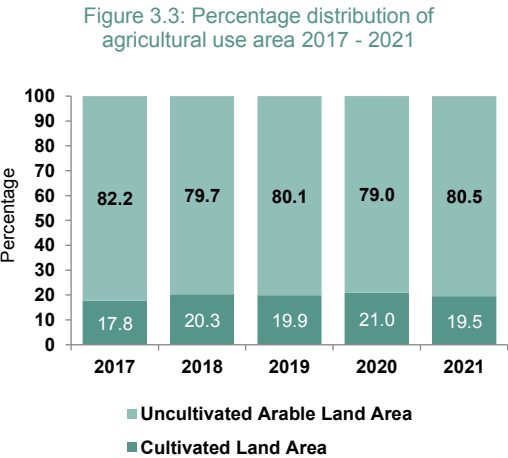
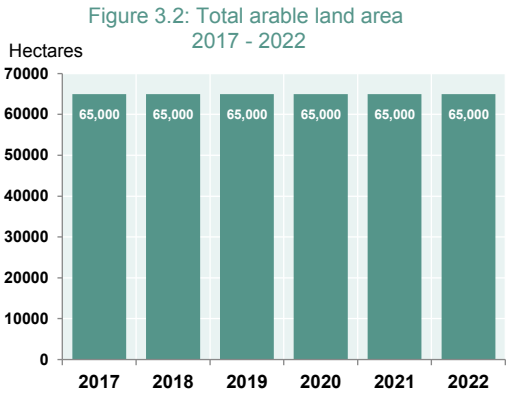


Table3.2: Area of arable land by type (hectares), 2017–2021

Year	Area of cultivated land						Area of uncultivated land	Total arable land
	Grain	Vegetables	Fruits & Dates	Palms	Green fodder	Total		
2017	277	2,159	230	2,341	6,583	11,590	53,410	65,000
2018	267	2,777	85	2,418	7,656	13,203	51,797	65,000
2019	153	2,832	149	2,153	7,620	12,907	52,093	65,000
2020	213	3,135	91	2,217	7,990	13,646	51,354	65,000
2021	394	2,766	311	2,393	7,566	13,430	51,570	65,000
Annual growth rate 2017 & 2021	9%	6%	8%	1%	4%	4%	-1%	0%

Source: Ministry of Municipality

1.2.1 Crops Area in Cultivated Land

The statistics indicate that the green fodder cultivated land area was the largest of total cultivated land in 2021, with an area of 7,566 hectares at a relative importance of 56.3% of total cultivated area, followed by vegetable area by 2,766 hectares at a relative importance of 20.6%, followed by palm tree area by 2,393 hectares at a relative importance of 17.8%, followed by grain area by 394 hectares at a relative importance of 2.9%, and finally fruit tree area by 311 hectares at a relative importance of 2.3%.

1.2.2 Farms

The table below indicates that the registered farms in Qatar amounted to 1,033 farms in 2022, with an area of 48,000 hectares. There are 1,033 active farms, with an area of 41,000 hectares.

In terms of the distribution of farms by municipalities and type of farm, we note that Al Khor Municipality took the lead in farm area, occupying 39.2% of total area of farms in Qatar in 2022, followed by Al Rayyan Municipality with 34%. The lowest farm area was in Doha Municipality at 0.05% only. This percentage is expected in Doha Municipality as a result of the pressure of urban sprawl accompanied by roads, constructions and facilities at the expense of sustainable land distribution. In terms of farm types, the 2022 statistics show that there were 2,47 crop farms, 33 livestock farms, 6,90 crop-livestock farms and 22 other farms.

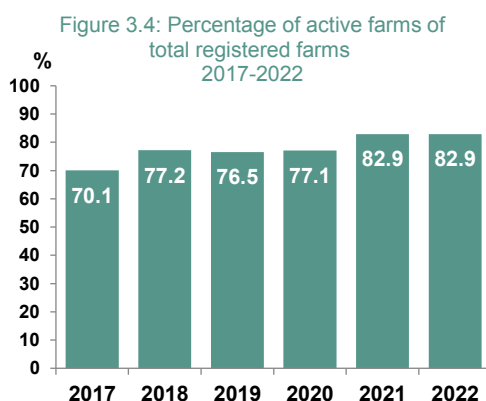


Table 3.3: Agricultural land use (hectares, number, ratio) 2017- 2022

Statement	2017	2018	2019	2020	2021	2022	Annual growth rate 2017 & 2022
Total arable area (hectares)	65,000	65,000	65,000	65,000	65,000	65,000	0%
Number of registered farms	1,310	1,220	1,245	1,244	1,225	1,246	-1%
Total registered farms area	49,988	50,346	50,723	51,036	49,782	47,987	-1%
Total arable area in registered farms	29,992	30,207	30,434	30,622	29,869	28,792	-1%
Number of active farms	916	942	952	959	1,016	1,033	2%
Total area of active farms	36,750	40,690	41,038	40,957	41,344	40,902	2%

Statement	2017	2018	2019	2020	2021	2022	Annual growth rate 2017 & 2022
Total arable area of active farms	22,050	24,414	24,623	24,574	24,806	24,541	2%
Open-field crop area in active farms	11,340	12,872	12,388	13,002	12,763	11,493	0%
Total crop area in active farms	11,589	13,203	12,897	13,647	13,430	12,134	1%
Degree of farm condensation %	52.6	54	52	56	54	50	-1%

Source: Ministry of Municipality - Annual Bulletin of Crop Areas and Production.

Table 3.4: Number and area of farms (hectares) by type and municipality, 2022

Municipality	Crops		Livestock		Mixed		Other1		Total	
	No. of farms	Area (hectares)	No. of farms	Area (hectares)	No. of farms	Area (hectares)	No. of farms	Area (hectares)	No. of farms ²	Area (hectares)
Doha	1	23.8	0	0.0	0	0.0	0	0.0	1	23.8
Al Rayyan	157	8,118.7	10	453.3	214	7,450.5	7	108.5	388	16,131.0
Al Wakrah	32	1,342.2	3	230.3	29	664.0	8	102.9	72	2,339.4
Umm Salal	55	1,836.4	1	66.1	93	3,564.8	2	245.4	151	5,712.8
Al Khor	124	5,111.8	7	844.2	228	12,589.2	3	34.0	362	18,579.2
Al Shamal	72	950.2	8	7.0	92	1,737.8	2	13.9	174	2,708.9
Al Dhaayen	31	414.8	2	17.6	34	1,425.6	0	0.0	67	1,858.1
Total	472	17,797.9	31	1,618.5	690	27,432.0	22	504.7	1215	47,353.1

1: Other (recreational - fishery - bees - neglected)

2: Total number of farms by municipality differs from the total number of farms registered at the state level

Source: Ministry of Municipality – Annual Bulletin of Crop Areas and Production

1.3 Annual and Perennial Crops

In 2021, the production of food groups on farms was dominated by green fodder reaching 638,000 tons at a relative importance of 61.6%, followed by milk and dairy products with 195,000 tons at a relative importance of 18.8%, followed by vegetables with 102,000 tons at a relative importance of 9.9%, followed by meat with 39,000 tons at a relative importance of 3.7%, followed by fruits and dates with 30,000 tons at a relative importance of 2.9%, followed by fish with 17,000 tons at a relative importance of 1.6%, and egg production with 11,000 tons at a relative importance of 1.1%. Finally came the production of grain amounting to 3,000 tons at a relative importance of 0.3%.

Table 3.5 : Quantity of agricultural production by food groups (tons), 2017-2021

Food Groups	2017	2018	2019	2020	2021	Change Rate 2017 & 2021
Grain	1,378	2,309.3	1,011	1,503	3,305	24%
Green fodder	534,515	629,878	619,199	650,993	637,707	5%
Fruits & dates	28,975	29,276.8	26,401	26,914	29,933	1%
Vegetables	65177	74,652	91,470	103,695	101,881	12%
Meats	24,805	36,036	36,919	46,124	38,736	12%
Milk & dairy products	56,146	226,408	199,926	206,683	194,710	36%
Eggs	5,753	8,372	7,943	9,358	11,134	18%
Fish	15,358	14,665	16,938	15,087	16,555	2%
Total	732,107	1,021,597	999,806	1,060,357	1,033,961	9%

Source : Ministry of Municipality - Annual Bulletin of Crop Areas and Production.

1.4 Self-Sufficiency in Food Commodities

According to the population's food security statistics, the self-sufficiency rate of food commodities reached 18% in 2022, with an annual growth rate of 9% compared to 2017. The table below shows a fluctuation in the index of self-sufficiency ratios of food commodities in the State of Qatar during the period (2017-2022).

With regard to self-sufficiency by food groups, the self-sufficiency rate for dairy group reached 98% in 2022, which is higher than the rest of food groups, followed by fish group with a self-sufficiency rate of 83%. The vegetables group reached 41%, followed by the egg group with 26%, then the meat group with 18%, followed by the fruits and dates group with 9%, then the grain group with 6%. However, there were no self-sufficiency ratios over the years in the following food groups: legumes and oilseeds, sugar and sugary products, and oils and fats.

Figure 3.5: Percentage of self-sufficiency by food groups 2021 & 2022

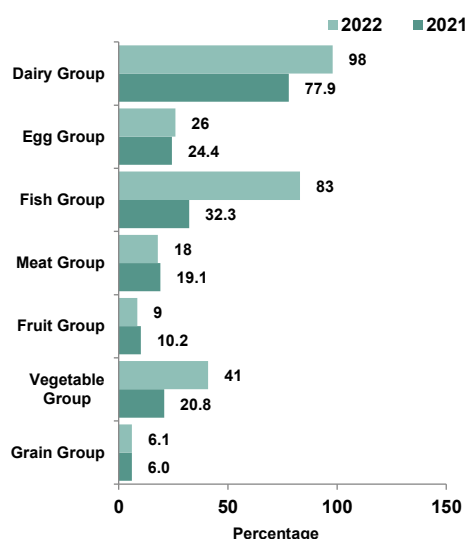


Table 3.6: Total food commodities available for consumption and percentage of self-sufficiency, 2017-2022

Year	Local Production (Tons)	Available for Consumption (Tons)	Self-Sufficiency Ratio of Food Commodities %
2017	244,038	2,114,721	11.5
2018	446,638	2,661,218	17
2019	430,565	2,740,744	16
2020	460,747	2,508,376	18
2021	445,445	2,375,610	19
2022	465,801	2,618,902	18
Annual growth rate 2017 & 2022	14%	4%	9%

* The data for previous years has been updated from the source.

Source: Ministry of Municipality - Annual Bulletin of Agricultural Commodity Consumption.

1.5 Fertilizers and Pesticides

1.5.1 Amount of Fertilizers Used

The organic substance in compost plays an important role in the physical and chemical changes, and in the activity of soil bacteria, which is beneficial to plant. The good soil is defined as the soil that has water-holding capacity and is air-permeated, resulting in a noticeable activity of roots which in turn would help healthy and normal growth with lots of natural ingredients needed for the plant to yield a good harvest and increase the crop. Nitrogen and natural potassium both provide the plant with nutrition when needed, and they do not dissolve in soil water. Compost is the fertilizers that contain, wholly or partially, nutrients of the soil in the shape of animal or vegetable organic compounds. The organic matter is the main component that needs to be in the soil to ensure a sustainable yield. The sandy soil in arid and semi-arid environments contains very little or no organic matter.

In terms of soil relation to the environment, there is no doubt that the compost improves the properties of the soil, retains water, activates the beneficial bacteria and is free of weeds and harmful bacteria. The statistics indicate that the volume of fertilizers used in 2021 amounted to 9,535 tons of heat-treated compost.

1.5.2 Amount of Pesticide Imports

In order to meet the population growth which is pressing on the environment in terms of increased demand for agricultural products to provide necessary food, the agricultural policies have adopted the intensive agriculture pattern which requires a number of measures, including the use of pesticides. Pesticides are used in Qatar for agricultural purposes (such as insecticides, fungicides and herbicides) to protect the palm trees and parks from insects and to combat insects in government buildings and private housing. The massive use of pesticides has serious implications on the environment and on the ecosystems, such as biodiversity and pollution of groundwater and public health.

Table (3.7) below shows that the amount of chemical pesticide imports increased from 113,000 kg in 2017 to 741,000 kg in 2022.

Table 3.7 : Imports of chemical pesticides by type (kg), 2017-2022

Type of Pesticide	2017	2018	2019	2020	2021	2022
Insecticides	0	574,445	465,661	543,678	783,666	669,837
Fungicides	0	104,891	1,697,569	156,953	179,466	55,675
Herbicides	0	0	0	19,806	50,324	15,889
Unspecific pesticides	112,543	0	0	4,396,310	0	0
Total	112,543	679,337	2,163,229	5,116,748	1,013,456	741,402

Source: Ministry of Municipality

1.5.3 Pesticides used for pest control in homes and government facilities

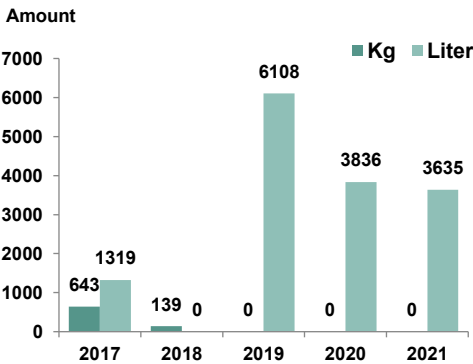
Scientifically speaking, the pest control methods are generally divided into: natural control and applied control. The natural control includes factors that destroy or limit the spread of pests naturally without human intervention, as natural conditions reduce pests. These factors are mainly:

Nutritional factors: such as lack of food due to drought or lack of breadwinner.

- Aerial factors: such as high or low temperature, humidity, wind and precipitation.
- Vital factors: such as natural enemies, e.g., predators, parasites or fungal, bacterial and viral insect diseases.
- Topographical factors: such as deserts and others.

The applied control is the human interference to apply such control when natural control fails. The community needs to control insects and rodents, such as fleas, cockroaches, rats and other pests. Figure (3.6) shows that the pesticides used for pest control in homes and government facilities amounted to 3,635 liters in 2021.

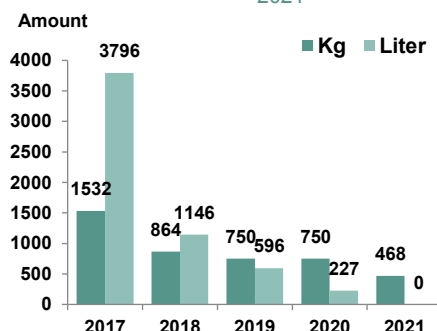
Figure 3.6: Amount of pesticides used to control pests at homes and government facilities, 2017-2021



1.5.4 Pesticides used for palm pest control

Palm trees are exposed to many animal, insect, fungal and bacterial, pests, as well as weeds and others. Pesticides are used to reduce losses caused by such pests. The statistics in Figure (3.7) indicate that the amount of pesticides used for palm pest control in 2021 amounted to 468 kg. It is also noted that the indicator of amount of pesticides used for palm pest control has declined post 2017.

Figure 3.7: Amount of pesticides used to control palm tree pests 2017-2021



1.6 Importance of the agriculture, forestry and fishery sector in the Qatari economy

The weight of this sector in the Qatari economy remains limited both in terms of its contribution to GDP and in terms of job opportunities (employment), as the value added in the agriculture and fishery sector increased by QR 1,951 million in 2021, at an annual growth rate of 12%.

As for employment in the agriculture and fishery sector, the agricultural sector contributes to creating job opportunities through agricultural labor. The percentage of employment in agriculture activity reached 1.3% of total labor force in 2021. However, in 2021, the number of labor force in this sector declined to 27,000 workers, the majority of whom were expatriates, with an annual growth rate of 1%.

Table 3.8: Importance of agriculture, forestry and fishery in the Qatari economy, 2017-2021*

Year	Economic sector in agriculture, forestry and fishing			Agricultural Labor		
	Value added agriculture, forestry and fishery (Million QR)	GDP at current prices (Million QR)	Percentage of value added agriculture, forestry and fishery sector in GDP %	Number of employees in agriculture, forestry and fishery sector	Total number of labor force	Percentage of workers in agriculture, forestry and fishery to total labor force %
2017	1,259	586,401	0.21	25,544	2,054,502	1.2
2018	1,457	667,339	0.22	27,907	2,094,647	1.3
2019	1,669	641,991	0.26	32,255	2,107,982	1.5
2020	1,781	525,657	0.34	27,936	2,091,396	1.3
2021	1,951	654,025	0.30	26,719	2,021,584	1.3
Annual growth rate 2017 & 2021	12%	3%	9%	1%	0%	2%

* Data for previous years has been updated from the source.

Source: National Planning Council - Labor Force Sample Survey- National Accounts Statistics.

1.7 Exports and Imports of Agricultural Products

In 2022, the value of exports of Qatari agricultural products amounted to approximately QR 22 million, decreasing at an annual growth rate of -9% from 2017. While imports of agricultural Qatari products slightly increased at an annual growth rate of 4% during this period, reaching QR 4 billion in 2022.

Table 3.9: Weight and value of agricultural product exports and imports in Qatar, 2017-2022*

Year	Exports of agricultural products		Imports of agricultural products	
	Weight (tons)	Value (Thousand QR)	Weight (tons)	Value (Thousand QR)
2017	14,157	35,316	1,320,720	3,681,524
2018	4,442	22,984	1,584,216	3,839,416
2019	4,115	14,686	1,784,519	4,116,547
2020	3,704	16,554	1,623,468	4,044,349
2021	8,472	21,864	1,339,053	3,754,851
2022	8,883	21,512	1,441,720	4,459,839
Annual growth rate 2017 & 2022	-9%	-9%	2%	4%

* Data for previous years has been updated from the source.

Source: National Planning Council – Foreign Trade Statistics.

1.8 Livestock Breeding on Farms

In 2021, the total number of livestock on farms reached nearly 1.9 million animals, with a 6% increase in the annual growth rate during the period 2017-2021. The table below shows that the annual growth rate of cow breeding on farms was the highest at 17% compared to the rest of the annual growth rates for livestock breeding on farms, followed by the annual growth rate of the number of other classified animals 15%, and then the number of horses came in third place with an annual rate of 14%.

Table 3.10: Number of animals in farms by species 2017-2021

Type	2017	2018	2019	2020	2021	Annual growth rate 2017 and 2021
Cows	24,958	38,165	43,061	45,958	46,594	17%
Sheep (lamb)	932,472	994,858	1,009,006	1,115,293	1,155,578	6%
Goat	382,423	409,840	441,279	464,980	476,902	6%
Camels	105,387	126,029	131,080	135,385	150,565	9%
Horses	7,333	8,325	9,731		12,467	14%
Other	26,893	45,402	28,426	36,603	46,851	15%
Total	1,479,466	1,622,619	1,662,583	1,798,219	1,888,957	6%

Source: Ministry of Municipality – Annual Bulletin of Crop Areas and Production.

1.9 Green Spaces

1.9.1 Green Space Area

In 2022, the total green space area in the State of Qatar reached nearly 3 million m², with an annual growth rate of 15% during the period 2017-2022.

In terms of the relative importance of the green space area by municipality in 2022, the vast share of green space area was in Al-Rayyan municipality, constituting 48% of total green space area by municipality.

As for the annual growth rates during the period (2017-2022), the highest annual growth rate in green space area by municipality was in Al Dhaayin municipality with an annual growth rate of 27%, followed by Al Khor municipality with an annual growth rate of 23%.

Figure 3.8: Green space area excluding public parks 2017 - 2022

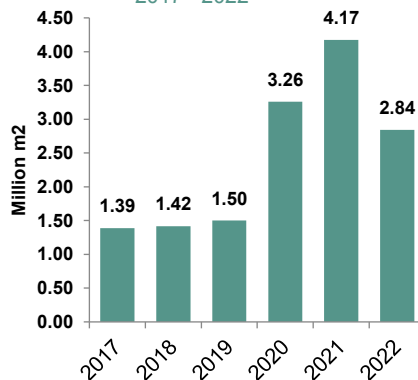


Table 3.11: Green space area (m²) by municipality, excluding public parks, 2017-2022*

Municipality	2017	2018	2019	2020	2021	2022	Annual growth rate 2017 & 2022
Doha	613,241	577,500	577,500	730,593	723,948	818,537	6%
Al Rayyan	552,206	552,206	684,681	2,169,226	2,933,108	1,364,426	20%
Al Shamal	41,206	33,295	33,295	33,950	34,831	49,187	4%
Al Wakra		66,000	11,305	181,407	181,407	72,861	-
Umm Salal	50,000	17,250	17,250	17,250	17,250	107,638	17%
Al Khor	17,250	140,633	140,633	134,104	166,529	49,459	23%
Al Dhaayin	112,233	29,250	34,200	114,026	114,026	373,309	27%
Al Shihaniya	...	...	3,282	3,282	3,282	6,760	27% (2019-2022)
Total	1,386,136	1,416,134	1502146	3,383,838	4,174,381	2,842,177	15%

*Data for previous years has been updated from the source.

Source: Ministry of Municipality

1.9.2 Trees, shrubs and palms planted in green spaces

In 2022, the number of planted trees, shrubs and palms reached 28 million, including 11,130 palms, 200,000 assorted trees, 1.8 million shrubs and 26 million of other types. It is noted that there was an increase in the annual growth rates of the number and area of trees, shrubs and palms from 2017.

Figure 3.9: Area of trees, shrubs and palms planted in green areas (not including public parks) 2017-2022

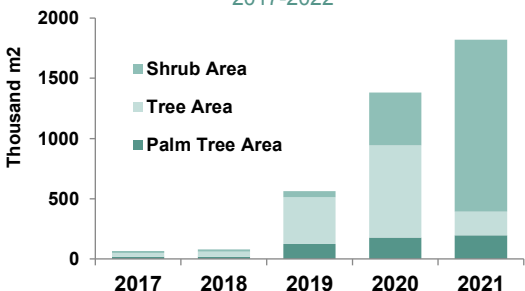


Table 3.12: Number and area of trees and planted area in green spaces (excluding public parks), 2017–2022*

Statement		2017	2018	2019	2020	2021	2022	Annual growth rate 2017 & 2022
Number	Palms	8,251	12,960	10,309	14,894	15,770	11,130	6%
	Trees	33,384	45,941	40,566	67,382	108,441	202,190	43%
	Shrubs	35,550	63,062	67,534	889,445	498,439	1,864,956	121%
	Other	26,342	357,939	712,710	18,878,378	14,516,638	26,227,961	298%
	Total	103,527	479,902	831,119	19,850,099	15,139,288	28,306,237	207%
Area (m2)	Palms	16,502	146,520	123,708	177,624	196,335	144,690	54%
	Trees	33,384	458,870	387,858	764,140	196,335	2,518,496	137%
	Shrubs	16,775	47,672	49,908	441,120	1,426,454	970,101	125%
	Total	66,661	653,062	561,474	1,382,884	1,819,124	3,633,287	122%

*Data for previous years has been updated from the source.

Source: Ministry of Municipality.

1.10 Public Parks

1.10.1 Number and Area of Public Parks

In 2022, the number of public parks in Qatar reached 137, with an annual growth rate of 11% from 2017, with an area of 3 million square meters and a growth rate of 22%.

In terms of the relative importance of the area of public parks by municipality in 2022, the vast share was in Doha Municipality, constituting 45% of total area of public parks by municipality.

As for the annual growth rates between 2017 and 2022, Doha municipality was the highest in the annual growth rate in green areas by municipality (38%).

Figure 3.10: Number of public parks 2017 -2022

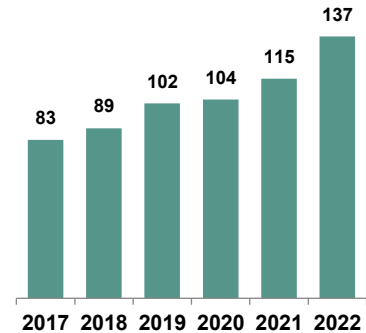


Table 3.13: Number and area of public parks by municipality, 2017-2022

Statement	Doha	Al Rayyan	Al Shamal	Al Wakra	Umm Slal	Al Khor	Al Dhaayin	Al Shihaniya	Total
Number of Parks									
2017	34	20	5	6	5	7	4	2	83
2018	35	20	5	6	6	10	4	3	89
2019	39	20	5	6	6	19	4	3	102
2020	39	20	5	6	6	19	6	3	104
2021	49	21	5	6	6	19	6	3	115
2022	57	23	7	6	6	26	9	3	137
Growth rate 2017 & 2022	11%	3%	7%	0%	4%	30%	18%	8%	11%
Public Parks Area (m2)									
2017	274,515	239,784	101,216	62,355	29,654	316,200	62,000	39,549	1,125,273
2018	529,013	239,784	98,800	62,355	53,654	354,041	62,000	53,131	1,452,778
2019	946,355	239,784	98,800	62,355	53,654	415,638	62,000	53,131	1,931,717
2020	946,255	239,784	98,800	62,355	53,654	415,638	76,000	53,131	1,945,617
2021	967,655	292,784	98,800	62,355	53,654	415,638	76,000	53,131	2,020,017
2022	1,387,983	525,520	130,385	65,460	56,652	720,047	123,921	53,304	3,063,272
Growth rate 2017 & 2022	38%	17%	5%	1%	14%	18%	15%	6%	22%

Source: Ministry of Municipality.

*Data for previous years has been updated from the source.

1.10.2 Trees, shrubs and palms planted in public parks

It is noted that the growth rate of plants in public parks increased during the period 2017-2022. With regard to the area of plants in public parks, there was an increase in the rates of plants area, except for the succulent plants and cacti area, which decreased by -12%.

Table 3.14: Number of trees and shrubs in public parks, 2017-2022

Plants	2017	2018	2019	2020	2021	2022
Date palm	1,576	1,510	1,595	1,632	2,384	1,854
Other plants	175,759	239,760	379,654	387,304	510,718	987,280
Palm group	4,335	10,676	10,953	10,996	3,786	3,327
Climbing plants	950	950	1,146	1,146	5,343	5,343
Succulents and cacti	4,880	4,880	4,885	4,885	3,752	2,416
Seasonal flowers	85,260	113,839	173,918	177,833	317,358	474,705
Ground-cover plants	70,940	112,423	176,666	180,401	198,291	504,816
Bushes	42,840	34,048	40,279	42,679	57,141	126,005
Palms	903	1,032	1,168	1,174	1,410	1,473
Trees	8,331	9,096	7,063	7,107	10,924	11,111

Source: Ministry of Municipality.

*Data for previous years has been updated from the source.

Table 3.15: Area of trees and shrubs in public parks (sq.m.), 2017-2022

Plants Area (m ²)	2017	2018	2019	2020	2021	2022
Date palm	3,152	18,120	20,148	37,260	28,608	24,102
Other plants	18,578	31,717	43,689	2,983,160	61,842	112,670
Palm group	4,958	29,172	29,804	51,028	39,888	38,832
Climbing plants	568	573	573	523	2,672	2,672
Succulents and cacti	2,263	2,326	2,341	2,627	1,876	1,163
Seasonal flowers	7,865	15,980	20,605	48,682	35,262	52,745
Ground-cover plants	7,882	12,839	20,170	332,978	22,032	56,091
Bushes	21,420	19,619	22,254	86,423	28,571	69,973
Palms	1,806	8,256	9,664	13,776	11,280	14,730
Trees	8,331	83,210	92,330	108,730	109,240	133,080

*Data for previous years has been updated from the source.

Source: Ministry of Municipality.

2. Water Demand

Water demand is part of the pressures resulting from meeting the needs of population and economy for natural resources, including water resources. Today, water demand exceeds all previous demands, due to population growth and mobility, rising living standards, changes in food consumption habits and pressures resulting from the growing need for energy, as the relation between water and energy is interdependent.

In 2021, the volume of water demand in the State of Qatar reached 641 million cubic meters. Accordingly, Qatar General Electricity and Water Corporation (KAHRAMAA) launched a national program for rationalization and energy efficiency to reduce water and electricity consumption. Qatar also seeks to enact water law to reduce water consumption and sustain water resources for future generations.

Table 3.16: Water Demand, 2017-2021

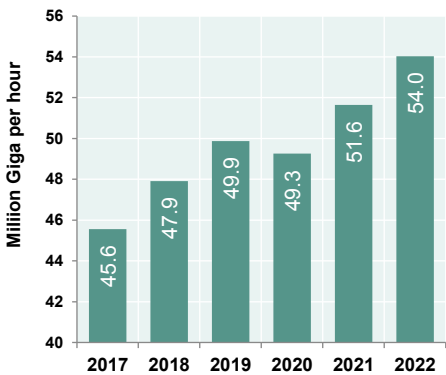
Year	Water Demand Million cubic meters
2017	568.9
2018	596.2
2019	628.7
2020	653.8
2021	641.0
Annual growth rate 2017 & 2021	3%

Source: Qatar General Electricity and Water Corporation (KAHRAMAA).

3. Power Generation

Power generation comes to meet the consumption linked to emerging needs resulting from the increase in population and economic growth, and pressures in the production of electricity and energy used for water desalination as well as fuel for vehicles and other population and economic growth requirements. The environment is being pressured by the increasing energy use, which in turn leads to more emissions released into the air and consequently causes a change in the ambient air quality and concentrations of greenhouse gases. The total amount of electricity generated reached 54 million gigawatt per hour in 2022, with an annual growth rate of 4% compared to 2017.

Figure 3.11 : Power generation per year 2017-2022



4. Transport

Car use is linked to the needs of the population, urbanization, economic prosperity and modern massive construction. All of these aspects resulting from the driving forces of population and economic development add pressure on environmental resources. The pressure resulting from the increased number of cars in Qatar is embodied in many aspects, such as increased emissions from the combustion of the fuel used in different transport vehicles, as well as the change in land use as a result of expansion of existing roads and construction of new roads, in addition to the water consumed in cleaning these vehicles and the resulting residuals, such as oils, batteries, tires, car bodies and discarded cars.

4.1 Automobiles & Motorcycles

In 2020, the total number of automobiles and motorcycles reached 1.7 million, of which 1.6 million were government, private cars, private transport vehicles, and taxis. The table below shows the accumulated numbers of different modes of transport during the period 2017-2020, where the list is topped by government licences with an annual growth rate of 58% from 2017, followed by heavy equipment licences with 39%, followed by motorcycle licences with 15%.

Table 3.17: Total number of automobiles and motorcycles by licence type, 2017-2020

Type of Licence	2017	2018	2019	2020	Annual growth rate 2017 & 2020
Government	3,531	13,608	13,503	13,985	58%
Private	955,328	998,987	998,987	1,083,377	4%
Private Transport	401,028	415,178	428,668	441,651	3%
Heavy Equipment	26,699	67,555	69,254	71,259	39%
Taxi	13,143	13,714	14,122	14,320	3%
Motorcycle	19,742	22,972	26,233	29,938	15%
Trailer	44,737	45,656	46,217	46,580	1%
Public Transport	2,821	2,828	2,900	2,912	1%
Other	55,704	7,317	55,816	27,262	-21%
Total	1,522,733	1,587,815	1,655,700	1,731,284	4%

*Data for previous years has been updated from the source.

Source: National Planning Council - Annual Statistical Abstract – Chapter of Transport and Communications Statistics.

4.2 Registered New Automobiles and Motorcycles

The statistics of 2020 indicate that the total number of registered new automobiles and motorcycles reached 57,632, with an annual growth rate of -5% from 2017. All types of licences were topped by high growth rates in government licencing with a growth rate of 40%, motorcycles with a growth rate of 15%, public transport with a growth rate of 59% and others 49% compared to 2017.

Table 3.18: Number of new registered automobiles and motorcycles by type of license, 2017-2020

Type of Licence	2017	2018	2019	2020	Annual growth rate 2017 & 2020
Government	46	369	176	125	40%
Private	43,868	43,659	45,979	36,921	-6%
Private Transport	18,713	14,150	13,167	12,903	-12%
Heavy Equipment	3,469	2,429	1,635	1,997	-
Taxi	876	571	385	239	-35%
Motorcycle	2,404	2,881	3,205	3,657	15%
Trailer	1,679	919	515	331	-42%
Public Transport	7	7	24	28	59%
Other	435	97	594	1,431	49%
Total	68,028	65,082	65,680	57,632	-5%

Source: National Planning Council - Annual Statistical Abstract – Chapter of Transport and Communications Statistics.

5. Completed buildings connected to public utilities

The statistics in Figure (3.12) indicate a general increase in the proportion of completed building connected to all public utility networks during the census years 1986-2020.

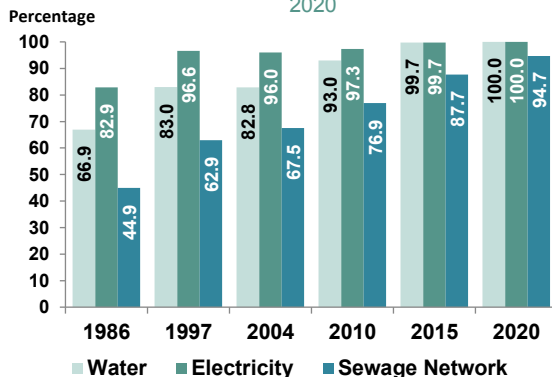
With regards to the public electricity grid, the percentage of completed buildings connected to electricity grid increased from 82.9% in 1986 to 100% in 2020.

So is the case with public water network, as the proportion of completed buildings connected to water network increased from 66.9% in 1986 to 100% in 2020.

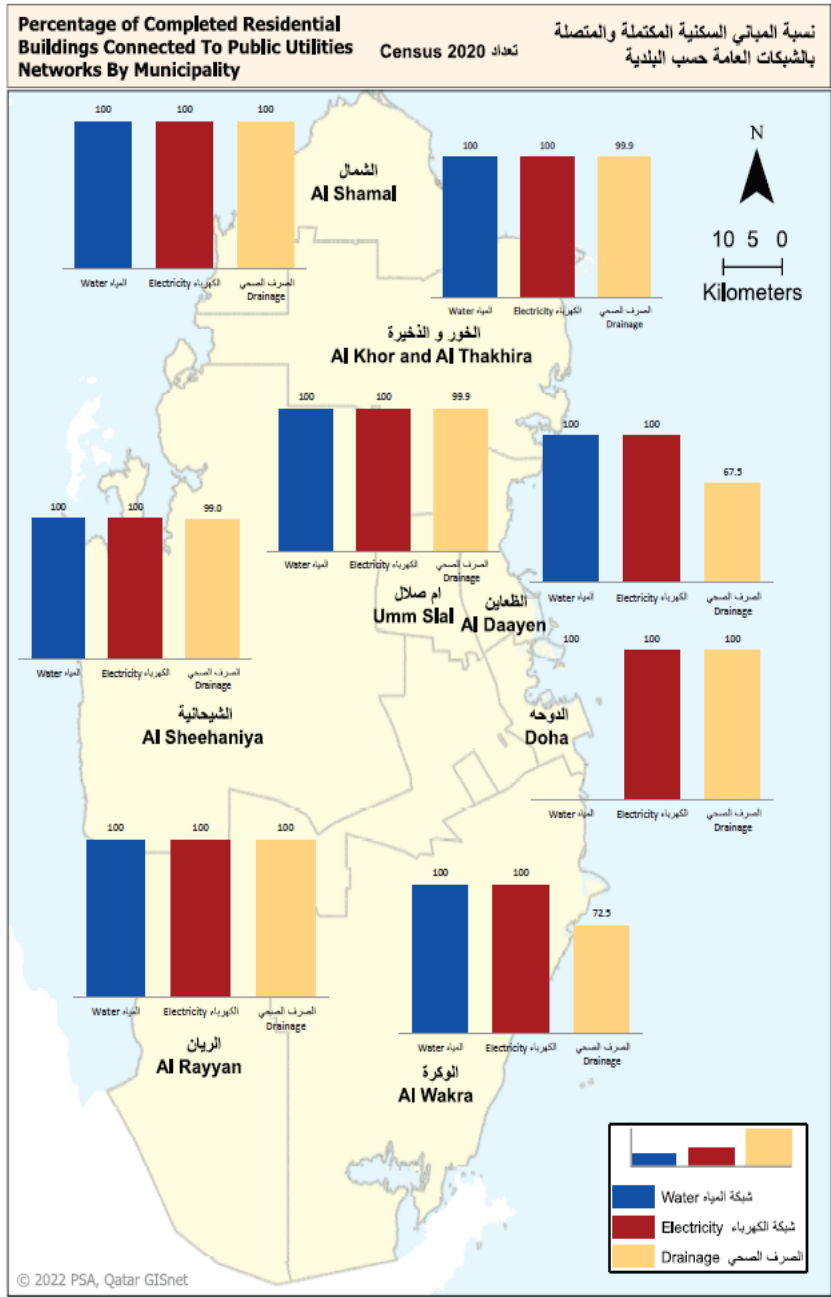
The index of completed buildings connected to the sewage network increased from 44.9 in 1986 to 94.7% in 2020. Over the census years, a rapid evolution is observed in the curve of completed buildings connected to the sewage network from the geographical map of the distribution of completed buildings by connection to the sewage network and municipality.

As for the completed buildings not connected to sewage network, their wastewater is collected by tanks, which discharge the wastewater at the domestic wastewater treatment plants.

Figure 3.12 : Percentage of completed buildings connected to public utility network by type of utility and general census years, 1986-2020



Map 3.1: Percentage of Completed Residential Buildings Connected to Public Utilities by Municipality, Census 2020



Chapter Four

State of the Environment and Impact on the Environment



State of the environment and Impact on the Environment

The state of the environment is linked to many aspects, whether they are natural aspects related to geographical location, nature of land, and climate and weather factors, or they are related to other factors that are mainly related to human activities and their consequences. This chapter measures the change in the state of the environment caused by pressure on various aspects of the environment. Most of these changes have negative impacts on the state of the environment and the health of ecosystems, as well as the human health. Changes increase in the state of the environment when the existing local ecosystems are fragile, limited and prone to rapid change.

As a result of the negative change on the state of the environment, this chapter also addresses the impact of this change on human health as well as the health of ecosystems, and the extent of environmental degradation caused by the change in the state of the environment, and the concomitant diseases associated with air and water pollution and food contamination. The chapter also addresses the loss of environmental resources, such as the climate in Qatar, biodiversity and depletion of environmental resources, such as water resources. This chapter further reviews each of the following topics: Qatar's climate, biodiversity, water resources use and quality, waste, energy consumption, air quality, consumption of ozone-depleting substances and diseases associated with environmental pollution.

1. Climate, lunar and solar eclipses and earthquakes

The State of Qatar is characterized by a desert climate with high temperatures, especially in the summer times. The average high temperatures are linked to high relative humidity, especially in coastal areas. Qatar's winter is generally warm, and temperatures in winter fall to low levels from time to time. The weather in Qatar is monitored by 37 stations, 2 buoys and 8 seismic stations. Table (4.1) below indicates the number and distribution of weather monitoring stations both onshore and offshore. In this report the climate statistics of 5 selected weather monitoring stations will be analyzed, namely; Ruwais, Dukhan, Mesaieed, Al Karaana and Doha International Airport.

Table 4.1: Number of weather monitoring stations (onshore and offshore), 2017-2021

Statement	2017	2018	2019	2020	2021
Meteorological stations	44	44	44	38	37
Buoys (fixed marine monitoring stations)	2	2	2	2	2
Seismic stations	9	9	9	8	8

*Data changed from source.

Source: General Authority of Civil Aviation - Department of Meteorology.

1.1 Temperature

Temperature is measured in the shade and is monitored around the clock like the rest of the weather elements. The analysis includes the average annual and monthly temperatures and long-term temperatures.

1.1.1 Monthly Mean Maximum and Minimum Temperature

The maximum temperature is defined as the highest temperature recorded during the day. It is usually recorded in the middle of the day. The minimum temperature is defined as the lowest temperature recorded during the day. It is usually recorded between dawn and sunrise. The statistics of the monthly mean maximum temperatures at Hamad International Airport show that the maximum temperatures gradually rise from May to August.

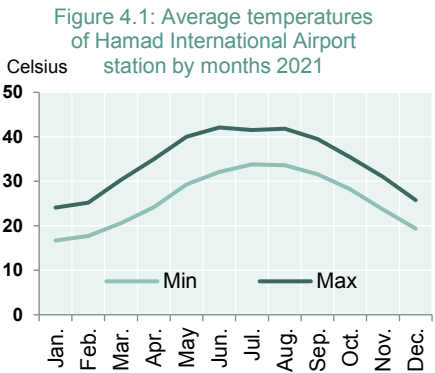


Table 4.2: Mean maximum and minimum temperatures by months for Hamad International Airport Station, 2017-2021

Year		January	February	March	April	May	June	July	August	September	October	November	December
2017	Min	17.1	15.4	20.3	25.8	30.4	32.3	33.2	33.7	31.5	28.4	23.7	17.6
	Max	24.1	21.7	27.2	35.5	40.3	42.3	42.7	41.4	39.4	36.8	30.2	25.1
2018	Min	15.5	17.5	21.0	24.7	28.6	33.0	33.4	23.9	31.8	28.4	23.4	19.4
	Max	23.4	25.3	31.2	33.1	37.8	42.9	42.6	42.2	39.5	34.7	28.9	25.3
2019	Min	17.3	17.0	18.6	23.3	29.0	32.7	33.5	33.2	31.5	29.6	23.1	19.3
	Max	24.5	23.5	25.8	31.8	38.6	43.4	41.8	41.5	39.6	36.2	29.3	25.5
2020	Min	15.8	16.5	19.5	24.4	27.7	31.9	33.5	33.9	31.0	27.5	23.7	19.0
	Max	22.2	23.9	27.0	32.5	37.4	43.1	41.6	42.1	39.6	34.9	30.1	25.4
2021	Min	16.7	17.7	20.6	24.2	29.3	32.1	33.8	33.6	31.6	28.2	23.7	19.4
	Max	24.1	25.2	30.3	35.0	40.0	42.1	41.5	41.8	39.5	35.4	31.0	25.8

Source: General Authority of Civil Aviation - Department of Meteorology.

1.1.2 Average Annual Temperature

During the period 2017-2021, the annual mean temperatures recorded at selected monitoring stations alternated between 27.1°C and 29.7°C. The annual temperature at Hamad Intl. Airport station reached 29.7°C in 2021, which was the highest temperature among the five stations, followed by Al Karaana station reaching 28.4°C. The lowest annual temperature was recorded at Dukhan and Ruwais stations reaching 27.6°C in 2021.

Table 4.3: Annual mean temperatures by selected monitoring stations, 2017-2021

Selected Stations	2017	2018	2019	2020	2021
Ruwais	27.2	27.5	27.3	27.3	27.6
Dukhan	27.1	27.5	27.3	27.1	27.6
Mesaieed	28.0	28.3	28.2	27.9	28.4
Al Karaana	28.1	28.6	28.4	28.2	28.4
Doha Intl. Airport	29.5	29.5	29.3	29.1	29.7

Source: General Authority of Civil Aviation – Department of Meteorology.

1.1.3 Annual Mean Maximum and Minimum Temperature

The statistics of the mean maximum temperatures in the five selected weather monitoring stations show that the highest mean maximum temperature was recorded at the Karaana station, reaching 35.4°C, while the lowest mean maximum temperature was recorded at Ruwais station, reaching 29.9°C.

Figure (3.4), which shows the mean minimum and maximum temperatures in July at Doha Intl. Airport during the period 2017-2021, indicates that the mean highest maximum temperature was recorded in 2017, reaching 42.7°C, while the mean highest minimum temperature was recorded in 2021, reaching 33.8°C.

Figure 4.2: Average temperature by degree and selected monitoring stations 2021

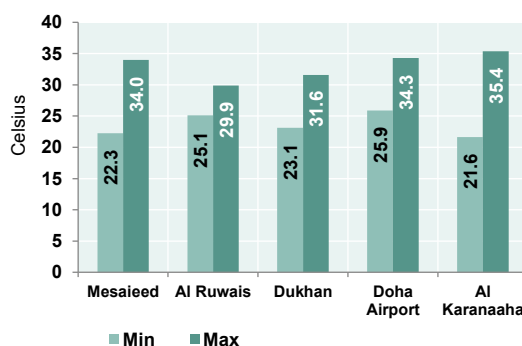


Figure 4.3: Average minimum and maximum temperatures in July at Doha Intl. Airport 2017-2021

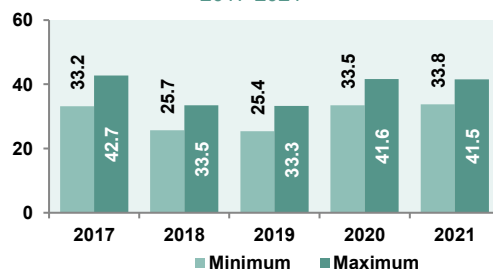
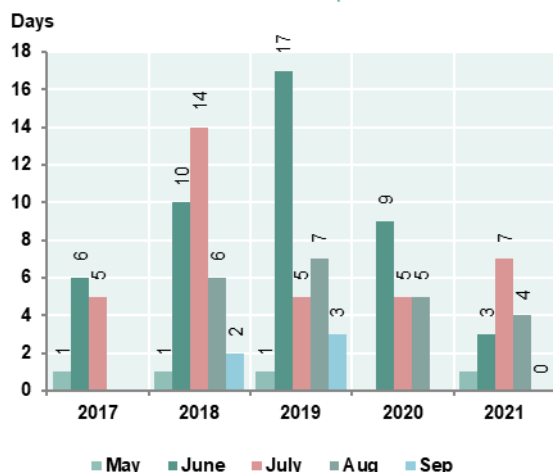


Table 4.4: Mean maximum and minimum temperatures for five selected stations, 2017-2021

Selected Stations	2017		2018		2019		2020		2021	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Mesaieed	22.2	33.3	22.4	33.6	22.6	33.2	22.1	32.9	22.3	34.0
Ruwais	24.7	29.6	25.1	29.9	25	29.6	24.8	29.7	25.1	29.9
Dukhan	22.8	31.1	23.3	31.5	23.2	31.4	22.8	31.2	23.1	31.6
Doha Intl. Airport	25.8	33.9	25.8	33.9	25.7	33.5	25.4	33.3	25.9	34.3
Al Karaana	21.6	34.8	22.1	35.2	22	34.8	21.7	34.8	21.6	35.4

Source: General Authority of Civil Aviation - Department of Meteorology.

Figure 4.4: Number of days in which temperatures were equal or above 45°C by month at Doha Intl. Airport 2017-2021



Note: As for the remaining months of the year, the temperature does not exceed 45 degrees Celsius.

1.1.4 Hottest and Coldest Days

The statistics of absolute maximum and minimum temperature measured at Doha Intl. Airport Station shows that 1 May, 3 June, 7 July and 4 August were the hottest days, reaching more than 45°C. When comparing between the five selected stations, we find the stations that monitored temperatures above 45°C in 2021 were the following: Mesaieed station (5 days), Dukhan (1 day), Hamad Intl. Airport (15 days) and Al Karaana (50 days), while it was not monitored at Ruwais station.

As for the coldest days, where the temperature was below 10°C, they were recorded in 2021 at Mesaieed station (7 days), Dukhan station (3 days) and Karaana station (8 days), while they were not

monitored at Ruwais and Hamad Intl. Airport. In general, the months of January and February are the coldest.

1.2 Rainfall

1.2.1 Annual rainfall rates

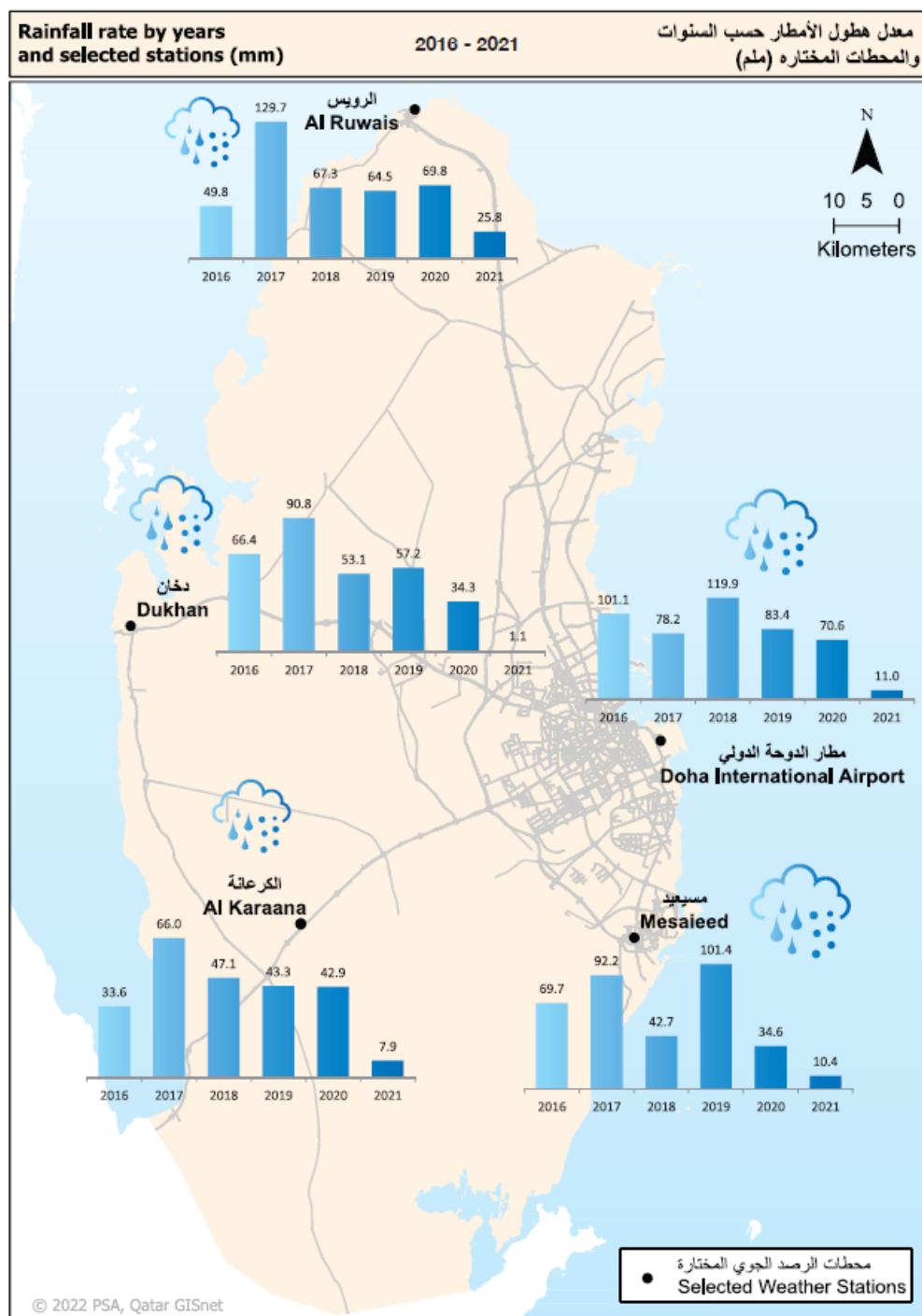
Rainfall is defined as precipitation of various types, such as drizzle (where the rainfall accumulating for 24 hours is less than 1 mm), as well as light, medium and heavy rain that may cause torrential rains and floods. Rainfall in Qatar is low and irregular, falling for a few days in winter, Heavy rain may fall for short periods of the day, as is the case in all desert areas. In 2021, the average annual total rainfall at Doha International Airport station decreased to 11.0 mm, while the annual rainfall level dropped for the rest of the selected stations during the period 2017-2021. When comparing between the selected monitoring stations, the highest annual rainfall was 25.8 mm in Ruwais and the lowest was 1.1 mm in Dukhan station in 2021.

Table 4.5: Annual rainfall rates by selected stations (mm), 2017-2021

Selected Stations	2017	2018	2019	2020	2021
Mesaieed	92.2	42.7	101.4	34.6	10.4
Ruwais	129.7	67.3	64.5	69.8	25.8
Dukhan	90.8	53.1	57.2	34.3	1.1
Doha Intl. Airport	78.2	119.9	83.4	70.6	11.0
Al Karaana	66.0	47.1	43.3	42.9	7.9

Source : General Authority of Civil Aviation - Department of Meteorology.

Map 4.1: Rainfall rate by years and selected stations (mm), 2016-2021



1.3 Relative Humidity (RH)

1.3.1 Monthly Mean Maximum and Minimum Relative Humidity

Relative humidity is the ratio of the partial pressure of water vapor to the equilibrium vapor pressure of water at a given temperature. It is noted that the mean maximum and minimum relative humidity gradually decreased in April and rose in September 2021.

Figure 4.5: Average maximum and minimum relative humidity by months at Doha Intl Airport Station 2021

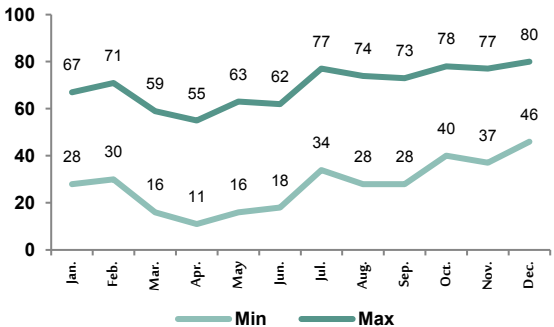


Table 4.6: Monthly mean maximum and minimum humidity by months in Hamad International Airport Station, 2017–2021

Month	2017		2018		2019		2020		2021	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
January	38	76	26	73	30	71	31	69	28	67.0
February	41	76	29	77	33	68	30	70	30	71.0
March	32	75	15	68	26	65	25	68	16	59.0
April	15	58	17	59	19	57	21	61	11	55.0
May	11	51	8	48	10	50	10	60	16	63.0
June	7	44	5	46	8	53	4	44	18	62.0
July	18	66	12	57	15	55	20	65	34	77.0
August	24	74	16	60	18	61	13	54	28	74.0
September	25	71	27	71	24	67	19	68	28	73.0
October	20	67	32	64	29	68	19	57	40	78.0
November	27	59	39	69	28	58	29	64	37	77.0
December	29	72	37	67	37	71	34	67	46	80.0

Source : General Authority of Civil Aviation - Department of Meteorology

1.3.2 Annual Mean Relative Humidity

The relative humidity is higher in coastal areas than in inland and desert areas. In 2021, the annual mean minimum relative humidity of Doha International Airport station was 28%, while the annual mean maximum relative humidity was 70%. When comparing between the five selected monitoring stations, the mean minimum relative humidity ranged between (21-49%) and the mean maximum relative humidity ranged between (70-80%) during the period 2017-2021.

Table 4.7: Annual mean maximum and minimum annual humidity by selected stations, 2017-2021

Month	2017		2018		2019		2020		2021	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Mesaieed	24	69	29	72	34	76	35	80	32	78
Ruwais	49	78	47	76	47	76	46	74	49	78
Dukhan	38	80	37	79	35	79	35	76	38	80
Doha Intl. Airport	24	66	22	63	23	62	21	62	28	70
Al Karaana	21	77	20	74	21	75	20	78	21	79

Source: General Authority of Civil Aviation – Department of Meteorology.

1.4 Atmospheric Pressure

1.4.1 Monthly Maximum and Minimum Atmospheric Pressure

Qatar's winter witnesses high mean atmospheric pressure, unlike its high temperature summer. According to the 2021 statistics of Doha International Airport station, the maximum atmospheric pressure value was 1028.9 hPa in February, while the lowest value was 992.2 hPa in July and August.

Table 4.8: Highest and lowest values of maximum and minimum atmospheric pressure (hPa) by months and selected monitoring stations, 2021

Month/ Selected Stations	Doha International Airport		Al Karaana		Dukhan		Ruwais		Mesaieed	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
January	1,007.9	1,026.0	1,008.0	1,026.7	1,007.7	1,026.0	1,007.8	1,025.5	1,011.3	1,024.2
February	1,007.9	1,028.9	1,007.9	1,029.6	1,006.3	1,029.2	1,005.9	1,028.4	1,010.6	1,023.4
March	1,001.3	1,019.7	1,001.8	1,020.0	1,001.7	1,020.5	1,002.0	1,019.9	1,003.1	1,020.0
April	1,002.2	1,017.3	1,001.4	1,017.6	1,001.3	1,017.1	1,002.7	1,017.1	1,005.4	1,016.5
May	1,001.7	1,013.0	1,001.7	1,013.7	1,001.4	1,013.4	1,001.6	1,013.3	1,000.2	1,010.1
June	995.5	1,005.6	996.1	1,006.2	995.0	1,005.5	995.1	1,004.9	995.1	1,003.8
July	992.2	1,004.7	993.1	1,004.8	991.9	1,003.9	991.6	1,003.9	990.4	1,001.7
August	992.2	1,002.9	992.6	1,003.2	992.1	1,002.4	992.1	1,003.0	995.7	1,004.3
September	1,001.2	1,008.3	1,001.4	1,008.8	1,000.9	1,008.0	1,001.0	1,008.2	998.4	1,007.9
October	1,005.6	1,017.8	1,005.5	1,018.3	1,004.7	1,017.7	1,004.9	1,017.5	1,002.0	1,021.9
November	1,011.7	1,021.2	1,011.2	1,021.4	1,010.1	1,020.5	1,011.4	1,020.8	1,009.1	1,019.4
December	1,010.1	1,023.8	1,010.4	1,024.3	1,010.1	1,024.1	1,010.2	1,023.8	1,013.7	1,023.4

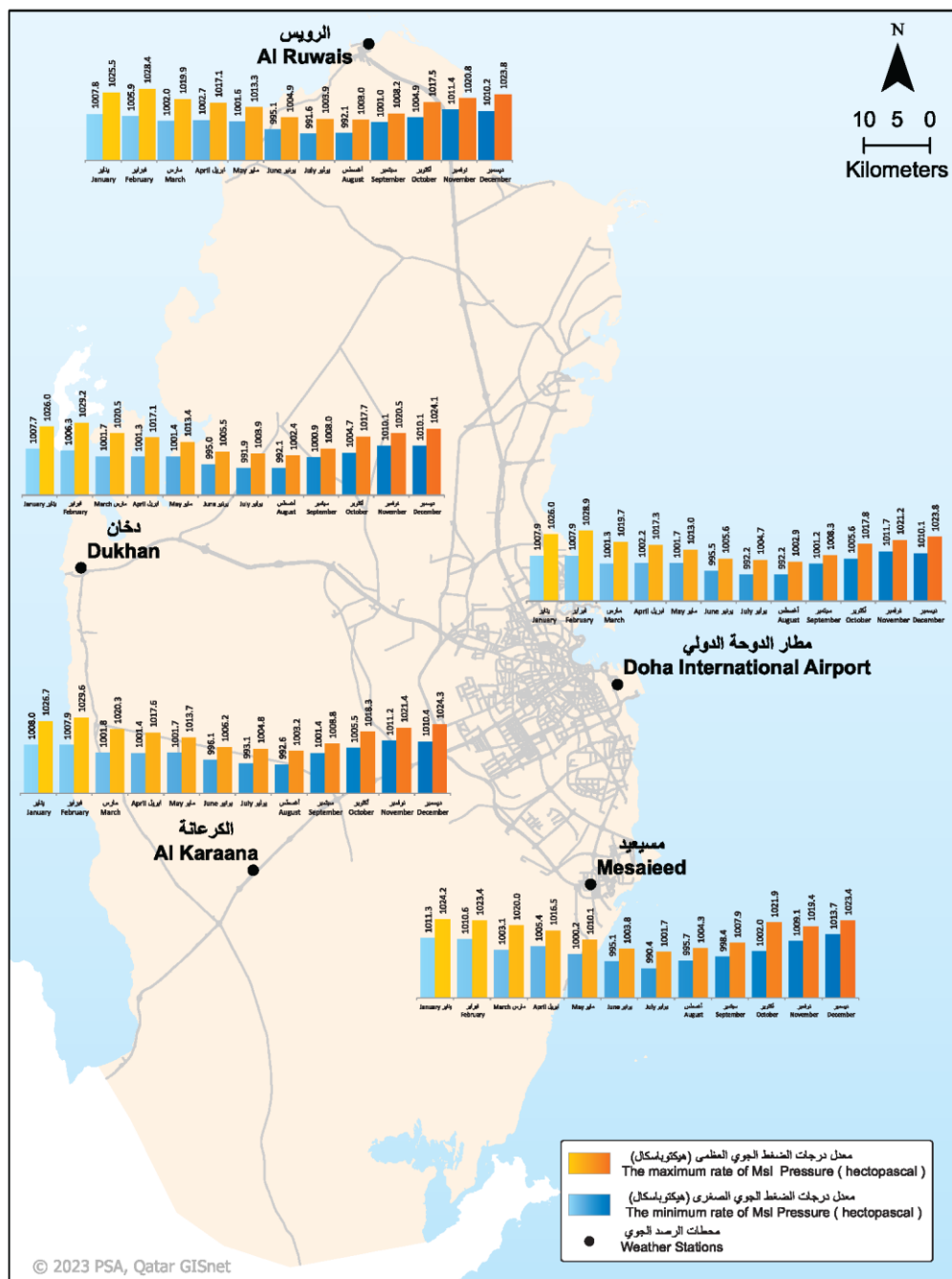
Source: General Authority of Civil Aviation - Department of Meteorology.

Map 4.2: Atmospheric pressure by months and selected stations (hPa), 2021

**MSL PRESSURE BY MONTHS
(HECTOPASCAL hPa)**

2021

الضغط الجوي حسب الشهر
(هيكتوباسكال)



1.5 Wind Speed

1.5.1 Monthly Average Wind Speed

There are two types of wind that blows over the State of Qatar:

- Al Shamal wind: a northern to northwesterly wind that sometimes comes loaded with dirt and dust. It is a semi-permanent wind that blows throughout the year and helps to soften the atmosphere.
- Al Kous wind: a south-western wind that causes a significant rise in temperatures (hot waves).

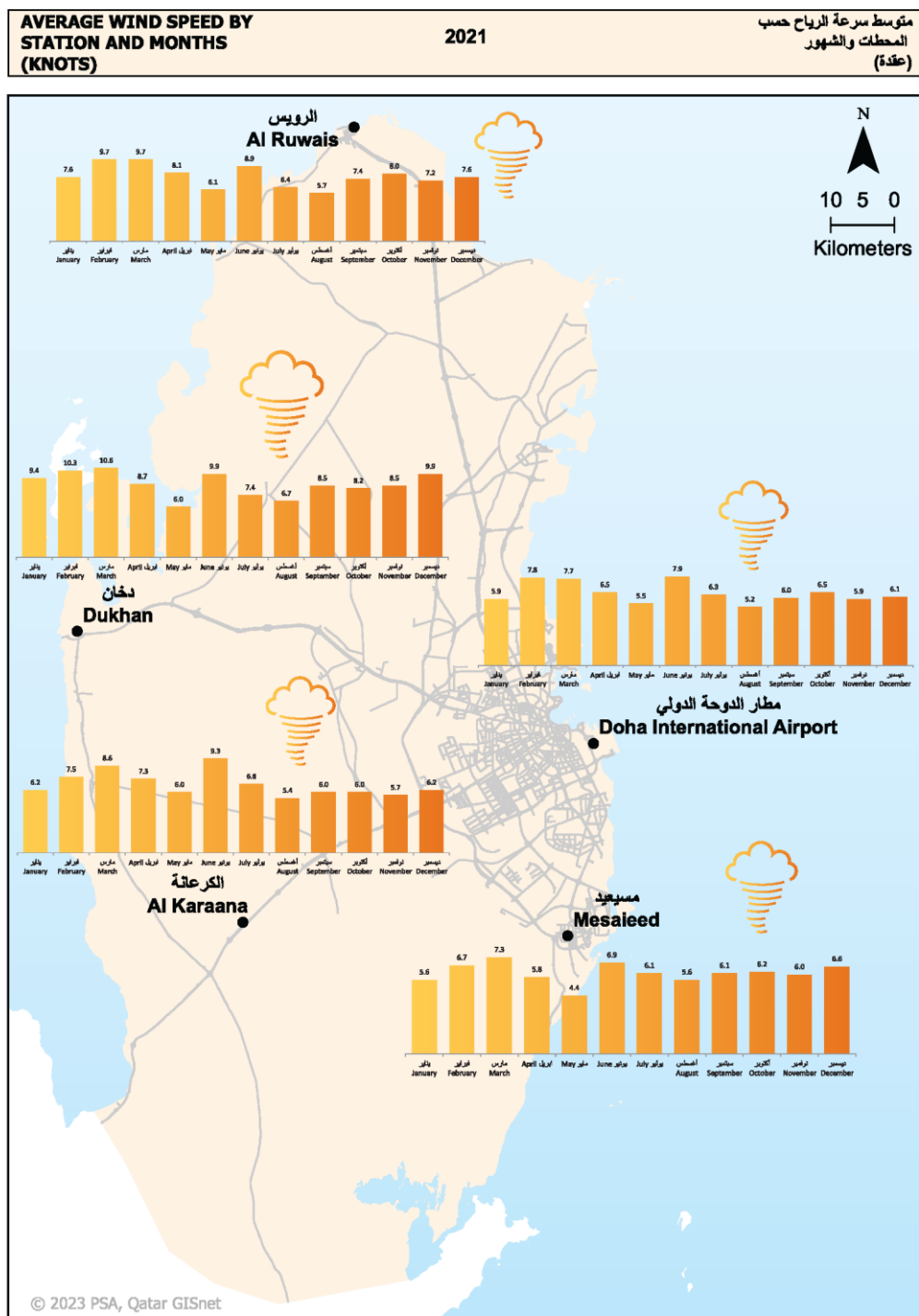
Table (9.4) on average wind speed by months and selected monitoring stations in 2021, shows that the highest value of the monthly average wind speed was recorded at Dukhan station in March at 10.6 knots, while the lowest value was recorded at Mesaieed station at 4.4 knots in May.

Table 4.9: Average wind speed (knots) by months and selected monitoring stations, 2021

Month & Selected Stations	Mesaieed	Ruwais	Dukhan	Doha Intl. Airport	Al Karaana
January	5.6	7.6	9.4	5.9	6.2
February	6.7	9.7	10.3	7.8	7.5
March	7.3	9.7	10.6	7.7	8.6
April	5.8	8.1	8.7	6.5	7.3
May	4.4	6.1	6.0	5.5	6.0
June	6.9	8.9	9.9	7.9	9.3
July	6.1	6.4	7.4	6.3	6.8
August	5.6	5.7	6.7	5.2	5.4
September	6.1	7.4	8.5	6.0	6.0
October	6.2	8.0	8.2	6.5	6.0
November	6.0	7.2	8.5	5.9	5.7
December	6.6	7.6	9.9	6.1	6.2

Source: General Authority of Civil Aviation - Department of Meteorology.

Map 4.3: Average wind speed by months and selected stations (knots) 2021



1.5.2 Annual Average Wind Speed

The statistics in the table below show that the annual average wind speed at weather monitoring stations is not much different from its counterpart at other stations.

Table 4.10: Annual average wind speed by selected monitoring stations, 2017-2021

Selected Stations	2017	2018	2019	2020	2021
Mesaieed	7.2	7.0	6.9	6.7	6.11
Ruwais	8.5	8.3	8.1	7.3	7.7
Dukhan	8.3	8.0	8.4	8.2	8.7
Doha Intl. Airport	6.6	6.6	6.7	6.6	6.4
Al Karaana	6.4	6.8	6.9	6.7	6.8

Source: General Authority of Civil Aviation – Department of Meteorology.

1.6 Sunshine

1.6.1 Daily Sunshine

The daily sunshine ranges between 8.4 to 12.1 hours according to Hamad International Airport station in 2020. The number of sunshine hours increases in hot months from June until September, where the average number of sunshine hours in these months was (11.8) hours, while the average number of sunshine hours in the winter months was (9.3) hours.

Table 4.11 : Average daily sunshine hours by month at Hamad International Airport Station, 2017–2020*

Month	2017	2018	2019	2020
January	8.1	8.9	7.0	8.4
February	6.3	8.2	8.1	9.0
March	6.5	9.5	8.3	8.6
April	10.4	7.8	7.7	7.1
May	10.8	9.4	9.6	11.3
June	12.0	11.6	11.8	12.1
July	10.8	10.6	11.2	11.2
August	10.9	10.7	10.9	10.8
September	10.0	10.2	10.2	10.5
October	10.1	8.6	9.5	10.1
November	8.9	7.7	8.7	8.8
December	8.5	8.4	7.1	8.9
Average	9.4	9.3	9.2	9.7

*2021 data is not available from the source.

Source: General Authority of Civil Aviation - Department of Meteorology.

1.6.2 Annual Sunshine

The statistics in the table below show that the summer season is characterized by a higher number of annual hours, reaching 341.7 hours at Hamad International Airport station, while in the winter season, it was 238.9 hours per year in 2020.

Table 4.12: Average sunshine hours at Hamad International Airport in summer and winter, 2017-2020

Years	Summer	Winter
2017	333.6	230.1
2018	320.8	254.6
2019	329.1	221.0
2020	341.7	238.9

* 2021 data is not available.
 *No data available from other stations.
 Summer is from May to September.
 Winter is from December to February.
 Source: General Authority of Civil Aviation - Department of Meteorology.

1.6.3 Mean Global Solar Radiance

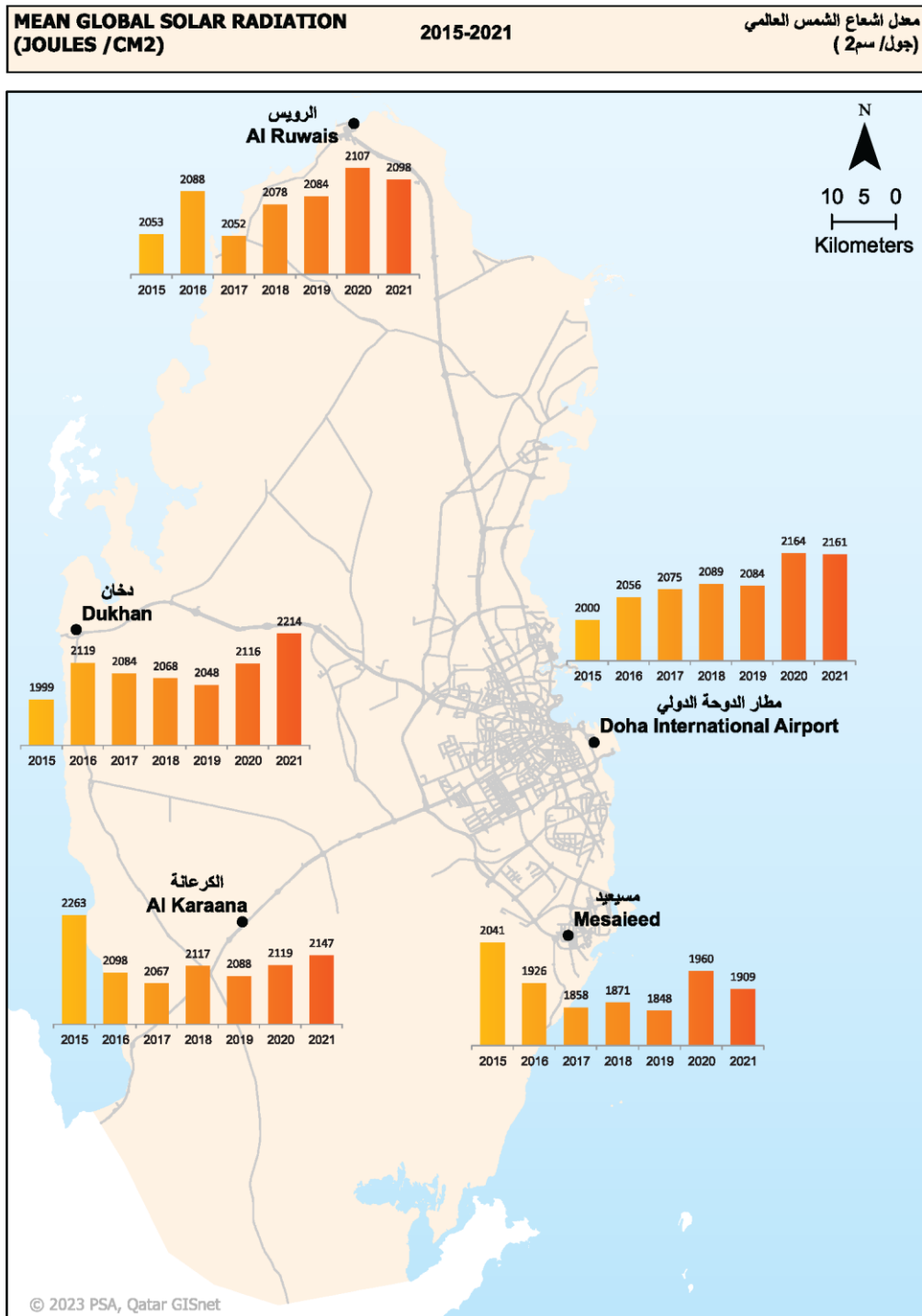
The table below shows that the mean global solar radiance at Mesaieed station was the lowest compared to other selected stations in 2021.

Table 4.13: Mean global solar radiation by selected stations, 2017-2021

Year	2017	2018	2019	2020	2021
Mesaieed	1,858	1,871	1,848	1,960	1,909
Ruwais	2,052	2,078	2,084	2,107	2,098
Dukhan	2,084	2,068	2,048	2,116	2,214
Doha Intl. Airport	2,075	2,089	2,084	2,164	2,161
Al Karaana	2,067	2,117	2,088	2,119	2,147

Source: General Authority of Civil Aviation - Department of Meteorology.

Map 4.4: Mean global solar radiance (Joules/cm2), 2015-2021



1.7 Lunar and Solar Eclipse

1.7.1 Lunar Eclipse

The table below indicates that there were 7 lunar eclipses during the period 2017-2021, except for the year 2020 where there was no lunar eclipse. The majority of eclipses were full and visible.

Table 4.14: Number of lunar eclipses by date and type, 2017-2021

Year	Number of Eclipses	Date	Type of Eclipse			Visible Eclipse in Qatar		
			Full	Partial	Total	Visible	Invisible	Total
2017	1	7 Aug	-	1	1	1	-	1
2018	2	31 Jan	1	-	1	1	-	1
		27 Jul	1	-	1	1	-	1
2019	2	21 Jan	1	-	1	1	-	1
		16 Jul	-	1	1	1	-	1
2020	0	-	-	-	-	-	-	-
2021	2	26 May	1	-	1	-	1	1
		19 Nov	-	1	1	-	1	1

Source: General Authority of Civil Aviation - Department of Meteorology.

1.7.2 Solar Eclipse

The table below shows that there were 12 solar eclipses during the period 2017-2021. In 2021 there were 2 solar eclipses on 10 June and 4 December, where the eclipse on 10 June was an annular and invisible eclipse in Qatar, while the one on 4 December 2021 was full and invisible in Qatar.

Table 4.15: Number of solar eclipses by date and type of eclipse, 2017-2021

Year	No. of Eclipses	Date	Type of Eclipse				Visible Eclipse in Qatar		
			Full	Partial	Annular	Total	Visible	Invisible	Total
2017	2	Feb - 26	-	-	1	1	-	1	1
		Aug - 21	1	-	-	1	-	1	1
2018	3	Feb - 15	-	1	-	1	-	1	1
		July - 13	-	1	-	1	-	1	1
		Aug - 11	-	1	-	1	-	1	1
2019	3	Jan 6 - 7	-	1	-	1	-	1	1
		July - 02	1	-	-	1	-	1	1
		Dec-26	-	-	1	1	1	-	1
2020	2	Jun - 21	-	-	1	1	1	-	1
		Dec-14	1	-	-	1	-	1	1
2021	2	Jun 10	-	-	1	1	-	1	1
		Dec-4	1	-	-	1	-	1	1

Source: General Authority of Civil Aviation - Department of Meteorology.

1.8 Earthquakes

1.8.1 Recorded National Earthquakes

The table below indicates that 20 national earthquakes were monitored during the period 2017-2021, ranging in magnitude between 1.7 and 2.4 Richter, and ranging in depth between 1 km and 97 km, distributed according to earthquake location. It should be noted that in 2021, 3 earthquakes were recorded in southwestern Qatar, the depth of which was less than 5 km, and its magnitude ranged between 1.9 and 2 Richter.

Table 4.16: Number of national earthquakes recorded by date, time, depth and magnitude, 2017-2021

Year	Number of recorded local earthquakes	Date	Time (Doha Time)	Hypocenter (location)	Earthquake Depth (km)	Earthquake Magnitude (Richter)
2017	1	Nov- 6	9:27:04	West Um Wishah	4	1.7
2018	2	Oct-15	10:48:47	Northeast Dukhan	46 km	2
		Oct-17	9:39:32	Qatar's western border with Saudi Arabia	55 km	2.4
2019	3	Feb-25	6:02:49	Northeast Dukhan	66 km	Less than 2 km Richter
		May-23	6:27:38	West Dukhan	97 km	Less than 2 km Richter
		Jun-16	6:04:58	Southeast Dukhan	1 km	Less than 2 km Richter
2020	11	Feb-25	6:11:14	Central West Qatar	Less than 5 km	Less than 2 km Richter
		Jun-8	6:59:04	Central Qatar	Less than 5 km	Less than 2 km Richter
		July-29	6:29:59	Northeast Qatar	Less than 5 km	Less than 2 km Richter
		Oct-13	6:14:48	Northeast Qatar	Less than 5 km	Less than 2 km Richter
		Oct-25	6:40:02	Central West Qatar	Less than 5 km	Less than 2 km Richter
		Dec-3	8:12:07	Central West Qatar	Less than 5 km	Less than 2 km Richter
		Dec-6	7:40:32	Central Qatar	Less than 5 km	Less than 2 km Richter
		Dec-7	7:02:45	Central West Qatar	Less than 5 km	Less than 2 km Richter
		Dec-7	7:42:06	Central Qatar	Less than 5 km	Less than 2 km Richter
		Dec-15	7:31:52	Central West Qatar	Less than 5 km	Less than 2 km Richter
		Dec-16	7:03:10	Central West Qatar	Less than 5 km	Less than 2 km Richter
2021	3	March 16	...	Southwest Qatar	Less than 15 km	2
		Dec-20	...	Southwest Qatar	Less than 5 km	1.9
		Dec-30	...	Southwest Qatar	Less than 5 km	2

Source: General Authority of Civil Aviation – Department of Meteorology.

...: Unavailable

1.8.2 Recorded Regional Earthquakes

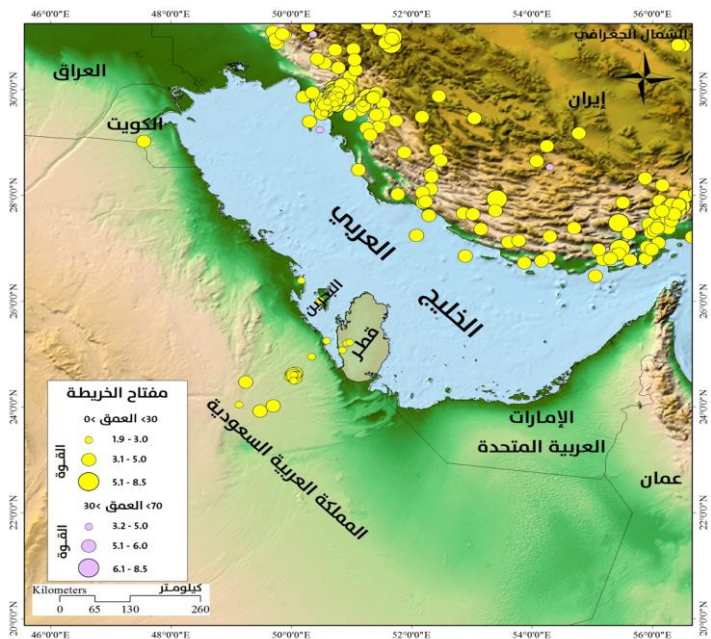
One regional earthquake was recorded during the period 2017-2021, which is one of the earthquakes coming from the Iranian-Iraqi border with a magnitude of 7.3 Richter and a depth of 24 km. it was slightly felt by people and did not result in any human losses.

Table 4.17: Number of regional earthquakes recorded by date, time, hypocenter, distance from Qatar, depth and intensity, 2017-2021

Year	Number of regional earthquakes felt by citizens in Qatar	Date	Time (Doha Time)	Hypocenter (location)	Distance from Qatar (km)	Earthquake depth (km)	Earthquake Magnitude (Richter)
2017	1	Nov-12	21:18:17	Iran-Iraq border	1185	24	7.3
2018	0	-	-	-	-	-	-
2019	0	-	-	-	-	-	-
2020	0	-	-	-	-	-	-
2021	0	-	-	-	-	-	-

Source: General Authority of Civil Aviation – Department of Meteorology.

Map 4.5: Seismic activity in the State of Qatar and near its borders, 2021



Source: General Authority of Civil Aviation – Department of Meteorology.

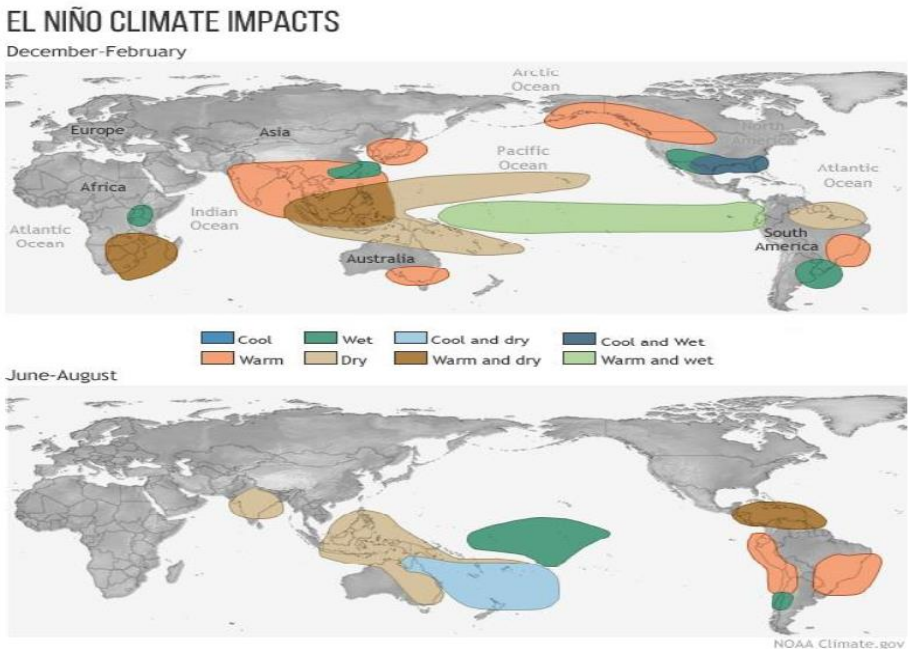
1.9 El Niño

El Niño is a natural climatic phenomenon that significantly increases the surface water temperature, especially in the period between the end of the summer and autumn. This rising water temperature causes warm streams of water in the tropics situated in the equator between the west coast of South America, the east coast of Asia and the north-east of Australia which is surrounded by the Pacific Ocean. The water moves towards the east until it reaches the coasts of Peru and Ecuador in South America, causing severe climate and environmental changes around the world. It is worth noting that this phenomenon affects the ocean every 4 to 12 years.

1.9.1 El Niño's Impact on Qatar and GCC Countries

El Niño is one of the key environment indicators of the climate sector. The Map below “El Niño Climate Impacts Worldwide” shows that Qatar and the GCC countries do not fall into the main area prone to impact during El Niño, but one cannot rule out some impacts on seasonal temperatures during the occurrence of El Niño. Nevertheless, there has been no proof of El Niño impact on the State of Qatar.

Map 4.6: El Niño's Climate Impacts Worldwide



2. Biodiversity

The biodiversity indicator is linked to the accuracy of biological systems in the State. This indicator shows the level of environmental sustainability as well as to what extent the environmental policies are included in national plans.

2.1 Nature Reserves

In 2020, the number of terrestrial and marine nature reserves in the State of Qatar reached 12, with an area of 3,464.92 km². As for the area of nature reserves, the results of 2020 show that the largest area was Khor Al Udaid Reserve, reaching 1,291.13 km², and constituting 24% of the area of the natural terrestrial reserves.

The statistics in the table below indicate stability in the proportion of terrestrial reserves during the period (2017-2020) at 23.6% of total area of Qatar with islands. This is an achievement in itself, despite the rapid population growth and urbanization witnessed by the State recently.

Table 4.18: Area of nature reserves (terrestrial and marine), 2020

Nature Reserves	Terrestrial		Marine	Total
	Reserve area (km ²)	Area of Qatar with islands (%)	Reserve area (km ²)	Reserve area (terrestrial and marine) (km ²)
Total area of Qatar with islands	11,627.04	...	35,000	46,627.04
Al Eraiq	54.76	1%	0.00	54.76
Al Thakhira	114.46	2%	179.14	293.60
Khor Al Udaid	1,291.13	24%	542.04	1,833.17
Al Rafaa	53.33	1%	0.00	53.33
Um Al Amad	5.72	0.0%	0.00	5.72
Um Qarn	24.71	0.0%	0.00	24.71
Al Sunai	3.92	0.0%	0.00	3.92
Al Reem	1,154.10	21%	0.00	1,154.10
Al Shihaniya	0.79	0.0%	0.00	0.79
Al Mashabiya	4.76	0.0%	0.00	4.76
Al Lusail	34.73	1%	0.00	34.73
Wadi Sultana*	1.33	0.0%	0.0	1.33
Total Reserves	2,743.74	23.60%	721.18	3,464.92

Note: The 2021 data is not available from the source.

*: Data for 2017

Source : Ministry of Environment and Climate Change

Table 4.19: Number and Area of Nature Reserves (Terrestrial and Marine) in the State of Qatar (km2), 2017-2020

Year	Number of Terrestrial Nature Reserves	Number of Marine Nature Reserves	Total Number of Terrestrial and Marine Nature Reserves	Area of Terrestrial Nature Reserves (km2)	Area of Marine Nature Reserves (km2)	Area of Terrestrial and Marine Nature Reserves (km2)	Percentage of Terrestrial Nature Reserves to Total Area
2017	12	2	14	2,744	721	11,627	23.6
2018	12	2	14	4 2.74	721	11,627	23.6
2019	12	2	14	4 2.74	721	11,627	23.6
2020	12	2	14	2.744	721	11,627	23.6
Annual growth rate 2017 & 2020	0%	0%	0%	0%	0%	0%	0%

Note: Data for 2021 is not available

Source: Ministry of Environment and Climate Change

Map 4.7: Distribution of nature reserves in Qatar, 2020



2.2 Arabian Oryx in Nature Reserves

The Arabian Oryx is classified as endangered species and is listed in the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). It was extinct in the wild by the early 1970s when the last one of its kind was killed in the Empty Quarter desert at Omani- Saudi border. However, it was saved and bred in zoos and private reserves and was reintroduced into the wild in 1980s. However, the success of this process has been uneven¹.

Qatar has been paying special attention to protect and breed these animals in large, fenced reserves where they can live and move around freely. Statistics indicate that the number of

Arabian Oryx in terrestrial nature reserves decreased to 1,295 in 2021, at an annual growth rate of -6%. The Arabian Oryx is distributed in 16 terrestrial nature reserves, and the maximum number is in Al Mashabiya reserve and Farm No. (279), which, in 2021, accommodated more than half the number of Arabian Oryx in Qatar (i.e., 61% of total Arabian Oryx in nature reserves).

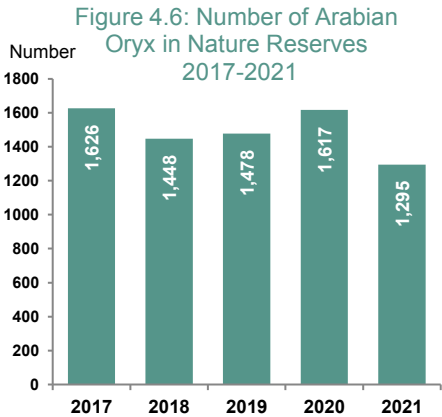


Table 4.20: Total Number of Arabian Oryx by Location, 2017-2021

Location	2017	2018	2019	2020	2021
Al Shihaniya	344	356	345	194	203
Al Mashabiya	716	701	734	522	421
Desert Park	0	0	4	4	0
Al Wajba	125	0	0	0	7
Green Qatar	0	0	2	2	2
Animal Research Center	0	0	7	7	0
Umm Thanyatain	4	4	4	4	0
Umm Qariba	51	34	28	27	0
Umm Al Mawaqi	28	36	42	48	0
Ras Laffan	4	4	4	4	0
Farm No. (279)(2)	163	140	128	602	372
Umm al-Amad	45	0	0	0	1
Ushairij	94	122	142	166	202
Al Rifaa	12	12	0	0	0
Umm Qarn	10	10	10	10	0
Buruq	30	29	28	27	87
Total	1,626	1,448	1,478	1,617	1,295

Source: Ministry of Environment and Climate Change

(1) Wikipedia, the free encyclopedia

https://en.wikipedia.org/wiki/%D8%A8%D8%A7_%D8%B9%D8%B1%D8%A8%D%A%D8%A9

2.3 Endangered Species

In 2017, the number of terrestrial flora and fauna amounted to 965 species, while the number of marine flora and fauna amounted to 853 species. The statistics in the table below indicate the following:

- There are 2 species of extinct terrestrial flora, 14 endangered species and 171 rare and threatened species.
- With regards to marine flora and fauna, there are 6 endangered species, 22 rare and threatened species and 7 near-threatened species.

Table 4.21: Number of registered species by type and risk of extinction, 2017

Type of Species	Extinct	Endangere d	Rare/ Threatened	Near- Threatened Species	Unclassified	Total Registered Species
Terrestrial flora and fauna	2	14	171	0	965	1,152
Marine flora and fauna	0	6	22	7	853	888

Source: Ministry of Environment and Climate Change

The statistics in Table (4.22) of terrestrial flora and fauna by species and risk of extinction in 2017 show that 4 out of 422 terrestrial flora in Qatar are endangered. There are also 2 extinct species and 5 endangered species out of 322 species of wild birds registered in Qatar. There is one endangered species and 5 threatened species out of 8 species of terrestrial mammals.

Table 4.22: Number of terrestrial flora and fauna by species and risk of extinction, 2017 *

Status of Species	Flora	Fungus	Mammal s	Amphibi ans	Reptiles	Birds	Invertebrat es
Extinct	0	0	0	0	0	2	0
Endangered	4	0	5	0	0	5	0
Threatened/Rare	0	0	1	0	0	0	170
Unclassified	418	142	2	1	29	315	58
Total registered number of terrestrial species	422	142	8	1	29	322	228

Source: Ministry of Environment and Climate Change.

*: The table has been updated from the previous report by adding the item "Unclassified".

The statistics in the table below of marine flora and fauna by species and risk of extinction, indicate that there are 7 near-threatened species, 2 threatened species, and one endangered species out of 57 species of fish registered in Qatar. There are also 4 endangered species and 11 threatened/rare species out of 15 species of marine mammals. However, there is only one endangered species and 9 threatened/rare species out of 15 species of marine birds.

Table 4.23: Number of marine flora and fauna by species and threat of extinction, 2017

Status of Species	Flora	Fish	Mammals	Amphibians	Birds	Reptiles
Extinct	0	0	0	0	0	0
Endangered	0	1	4	0	1	0
Threatened/Rare	0	2	11	0	9	0
Near-threatened	0	7	0	0	0	0
Unclassified	402	47	0	379	15	20
Total number of registered marine species	402	57	15	379	15	20

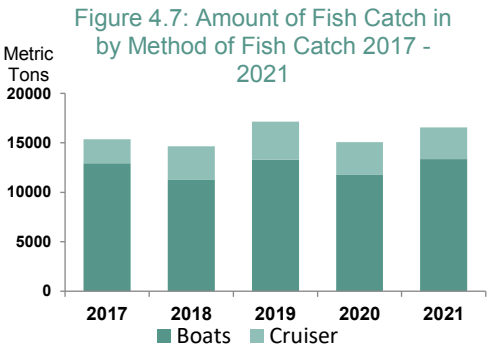
Source: Ministry of Environment and Climate Change.

2.4 Fish Stocks

The Environment statistics aim to provide statistical data on aquatic resources, including fish stocks in view of its importance for the development of sustainable fisheries industry procedures. The National Development Strategy of the State of Qatar 2018-2022 emphasized the need to have sustainable fish resources and monitor poaching which represents an environmental and food supply threat, in order to preserve and increase fish stocks, enforce effective laws and provide support for local aquaculture breeding farms.

The proportion of fish stocks within a biologically sustainable level is also linked to SDG 14/Target 14/Indicator 4 (14.4.1) of the 2030 SDGs on the sustainable protection and exploitation of marine resources to achieve sustainable development. The proportion of fish stocks within safe biological limits is defined as the proportion of fish stocks or species that is being exploited within the maximum sustainable biological productivity.

It is worth mentioning that the United Nations Convention on the Law of the Sea (UNCLOS III) entered into force in 1994 and was ratified by the State of Qatar on 9 December 2002. The convention also includes sustainability indicators relating to fishing (see UN Statistics Division 2013):



- Yield-related indicators: catches.
- Fishing capacity-related indicators: Fishing effort and intensity.

2.4.1 Amount of fish catch and number of fishing vessels and fishermen

The 2021 statistics indicate that the total catch increased to 16,000 metric tons, the number of vessels increased to 465 vessels and the number of fishermen increased to 2,828.

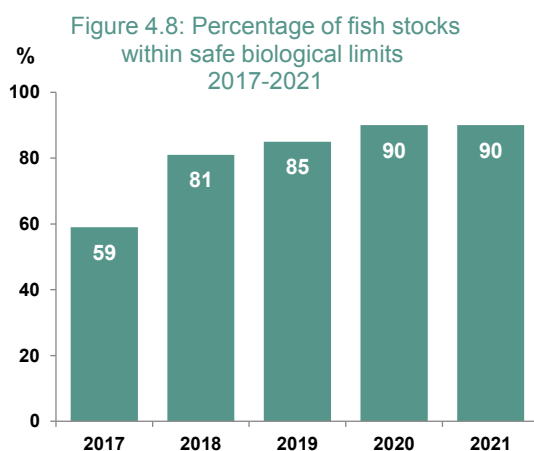
Table 4.24: Amount of fish catch and number of fishing vessels and fishermen, 2017-2021

Year	Amount of fish catch (metric tons)	No. of fishing vessels	No. of fishermen
2017	15,358	478	3,664
2018	14,665.0	471	3,816
2019	16,938.2	472	3,769
2020	15,087	457	2774
2021	16,552	465	2,828
Annual growth rate 2017 & 2021	2%	-0.7%	-6.3%

Source: Ministry of Municipality, National Planning Council calculations.

2.4.2 Proportion of Fish Stocks

The proportion of fish stocks within safe biological limits is defined as the proportion of fish stocks or fish species that are exploited within the maximum level of sustainable biological productivity. Figure (4.8) indicates that the proportion of fish stocks within safe biological limits increased to 90% in 2021.



2.4.3 Exploitation Rate

The table below of fishing by exploitation rate indicates that overexploitation rate reached 1,424 tons of fish and marine species. The amount of fish catch for the maximum exploitation category reached 3,496 tons, while the exploitation of its catch was sustainable, reaching 9,042 tons in 2021.

Figure (4.10) of the relative distribution of fishing by exploitation rate 2017-2021, indicates that the highest percentage of maximum exploitation was in 2018 at 28.5%, while the lowest percentage of maximum exploitation was in 2017 at 1.1%. The years 2018 and 2021 witnessed the highest rates of sustainable exploitation, reaching 38.1% and 54.6%, respectively.

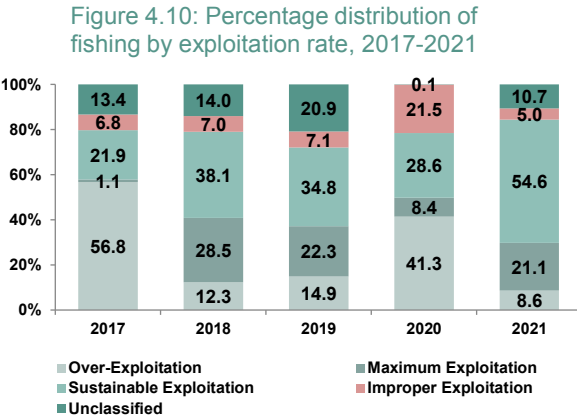
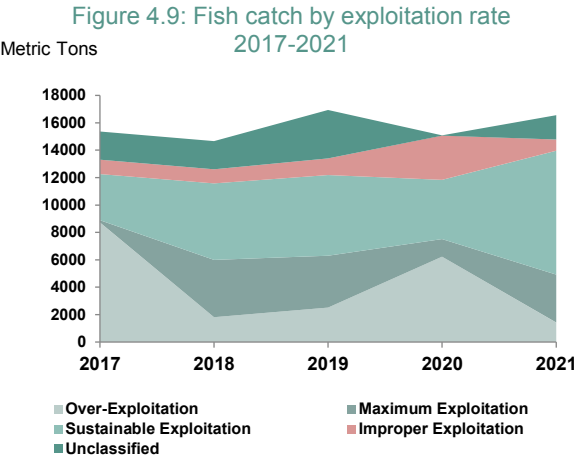


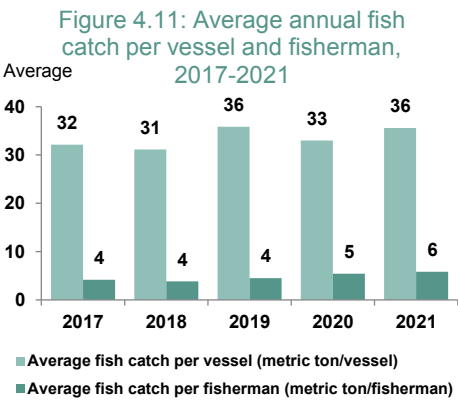
Table 4.25: Fishing by exploitation rate (tons), 2017-2021

Year	Overexploitation	Maximum exploitation	Sustainable exploitation	Improper exploitation	Unclassified	Total
2017	8,720	171	3,356	1,052	2,059	15,358
2018	1,808	4,185	5,585	1,030	2,057	14,665
2019	2,523	3,777	5,897	1,205	3,537	16,938
2020	6,238	1,274	4,315	3,247	14	15,088
2021	1,424	3,496	9,042	825	1,765	16,552
Annual growth rate 2017 & 2021	-36%	113%	28%	-6%	-4%	2%

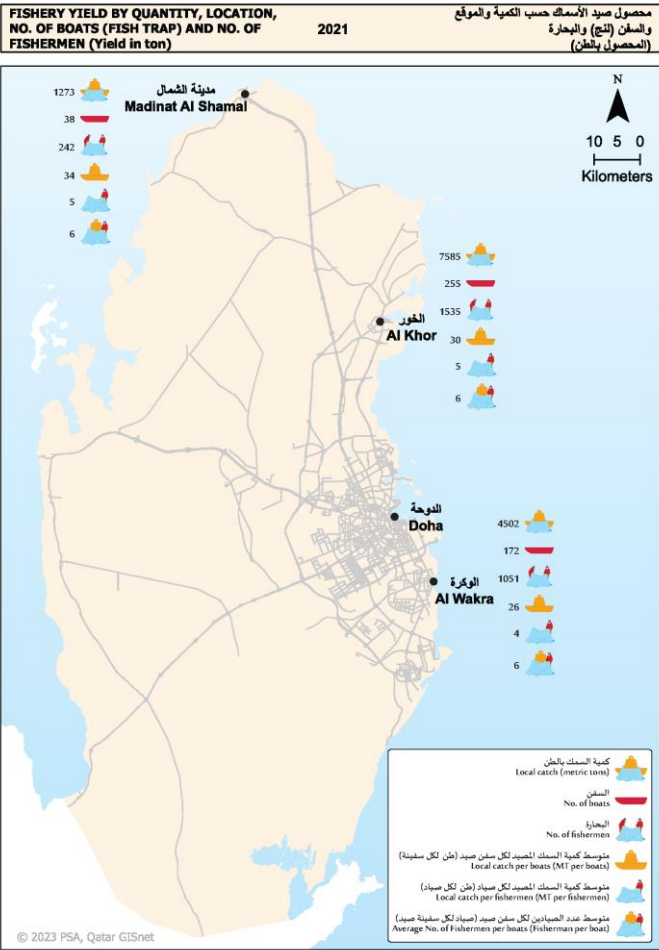
Source: Ministry of Municipality

2.4.4 Fishery Effort (fish trap)

It is clear from the figure that there was an increase in fishery effort in 2021, as the share of catch per vessel reached 36 tons with an annual growth rate of 3% during the period (2017-2021). The share of fish catch per fisherman also increased to 6 tons in 2021 with an annual growth rate of 9% for the same period.



Map4.8: Fishery yield by quantity, location and number of vessels (fish trap) and fishermen, 2021

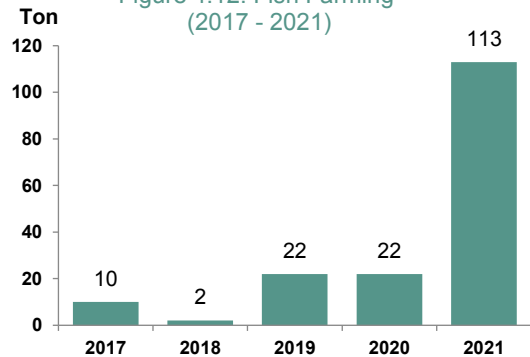


2.5 Fish Farming

At present, there are development projects to increase fish stocks, and achieve self-sufficiency in fish. These projects fall under the National Development Strategy for natural resources, which includes two core programs; first program aims to improve fisheries production technique, which is based primarily on setting up a comprehensive national plan for the development of fish farming in Qatar to meet the growing market needs of fish,

which cannot be met by fish production from fisheries, as it already reached its maximum limit of exploitation. The second program reviews and strengthens legislations relating to the exploitation of fishery resources and is based primarily on the actions and measures that will protect and develop aquatic resources and exploit them in rational and wise ways in order to increase fish stocks, especially in terms of preventing poaching and reducing practices that threaten the marine environment and fisheries in the State. According to statistics in the below table below, the amount of the culture of Nile tilapia reached 113 metric tons in 2021. It is of importance to encourage private sector investment in the field of fish farming and aquaculture, which provides strategic stocks to meet Qatar population needs of food in the wake of the shrinking surplus of fish production in recent years and the significant increase in the population as a result of the major economic and urban boom witnessed in Qatar.

Figure 4.12: Fish Farming (2017 - 2021)



2.6 Exports and Imports of Fish, Crustaceans, Mollusca and Others

The statistics indicate an increase in the weight of fish and crustaceans imported to Qatar, reaching nearly 33 million kg worth of QR 489 million in 2022, while the weight of exported fish reached approximately 113 thousand kg worth of QR 2.6 million. The annual growth rate of exported fish decreased by -44% compared to 2017.

Figure 4.13: Weight of exports and imports of fish, crustaceans, molluscs and other aquatic invertebrates, 2017-2022

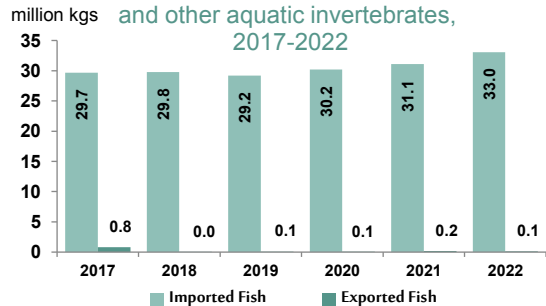


Table 4.26: Volume and value of Qatar exports and imports of fish, crustaceans, Mollusca and other aquatic invertebrates (kg, QR) 2017-2022

Year	Imports		Exports	
	Volume of Imported Fish (kg)	Value of Imported Fish (QR)	Volume of Exported Fish (kg)	Value of Exported Fish (QR)
2017	29,679,972	295,792,142	796,232	3,278,230
2018	29,757,732	340,197,368	37,598	554,270
2019	29,177,491	364,445,510	86,379	525,596
2020	30,174,189	342,592,373	64,506	341,510
2021	31,072,771	376,324,885	162,026	328,576
2022	33,049,439	488,831,260	113,420	2,631,041
Annual Growth Rate 2017 - 2022	2%	11%	-32%	-4%

Note: Data changed by the source.

Source: NPC, Statistical Abstract, Chapter of Foreign Trade Statistics

2.7 Sea Turtle Nests

Statistics indicate that the total number of monitored sea turtle nests amounted to 193 nests in 2020, the majority of which are concentrated in Fuwairit, Al Ghariyah and Umm Tais Island. Furthermore, the number of live hatching turtles reached 9,416 turtles, with a success rate of hatching turtle eggs that reached 90% in 2020.

Table 4.27: Total number of registered sea turtle nests by location, 2017-2020

Location	2017	2018	2019	2020
Ras Laffan	42	40	46	30
Fuwairit	52	56	32	61
Al Maroona	4	5	7	13
Ras Rukn Island	43	13	17	20
Umm Tais Island	24	4	53	26
Shraouh Island	3	0	1	2
Halul Island	40	0	33	0
Al Ghariya	0	24	23	41
Total	208	142	212	193

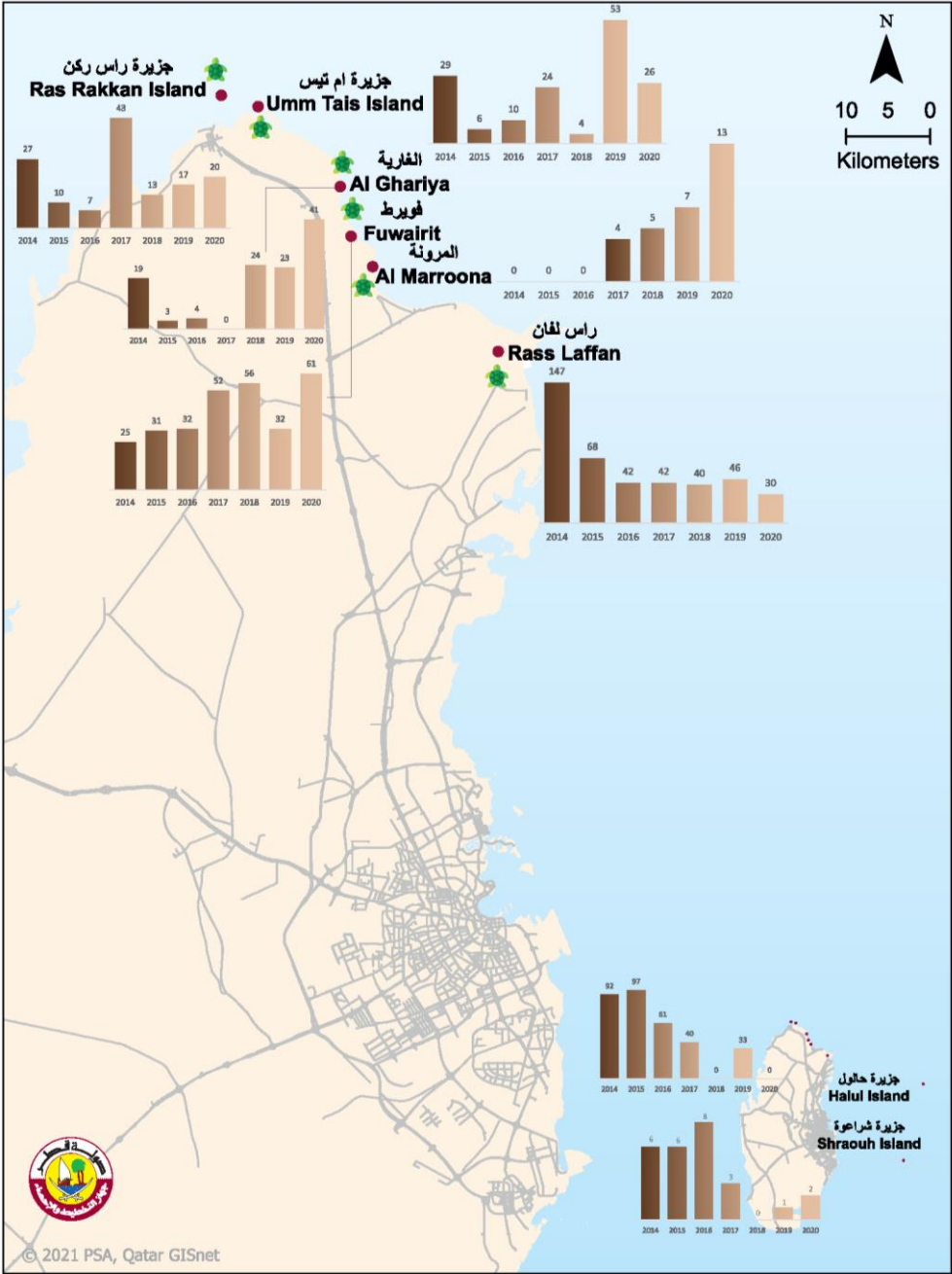
Source: Ministry of Environment and Climate Change

Table 4.28: Number of live hatching turtles and hatching success rate, 2017-2020

Location	2017	2018	2019	2020
Number of live hatching turtles	2,814	5,037	5,706	9,416
Hatching success rate	73.5%	80.0%	82.0%	90.0%

Source: Ministry of Environment and Climate Change

Map 4.9: Number of sea turtle nests, 2014-2020



3. Uses and Types of Water Resources

Water is at the forefront of national and international priorities, mainly in the countries suffering from natural water resource shortage, e.g., the State of Qatar. This priority is manifested in the relationship of water to Qatar's National Development Strategy. Qatar is among the world's least countries with natural freshwater resources, i.e., annual production rate. The groundwater resources did not exceed 71.7 million m³, rainfall (long-term annual average 1998-2022) amounted to 71.7 million m³. It is clear from statistics that the annual safe water abstraction level should not surpass 53.7 million m³, after calculation of the outflow of water from aquifers into the sea, and deep saline reservoirs, which amount to 18 million m³ annually. Therefore, the annual renewable safe water abstraction (water balance) represents 53.7 million m³.

Table 4.29: Natural Water Balance of Aquifers in Qatar (Average Annual Values During 1998-2021)

Balance item	Million m ³ /year	Source
1- Recharge of aquifers from rainfall	71.7	Ministry of Environment (long-term annual average 1998-2021)
2- Total water renewable resources	71.7	
3- Flowing out groundwater reservoirs into the sea and deep saline reservoirs	18.0	Ministry of Environment (long-term annual average 1998-2021)
4- Annual average of water balance (net and safe renewed yield on an annual basis) = (3) – (4)	53.7	Subtraction of 2-3

(*): Water statistics of the UN FAO, OECD, UNSD and Eurostat

(**): Without returns from irrigation.

Source: Qatar General Electricity and Water Corporation (Kahramaa)

In reality, however, groundwater abstraction ratio is 4 times higher than the safe yield (250 million m³/year) which leads to groundwater depletion and leakage of seawater and deep saline groundwater into aquifers, and therefore leading to salinity increase and concentration of dissolved solids. In addition, high salinity and dissolved solids concentrations may render water unsafe for drinking or even for agricultural purposes.

Shortage of water resources, harsh climate conditions, polluted groundwater, inappropriate agricultural patterns, improper agricultural practices, over grazing, and lack of socio-economic development lead altogether to water deterioration and desertification. In turn, the problem of desertification will aggravate due to the accumulation of salinity year after year, causing soil deterioration and making it infertile, which is the main reason for abandoned farms. Such deteriorated soil exists in farms in vicinity of coasts owing to the impact of high saline irrigation water, or on inland farms where solid soil is exposed to salinity.

3.1 Groundwater Quantity

It is worth mentioning that most groundwater abstractions (230 million m³ in 2021) are directed for agricultural purposes, i.e. 92% of total abstracted groundwater, whereas the remaining proportion is allocated for domestic, municipal and industrial uses by 20 million m³.

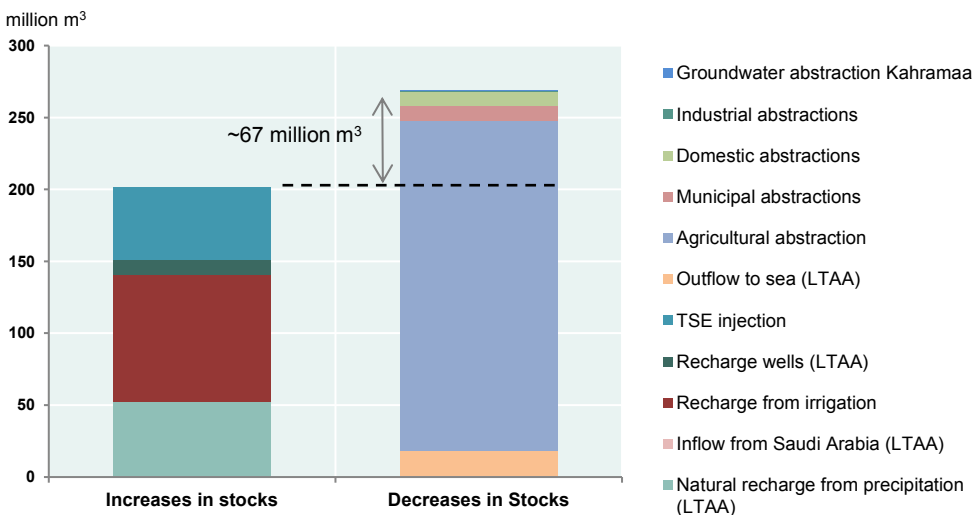
Table 4.30: Quantity of Abstracted Groundwater by Sector of Use (million m³/year) 2017-2022

Year	Farms	Municipal\ Domestic\ Industrial	Total
2017	230	20	250
2018	230	20	250
2019	230	20	250
2020	230	20	250
2021	230	20	250
2022	230	20	250

3.1.1 Water Balance

Figure below shows the latest annual average of groundwater balance (long-term annual average of natural water balance and figures of the artificial balance items of 2022). The long-term renewable natural water resources are estimated at around 52.3 million m³ per year from recharge due to rainfall. The mentioned natural recharge sources account for 26% of annual additions to aquifers. As for the remaining proportion of annual additions to aquifers, it accounts for 74% due to artificial recharge processes (recharge of wells), and injection of treated wastewater and irrigation return flow.

Figure 4.14: Water Balance (Long-term Annual Average), 2022



Source: Kahramaa, and Ashghal – Data compiled by NPC

3.2 Water Abstraction and Uses

3.2.1 Water Production

The figure shows the water available for use in 2022 that highlights the increasing demand for water owing to the population and economic growth in Qatar. To meet this growing demand, desalination and groundwater abstraction are overexploited beyond their safe yield. Thus, total water available for use (including desalinated water, groundwater, and wastewater reuse) amounted to 1185.6 million m³. Desalinated water production which is amounted to 632 million m³ (after loss) constituted 55% of total water available for use.

Groundwater constituted 21% (250 million m³), and treated wastewater made up 22% of total water available for use. The current groundwater abstraction ratios are 5 times higher than renewable natural water, and over 92% of this water is used in agriculture.

Comparing the production of desalinated water after loss during the period (2017-2022), the findings showed 2% rise in the annual growth rate of desalinated water production in 2022 compared to 2017. Water service subscribers increased by 6% during the same period, while real water loss went up to 11% in 2017-2022.

Figure 4.15: Water available for use (after loss) by type of water (million m³) 2017-2022

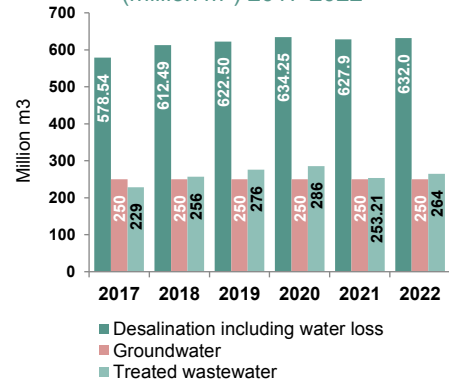


Table 4.31: Water Production and Real Loss, 2017-2022

Item	2017	2018	2019	2020	2021	2022	Annual Growth Rate 2017 -2022
Desalinated water (Mm3) including loss	605	637	668	689	669	670	2%
Desalinated water (Mm3) excluding loss	582	612	642	650	628	632	2%
Real loss (Mm3)	23	25	26	39	41	38	11%
Real loss (%)	4%	4%	4%	6%	6%	6%	8%
Number of desalinated water consumers (water service subscribers)	317,215	329,832	363,338	382,932	406,745	426,738	6%

Source: Kahramaa

3.2.2 Water Uses

The water available for use is composed of desalinated seawater, treated wastewater, and abstracted groundwater. In 2022, the total water available for use amounted to 1,185.6 million m³, of which 57% was desalinated seawater, 22% was treated wastewater and 21% was abstracted groundwater. In 2022, over 9.6% of available water for use was not used because it was lost during transport (3.2%), discharged into wastewater lagoons (2.0%), discharged into the sea (0.01%) or injected into deep aquifers (4.3%).

Since 2008, total water withdrawn from aquifers remained unchanged at 250 million m³ annually, i.e. over 5 times higher than theoretical maximum sustainable abstraction. 92% of abstracted groundwater is used for agriculture purposes, whereas 8% is allocated for domestic, municipal, and industrial uses.

As for wastewater in 2022, around 72% of treated wastewater was directly reused for agriculture and green space irrigation, while about 9% was discharged into wastewater lagoons and the sea and was no longer available for further use. In addition, 19% of treated wastewater was injected into deep aquifers.

Assumptions and Clarifications on Statistics:

1. Commercial uses include supplies from Kahramaa to large industrial complexes.
2. No data are available for cost-free water uses. However, they were computed by NPC as follows: water production minus water loss, minus cost-free water uses. Cost-free water was considered as being utilized for private home uses.

In 2022, total water used in Qatar amounted to 958.7 million m³ (after deducting water loss quantities from the public network estimated at 38 million m³). The largest share is directed for private domestic uses at 317 million m³, followed by agriculture by 311 million m³, government uses at 207 million m³, and commercial activities at 93 million m³, and finally industries at 31 million m³. As for the key sources of water used in agriculture, they are as follows: 230 million m³ of groundwater (74%) and 76 million m³ of treated wastewater (26%).

Figure 4.16: Water use by sector and water source, not including water wasted in transportation (million M³) 2022

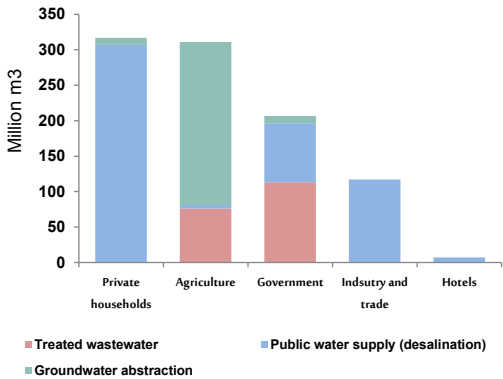


Figure 4.17: Percentage distribution of water available for use in 2022

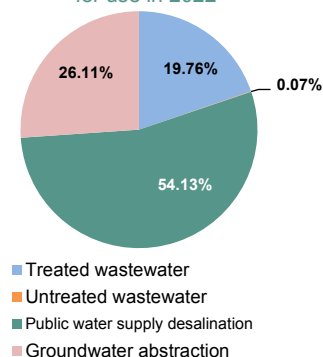


Figure 4.18: : Percentage of water use and loss in 2022

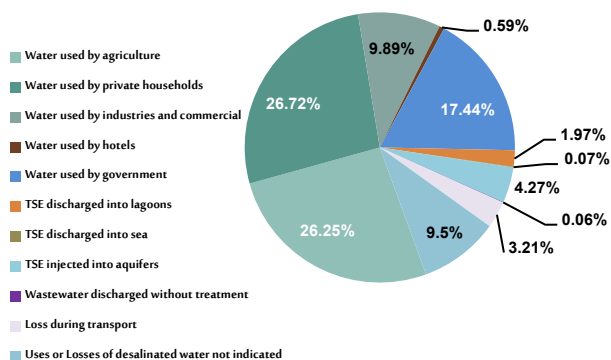


Table below presents the full balance of water uses in Qatar in 2022. The Table indicates that a large proportion of usable water is still not exploited, such as treated wastewater discharged by injection into deep aquifers, wastewater lagoons and the sea (6.2%), or amounts of drinking water lost during transport (3.2%).

Table 4.32: Water Use Balance (mm³) 2022

Item	Amount of water likely to be available for use	Amount of used water and losses	Remarks
Amount of distilled water	670		Amount of water received from Kahramaa
Amount of extracted fresh groundwater	250.28		It includes data on agricultural, municipal, domestic and industrial.
Amount of treated wastewater	264.33		Amount of wastewater discharged from urban wastewater treatment plants.
Amount of untreated wastewater	1		Untreated wastewater discharged into industrial basins.
Total amount of water available for use*	1,185.61		Amount of water available before water loss.
Amount of untreated wastewater		1	
Total distilled water losses		38	Total water losses.
Amount of treated wastewater discharged into industrial basins		23.35	
Amount of treated wastewater discharged into the sea		0.88	
Amount of treated wastewater injected into deep aquifers		50.60	
Amount of water used in the agricultural sector		311.156	Groundwater and treated wastewater.

Item	Amount of water likely to be available for use	Amount of used water and losses	Remarks
Amount of water used in the industrial sector and commercial activities		124.18	Amount of water supplied by industrial wells and amount of water provided by KAHRAMAA including large industrial complexes and hotels.
Amount of water used in the domestic sector		327.1	Amount of water provided by KAHRAMAA and from domestic and municipal wells.
Amount of water used in the government sector		196.34	Amount of water provided by KAHRAMAA and amount of treated wastewater for irrigation of green spaces.
Uses or losses of desalinated water not shown		113.03	These differences between water inputs to the system and (apparent) uses or losses from the source are not shown.
Total amount of water used and losses*		1,185.64	

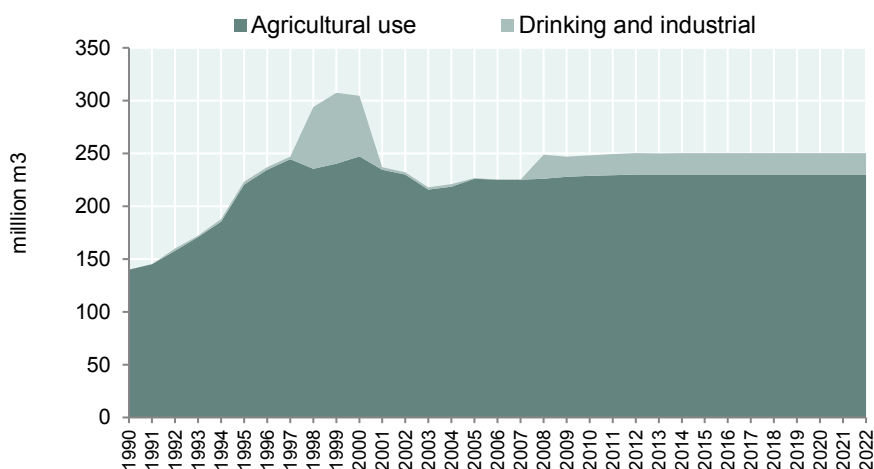
*There are some differences between the total amount of water available for use and the total amount of water used and its losses as a result of weighting.

Source: Ministry of Municipality, Kahramaa and Ashghal. Data compilation conducted by NPC

3.2.2.1 Groundwater Abstraction

Figure below shows the abstracted groundwater from 1990 to 2022. Annual abstraction rate has stabilized at the level of 250 million m³, i.e. 5 times the water balance (the long-term annual average). Over those years, agriculture had the largest share of abstracted water (92% in 2022).

Figure 4.19: Groundwater Abstraction 1990-2022



3.3 Fresh Water Quality

Water quality is monitored by the Ministry of Public Health, a regulatory body that provides Qatar's population with its needs as per the national and international health standards.

The figure on the results of bacteriological tests of drinking water samples by source during the period (2017-2022) indicates that no samples taken from public water sources, i.e. government agencies, were incompatible. In 2022, the incompatibility rate was zero. However, in 2017 the incompatibility rate was insignificant at almost 2%. Moreover, the percentage of incompatible samples taken from private water sources, i.e. the samples taken from the end of KAHRAMAA network (water service provider) in private sources in 2022 amounted to 7%. In general, the proportion of incompatible drinking water samples from all sources increased from 5% in 2017 to 7% in 2022.

It is clearly noted that the percentage of samples taken from desalination water plants, mineral water and bottled water in 2017, 2018 and 2020 were found incompatible in "routine bacteriological and chemical tests". In 2019 and 2021, the inconformity was found in routine bacteriological and Pseudomonas test. In 2022, the inconformity was found in Pseudomonas and chemical tests. The percentage of non-conforming samples in "other tests" remained almost constant from 2017 to 2022, as the inconformity rate was zero, while the percentage of non-conforming samples in "chemical tests" decreased from 1.3% in 2017, to 1% during the year 2022.

Figure shows that no desalinated drinking water samples were found incompatible in "chemical and bacteriological tests" during 2018, 2020, and 2022; limited only to the years 2017, 2019 and 2021. However, the percentage of desalinated drinking water samples that were incompatible with standards of "chemical and bacteriological tests" in 2022 was zero, and for the rest of the years it was between (2.5% and 3.2%). The percentage of non-compliant drinking water samples from bottled water in 2022 amounted to 3.2%.

Figure 4.20: Percentage of samples passing water tests of desalination plants and bottled water by type of test, 2017 - 2022

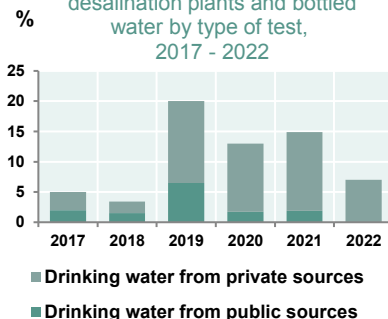


Figure 4.21: Percentage of samples passing water tests of desalination plants and bottled water by source, 2017 - 2022

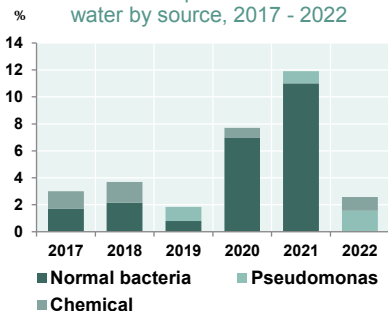
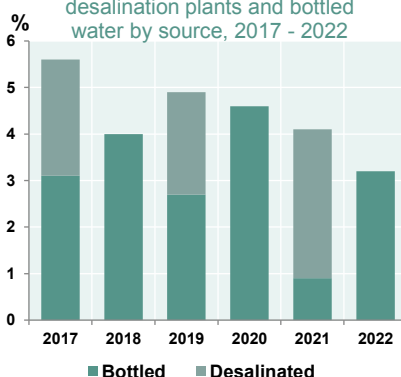


Figure 4.22: Percentage of Samples passing water tests of desalination plants and bottled water by source, 2017 - 2022



3.4 Quality of Wastewater Generated from Urban Areas

3.4.1 Collection of wastewater from urban areas and treatment infrastructure

Wastewater collection and infrastructure available for its treatment double the environmental benefits by reducing the transfer of contaminants into groundwater, preserving biodiversity, which might get affected by wastewater contaminants, and decreasing nutrients discharged into coastal waters, and in turn reducing coastal water pollution. Most importantly, treated wastewater is considered as an alternative source of water that reduces pressure on water resources, and contributes to their sustainability, especially in the countries that suffer from water shortage such as the State of Qatar. Such an orientation allows further reliance on water reuse in agriculture and green space irrigation, or other uses.

In 2022, the number of wastewater treatment plants reached 21; at an annual growth rate of -2.6% during 2017-2022, with a design capacity of 991 thousand m³/day. Compared to previous years, wastewater treatment plants design capacity rose by 3.7% during the period 2017-2022. The plants received 265 million m³ of wastewater per year, of which 264 million m³ were treated, i.e. 99.6% of total wastewater in 2022.

Table 4.33: Wastewater in Sewage Treatment Plants 2017-2022

Item	2017	2018	2019	2020	2021	2022
Number of wastewater treatment plants	24	25	26	26	23	21
Total design capacity of sewage plants (1000 m3/day)	828	965	966	1,022	994	991
Amount of collected wastewater (1000 m3/year)	231,473	257,829	278,216	291,531	255,049	265,478
Amount of treated wastewater (1000 m3/year)	228,668	256,467	276,114	285,816	253.2	264,326
Percentage of treated wastewater of total wastewater	98.8	99.5	99.2	98.0	99.3	99.6
Treated wastewater used for agriculture irrigation (1000 m3/year)	69,508	79,669	86,056	88,957	77,156	76,132
Amount of treated wastewater used for green space irrigation (1000 m3/year)	61,029	71,208	76,648	86,568	107,862	113,344
Amount of treated wastewater used for injection into aquifers (1000 m3/year)	63,859	66,892	79,706	78,104	54,697	50,599
Amount of treated wastewater discharged into lagoons (1000 m3/year)	33,817	38,161	33,001	32,313	13,401	23,353
Amount of treated wastewater discharged into the sea (1000 m3/year)	455	546	713	55	107	884
Dry sludge from wastewater (ton per year)	40,805	37,688	39,096	40,960	41,349	49,049
Sludge from wastewater (1000 m3 per year)	222	202	191	203	210	261
Amount of wastewater not collected in wastewater treatment plants, and discharged untreated into lagoons (million m3)	2.4	1.6	1.0	0.8	0.7	0.7
Total discharge of surface groundwater into the sea (million m3 per year)	95.4	100.9	90.9	98.5	81.9	89.1

Source: Public Works Authority (Ashghal)

3.4.2 Wastewater Treatment in Wastewater Plants by Type

There are three types of wastewater treatment in wastewater plants in Qatar: secondary and tertiary (disinfection), and tertiary (removal of nitrogen and phosphorous). Secondary treatment is defined as the removal of biodegradable organic compounds (both dissolved and suspended) and the removal of suspended solids. Typically, disinfection is featured in the conventional secondary treatment. Tertiary treatment is the removal of solids that remained from the secondary treatment, and sand filtration and micro refineries are usually used. Further, tertiary treatment includes removal of nitrogen and phosphorous, as well as disinfection. The design capacity of wastewater treatment plants which implement secondary treatment amounted to 1.14 thousand m3/day, tertiary treatment (disinfection) to 193 thousand m3/day, and tertiary treatment (nitrogen and phosphorous removal) to 788 thousand m3/day for 2022.

Figure 4.23: Hydraulic Design Capacity by Treatment Type at Wastewater Treatment Plants 2017- 2022

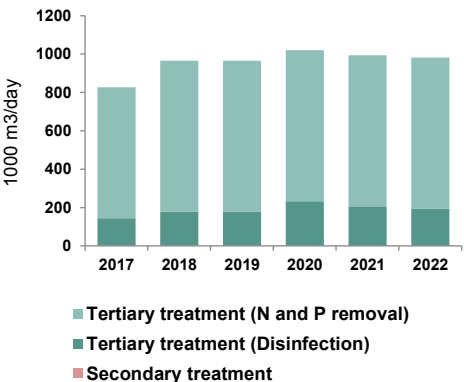


Table 4.34: Urban wastewater treatment plants, hydraulic design capacity and amount of wastewater pumped into each plant, 2022

Type	Hydraulic design capacity		Amount of wastewater pumped (Thousand m3/year)
	(Thousand m3/day)	(Thousand m3/year)	
Secondary (sterilization)	1.14	416.1	280
Tertiary (disinfection)	192.9	70,401.2	44,618.8
Tertiary (nitrogen and phosphorous removal)	788	287,620	220,579
Total	982.04	358,444.6	265,477.8

Source: Public Works Authority

3.4.3 Reuse of wastewater

The design capacity for wastewater treatment increased to 982 million m³/day in 2022, and the production of treated wastewater doubled from 229 million m³ in 2017 to 264 million m³ in 2022. Government uses (irrigating green spaces - 42.9%) accounted for the largest share in use of treated wastewater, followed by agriculture (28.8% in 2022). Moreover, in 2022, 9% of treated wastewater was discharged into drainage collection lagoons and thus no longer available for further use. Also, 19.1% of the treated wastewater was injected into deep aquifers, and less than 0.3% of the treated wastewater was discharged into the sea.

Figure 4.24: Use and discharge of treated wastewater 2017 - 2022

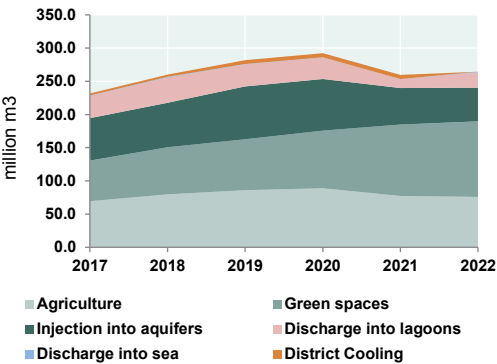
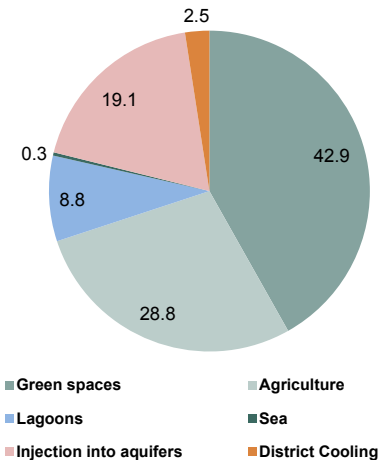


Figure 4.25: Use and discharge of treated wastewater 2022

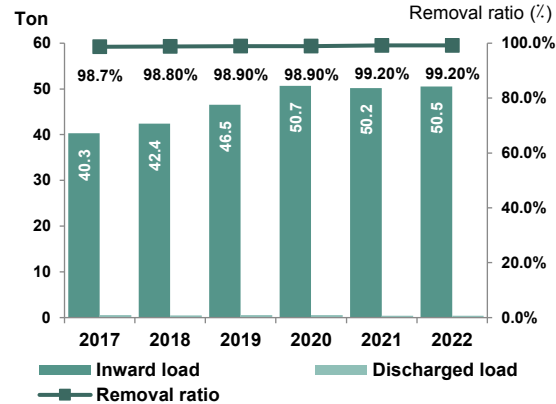


3.4.4 Urban Wastewater Treatment, Discharge and Quality

3.4.4.1 Biochemical Oxygen Demand (BOD)

Statistics show that organic pollution in terms of BOD was removed during the period (2017-2022) at a rate higher than 98.7%, since in 2022 a rate of 99.2% of BOD has been removed. We find that the BOD collected amount has risen to 50.5 thousand metric tons in 2022.

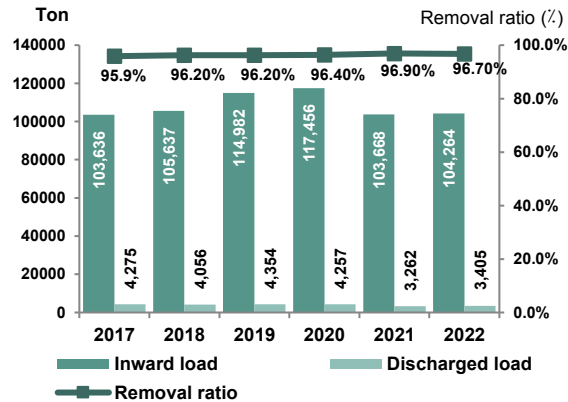
Figure 4.26: Treatment efficiency at urban wastewater treatment plants by BOD 2017 - 2022



3.4.4.2 Chemical Oxygen Demand (COD)

Statistics indicate that organic pollution in terms of COD was removed during the period (2017-2022) at a rate higher than 95.9%, whereas in 2022 a rate of 96.7% of COD was removed. We find that the COD collected amount has risen to 104 thousand metric tons in 2022.

Figure 4.27: Treatment efficiency at urban wastewater treatment plants by COD 2017 - 2022



3.4.5 Wastewater Quality

3.4.5.1 Public Works Authority Tests for Wastewater

In 2022, the Public Works Authority took samples of treated wastewater in sewage treatment plants to conduct detailed tests on fecal coliform bacilli. Statistics indicate that there were only 2 incompatible samples in all plants in 2022. Also, the results of samples for parasitic tests (protozoa) indicated that there were 1 sample incompatible to the specifications approved by the plants.

Table 4.35: Detailed and specialized results of bacteriological and parasitic tests for treated wastewater by treatment plant, 2022

Plant	Detailed Tests by Fecal Coliform Bacilli/ 100 Mi of Sample					Parasites Tests (Protozoa)		
	Total No. of Samples	Compatible Samples		Incompatible Samples		No. of Samples	Incompatible Samples	
		No.	%	No.	%		No.	%
Doha West	377	377	100%	0	0%	24	0	0%
Doha West (Old)	754	754	100%	0	0%	48	0	0%
Industrial Area	NA	NA	NA	NA	NA	NA	NA	NA
Doha North	377	376	99.73%	1	0.27%	24	0	0%
Lusail	365	365	100%	0	0%	12	0	0%
Barwa City	365	365	100%	0	0%	12	1	8%
Barwa Musaimeer	65	65	100%	0	0%	24	0	0%
Barwa Al-Siliyyah	65	65	100%	0	0%	24	0	0%
Barwa Village	60	60	100%	0	0%	12	0	0%
Barwa Al-Baraha	65	64	100%	0	0%	24	0	0%
Al-Khor	65	65	100%	0	0%	24	0	0%
Ras Abu Fontas	25	25	100%	0	0%	9	0	0%
Al-Shihaniyah	65	65	100%	0	0%	24	0	0%
Al-Thakhira	53	53	100%	0	0%	12	0	0%
New Al-Thakhira	19	19	100%	0	0%	8	0	0%
Jamiliyah	360	359	100%	1	0%	184	0	0%
Al Shamal Camp	52	52	100%	0	0%	12	0	0%
Al-Shamal	52	52	100%	0	0%	12	0	0%
Al-Kharib	47	47	100%	0	0%	11	0	0%
Al-Karaana	53	53	100%	0	0%	12	0	0%
Al-Ghazal	65	64	100%	0	0%	24	0	0%
Barzan	52	52	100%	0	0%	12	0	0%
Jaryan	60	60	100%	0	0%	12	0	0%
Total	53	53	100%	0	0%	12	0	0%

Source: Public Works Authority (Ashghal)

3.4.5.2 MoPH Tests

The Ministry of Public Health (MoPH), in controlling the quality of treated wastewater by source used for irrigation at Corniche area during the period 2017-2022, adopted WHO's standards related to microorganisms, and FOA's standards related to heavy metals.

Statistics on the results of detailed and specialized bacteriological and parasitic tests of treated wastewater by treatment plant indicate that all samples taken from the monitored plants were compatible. The Ministry of Public Health, as a regulatory body, conducts such tests to monitor the quality of treated wastewater. It is clear that the treated wastewater samples monitored in the Corniche area conformed to international standards of the detailed fecal coliform bacilli tests during 2017-2022. Thus, the quality of treated wastewater used for irrigation conforms to the highest international standards.

Table 4.36: Results of detailed and specialized bacteriological and parasitic tests of treated wastewater by treatment plant 2017-2022

Year	Plant	Detailed Tests by Fecal Coliform Bacilli/ 100 Mi of Sample			Parasites Tests (Protozoa)		
		Total No. of Samples	Incompatible Samples		Total No. of Samples No.	Incompatible Samples	
			No.	No.			%
2017	Doha South	365	0	0.0%	6	0	0.0%
	Doha West	56	0	0.0%	61	0	0.0%
	Doha North	365	0	0.0%	365	0	0.0%
	Total	786	0	0.0%	432	0	0.0%
2018	Doha South	2	0	0.0%	2	0	0.0%
	Doha West	2	0	0.0%	2	0	0.0%
	Doha North	2	0	0.0%	2	0	0.0%
	Total	6	0	0.0%	6	0	0.0%
2019	Doha South	4	0	0.0%	4	0	0.0%
	Doha West	4	0	0.0%	4	0	0.0%
	Doha North	4	0	0.0%	4	0	0.0%
	Total	12	0	0.0%	12	0	0.0%
2020	Doha South	1	0	0.0%	1	0	0.0%
	Doha West	1	0	0.0%	1	0	0.0%
	Doha North	1	0	0.0%	1	0	0.0%
	Total	3	0	0.0%	3	0	0.0%
2021	Doha South	3	0	0.0%	3	0	0.0%
	Doha West	3	0	0.0%	3	0	0.0%
	Doha North	3	0	0.0%	3	0	0.0%
	Khor	1	0	0.0%	1	0	0.0%
	Total	10	0	0.0%	10	0	0.0%
2022	Doha South	3	0	0.0%	3	0	0.0%

Source: Ministry of Public Health

Table 4.37: Quality of treated wastewater by test source, use, and type of tests (Corniche), 2017-2022

Year	Corniche (irrigation of green spaces and trees)									
	Detailed tests of fecal coliform bacilli			Parasite tests (Protozoa)			Other tests			
	Compatible samples	Incompatibl e samples	Percentage of incompatibl e samples	Compatible samples	Incompatible samples	Percentage of incompatible samples	Compatible samples	Incompatibl e samples	Percentage of incompatibl e samples	
2017	32	0	0.0%	12	0	0.0%	12	0	0.0%	
2018	13	0	0.0	Not tested			None			
2019	24	0	0.0	No parasitic tests for Corniche samples			None			
2020	7	0	0.0	No tests for parasitic contaminants			No other tests			
2021	10	0	0.0							
2022	14	0	0.0	14	0	0.0 %	3	0	0.0 %	

Source: Ministry of Public Health

4. Solid Wastes

4.1 Waste facilities and annual waste quantity

Waste is defined as materials generated by daily human activity, such as domestic, municipal and various industrial activities. Waste represents a burden on environment and is considered harmful to public health. Municipal waste is not considered dangerous, does not cause hazardous environment problems and is easy to dispose of safely. The government pays special attention to waste management and treatment, in view of its keenness to reduce waste effects on health, maintain civilized look of the State, and promote waste reduction practices, in light of Qatar's increasing economic growth in diverse sectors such as construction and demolition, industry, trade, and agriculture.

The 2021 statistics indicate that there are four waste transfer stations in Al-Khor, Dukhan, Doha South, and Doha West; two waste landfills in Umm Al-Afai and Mesaieed; two waste dumps in Umm Thanyatain and Rawdat Rashed; and one domestic solid waste management center in Mesaieed. The total amount of solid waste in Qatar reached about 12 million tons during 2021, with an annual growth rate of 10% during the period (2017-2021).

Table 4.38: Number of Waste Management Facilities 2017-2021

Facilities	2017	2018	2019	2020	2021
No. of transfer stations	4	4	4	4	4
No. of landfills	2	2	2	2	2
No. of dumps	1	1	2	2	2
No. of waste treatment plant ⁽¹⁾	1	1	1	1	1

(1) Domestic Solid Waste Management Center in Mesaieed

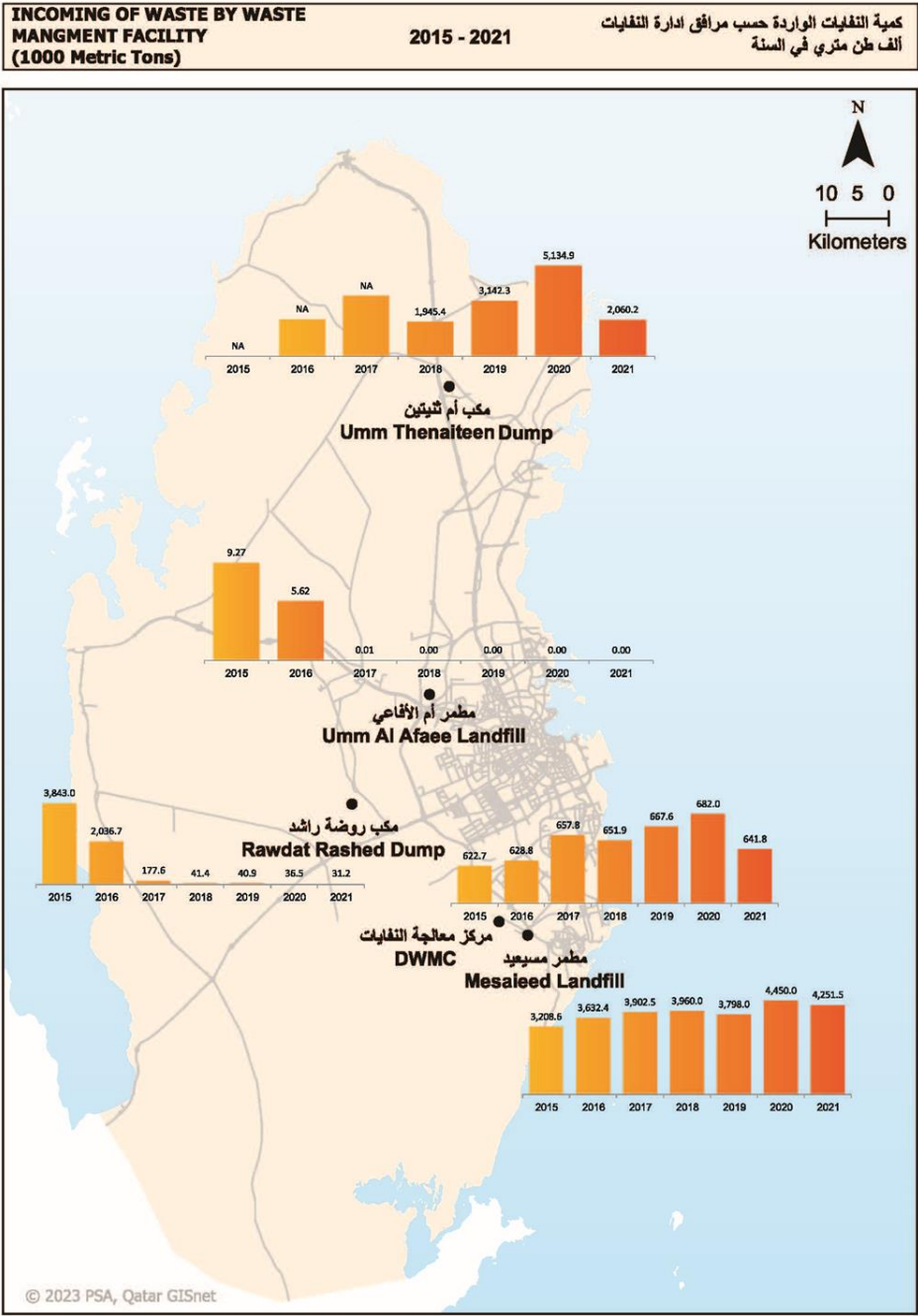
Source: Ministry of Municipality and Environment

Table 4.39: Managed Waste by Type and Waste Management Facility (ton) 2017-2021

Waste by Type	Waste Management Facility	2017	2018	2019	2020	2021
Domestic	Mesaieed	536,050	664,959	617,576	616,839	873,084
	DSWMC	648,337	651,880	667,637	682,011	641,784
	Total Domestic Waste	1,184,387	1,316,839	1,285,213	1,298,850	1,514,868
Construction	Rawdat Rashid Dump/inward	140,402	2,010	0	0	5,135,487
	Rawdat Rashid Dump/treated	177,969	50,306	0	434,000	927,800
	Mesaieed	533,036	1,058,918	611,006	1,181,706	795,830
	Umm Thanyatain	3,418,673	1,945,359	3,142,310	5,134,858	2,060,220
	Total Treated Construction Waste	177,969	50,306	0	434,000	927,800
	Total Inward Construction Waste	4,092,111	3,006,287	3,753,316	6,316,564	7,991,537
Bulky	Mesaieed	2,661,504	2,198,780	2,501,528	2,400,963	2,239,418
	Total Bulky Waste	2,661,504	2,198,780	2,501,528	2,400,963	2,239,418
Tires	Rawdat Rashid Dump /inward	37,186	39,406	40,895	36,496	31,208
	Rawdat Rashid Dum/(treated	15,062	27,300	18,365	13,897	12,850
	Umm Al-Afai Landfill/ treated	13	0	0	16,677	26,494
	Total Treated Tires	15,075	27,300	18,365	30,574	39,344
Other	Total Inward Tires	37,186	39,406	40,895	36,496	31,208
	Mesaieed	171,912	37,379	67,892	250,494	343,126
	DSWMC	9,491	0	0	0	0
	Total Other Types	181,403	37,379	67,892	250,494	343,126
Total Treated		193,044	193,044	77,606	18,365	464,574
Total Inward		8,156,591	8,156,591	6,598,691	7,648,844	10,303,367

Source: Ministry of Municipality and Environment

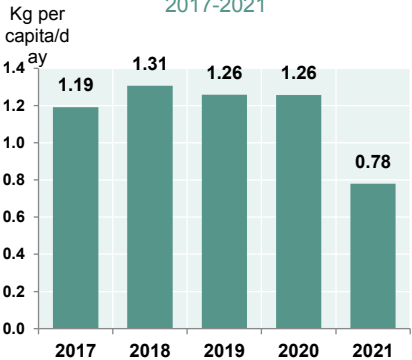
Map 4.10: Waste Generated by Waste Management Facilities (1,000 metric tons), 2015-2021



4.2 Per capita domestic waste

The figure indicates that the daily per capita domestic waste decreased to 0.87 kg for 2021, which is less than the target set in the National Development Strategy (1.6 kg per capita/day).

Figure 4.28: Per capita domestic waste production (kg per day) 2017-2021



4.3 Recycled Waste

Waste degradation over the years leads to the absorption of contaminants by water sources (underground or surface), and soil pollution, which affect food cycle and contaminate drinking water, and therefore jeopardize public safety. In addition, waste pollutes the atmosphere by emitting pollutant gases that put the health of people, plants, and living organisms at risk by affecting the respiratory system, along with the emission of unpleasant odors. Further, waste distorts the landscape, natural views, and beauty of nature. From this perspective, communities have come to realize the environmental problems. Thus, taking action to recycle waste will have several benefits including the protection and preservation of natural resources, reduction of waste and providing new job opportunities.

Statistics indicate that treated waste amounted to nearly 12.1 million tons in 2021. DSWMC received 642 thousand tons, and 21.7 thousand tons were recycled. This quantity is considered very tiny compared to the generated, collected and treated waste. Here comes the role of the civil society's awareness regarding the importance of recycling and environment protection, encouragement of private and public sector to prepare projects that recycle all types of waste, and the importance of instilling recycling in the Qatari values and school curricula.

Table 4.40: Recycled Domestic Wastes (ton) 2017-2021*

Item	2017	2018	2019	2020	2021
Total inward waste	8,156,604	6,598,691	7,648,844	10,303,367	12,120,156
Domestic waste treated at DSWMC, Mesaieed	648,337	651,880	667,637	682,011	641,784
Amount of recycled materials	42,116	37,379	5,603	4,069	21,698

* Data for previous years has been updated from the source.

Source: Ministry of Municipality

4.4 Converting Waste into Products

DSWMC in Mesaieed, in operation since 2011, is one of the largest specialized waste recycling centers in the Middle East with an area of 3 km² near Mesaieed Industrial City, and its capacity is 2,300 tons/day. It is designed to meet all environment safety requirements in terms of recycling and production. The recycling process at DSWMC passes through 5

stages; the first one starts with weighing waste, and the second is about separation and recycling, while the third is waste-to-energy, and the fourth is recycling to obtain high quality liquid or solid compost. This latter is one of DSWMC's characteristics to increase green spaces. It is noteworthy that DSWMC converts waste into energy. Most of the waste arriving at the center is recycled according to enforced regulations.

DSWMC has achieved a quantum leap in converting solid waste into energy and recyclable materials, and in producing organic compost to support agricultural sector. DSWMC generated about 264 thousand megawatts of electricity in 2021, used to operate the center itself, while part of this energy goes to the government network.

Figure 4.29: Production Capacity of DSWMC in Mesaieed by Type, 2017 - 2021

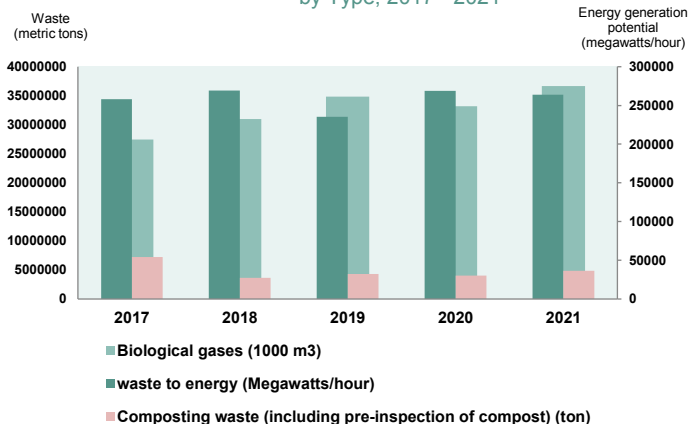


Table 4.41: Mesaieed DSWMC's Productive Capacity by Type; 2017-2021 *

Item	2017	2018	2019	2020	2021
Quantity of waste treated at DSWMC (ton)	648,337	651,880	667,637	682,011	641,784
Composting waste produced (including compost pre-inspection) ton	54,225	27,286	32,260	30,202.30	36,321
Waste to energy (megawatts/hour)	257,890	269,051	235,149	268,776	264,044
Biological gases (1000 m3)	27,437,950	30,979,910	34,874,390	33,180,890.30	36,648,228

* Data for previous years has been updated from the source

Source: Ministry of Municipality

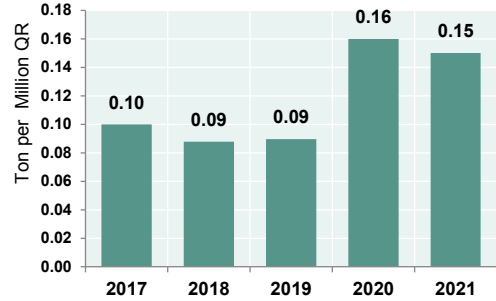
5. Hazardous Waste

5.1 Hazardous waste generation from GDP

Hazardous waste is the waste that exhibits dangerous traits such as toxicity, corrosivity, reactivity, and ignitability, all of which make it harmful to environment and human health. Hazardous waste is composed of biomedical waste, in addition to the waste of industry, and oil and gas. This kind of waste includes also chemicals, acids, alkalis, contaminated soil, etc.

Hazardous waste generation index increased to 0.15 metric ton per one million QR of GDP in 2021.

Figure 4.30: Hazardous generated waste in tons per million QR of GDP; 2017-2021



5.2 Per capita hazardous waste

The total per capita generated hazardous waste amounted to 36.3 kg per capita in 2021, and the index is increasing.

Figure 4.31: Per capita of total hazardous generated waste, 2017-2021

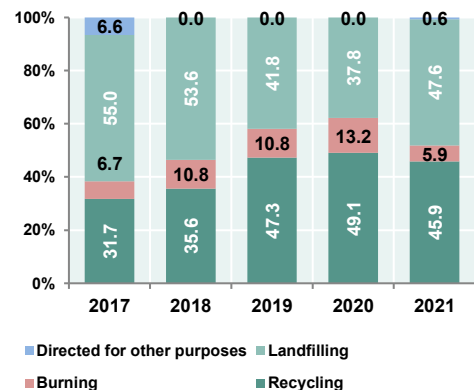


5.3 Methods of Hazardous Waste Disposal

The treatment of hazardous waste enables to change the characteristics and traits of hazardous waste to turn it non-or less-hazardous, and then it can be dealt with safely. Thus, it can be collected, stored and disposed of without causing harm to individuals and the environment.

According to of the percentage distribution of hazardous waste by disposal methods, it was noted that, in 2021, 47.6% of hazardous waste was disposed of by dumping in landfills, followed by 45.9% through recycling, then 5.9% was disposed of by incineration, and then direction to other purposes at a rate of 0.6%.

Figure 4.32: Percentage distribution of hazardous waste by disposal methods 2017 - 2021



6. Energy Consumption

6.1 Value of Energy Consumption in Various Economic Sectors

In terms of the relative importance of expenditure on intermediate consumption of both electricity and water mixed in 2020, the highest share was registered for the business sector (53.6%), while the lowest was for insurance accounting for less than 0.1% of total expenditure on intermediate consumption of both electricity and water (mixed).

In terms of annual growth, the activities that grew the most in expenditures on intermediate consumption of water (separately) were energy and industrial activities with an annual growth rate of 9%, while that of hotel and restaurant activities declined by a rate of 3% of the total expenses in intermediate consumption on water (separately).

Table 4.42: Value of Expenditure on Electricity, Fuel and Oils by Economic Activity (thousand QR) 2017-2020 *

Economic Sector	Items	2017	2018	2019	2020
Banks	Electricity & Water	26,119	23,325	26,126	23,007
	Fuel & Oil	1,486	1,134	1,074	701
Insurance	Electricity & Water	1,920	2,073	2,796	2,043
	Fuel & oil	312	369	244	174
Energy and manufacturing	Electricity & Water	9,394,628	9,215,745	9,836,804	9,059,540
	Fuel & Oil	3,694,005	5,238,993	4,563,753	4,770,134
Wholesale and retail	Electricity & Water	309,001	320,286	367,061	259,238
	Fuel & Oil	94,071	105,935	104,551	102,116
	Electricity & Water	259,968	328,074	363,077	258,433
Transport and communications	Fuel & Oil	161,524	191,336	215,340	202,901
	Electricity & Water	14,020,584	18,865,276	18,234,256	5,926,008
Construction	Fuel & Oil	650,114	620,327	661,073	604,699
	Electricity & Water	2,611,768	,592,638	3,486,959	2,117,798
Business services	Fuel & Oil	276,436	495,144	682,897	1,090,304
	Electricity & Water	258,991	311,244	311,551	206,409
Personal social services	Fuel & Oil	123,431	495,144	156,540	112,637
	Electricity & Water	87,514	311,244	82,101	69,140
Hotels & restaurants	Electricity	226,776	249,047	234,208	184,333
	Water	89,718	87,496	95,365	81,400
	Fuel & Oil	103,182	108,017	117,188	102,650

* Data of 2021 are not available

6.2 Electrical Energy Consumption

This consumption responds to the needs of the increasing population number and economic growth, which in turn causes pressure on the environment regarding the production of electricity to meet the population and economic needs. Therefore, the environment is often negatively affected due to this use, which relies on fossil fuels to generate energy. Consequently, it is necessary to alleviate the impacts on the environment through various methods, such as the increasing reliance on renewable energy sources and electricity use efficiency. Uses of energy lead to further emissions in the air, and in turn change the status of the surrounding air quality, and concentrations of greenhouse gases which cause negative impacts on human health and biological systems.

Total electricity consumption amounted to 59 million megawatts/hour in 2022, a growth rate of 3% during the period 2017-2022. Electricity consumption in the domestic sector had the highest share of total consumed electricity in 2022; amounted for 41 million megawatts/hour.

Figure 4.33: Electricity Consumption by Sector 2017-2021

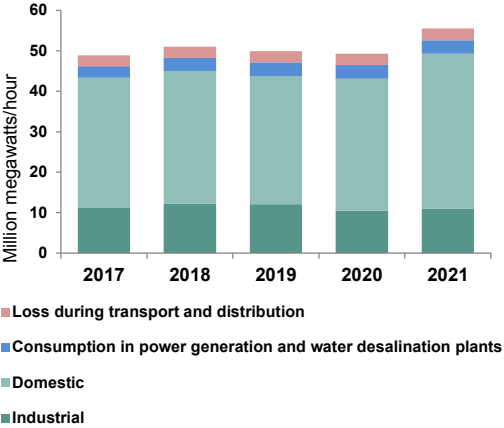


Table 4.43: Electricity Consumption by Sector (megawatts/hour) 2017-2022

Item	2017	2018	2019	2020	2021	2022
Industrial	11,261,941	12,197,379	12,124,082	10,464,837	10,967,380	11,817,635
Domestic	32,095,345	32,765,544	31,536,113	32,624,482	38,284,270	40,517,945
Consumption in power generation and water desalination plants	2,831,204	3,258,544	3,440,493	3,433,881	3,312,299	3,298,081
Loss during transport and distribution	2,694,696	2,786,404	2,772,002	2,774,269	2,924,725	3,121,323
Total	48,883,186	51,007,871	49,872,690	49,258,957	55,488,674	58,754,984

Source: Kahramaa – Annual Statistical Report

7. Air Quality

All living beings including humans, animals, plants and even inanimate objects interact within the atmosphere. Air and respiration are of course the main elements of life without which life becomes impossible even for minutes. Therefore, keeping air pure and unpolluted is necessary for the life and health of all living things.

The effects of human activities, which lead to the increase in pollutants in the environment, are manifested in the emission of pollutants into the air, water, and soil. Ambient air quality pollutants are defined as any substance that enters the air environment in quantities surpassing the minimum limit as per the approved national, regional and international standards. This substance includes sulfur dioxide, hydrogen sulfide, measured nitrogen oxides, chemo-light oxidizers (Ozone), carbon monoxide, non-methane hydrocarbons, lead components, sulphates, fluorides, ammonia, and suspended molecules that can be inhaled.

Air pollution is one of the most environmental dangers to health. By reducing air pollution, countries can alleviate the burden of diseases caused by respiratory infections, heart diseases, and lung cancer. The more air pollution is reduced, the more respiratory and cardiovascular health is improved on the long and short terms.

In 2014, the Ministry of Municipality and Environment adopted a new approach to provide data on air quality in order to respond to Qatar's National Development Strategy. It also took all measures to improve ambient air quality. The Ministry of Municipality and Environment monitors air quality at three air monitoring stations. Movenpick Station (Corniche), Qatar University Station and Aspire Zone Station:

The following criteria are being used in order to describe the air pollution index: Clean for 0-50 category, Normal for 51-100 category, Below Normal for 101-150 category, Limited Pollution for 151-200 category, Pollution for 201-300 category and Severe Pollution for 301-500 category.

The criterion "Normal" was adopted as a national boundary reflecting the extent which pollution should not exceed. The following Table shows that during 2019-2021, the values of the index did not exceed the "normal" limit of all the pollutants observed, and all were within the "clean" criterion except for fine particulate matter 10 micrometers or less in diameter (PM10) that recorded as "normal" in 2019-2021 at Qatar University (QU) and Corniche monitoring stations.

Table 4.44: Annual Average Air Quality in Doha City by location 2019 - 2022

Pollutant	2019			2020			2021			2022			Annual *Limit
	Aspire Zone	Qatar University	Corniche	Aspire Zone	Qatar University	Corniche	Aspire Zone	Qatar University	Corniche	Aspire Zone	Qatar University	Corniche	
SO ₂	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Normal
NO ₂	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Normal
O ₃	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Normal
CO	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Clean	Normal
PM ₁₀	Clean	Normal	Normal	Clean	Normal	Normal	Clean	Normal	Normal	Normal	Normal	Normal	Normal

Source: Ministry of Municipality and Environment

* Criterion "Normal" is selected as the annual limit

Description of Air Quality Index

Clean 0-50

Normal 51-100

Less than normal 101-150

Limited pollution 151-200

Pollution 201-300

Severe pollution 301-500

Figure 4.34: Air Quality Index for all elements at Corniche Station 2022

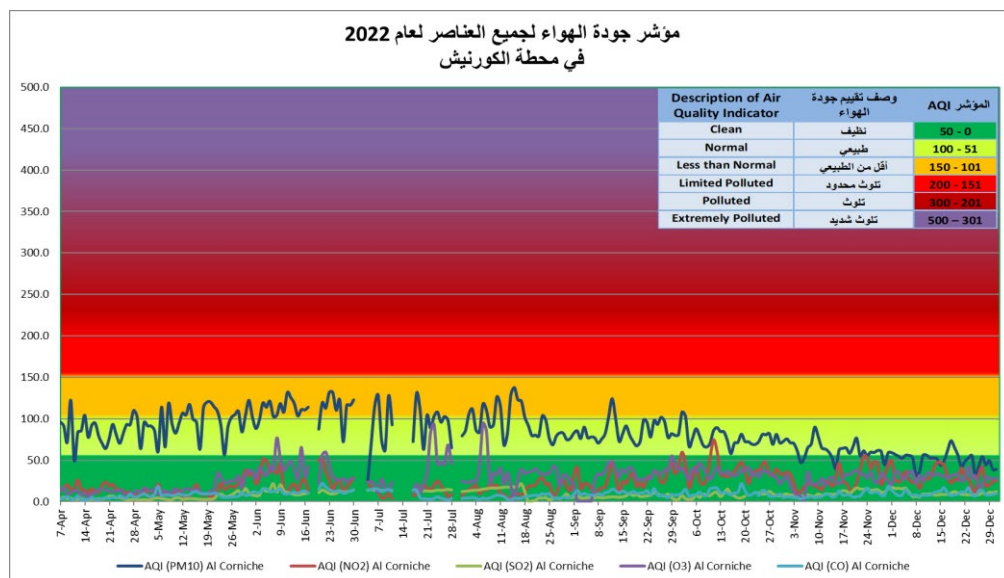


Figure 4.35: Air Quality Index for all elements at Qatar University Station 2022

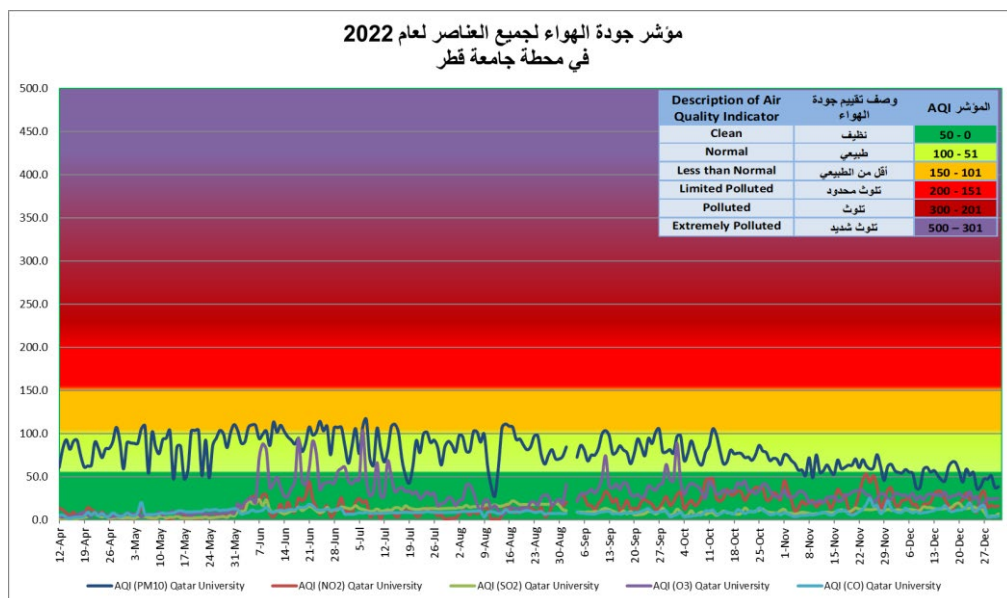
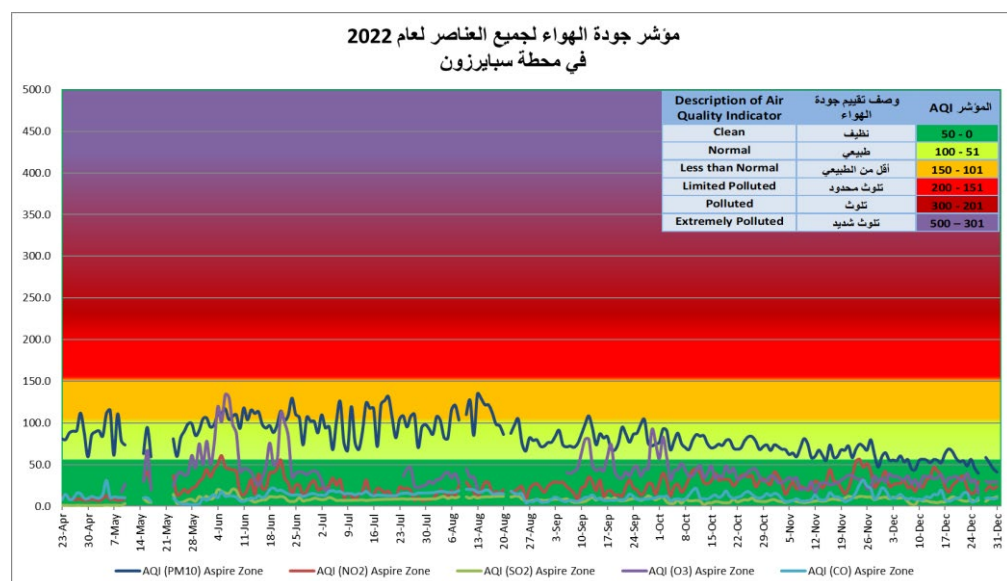


Figure 4.36: Air Quality Index for all elements at Aspire Zone Station 2022



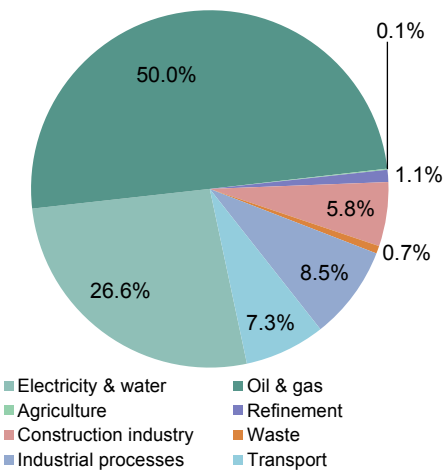
8. Greenhouse Gases

Greenhouse emissions are associated with global warming and hence climate change. These phenomena are global and transboundary. Thus, countries share a responsibility to find solutions and means to reduce the risks of global climate change. The UN Climate Change Conference held in Paris in 2015 asserted that practical solutions should be found to reduce the risks of global climate change within the cost limit that developed countries must provide to assist developing countries, as well as ensuring that the permanent supply of energy needed by human progress is not compromised. This could be implemented by managing the environmental impacts of energy supplies and diversifying access to renewable fuels, low-carbon fuels and clean energy. Not only do such solutions contribute to environment protection, but to the creation of job opportunities and new investments as well, and consequently achieve big gains in living standards.

The main six global warming gas sources:

1. CO₂.
2. CH₄.
3. N₂O.
4. PFCs.
5. HFCs.
6. SF₆.

Figure 4.37: The largest contributions to greenhouse gas emissions in Qatar according to the First National Communication 2007



المصدر: وزارة البيئة والتغير المناخي - تقرير البلاغ الوطني الأول عام ٢٠٠٧

The above-mentioned greenhouse gases trap heat in the atmosphere to keep the earth warm and the climate moderate. Those gases are rather influential to global warming than being pollutants. Carbon dioxide is one of the main gases that contribute to this phenomenon. It is produced during the burning of coal, oil and natural gas in power plants, by cars and others, in addition to not being absorbed due to large-scale deforestation. Another influential gas is methane from cow breeding, landfills, mine works, gas pipelines, etc. Nitrous dioxide from fertilizers and other chemicals also contributes to heat retention. It is produced during the burning of coal, oil and natural gas in power plants, cars and others, in addition to not being absorbed by large-scale deforestation. Another influential gas is methane, which is produced from cow breeding, landfills, mine works, gas pipelines,

etc. Nitrous dioxide produced from fertilizers and other chemicals also contributes to heat retention.

To reduce gas emissions, and alleviate and adapt with the climate change effects, the State of Qatar submitted its executive plan to the Paris Conference held in 2015. The plan entitled “Intended Nationally Determined Contributions Report” was submitted to the Secretariat of the UN Framework Convention on Climate Change under the two Decisions (1/CP.11) and (1/CP.02), in accordance with Decision (02/CP.11), and the principles and decisions of the Framework Convention on Climate Change.

From the figure above, it is clear that the sectors contributing largely to greenhouse emissions were oil and gas, though an unofficial report released in 2015 indicates a considerable decrease in emissions by this sector. Also, this figure shows that water and electricity generation came second in the production of these emissions, which is normal in a country that heavily depends on desalination that requires energy, and in turn more emissions. Therefore, not only does water use conservation preserve water resources, but it contributes to the decrease in emissions as well. In third and fourth places came industry and transport sectors at 8.5% and 7.3% respectively. Such percentages might be cut by maximizing dependence on renewable energy, increasing use of public transport and providing environment-friendly modes of transport.

9. Consumption of Ozone-Depleting Substances (ODS)

The consumption of ozone-depleting substances (ODS) is defined as the sum of the consumption of the ozone-depleting potential-weighted metric tons of all ozone-depleting substances controlled under the Montreal Protocol on Substances that Deplete the Ozone Layer. The Ozone-depleting potential-weighted metric tons are metric tons of individual ozone-depleting substances multiplied by their ozone-depleting potential in metric tons. The Ozone-depleting substances (ODS) are defined in the Montreal Protocol as substances containing chlorine or bromine, which destroy the stratospheric ozone layer that absorbs most of the biologically damaging ultraviolet radiation. The phasing out of ozone depleting substances, and their substitution by less harmful substances or new processes, are aimed at the recovery of the ozone layer. Substances controlled by the Montreal Protocol include chlorofluorocarbons (CFCs), halons, methyl bromide and hydrochlorofluorocarbons (HCFCs) among others. It should be noted that mass of ODS consumption in 2022 reached 2160 metric tons, with an annual growth of 3% compared to 2017.

Table 4.45: Mass of ODS consumption (metric ton), 2017-2022

Year	HCFCs 22	HCFCs 123	HCFCs 141b	HCFCs 142b	HCFCs 134A	Total
2017	1,084.66	0.00	59.45	36.00	708.83	1,888.90
2018	1,179.62	10.88	5.44	48.00	723.98	1,967.90
2019	1,263.81	0.55	0.00	0.00	844.23	2,108.60
2020	1,026.00	0.00	0.00	0.00	763.73	1,789.70
2021	1,027.15	0.00	0.00	0.00	831.11	1,858.30
2022	1,024.96	3.60	NA	NA	1,131.00	2,159.60

Source: Ministry Environment and Climate Change

Table 4.46: ODS (by Ozone Depleting Potential ODP) according to Montreal Protocol, 2017-2022

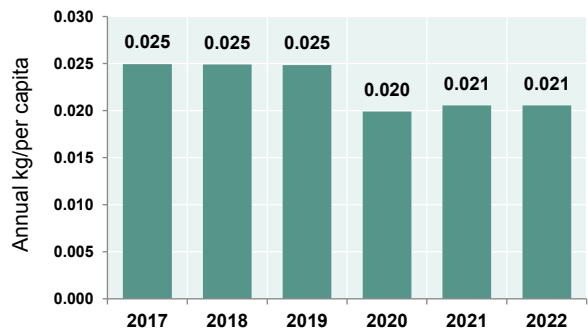
Year	HCFCs 22	HCFCs 123	HCFCs 141b	HCFCs 142b	Total
2017	59.66	0.00	5.95	2.34	67.95
2018	64.87	0.22	0.54	3.12	68.75
2019	69.52	0.01	0.00	0.00	69.53
2020	56.43	0.00	0.00	0.00	56.61
2021	56.49	0.00	0.00	0.00	56.49
2022	56.44	0.07	0.00	0.00	56.51

Source: Ministry Environment and Climate Change

9.1 Annual per capita ODS consumption (kg per capita/year)

The figure indicates that the annual per capita ODS consumption decreased to 0.021 kg per capita during 2022.

Figure 4.38: ODS consumption 2017-2022



9.2 Comparison of Mass of ODS Consumption, Global Warming and ODP

Figure indicates a general rise in the mass of ODS consumption at 3% and a slump in ODP at -4%, as well as an increase in the global warming potential at 3% during 2017-2022.

Figure 4.39: Comparison of Mass of ODS Consumption, Global Warming Potential and ODP (2017=100), 2013-2022

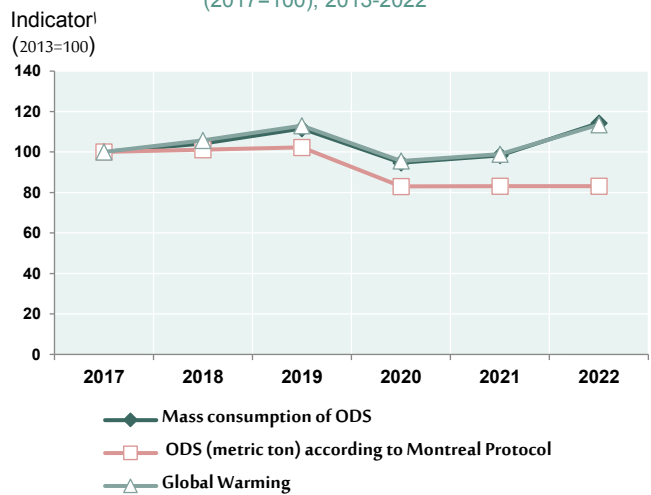


Table 4.47: Mass of ODS consumption, global warming potential and ODP, 2017-2022

Year	Mass of ODS consumption	ODS (metric ton), as per Montreal Protocol	Global Warming *
2017	1,888.94	68.0	2,648,933
2018	1,967.92	68.8	2,801,246
2019	2,108.59	69.5	2,993,264
2020	1,789.73	56.4	2,531,851
2021	1,858.26	56.5	2,621,169
2022	2,159.56	56.5	3,008,064
Annual Growth Rate 2014-2019	3%	-4%	3%

*: Calculations of National Planning Council

Source: Ministry of Environment and Climate Change

10. Environment Pollution-Related Diseases

10.1 Infectious and Communicable Diseases

Not only does environment pollution affect the health of biological systems and ecosystem in general, but it also affects the health of human being, who lives in the whole ecosystem of this universe, and depends on and interacts with the biological systems related to the population, food and water environment. The table below indicates the infectious and communicable diseases reported to the Preventive Health Department at the Ministry of Public Health during the period (2017-2021). Overall, the total cases of infectious and communicable diseases reported to the Preventive Health Department during 2017-2021 increased by 3%. The total reported cases increased from 10,165 cases in 2017 to 11,627 cases in 2021. It is clear that the highest annual growth rates of diseases were for mumps and parotitis, with an annual growth rate of 33%.

Table 4.48: Number of Infectious and Communicable Disease Cases Reported to the Preventive Health Department, 2017-2021

Diseases	2017	2018	2019	2020	2021
Typhoid/ paratyphoid	725	685	483	68	102
Bacterial food poisoning	385	413	441	0	271
TB	295	441	376	0	0
Non-pulmonary TB	340	310	444	0	0
Leprosy	38	19	28	14	50
Measles	9	2	5	3	1
Rubella	2	0	1	3	3
Hepatitis	1,150	1,628	1,884	0	0
Mumps/parotitis	21	23	25	21	66
Infectious diarrhea	887	968	668	0	0
parasitic scabies	894	1,286	1,968	157	1,254
Meningitis of all types	329	274	211	3	8
Other	5,090	9,497	10,814	3,354	9,872
Total	10,165	15,546	17,348	3,623	11,627

Source: Ministry of Public Health

Source: NPC – Annual Statistical Abstract – Chapter of Health Service Statistics

10.2 Tuberculosis (TB) Cases

In 2021, TB cases amounted to 1,053 cases, with an annual growth rate of 13%. It is noted that most of such cases are of Asian origin.

Figure 4.40: Number of TB Cases 2017-2021



Table 4.49: Number of reported TB cases by Country of Nationality, 2017-2021

Nationality	2017	2018	2019	2020	2021
Qatar	21	12	22	16	27
KSA	1	7	0	0	2
Somalia	4	2	3	0	5
Egypt	5	3	6	3	4
India	133	136	158	219	247
Pakistan	13	25	26	26	28
Iran	0	1	1	2	0
Bangladesh	81	91	132	124	147
Nepal	162	178	170	183	214
Philippine	96	110	127	139	175
Other countries	119	186	175	147	204
Total	635	751	820	859	1,053

Source: Ministry of Public Health

Source: NPC – Annual Statistical Abstract –Chapter of Health Service Statistics

10.3 Deaths by Selected Causes

The Table below shows the number of deaths by selected causes of death. According to statistics, the annual growth rates of death declined by -11% during the period 2017-2021.

With regards to relative importance, the respiratory system-related deaths were the highest in terms of causes of death as they made up 50% of total selected causes of death. They were then followed by Flu and Pneumonia at 14% in 2021.

Table 4.50: Number of Reported Deaths by Cause of Death, 2017-2021

Causes of Death	2017	2018	2019	2020	2021
Other gastroenteritis	3	5	6	1	2
Other TB diseases	3	4	5	5	7
Blood poisoning	18	28	28	...	...
Hepatitis	5	10	6	1	4
Rest of infectious and parasitic diseases	10	9	6	...	...
Malignant tumor in the bronchus and lung	41	31	29	...	...
Leukemia	18	30	19	...	...
Atherosclerosis	5	1	3	5	8
Other circulatory system diseases	15	41	21	15	17
Flu and Pneumonia	98	107	97	84	36
Other acute LRTI	4	1	1	3	2
chronic lower respiratory diseases	16	13	8	14	13
Rest of respiratory system diseases	128	142	108	176	130
Liver diseases	34	28	32	42	31
Poisoning incidence and exposure to poisonous substances	14	13	10	15	12
Total	412	463	379	361	260

Source: NPC – Births and Deaths Statistics Bulletin

Chapter Five

Environment Protection and Management Response Activities



Environment Protection and Management Response Activities

This chapter focuses on the State's willingness and commitment to the protection and management of the environment, the allocation of the necessary legislative structures, the enactment of environmental laws, the creation of institutions, the allocation of financial resources, and the provision of qualified human resources capable of carrying out activities aimed at the protection and management of the environment. Moreover, the chapter sheds light on spreading the culture of environmental awareness, whether through awareness-raising activities, or through the provision of educational curricula aimed at rooting the process of environmental protection and management of today's children tomorrow's leaders.

This chapter includes expenditure on the environment protection, number of workers, volunteers, trainers, and participants in various environmental programs, environmental compliance activities, environmental legislation, laws and international conventions, new projects under assessment of their impact on the environment, environmental education, natural disaster preparedness, and environmental investment - green economy

1. Expenditure on the Environment Protection

Among the important and vital response activities provided by the State and its different sectors for the environment protection and management, is the expenditure on the environment protection and management. Such expenditure is spent by the public and private sectors and households to minimize or reduce the environment pollution, rehabilitate facilities, manage the environment resources and ensure the continuity and sustainability of the environment services and goods. The national environment strategy includes programs and goals on the expenses spent on the environment protection.

The economic diversification, which is the target of several countries owing to its importance in diversifying the income sources and reducing dependence on limited resources, is related to and results from spending on the environment. In addition, a sustainable economy, able to ensure economic growth without causing harm to the environment sources, stems from spending on the environment. The economy which is environment friendly is called green economy. It is capable of attracting several investments, especially in the quasi-absence of competition when talking about local environment systems. At the same time, this kind of economy usually creates more new job opportunities than the conventional economy does.

1.1 Environment protection and management activities.

This section features the public expenditure on the environment sector during the period 2017-2021. It covers the majority of items included in the budget of the Ministry of Municipality and the Ministry of Environment and Climate Change and other counterparts in the Classification of the Functions of Government (COFOG). The figure shows the value of public expenditure on the environmental protection and management sector. It should be noted that these expenses are classified according to COFOG, and include only current expenses, salaries and wages of the Ministry of Municipality and the Ministry of Environment and Climate Change. The process of the environment protection is distributed on various ministries and public institutions. In general, the UN Classification of Resource Use and Management Activities and Expenditure (CRUMA) should be adopted to cover various expenditures on the environment protection and management activities.

Current spending on landscape and public parks protection activities achieved the highest annual growth rate among total current expenditures, as the annual rate reached 8% during the period 2017/2021.

The statistics of the value of public expenditures on the environment protection and management sector by type of expenditure and the environmental field for the fiscal years 2017-2021 indicate that the expenditure on the environment during this period amounted to about QR 33.0 billion, of which QR 18.1 billion focused on capital expenditure and major projects in the areas of sewage and waste, and on gardens and parks, an average of 55.1% of total expenditure on this sector. During the same period, approximately QR 12.9 billion was spent on current expenses, salaries and wages at an average rate of 44.9% of total expenditure on the environment sector during the fiscal years 2017-2021.

Figure 5.1: Public expenditure on environment protection and management 2017-2021

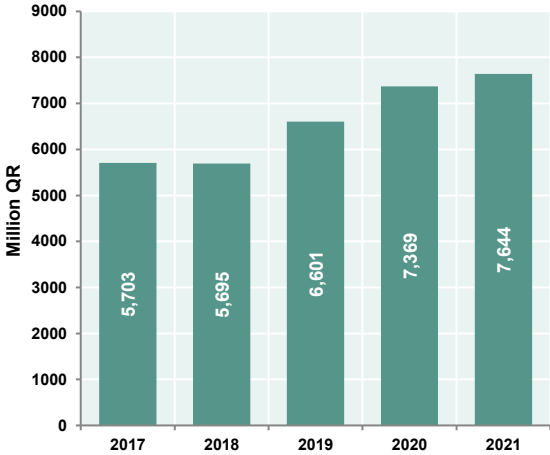
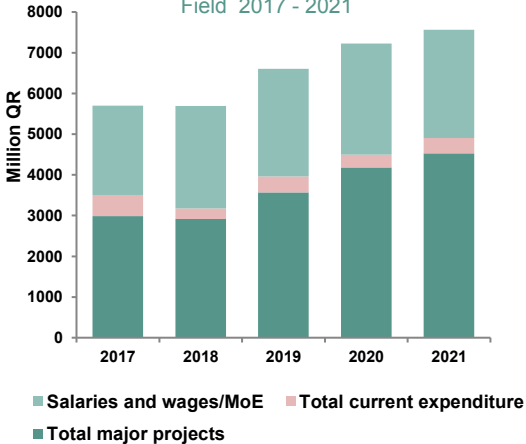


Figure 5.2: Public Expenditure on Environment Protection and Management by Type of Expenditure and Environmental Field 2017 - 2021



The figure shows that the share of salaries and wages at the Ministry of Municipality and Environment during the fiscal years 2017-2021. It made up an average of about 34.8% in 2021, whereas the current expenditure of the same ministry for 2017 constituted 3.4% of total expenditure on the environment protection (capital expenditure, current expenditure, salaries and wages).

The total current expenditure on the environment protection (current expenditures of the Ministry of Municipality and Environment and other institutions concerned with the environment) during the same period amounted to QR 373 million, which constituted an average of about 4.9% of total expenditure on the environment protection (capital expenditure, current expenditure, salaries and wages).

It is clear from the results that the most capital expenditure was on sewage projects during the fiscal years 2017-2021, as they made up about 40.1% of the total expenditure on environmental protection (capital and current expenditure, salaries and wages) in 2021.

Table 5.1: Public expenditure on the environment protection and management by type of expenditure and environmental field (million QR), 2017-2021

Item		2017	2018	2019	2020	2021	
Capital Expenditure	Waste management	64.9	0	0	0	0	
	Labs, etc.	0.1	0	0	0	0	
	Landscape and park protection	49.6	193.2	135	1,030.2	1,460	
	Wastewater management	2,677.5	2,723	3,336	3,152.4	3,069	
	Other capital expenditure	197.7	0	101			
	Total	2,989.7	2,916.1	3,572	4,182.6	4,529	
Current Expenditure	Current expenses / Ministry of Municipality and Ministry of Environment and Climate Change	193.1	0	0	0	0	
	Waste management	120.2	118.8	225	153.9	192	
	Landscape and public park protection	118.4	120.5	152	143.6	160	
	Operating expenses/ sewage	69	6.6	4	2.0	0.25	
	Environmental activities not elsewhere classified	12.3	10.8	10	13.1	21	
	Total	513	256.8	391	312.2	373	
Salaries and wages / Ministry of Municipality and Ministry of Environment and Climate Change		-	2,200.8	2,521.9	2638	2,726.8	2,658
Grand Total		5,703.4	5,694.8	6,601	7,368.9	7,644.31	

Source: Ministry of Finance

1.2 Expenditure on the Environment by the Environmental Field

Expenditure is generally divided into two types: current expenditure which includes the operating and maintenance expenditure, salaries and wages; and capital expenditure which includes expenditure on projects and improvement of asset increases.

The activities of the environment protection and management are divided into several sections, based on the group of activities by the environmental field/medium, which is spent on for protection and management. These environmental fields/media consist of different environmental aspects, such as waste management, wastewater, biodiversity, air pollution reduction, environmental research and studies, environment asset management and other environmental fields. The following table shows the expenditure on the environment by the environmental field and type of expenditure in 2021.

The results also indicated that the percentage of capital expenditures of total expenditure (current and capital) for various environmental fields was 79.1%.

With regard to the largest capital expenditure, it was on the expenditure on wastewater management by 49.3% of total capital expenditure, followed by capital expenditure on protection and treatment of soil and groundwater by 24.8% of total capital expenditure.

Moreover, results also indicated that the percentage of current expenditure of total expenditure (current and capital) for various environmental fields was 20.9%.

As for the largest current expenditure, it was on the wastewater management by 59.7% of total current expenditure, followed by current expenditure on activities of protection and treatment of soil and groundwater by 26% of total current expenditure.

Table 5.2: Value of Expenditure on the environment by type of expenditure and main environmental field (thousand QR), 2021

Code	Environmental Activities	Expenditure Type					%
		Current Expenditure	%	Capital Expenditure	%	Overall Total Expenditure	
1	Waste management	34,960.1	3.3	1,143.2	0.0	36,103.3	0.7
2	Wastewater management	633,717.1	59.7	1,986,154.3	49.3	2,619,871.4	51.5
3	Pollution reduction	5,572.2	0.5	46,699.3	1.2	52,271.5	1.0
4	Ventilation and treatment of waste gases	732.8	0.1	0.0	0.0	732.8	0.0
5	Protection and treatment of soil and groundwater	276,039.7	26.0	998,257.7	24.8	1,274,297.4	25.0
6	Noise and vibration reduction	1,470.4	0.1	3,290.0	0.1	4,760.4	0.1

Code	Environmental Activities	Expenditure Type					%
		Current Expenditure	%	Capital Expenditure	%	Overall Total Expenditure	
7	Radiation Exposure Protection	10.0	0.0	0.0	0.0	10.0	0.0
8	Biodiversity and landscape protection	13,121.0	1.2	0.0	0.0	13,121.0	0.3
9	R&D activities	19,463.1	1.8	6,876.5	0.2	26,339.6	0.5
10	Environmental protection n.e.c.	11,034.0	1.0	1,186.6	0.0	12,220.5	0.2
11	Natural and desalinated water sources protection	53,608.2	5.0	975,876.1	24.2	1,029,484.4	20.2
12	District cooling activities	12,586.1	1.2	8,389.9	0.2	20,976.0	0.4
Total		1,062,314.6	100.0	4,027,873.6	100.0	5,090,188.2	100.0

Source: The process of collecting data from the public entities targeted in the study

From the results of the following table, which show the sub-details of the activities of the top 3 environmental fields in terms of financial expenditure, it became clear that the largest total expenditure on the activities of the environment protection and management was on wastewater management by about 51.5% of total expenditure on various environmental fields. Based on the details of the expenditure on the sub-activities, it was found that the expenditure on wastewater treatment plants was the highest by 59.6% of total expenditure on wastewater management activity, amounting to QR 2.6 billion. In second place came the expenditure on sewage networks by 39.6%.

Then, the expenditure on "protection and treatment of soil and groundwater" activities came third by 25.0% of total expenditure on various environmental fields. The highest share of expenditure was shared between the sub-activities of "Facilities Rehabilitation" and "Other Activities" by 50% each of total expenditure on the protection and treatment of soil and groundwater.

The share of the sub-activity of "Establishing Water Networks" was the largest, amounting to 85.9% of the total spending on the activity of protecting natural water sources and desalinated water, which came in third place, amounting to 20.2% of the total spending on various environmental fields.

Table 5.3: Value of expenditure on the environmental by type of expenditure and environmental sub-field (thousand QR), 2021

Code	Environmental Activities	Current Expenditure	Capital Expenditure	Total Expenditure
Wastewater Management				
2.1	Pollution prevention by adjusting the production process	773.3	0	773.3
2.2	Sewage networks	408,559.30	626,106.90	1,034,666.10
2.3	Wastewater treatment plants	203,195.40	1,359,491.40	1,562,686.80
2.4	Cooling water treatment	8,130.30	0	8,130.30
2.5	Procedures, control, laboratories and so on	12,460.40	5	12,465.40
2.7	Other activities	598.5	551	1,149.50
2	Total wastewater management expenditure	633,717.10	1,986,154.30	2,619,871.40
Protection and Treatment of Soil and Groundwater				
5.5	Procedures, control, laboratories and so o	879.9	0	879.9
5.6	Facilities Rehabilitation	137,579.90	499,128.90	636,708.80
5.7	Other Activities	137,579.90	499,128.90	636,708.80
5	Total expenditure on the protection and treatment of soil and groundwater	276,039.70	998,257.70	1,274,297.40
Protecting natural water sources and desalinated water				
11.1	Protecting and rehabilitating natural water sources	820.1	8,058.60	8,878.70
11.2	Establishing water networks	0.0	884,080.3	884,080.347
11.3	The cost of maintaining water networks	52,788.10	83,737.10	136,525.30
11	Total expenses for protecting natural water sources and desalinated water	53,608.216	975,876.14	1,029,484.356

Source: The process of collecting data from the public entities targeted in the study

From the results in the following table, it is evident that environmental expenditures in 2021 have tripled compared to environmental expenditures in 2020. It is noted that expenditures on wastewater management were prevalent during the five years (2017-2021), with the largest share of total spending on all environmental activities. Its annual growth rate during this period reached 53%. This was followed by spending on soil and groundwater protection and treatment activities, which was prevalent during the same period, as its annual growth rate reached 49% during these five years.

Table 5.4: Total Expenditure on Environment by Environmental Activity Field, 2017-2021 (thousand QR)

Code	Environmental Activities	Total Expenditure (QR 1000)				
		2017	2018	2019	2020	2021
1	Waste management	133,657.7	69,213.7	74,634.4	48,062.8	36,103.3
2	Wastewater management	476,611.6	1,830,563.4	2,631,767.1	8,511.5	2,619,871.4
3	Pollution reduction (protecting air, water and climate)	24,375.8	107,845.0	271,004.4	28,951.1	52,271.5
4	Ventilation and treatment of waste gases	15,348.1	193.8	10.0	576.8	732.8
5	Protection and treatment of soil and groundwater	255,208.0	1,090,745.5	1,828,165.6	1,096.4	1,274,297.4
6	Noise and vibration reduction	14,770.6	963.7	2,480.3	1,083.3	4,760.4
7	Radiation Exposure Protection (except for external site safety)	19.2	37.4	0.0	0.0	10.0
8	Biodiversity and landscape protection	138,198.7	11,409.8	6,854.9	10,386.1	13,121.0
9	R&D activities	296,901.3	28,439.1	29,655.4	4,023.4	26,339.6
10	Environmental protection activities n.e.c.	71,585.1	51,986.7	48,641.5	884,022.1	12,220.5
11	Natural and desalinated water source protection	204,032.0	828,637.5	48,631.3	819,570.6	1,029,484.4
12	District cooling activities	19,891.4	71,811.3	18,548.4	39,940.3	20,976.0
Total		1,650,599.6	4,091,847.0	4,960,393.3	1,846,224.4	5,090,188.2

Source: The process of collecting data from the public entities targeted in the study

1.3 Environmental Expenditure on Scientific Research

Qatar's R&D Survey 2021 defines the scientific research as a creative work conducted on the basis of a systematic approach to increase human, cultural and community knowledge, and uses it for the innovation of new practices. Innovation includes a wide range of activities that lead to the introduction of a new or remarkably improved product.

In terms of the type of R&D and scientific field, the R&D Survey 2021 indicates that expenditure on research by sector in the field of environment amounted to 5.4%. This was distributed by sector at a rate of 11% of the total R&D spending for the business sector. The percentage of spending on research by sector in the field of the environment in the government sector was 4%, and the percentage of spending on research in the field of the environment in the higher education sector was 4.7% of the total R&D spending in the higher education sector for 2021.

It is worth noting that R&D spending in the field of energy, which includes renewable energy, is also included in spending on the environment. However, the classification of R&D is based on the binary number of the field of science, which undermines the opportunity to review expenditures on renewable energy and sometimes leads to the integration of some environmental science fields with other science fields, or the integration of other science fields with the environmental science field.

Table 5.5: Expenditure on R&D by Sector and Statistical Classification of Socio-economic Objectives, 2021

Item	Business		Government		Higher education		Total	
	QR	%	QR	%	QR	%	QR	%
Land exploration and exploitation	12,615,982	2.2	15,653,693	1.6	3,458,105	0.1	31,727,780	0.7
Culture, entertainment, religion and media	20,247,873	3.5	52,831,215	5.4	595,663,352	20.6	668,742,440	15
Political and social systems, structures and processes	51,398,447	8.9	129,142,969	13.2	290,442,151	10	470,983,567	10.6
General progress of knowledge	28,814,281	5	80,225,178	8.2	663,956,089	22.9	772,995,547	17.4
Defense	15,575,287	2.7	3,913,423	0.4	11,591,412	0.4	31,080,122	0.7
Environment	63,547,170	11	39,134,233	4	137,300,277	4.7	239,981,681	5.4
Transport, communications and other infrastructure	90,492,417	15.7	35,220,810	3.6	57,261,576	2	182,974,803	4.1
Energy	106,690,715	18.5	23,480,540	2.4	193,190,203	6.7	323,361,458	7.3
Industrial production and technology	96,566,779	16.8	43,047,656	4.4	161,874,071	5.6	301,488,506	6.8
Health	37,380,689	6.5	361,991,656	37	508,785,718	17.6	908,158,062	20.4
Agriculture	42,053,275	7.3	39,134,233	4	0	0	81,187,508	1.8
Education	10,902,701	1.9	154,580,221	15.8	274,330,088	9.5	439,813,009	9.9

Source: NPC – R&D Survey

2. Employees, Volunteers, Trainers and Participants in Various Environment Programs

2.1 Environment Protection Employees

Environment is often accused of slowing down the economy due to the environment protection requirements and standards that some may see as hindering economy. However, in reality it is the opposite. When we protect environment, this protection requires the presence of several activities and programs that, in turn, attract further investments, which will push the economy forward and create job opportunities that will complete the economic cycle.

The workers in different environment protection activities are not limited to specialists only. Any worker in the environment protection activity is considered an environmental worker, even if his/her specialization/job is not directly related to the environment protection. Being a worker in an environmental field means that he/she is an environmental worker. The two tables below show the number of workers in the environment protection activities in 2019 in different government, semi-government and private sectors targeted in the data collection process.

Statistics on the number of workers in industries related to environmental protection by nationality, sex, compensation and main economic activity in 2021, show that the largest percentage by economic activity was in waste collection, treatment and disposal, and material recovery activities at 82%. The percentage of workers in sewage came in second place with 28%, followed by the percentage of workers in other waste management services, accounting for 9% of total workers in the supply activities and sewage and waste management and treatment activities.

Also, the results show that the total number of workers in the supply activities and sewage and waste management and treatment activities amounted to 2.4 thousand workers, which constituted 2% of total number of workers in the industrial sector, totaling 149 thousand workers, of whom Qataris constituted 2%. The compensation for total workers in supply activities and sewage and waste management and treatment activities amounted to QR 167 million, representing 1% of total compensation for workers in the industrial sector that amounts to QR 21.5 billion.

Table 5.6: Number of workers in environment protection-related industries by nationality, sex, compensation and main economic activity (number, thousand QR), 2021

Code	Economic Activity	No. of Qataris			No. of Non-Qataris			Total			Compensation (Thousand QR)		
		Male	Female	Total	Male	Female	Total	Male	Female	Total	Qataris	Non-Qataris	Total
37	Sewage	0	0	0	667	5	672	667	5	672	0	38,373	38,373
3700	Sewage	0	0	0	667	5	672	667	5	672	0	38,373	38,373
38	Waste collection, treatment and disposal activities, and material recovery	12	0	12	1,390	92	1,482	1,402	92	1,949	4,109	110,007	114,116
3811	Non- hazardous waste collection	1	0	1	447	55	502	448	55	503	0	14,276	14,276
3821	Non- hazardous waste Treatment and disposal	1	0	1	518	35	553	519	35	554	308	68,921	69,229
3822	Hazardous waste Treatment and disposal	5	0	5	264	2	266	269	2	271	1391	17,600	18,991
3830	Materials recovery	5	0	5	161	0	161	166	0	166	2410	9,210	11,620
39	Waste treatment and other waste management service activities	0	0	0	223	2	225	223	2	225	0	14,293	14,293
3900	Waste treatment and other waste management service activities	0	0	0	223	2	225	223	2	225	0	14,293	14,293
E	Total supply activities and sewage and waste management and treatment activities	12	0	12	2,280	99	2,379	2,292	99	2,391	4,109	162,673	166,782

Source: NPC – Annual Bulletin of Economic Statistics/ Energy and Industry

The results of table (5.7) indicate that workers in other environment activities were the highest in terms of annual allocations, as their annual allocations amounted to 66.4 % of total annual allocations for workers in different environmental activities, followed by the allocations for workers in waste management activity, accounting for 6.8% of total annual allocations for workers in various environmental activities.

As for the number of workers, the table below shows that the percentage of workers in other environment activities was the highest, amounting to 49.6% of total workers in various environmental activities, 55.1% of whom were Qataris, while 44.9 % of them were non-Qataris. The percentage of workers in waste management activities came in second place with a percentage of 26.8%, 4.2% of whom were Qataris, while 95.8 % were non-Qataris. Then the percentage of workers in agriculture, livestock and fisheries activities came in the third place, as their percentage was 5.6% of the total number of workers in various environmental activities. However, the percentage of workers in climate change and air quality management activities was the lowest, as the total percentage of workers in these activities reached 0.2% of the total number of workers in various environmental activities.

In term of the total number and nationality of workers, it is clear from 2021 results that the number of male and female Qatari workers reached 6,481 workers, and they constituted 39.2% of the total number of workers in environmental protection and management activities, numbering 16 thousand workers. On the other hand, the percentage of non-Qatari males and females reached 60.8%, numbering ten thousand workers.

Table 5.7: Number of workers in various environmental activities by activity, nationality, sex and annual salaries (number, QR), 2021

Environment Activities	Number of Environmental Workers										Total Annual Salaries (000 QR)
	Qataris			Non-Qataris			Overall Total				
	Males	Females	Total	Males	Females	Total	Males	Females	Total		
Land, area, property and landscaping management	106	95	201	344	18	362	450	113	563	109,605.0	
Wastewater management	131	57	188	4233	14	4247	4364	71	4435	209,544.2	
Environmental security and safety and environmental health activities	127	77	204	145	17	162	272	94	366	144,920.1	
Environmental studies, research, information, policies and training activities	2	2	4	52	23	75	54	25	79	23,094.0	
Wastewater management	123	49	172	427	35	462	550	84	634	63,505.9	
District cooling activities	0	3	3	2	1	3	2	4	6	2,069.7	
Agriculture, livestock and fisheries	235	163	398	503	32	535	738	195	933	205,271.9	
Nature reserves, biodiversity and wildlife laboratory, environmental monitoring, water quality control, wastewater, prevention, inspection and so on	100	51	151	61	4	65	161	55	216	23,286.4	
Climate change and air quality management activities	39	74	113	39	7	46	78	81	159	7,756.0	
Urban planning and infrastructure activities	5	11	16	12	5	17	17	16	33	3,950.0	
other environmental activities	44	63	107	52	9	61	96	72	168	53,165.4	
Various other public administrations, environmental assessment and processes	2,528	1,988	4,516	3,422	256	3,678	5,950	2,244	8,194	2,030,839.5	
	293	115	408	321	7	328	614	122	736	182,880.6	
Total	3,733	2,748	6,481	9,613	428	10,041	13,346	3,176	16,522	3,059,888.8	

Source: Data collected from the agencies targeted in the data collection process.

The results indicate that the highest percentage of workers was in other environmental activities, amounting to 50% in 2021, while in 2020 the highest percentage of workers was in waste management, 49%.

Table 5.8: Number of Workers in Various Environmental Activities by Activities, 2017-2021

Activity	2017	2018	2019	2020	2021
Land, area, property and landscaping management	576	556	556	581	563
Wastewater management	792	694	973	12	634
Waste management	4,379	4,512	4,573	4,475	4,435
Environmental security and safety and environmental health activities	355	261	327	308	366
Environmental studies, research, information, policies and training activities	153	148	227	22	79
Design, construction and building standards activities	830	...	...	...	...
District cooling activities	710	720	801	6	6
Agriculture, livestock and fisheries	966	917	917	946	933
Water desalination	...	...	...	248	...
Desalination waste collection and treatment	...	...	...	352	...
Nature reserves, biodiversity and wildlife	539	404	424	420	216
laboratory, environmental monitoring, water quality control, wastewater, prevention, inspection and so on	293	256	241	296	159
Climate change and air quality management activities	49	29	29	19	33
Urban planning and infrastructure activities	158	158	158	159	168
Forecasting, monitoring, analysis, networking and natural disaster programs activities	189	...	7	2	0
Other environmental activities	39	7,398	7,493	209	8,194
Various other public administrations, environmental assessment and processes	267	1594	685	1139	736
Total	10,295	17,647	17,411	9,194	16,522

Source: Data collected from the agencies targeted in the data collection process.

2.2 Volunteers in Various Environmental Programs

The results for 2021 show that the highest percentage of volunteers by gender was for males, with a rate of 55% of the total volunteers, distributed by nationality at 45.1% for Qatari males and 9.8% for non-Qatari males, while the percentage of Qatari female volunteers reached 26.9%, compared to 18.3% for non-Qatari female volunteers.

Table 5.9: Number of volunteers in various environment programs by nationality and gender, 2017-2021

Years	Qataris			Non-Qataris			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
2017	1	0	1	32	3	35	33	3	36
2018	23	10	33	52	37	89	75	47	122
2019	15	10	25	20	15	35	35	25	60
2020	17	10	27	25	17	42	42	27	69
2021	504	300	804	110	204	314	614	504	1,117

Source: data collected from the agencies targeted in the data collection process.

3. Environmental Compliance Activities

3.1 Various Environmental Compliance Activities

The scientific and specialized environment protection and management activities are accompanied by other aspects that are equally important. These aspects are represented by many different activities that mark the environmental achievements through the relevant environmental awards, whether granted to national authorities by international bodies or national institutions, or in the form of environmental gatherings, meetings and conferences on various national, regional or international environmental events. They could also be awareness-raising campaigns that may be the most popular and widespread of these activities. Such campaigns may be separate or may accompany a specific environmental project. There are also environmental advocacy programs that reflect the desire of communities and community organizations to protect the environment. They may come in the form of community development targeting neighboring or surrounding communities in a particular environmental project. A plan is then set to integrate these communities with the environmental project in a way that achieves material and moral benefits for them. However, the plan does not make much change in their current lifestyle.

The following table reviews the activities, which reflect the environmental commitment at various levels during 2019-2021, with the data received, since not all the entities targeted in the study have provided the data. The results indicate that the expenditure on environmental awareness activities in 2021 was the highest in cost compared to the rest of activities related to environmental commitment, which amounted to 33% (QR 2 million). Then, the second rank was occupied by expenses on specialized training workshops by the activity of the institution held by the ministry or institution for a specific category, at 17% (i.e., 1.01 million Qatari riyals).

Table 5.10: Environment Compliance Activities by Type of Activity and Cost (QR), 2019-2021

Event/Program Title	2019				2020				2021			
	No. of Events	No. of Participants or Targeted	Cost (Thousand QR)	No. of Events	No. of Participants or Targeted	Cost (Thousand QR)	No. of Events	No. of Participants or Targeted	No. of Events	No. of Participants or Targeted	Cost (Thousand QR)	Cost (Thousand QR)
Cooperation agreements signed with local and international institutions in the field of environmental protection	8	0	0	0	0	0	0	0	0	0	0	0
Specialized research and studies in environment - district cooling	38	0	0	6	130	0	0	0	0	0	0	0
The number of entities that publish a report on sustainability	4	6	0	6	0	0	0	0	0	0	0	0
Environmental awards granted to other entities	40	1,127	147.6	20	0	5.0	31	2,025	50			
Environmental competitions	11	2,514	400.0	87	11,363	480.0	24	1,750	140			
Participations in environmental events (local and external)	134	4,007	713.2	114	704	383.1	130	2,285	416.3			
Environment-related workshops and conferences organized by the institution	223	26,577	717.5	353	21,572	144.0	184	5,758	1,000			
Specialized training workshops by the activity of the institution, held by the ministry/ institution for a specific category	23	1,001,738	993.4	43	6,156	2,067	16	178	1,011			
Environment advocacy programs	95	2,021,645	529.5	593	12,544	2,230.5	26	1,680	2,000			
Community environmental development campaigns	192	7,349	1,485.8	274	9,960	579.6	312	7,006	1,005			
Environment awareness campaigns	61	202,372	852.0	30	3,567	100	63	2,000	500			
Total	828	3,267,335	5,838.9	1,528	65,996	5,989.2	786	22,682	6,122.3			

Source: data collected from the agencies targeted in the data collection process.

4. Sustainability Assessment and Green Building

4.1 GSAS Green Building Standard

4.1.1. Projects Registered for GSAS

2007 marked the start of the development of GSAS Framework. The development process involved in-depth and thorough examination of more than 140 building rating systems, tools, guidelines and standards around the globe. Then, the development process focused on narrowing down the choice to 40 whole building rating systems which were further analyzed based on their scope. This was followed at a later stage by a careful investigation of the best practices used by six (6) of the most prestigious systems at the global level.

The certificate issued according to the "GSAS" system includes:

- GSAS Design & Build (GSAS-D&B) Certificate
- GSAS Construction Management (GSAS-CM) Certificate
- GSAS Operations Certificates

GSAS development process is based on a bottom-up approach, as it was developed from scratch to allow a seamless integration process between local needs and Sustainable Development Goals.

The Global Sustainability Assessment System (GSAS) is the first performance-based system in the Middle East and North Africa (MENA) region, developed for assessing and rating buildings and infrastructure for their sustainability impacts. The primary objective of GSAS is to create a sustainable built environment while addressing the local needs and environmental conditions specific to the region. Statistics indicate that a total area of 721 million square feet was registered, including 158 projects, during the period 2016-2022.

Table 5.11: No. of projects registered for GSAS certificates for green buildings, 2022*

Certificate	No.	Area (ft2)
Total No. of registered projects for GSAS-D&B	129	698,070,932
Total No. of registered projects for GSAS-CM	23	17,229,472
Total No. of registered projects for GSAS Operation	6	5,788,707
Total No. of registered projects	158	721,089,111

*Includes statistics from 2021 to 2022.

Source: Gulf Organization for Research and Development (GORD)

In terms of the distribution of projects that were registered to obtain the GSAS certificate by municipalities, the results indicate that Al Daayen Municipality ranked first, as the number of projects reached 39 projects with an area of 11 thousand square feet, and the percentage constitutes 79% of the total projects that registered to obtain various GSAS certificates. Then, Al-Rayyan Municipality came in second place, as the number of projects

reached 8 projects with an area of 6,000 square feet, constituting 7% of the total projects registered to obtain the various GSAS certificates for 2022.

Table 5.12: Number of projects registered for GSAS certificates by municipality, 2022

Municipality	GSAS-D&B		GSAS-CM		GSAS Operation		Total	
	No. of Projects	Area (ft2)	No. of Projects	Area (ft2)	No. of Projects	Area (ft2)	No. of Projects	Area (ft2)
Al-Daayen	30	6,103	8	5,779	1	21	39	11,903
Al Khor	0	0	0	0	0	0	0	0
Al Rayyan	0	0	4	4,352	4	2,327	8	6,679
Al Shahaniya	0	0	1	3,397	0	0	1	3,397
Al Shamal	1	431	0	0	0	0	1	431
Al Wakrah	0	0	3	2,065	0	0	3	2,065
Doha	1	48	1	47	1	3,441	3	3,536
Umm Salal	0	0	2	504	0	0	2	504
Total	32	6,581	19	16,144	6	5,789	57	28,515

4.1.2. Projects Obtained GSAS

The results indicate that an area of 1,750 million square feet was registered, distributed among 1,880 projects, during the period 2012-2022. The following figure also shows the development of the number and area of projects that obtained GSAS certificates during 2012-2022. It also appears from the figure that the number of buildings obtained GSAS certificates increased with a growth rate of 81.1% during the period during 2012-2022.

Figure 5.3: Number and area of projects obtained GSAS certificates 2012 - 2022



Table 5.13: No. of projects obtained GSAS certificates for green buildings, 2022*

Certificate	No.	Area (ft2)
Total No. of registered projects for GSAS-D&B	842	1,043,330,085
Total No. of registered projects for GSAS-CM	940	562,337,629
Total No. of registered projects for GSAS Operation	44	90,386,826
Total No. of registered projects	54	54,892,697

*Includes statistics from 2021 to 2022.

Source: Gulf Organization for Research and Development (GORD)

In terms of the distribution of projects that obtained GSAS certification according to municipalities, the results indicate that Al Daayen Municipality ranked first in terms of the number of projects that obtained the GSAS certificate for various types, as the number of projects reached 597 projects with an area of 71.2 million square feet, and the percentage constitutes 40% of the total projects that obtained the various GSAS certificates. Al Wakrah Municipality came in second place, with the number of projects reaching 40 projects with an area of 34.7 million square feet, constituting 19.5% of the total projects registered to obtain the various GSAS certificates.

Table 5.14: Number of projects obtained GSAS certificates by municipality, 2022

Municipality	GSAS-D&B		GSAS-CM		GSAS Operation		Total	
	No. of Projects	Area (ft2)	No. of Projects	Area (ft2)	No. of Projects	Area (ft2)	No. of Projects	Area (ft2)
Al-Daayen	594	46,729	3	24,437	0	0	597	71,166
Al Khor	4	1,498	0	0	1	16,505	5	18,003
Al Rayyan	40	8,705	1	162	8	15,768	49	24,635
Al Shahaniya	15	3,632	0	0	0	0	15	3,632
Al Shamal	16	962	1	821	0	0	17	1,783
Al Wakrah	33	24,561	3	2,157	2	8,019	38	34,737
Doha	21	12,275	3	9,865	5	1,936	29	24,077
Total	723	98,364	11	37,441	16	42,228	570	178,033

Source: Gulf Organization for Research and Development (GORD)

Moreover, the statistics show the number of projects that obtained the GSAS certificate by certificate category during 2022. The percentage of projects that obtained the GSAS-Design (Certified) category reached 33%, and the (2-star) category came in second place with 24%. Likewise, the percentage of the (certified) category was 86% in the projects that obtained the GSAS-D&B certificate, and the (2-star) category came in second place with a percentage of 7%. As for the projects that obtained the GSAS-CM, the percentage of category (A*) reached 91%. While the percentage of the (Gold) category was 38% in projects that obtained a GSAS Operation certificate.

Table 5.15: Number of projects obtained GSAS certificates by category and type of certificate until 2022

Certificate Type	Certified	2 Stars	3 Stars	4 Stars	5 Stars	Total
GSAS Design	84	60	55	56	0	255
GSAS-D&B	401	35	19	10	3	468
Total	485	95	74	66	3	723

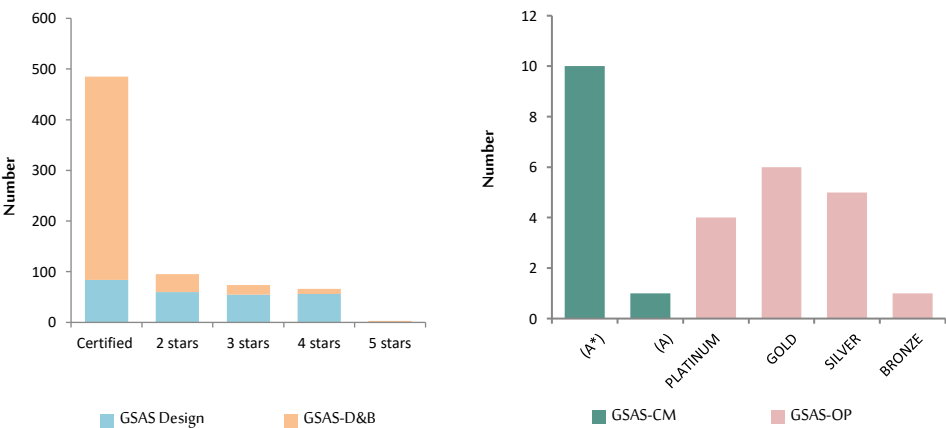
Source: Gulf Organization for Research and Development (GORD)

Table 5.16: Total projects obtained GSAS certificates by category and type of certificate until 2022

Certificate Type	(A*)	(A)	Platinum	Gold	Silver	Bronze	Total
GSAS-CM	10	1	0	0	0	0	11
GSAS Operation	0	0	4	6	5	1	16
Total	10	1	4	6	5	1	27

Source: Gulf Organization for Research and Development (GORD)

Figure 5.4: Number of projects obtained GSAS certificates by category, 2022



5. Environmental Awards

The environmental awards express the motivation of institutions' efforts towards environmental protection and sustainability through programs, projects, activities, systems, etc. The table shows an institutional awareness on environment preservation practices as 100 awards were received during the period 2017-2021, of which 62 are national and 39 are international.

Table 5.17: Number and type of awards granted to national institutions, 2017-2021

Year	No. of Awarded National Institutions	No. of Awards	Type	
			National	International
2017	11	44	27	17
2018	10	19	10	9
2019	13	23	16	7
2020	2	5	1	4
2021	2	9	8	2

Source: data collected from the agencies included in the study/questionnaire

6. National Entities and Institutions that Publish Sustainability Reports

The publication of sustainability reports by Qatar-based companies operating in various fields of economic activities reflects the extent of their environmental and social responsibility and their commitment to the environment protection and sustainability issues. It is clear from the table below that the number of national entities and institutions that publish reports to obtain operation permits, whether large, medium or small industries, are the largest compared to other companies, such as the number of national entities and institutions that publish sustainability reports, and the number of companies listed on Qatar Stock Exchange (QSE).

Table 5.18: Total number of companies that publish sustainability or social responsibility reports and numbers of companies that follow sustainable practices or social responsibility approach, 2022

Report Type	Company Type	2022
No. of companies publishing sustainability or social responsibility reports / QSE, and from the official website of the national authorities		
Sustainability or social responsibility reports	Large companies listed on the QSE	11
	Large companies / official website of national authorities	3
	Total	14
No. of companies* that adopt a sustainable practices approach or social responsibility		
Companies that adopt a sustainable practices approach or social responsibility	Large Companies	32
	SMEs	138
	Total	170

*: This includes only companies that submit an operating permit from the Ministry of Municipality and Environment
Source: Qatar Stock Exchange, the official website of the national authorities and the Ministry of Environment and Climate Change

A- Companies registered on the Qatar Stock Exchange

Table 5.19: Companies publishing ESG reports, 2017-2022

Companies	2017	2018	2019	2020	2021	2022
Doha Bank	97%	100%	100%	14%	100%	...
Qatar and Oman Investment Company	97%	97%	...	...	...	...
Qatar International Islamic Bank	92%	92%	76%	...	...	...
Aamal	86%	92%	92%	97%	...	...
National Bank of Qatar	92%	100%	100%	3%	100%	100%
Commercial Bank	...	...	100%	...	97%	94%
Ooredoo	...	...	...	81%	100%	...
Al-ahly Bank	...	...	...	...	100%	...
Gulf Warehousing Company	...	...	...	...	...	97%
Qatar Fuel	...	...	...	...	...	94%
Baladna	...	...	...	...	...	13%

Note: The initiative was launched in 2017.

*Every year, five companies are selected for evaluation by the Qatar Stock Exchange.

...: unavailable

Source: Qatar Stock Exchange

Platform link: <https://qse.arabsustainability.com/ara>

7. Scientific research, academic projects and program research on various environmental activities

Scientific research, projects and research of academic programs on various fields of environmental activities were monitored by national research authorities and sometimes in cooperation with regional and international research bodies on various fields of environmental activities, such as water, wastewater, waste, biodiversity, climate change and other environmental fields. In terms of the types of scientific research and academic projects and program, different types of research have been distinguished, such as scientific papers, research projects, and research in various academic fields, as well as papers presented at conferences, capacity building programs, various research articles, and research competitions.

It is evident from the scientific research that was conducted by various research bodies that the predominant research field in 2021 was research in the field of Environmental Protection, Pollution Control and Environmental Technology, with 38% of the total research areas of various environmental activities. By type of research in this field, it is clear through the results that the most common type of research was scientific papers, which accounted for 33% of all research in the field of Environmental Protection, Pollution Control and Environmental Technology. Research in the field of Energy and Environmental Sustainability ranked second, with a rate of 23% of the research field in various environmental activities. Overall, the most common type of research in 2021 was scientific papers in various fields of environmental research, accounting for 79.1% of all types of research in various fields of environmental research.

Moreover, results of 2020 indicated that the predominant field of research was research in the field of biodiversity, which in 2020 accounted for 36% of all research in the fields of various environmental activities. By type of research in the field of Environmental Protection, Pollution Control and Environmental Technology, it is clear from the results that the most common type of research was scientific papers, which accounted for 38% of all research in the field of biodiversity. Research in the field of agriculture, food security, fish and livestock, biodiversity and energy ranked second after research in the field of Environmental Protection, Pollution Control and Environmental Technology, with a rate of 28.1%. In general, the type of research with the highest percentage in 2020 was in scientific papers in various fields of environmental research, as it constituted 88% of the total types of research in various fields of environmental research.

Table 5.20: Research related to environmental activities by research field and type, 2020-2021

Research Field	2020		2021		
	Bachelor, Master and Ph.D.	Research Paper	Bachelor, Master and Ph.D.	Research Paper	Other
Environment Protection, Pollution Control and Environment Technology	5	60	0	67	11
Land Use and Facilities Management	0	2	0	5	0
Agriculture, Food Security, Fisheries and Livestock	1	15	0	15	9
Climate Change	2	4	0	7	1
Energy and Environmental Sustainability	3	12	0	47	5
Environmental laws and regulations	0	1	0	0	0
Public health and other environmental activities	0	2	0	6	8
Rationalization and Awareness	0	9	2	2	3
Response to Natural & Technical Disasters	0	4	0	0	4
Biodiversity	7	15	0	12	5
Water	1	11	0	10	0
Wastewater	0	2	0	1	2
Air pollution	1	6	0	5	1
Energy	0	15	0	25	3
Waste Management	2	2	0	2	0
Total	22	160	2	204	52

Source: Data collected from the target entities in the data collection process

8. Environment-Related Legislation, Laws and International Agreements

The Permanent Constitution of the State of Qatar reviewed many environmental issues and stressed that they should be in accordance with the Islamic standards from which the Constitution is derived, as well as according to international standards. Article 6 of the constitution states that the State shall respect and implement all international charters, treaties and conventions to which it is a party, in addition to articles 23 and 33 on public health, natural resources and the protection of the environment and its natural equilibrium to achieve comprehensive and sustainable development for all generations. Many environmental laws and legislation have been articulated and developed based on these articles.

8.1 Environment-Related Regulations and Legislation

The creation of a legislative and legal environment that regulates, guarantees and enforces the environment protection and management is integrated with other aspects of the State's response to the environment protection and management, such as the financing aspect (expenditure), the provision of human resources and other aspects of the State's readiness to protect the environment. The table shows the number of legislations and laws issued by the State in its various institutions for environment protection and management, as well as international and regional conventions and treaties during the period 2017-2021.

The relative importance of the legislation was as follows: ministerial decrees and laws both constitute 97%, decisions of the cabinet and prime minister constitute 3% in 2021.

Table 5.21: Number of legislations issued for the environment protection and management by type of legislation, 2017-2021

Year	Type of Legislation					Total
	Law and Decree	Emiri Order	Emiri Decision and Decree	Cabinet and Prime Minister Decision	Ministers and Heads of Government Agencies' Decisions	
2017	2	0	2	1	0	5
2018	3	0	3	1	1	9
2019	5	0	3	3	1	12
2020	2	0	6	0	3	11
2021	0	0	32	1	0	33

Source: Compiled by National Planning Council

8.2 International Conventions

The State of Qatar is an active member in many international, Islamic, Arab and Gulf spaces. Qatar has been a member of both the United Nations and the League of Arab States since 1971, a member of the League of the Islamic World since 1972, and a founding member of the Gulf Cooperation Council since 1981.

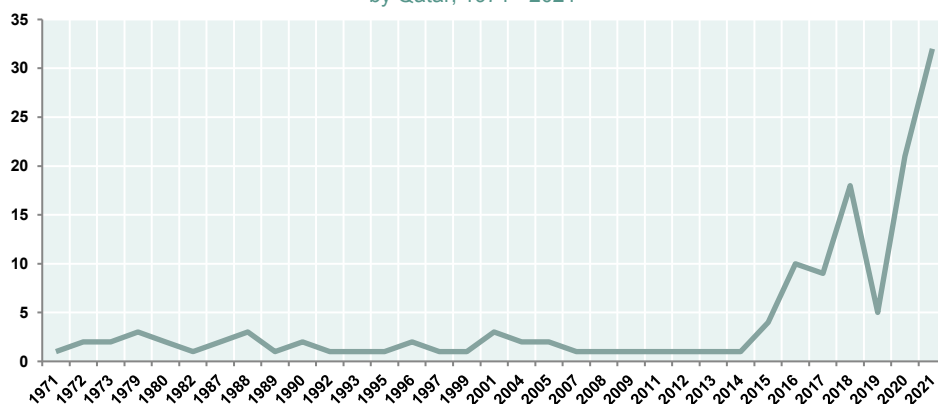
The State of Qatar lives within a global system governed by many international and regional frameworks, conventions and laws, from which many conventions of various kinds and different specializations emerge. It is a well-known fact that environmental issues, as a whole, are transboundary, requiring the concerted efforts of all countries to preserve the environment of our planet.

Within the framework of the State's response to the environment protection and management, Qatar has been an active party to several international, bilateral, multilateral, regional and Arab conventions related to the environment protection and management. It is worth mentioning that a number of legislative, institutional, human and financial aspects have emerged from these conventions to meet their requirements. The appendix lists the environment-related conventions signed by the State of Qatar.

The number of environmental agreements of various fields ratified by the State of Qatar during the period (1971-2021) is as follows: [1]

(47) International agreement	(10) Multilateral agreements	(2) GCC agreement
(5) Regional agreements.	(9) International protocol	(66) bilateral agreements.

Figure 5.5: Number of multilateral international environmental agreements ratified by Qatar, 1971 - 2021



[1] For further information, please see the list of international agreements in the annexes.

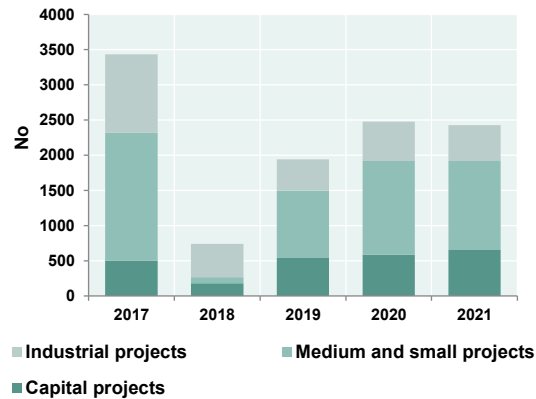
9. New Projects Subject to Environmental Impact Assessment (EIA)

Projects in Qatar are subject to an Environmental Impact Assessment (EIA), a process whose scope and type of analysis depend on the nature and magnitude of the potential environmental impacts of the proposed project. The EIA examines potential environmental risks and impacts on an area, searches for alternatives and identifies ways to improve selection of project impact, location, planning, design and implementation by preventing, minimizing, mitigating or compensating its negative environmental impacts and promoting its positive impacts. The EIA includes the mitigation and management of negative environmental impacts throughout the project implementation period, and takes into account the natural environment (air, water and land), human health and safety and social aspects. The project owner is responsible for conducting the EIA.

The results show a rise in the number of projects subject to EIA in response to the environment conditions in 2021 compared to 2014, amounting to 2,428 projects in 2021 compared to 1,342 projects in 2018, an increase of approximately twofold.

The highest rise ratio was in the major projects, increasing 3 times higher in 2021 compared to 2017.

Figure 5.6: Number of new projects subject to EIA by type of project, 2017-2021



10. Environmental Education

The environment protection is not only a process to reduce pollutants and emissions, but it goes beyond that role to be a standard process that accompanies all stages of human life, especially in the educational stage, where one can comprehend the relations between the biotic and abiotic components in which we live. Further, the environment-related education provides specialists capable of managing the change process in human activities to align them with the laws of the universe, and not to ruin, with our own hands, the habitats that we live in. In addition, the environmental education addresses the unabated negative impacts caused by the population and economic growth on the environment resources and ecosystem.

10.1 Environment-specialized students and graduates at different universities and faculties.

Environmental education contributes to raising environmental awareness in the periphery of the recipients of this science and the surrounding circles. Areas of environmental science, which are very diverse, have been distributed to cover almost all of the most well-known life sciences. They have also recently intervened in economic and social aspects to work together within an integrated system to achieve sustainability.

10.1.1 Environment-specialized students

Results show that the number of enrolled students increased recently compared to previous years during the period 2017-2021, as the number of male enrolled students reached 76 and females 75 in 2021, with an annual growth rate of 11% for males and 1% for females compared to 2017/2018. In terms of the number of students enrolled by university and college, the number of students enrolled at Qatar University for various educational levels was the highest compared to the number of students enrolled in other educational institutions, amounting to 114 male and female students, a percentage of 75% of total number of students enrolled in educational institutions for environmental specialties.

Table 5.22: Number of students enrolled in universities and colleges by sex, university, college and environment specialization during the academic years 2017/18–2020/21

Environment-Related Educational Specialization	2017/2018		2018/2019		2019/2020		2020/2021	
	Male	Female	Male	Female	Male	Female	Male	Female
Meteorology	5	1	1	1	0	0	0	0
HSE	5	4	1	5	2	0	0	1
Archeology	4	2	0	0	0	0	0	0
Bachelor of Environmental Sciences	15	40	12	25	4	12	3	14
Master in Environment Sciences	3	4	2	5	1	7	3	6
Master's in environmental engineering	3	4	3	9	2	1	4	3
Master's in urban planning and Design	1	6	1	5	0	2	0	3
MSc Sustainable Energy	4	3	3	2	12	13	11	11
Master of Sustainable Environment	3	6	2	1	2	6	4	6
PhD in Sustainable Energy	0	0	8	1	34	11	37	14

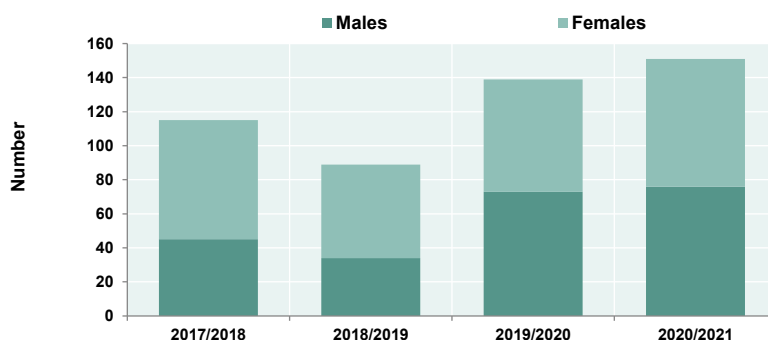
Environment-Related Educational Specialization	2017/2018		2018/2019		2019/2020		2020/2021	
	Male	Female	Male	Female	Male	Female	Male	Female
PhD Sustainable Environment	2	0	1	1	16	14	14	17
Total	45	70	34	55	73	66	76	75

Source: Public and private universities

10.1.2 Environment-specialized graduates

It was noted that the number of graduates in environmental disciplines has increased recently than in previous years during the period 2017-2021, as the number of male graduates reached 75 and females 76 in the year 2020/2021.

Figure 5.7: Number of graduates in environment-specialized majors from universities and colleges by sex, 2017/2018-2020/2021



10.2 The Environment in Educational Curricula

10.2.1 Science for the elementary and middle school levels

The inclusion of environment topics in the educational curricula at different levels is a quantum leap that reinforces environmental concepts and issues. It is also linked to straightening human behavior towards issues of conservation of the environment and natural resources, such as water; waste minimization, recycling culture, conservation of biodiversity linked to food chains and many other environmental topics addressed in these curricula. This inclusion also raises awareness among today's children tomorrow's leaders on various environmental issues, as well as arming them with science that enables them to manage future development in a sustainable manner.

Table below shows that these environmental lessons and units are included in the initial educational levels, where we note that the proportion of units dealing with environmental topics in the first grades of both semesters, amounted to about 33% of total number of units of science. The table also shows that this interest in environmental topics is evident in Grades 3 and 4, where the proportion of environmental units makes up about 50% compared with the units of science in both semesters. Attention to environmental issues continues up to the advanced grades, such as Grade 9, after which the science subject is divided into several branches, such as chemistry, physics and biology from Grade 10 up to Grade 12.

Table 5.23: Number of environmental units in the primary and preparatory stages in sciences, 2021

Grade	Environmental Units	Overall Units	Percentage of Environmental Units to Total Units	Biotic Components*	Abiotic Components*
First Semester					
Grade 3	1	3	33%	0	1
Grade 4	2	3	67%	1	2
Grade 5	1	3	33%	0	1
Grade 6	0	0	0%	0	0
Grade 7	3	4	75%	0	3
Grade 8	1	4	25%	0	1
Grade 9	0	0	0%	0	0
Second Semester					
Grade 3	1	2	50%	0	1
Grade 4	2	4	50%	1	2
Grade 5	4	4	100%	1	3
Grade 6	1	4	25%	1	0
Grade 7	2	8	25%	2	0
Grade 8	2	9	22%	0	2
Grade 9	2	6	33%	1	1

* Biotic environmental components include all living creatures in the environment: animals, humans, plants, fungi, bacteria and other single-celled creatures.

** Abiotic environmental components include materials: rocks and lands, water and air, energy: heat and light; powers: wind – air-generated force; sea waves, the flow of water in the valley or on the surface of the earth - the force caused by the movement of water.

Source: Data are compiled from educational curricula for different grades.

10.2.2 Biology, Physics and Chemistry at the secondary level

The table below shows the number of environmental units that were included in biology, physics and chemistry in the secondary school during 2021, where the results indicate that the proportion of environmental units in biology in Grade 10 was the highest during the second semester, amounting to 70% of total biology units.

10.2.2.1 Biology

The environmental units in biology in Grade 12 (Advanced) came in second place, with a percentage of 75% of total biology units in both semesters.

10.2.2.2 Physics

With regard to the percentage of environmental units in physics, results indicate that Grade 12 (Science and Technology) had the highest percentage, during the first semester, reaching 50%. As for Grade 10, it made up 33% of the number of total units in physics for both semesters.

10.2.2.3 Chemistry

With regard to the percentage of environmental units in chemistry, the results indicate that Grade 10 achieved the highest percentage in second semesters, reaching 25% of total chemistry units.

Table 5.24: Number of Environmental Units at the Secondary Stage in Biology, Physics and Chemistry, 2021

Grade	Environmental Units	Overall Units	Percentage of Environmental Units to Total Units	Biotic Components*	Abiotic Components**
Biology (First Semester)					
Grade 10	2	5	40%	0	2
Grade 11 (Science)	2	4	50%	0	2
Grade 12 (Science)	3	4	75%	1	2
Biology (Second Semester)					
Grade 10	3	3	100%	2	1
Grade 11 (Science)	4	5	80%	2	2
Grade 12 (Science)	3	4	75%	1	3
Physics (First Semester)					
Grade 10	1	3	33%	0	1
Grade 11 (Science & Technology)	1	4	25%	0	1
Grade 12 (Science & Technology)	1	2	50%	0	1
Physics (Second Semester)					
Grade 10	1	3	33%	0	1
Grade 11 (Science & Technology)	0	0	0%	0	0
Grade 12 (Science & Technology)	0	0	0%	0	0
Chemistry (First Semester)					
Grade 10	0	0	0%	0	0
Grade 11 (Technology)	0	0	0%	0	0
Grade 12 (Technology)	0	0	0%	0	0
Grade 11 (Science)	0	0	0%	0	0
Grade 12 (Science)	0	0	0%	0	0
Chemistry (Second Semester)					
Grade 10	1	4	25%	0	1
Grade 11 (Technology)	0	0	0%	0	0
Grade 12 (Technology)	0	0	0%	0	0
Grade 11 (Science)	0	0	0%	0	0
Grade 12 (Science)	0	0	0%	0	0

* Biotic environmental components include all living creatures in the environment: animals, humans, plants, fungi, bacteria and other single-celled creatures.

** Abiotic environmental components include materials: rocks and lands, water and air, energy: heat and light; powers: wind – air-generated force; sea waves, the flow of water in the valley or on the surface of the earth - the force caused by the movement of water.

Source: Data are compiled from educational curricula for different grades.

10.2.3 Social sciences for the elementary, middle and high school levels

As science and environmental issues are complex and intertwined in many aspects with other sciences, environment science and related issues have been introduced into culture and social subjects.

10.2.3.1 Social sciences

The results indicate that the percentage of environmental units in social sciences was the highest in the secondary stage (Grades 12), with an average percentage of all secondary grades (foundation and advanced) that reached 34% of the total units of social sciences during the second semester. This was followed by the average percentages of the environmental units in the preparatory stage of social sciences (Grade 6- 9), where the average percentage reached 26% of the total units of Social Science during the second semester. The percentage of environmental units in the social sciences subject in the primary stage (Grade 3-6) came third, with an average rate of 29% of the total units of social sciences during the second semester.

Table 5.25: Number of Environmental Units in Primary, Preparatory and Secondary Stages in Social Sciences Subjects, 2021

Grade	Environmental Units	Overall Units	Percentage of Environmental Units to Total Units	Biotic Components*	Abiotic Components**
Social Sciences (First Semester)					
Grade 3	1	3	33%	0	1
Grade 4	1	6	17%	0	1
Grade 5	2	6	33%	0	2
Grade 6	2	6	33%	0	2
Grade 7	1	6	17%	1	0
Grade 8	1	6	17%	0	1
Grade 9	2	5	40%	0	2
Grade 10	1	6	17%	0	1
Grade 11	0	0	0%	0	0
Grade 12	2	2	100%	0	2
Social Sciences (Second Semester)					
Grade 3	1	5	20%	0	1
Grade 4	1	6	17%	0	1
Grade 5	1	6	17%	0	1
Grade 6	2	6	33%	0	2
Grade 7	1	5	20%	0	1
Grade 8	1	6	17%	1	0
Grade 9	2	6	33%	0	1
Grade 10	1	6	17%	0	1

* Biotic environmental components include all living creatures in the environment: animals, humans, plants, fungi, bacteria and other single-celled creatures.

** Abiotic environmental components include materials: rocks and lands, water and air, energy: heat and light; powers: wind – air-generated force; sea waves, the flow of water in the valley or on the surface of the earth - the force caused by the movement of water.

Source: Data are compiled from educational curricula for different grades.

11. Environmental Investment – Green Economy

The concept of environmental investments refers to investment in its usual form, but the outputs of this investment benefit the environment protection and management, leading to the demonstration of one aspect of managing the response to the environment protection and management by the state and the economy.

The environmental investments in the State of Qatar range between a variety of environmental fields, such as the companies that collect, treat and recycle waste; the companies that provide gardening, public square and landscaping services; the companies that provide district cooling, environmental consulting and wastewater management, and recently renewable energy investments; and many other investments that provide environment protection and management services. However, no data were available on environmental investments at the time of the preparation of this report.

The environmental investments not only benefit the environment, but the society and economy as well, and therefore they achieve a balance among the three sustainable development pillars. These investments are accompanied by the creation of job opportunities for different positions, such as ordinary and skilled labor, specialists and experts. Moreover, such investments lead to the creation of diverse economic opportunities, which push forward the economic growth in different sectors.

11.1 Environment Service-Related Industries

The following figure and table delineate the economic activities associated with the environment services which are classified according to ISIC (Rev. 4) on the industry of water supply and activities of sewage and waste management and treatment. Based on the results, a financial deficit is remarked in this activity, as the net value added is negative, which represents the total value added of depreciations. In turn, according to the data in the table below, the total value added is negative representing production value minus goods/services supplies.

Figure 5.8: Activities of environment service-related industries, 2017 – 2021

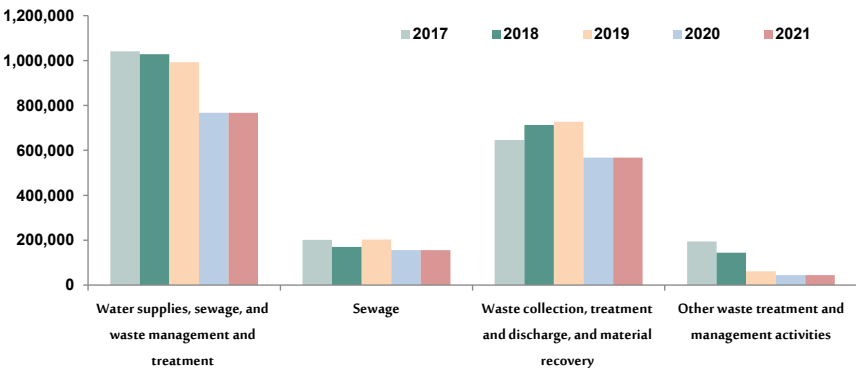


Table 5.26: Environment protection-related industries by economic activity and value added (Thousand QR), 2021

Activity code	Key economic activity	Net value added	Depreciations	Total value added	Goods/services supplies			Production value		
					Total	Services	Goods	Total	Other revenues	Products
E	Water supplies, sewage, and waste management and treatment	418,319	33,725	452,044	315,361	169,361	146,000	767,405	12,784	754,621
37	Sewage	73,965	7,505	81,470	74,161	63,666	10,495	155,631	64	155,567
3700	Sewage	73,965	7,505	81,470	74,161	63,666	10,495	155,631	64	155,567
38	Waste collection, treatment and discharge, and material recovery	324,229	22,157	346,386	221,124	96,146	124,978	567,510	12,490	555,020
3811	Non-hazardous waste collection	48,935	2,311	51,246	6,455	4,751	1,704	57,701	0	57,701
3821	Non-hazardous waste treatment and discharge	168,073	6,117	174,190	109,860	67,200	42,660	284,050	8,614	275,436
3822	Hazardous waste treatment and discharge	57,649	6,506	64,155	19,602	12,449	7,153	83,757	0	83,757
3830	Material recovery	49,572	7,223	56,795	85,207	11,746	73,461	142,002	3,876	138,126
39	Other waste treatment and management activities	20,125	4,063	24,188	20,076	9,549	10,527	44,264	230	44,034
3900	Other waste treatment and management activities	20,125	4,063	24,188	20,076	9,549	10,527	44,264	230	44,034

Source: NPC – Annual Economic Statistics Bulletin/Energy and Industry

11.2 Alternatives that Provide Cooling (District Cooling)

Under the response activities, there are environment-friendly alternatives compared to the conventional methods. These activities are featured in the green economy activities, which aims to reduce the negative impacts of the conventional economy on the environment via the exploitation of non-conventional sources as alternatives in water resource uses, energy consumption reduction, and therefore emission reduction.

For example, multiple enterprises have recently adopted the central district cooling service that cools the air through chilled water units that currently use treated wastewater in the cooling process. According to Kahramaa/District Cooling, the energy used in such type of cooling is less by 40-50% than its counterpart methods of conventional cooling.

This type of cooling in Qatar takes place in several different economic sectors and activities by specialized enterprises by some establishments which provide cooling through self-service within the same facility. Other establishments treat their own sewage water and then use it in cooling in an integrated process aimed at treating wastewater, conserving fresh water and reducing energy use.

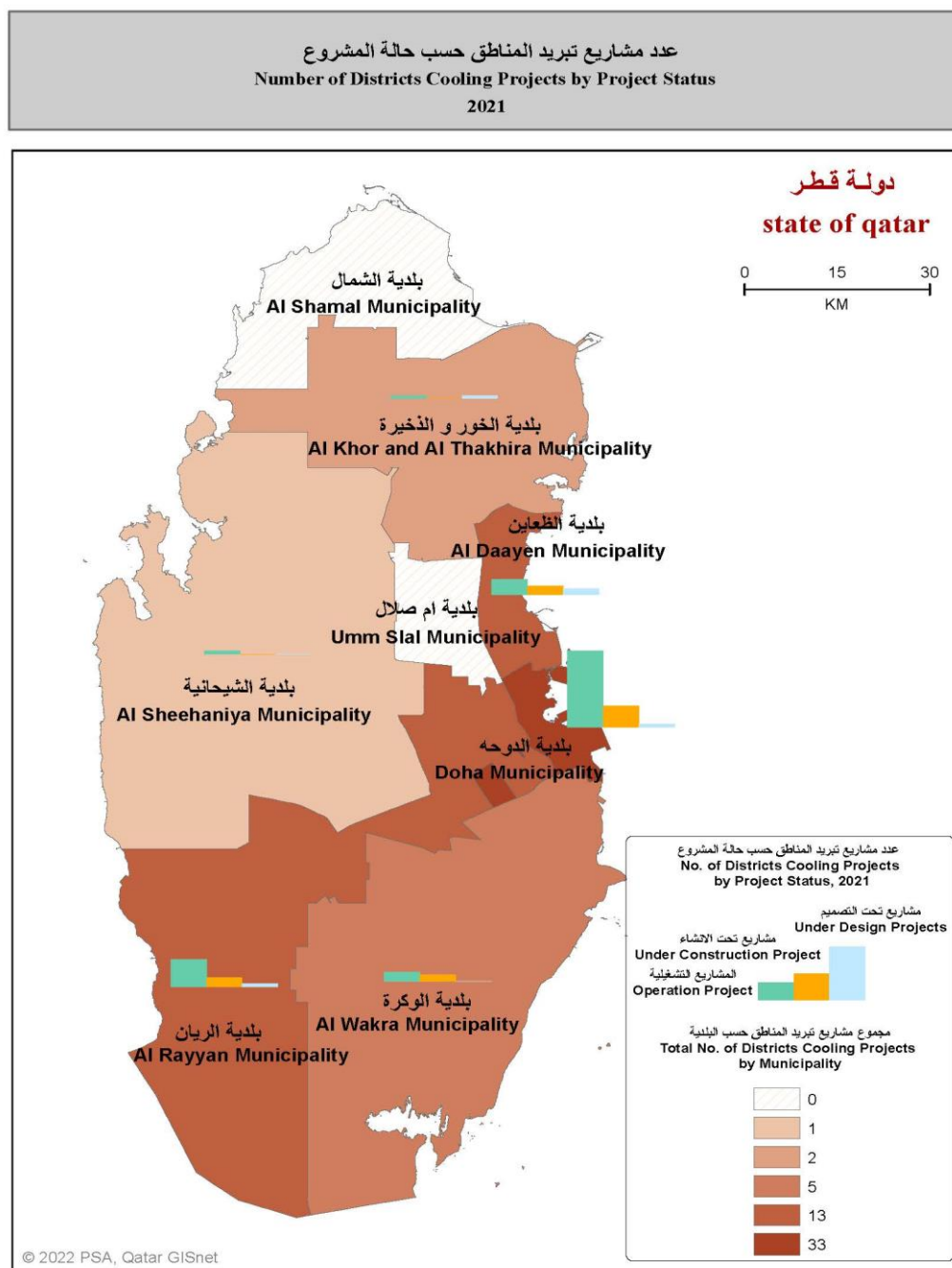
Results show the amount of electrical energy saved in the cooling process, compared to the conventional method, as well as the reduction of CO2 emissions. This has contributed to improving the quality of environment, preserving the natural resources, and creating a large number of job opportunities compared to the conventional cooling methods (nearly staff-free). The cooling plants have offered around 1.696 jobs, including 1.284 technical jobs, and 412 other accompanying jobs, such as the administrators, accountants, sales representatives and service and support staff related to district cooling.

Table 5.27: Indicators of the District Cooling, 2021

Economic Activity	Capacity of basic – combined cooling plants (TR)	Water used(m3)	Quantity of electric power used (MWh)	Quantity of electric power saving compared to conventional cooling (MWh)	Quantity of emission reduction compared to conventional cooling (thousand metric tons of CO2 equivalent)	Quantity of desalinated water saving (thousand m3/ year) using treated water for cooling
Supply of central cooling service	222,500	4,414,828	517,518	207,007	93,153.2	2,075.2
Commercial	193,000	1,181,773	114,082	45,633	20,534.8	474.9
Hotels	34,650	524,743	63,175	25,270	11,371.5	299.6
Education	211,700	1,499,348	204,970	81,988	36,894.6	363.2
Transport	69,718	1,300,374	141,971	56,789	25,554.8	177.0
Health	54,158	855,173	123,359	49,344	22,204.7	0.121
Cultural	32,350	377,079	58,679	23,472	10,562.2	55.3
Sports	198,368	1,577,777	142,529	57,012	25,655.3	1,385.3
Real estate development	174,046	3,096,193	333,334	133,334	60,000.2	2,236.7
Industrial	53,850	205,023	31,188	12,475	5,614	0
Other	45,950	797,540	36,456	14,582	6,562	778
Total	1,290,290	15,823,851	1,767,262	706,905	318,107.1	7,845.6

Source: National Planning Council - District Cooling Statistics in Qatar

Map 5.1: Number of District Cooling Projects by Project Status 2021



12. Natural Disaster Preparedness

The State of Qatar has enacted the necessary laws and regulations to mitigate the effects of disasters. Thus, a number of national institutions and entities have been established, such as the Permanent Committee for Emergency (PCE), established by the Council of Ministers' Resolution No. 17 of 1998. The PCE has taken into consideration urban and civil expansion and has adopted all safety and security measures and standards at global levels, and has been enhancing the capabilities of qualified personnel to work in the field of rescue, relief and development to ensure the safety of all people living in Qatar. The State has also established the Standing Committee for Rescue, Relief and Humanitarian Assistance in the affected areas of sisterly and friendly countries, as well as the establishment of government humanitarian associations, non-government organizations and donor institutions that provide support and relief to all countries affected by natural or conflict-related disasters.

It is worth mentioning that the State of Qatar has been participating in all international forums on disaster management based on its strong belief in the importance of concerted international efforts and cooperation at all levels for disaster risk reduction. Qatar also hosted the 3rd Arab Conference on Disaster Risk Reduction at the end of April 2017 entitled "Implementation of the Sendai Framework in the Arab Region" in coordination with the United Nations Office for Disaster Risk Reduction and the League of Arab States. The hosting of the conference came as a fulfillment of Qatar's commitments as an active member of the international community and in implementation of the Sendai Declaration on the need for a regional policy that makes disaster response an effective and influential effort.

Qatar's launch of "HopeFor" initiative in 2011 is one of the outstanding examples of international partnership for disaster risk reduction, which culminated in the 65th session of the United Nations General Assembly Resolution No. 307 entitled: "Improving the effectiveness and coordination of military and civil defense assets for natural disaster response". The State of Qatar supports the Sendai Framework for Disaster Risk Reduction 2015-2030 and its seven objectives. Therefore, the proportion of local governments that adopt and implement local disaster risk reduction strategies in line with national disaster risk reduction strategies was 100% in Qatar during the period (2018-2022).

12.1 Covid-19 Pandemic

12.1.1 People Infected and Died from Covid-19

Statistics indicate that the number of people who were infected with Covid-19 reached 3,904.9 per 100,000 people in 2021. It is clear that females were more infected than males, as their number reached 5,044.4 per 100,000 people. In the age groups, we find that children under the age of 15 are higher. The infection rate reached 1114.8 per 100,000 people for the same age group.

Regarding the death rate due to the Covid-19, it reached 13 per 100,000 people in 2021, and females were more likely to die compared to males, as the rate reached 10.9 per 100,000 people in 2021, and in the age group over 65 years they had a greater share of deaths due to Covid-19. It reached 338.9 per 100,000 people for the same age group.

Table 5.28: Number of people Infected and Died due to Covid-19, 2017 - 2021

Sub-indicator	Gender	Age Group	2017	2018	2019	2020	2021
Number of injured people as a result of disasters per 100,000 population	Males	All age groups	0	0	0	5,434.8	3,455.3
	Females		0	0	0	3,449.0	5,044.4
	Total		0	0	0	4,868.7	3,904.9
Number of injured people as a result of disasters per 100,000 population by age groups	Total	0 - 14 years	0	0	0	10,685.8	1,865.3
		15 - 64 years	0	0	0	3,767.7	1,114.8
		65 years and older	0	0	0	4,542.4	1,762.8
Number of dead people as a result of disasters per 100,000 population	Males	All age groups	0	0	0	10.3	13.8
	Females		0	0	0	4.6	10.9
	Total		0	0	0	8.6	13
Number of dead people as a result of disasters per 100,000 population by age groups	Total	0 - 14 years	0	0	0	0	0.2
		15 - 64 years	0	0	0	5.6	9.9
		65 years and older	0	0	0	327.1	338.9

Source: Ministry of Public Health, Ministry of Interior, and calculations of National Planning Council

References and Data Sources

1. Qatar Civil Aviation Authority – Meteorology Department
2. Ministry of Municipality and Environment
3. Ministry of Public Health
4. Ministry of Finance
5. Ministry of Interior
6. Public Works Authority (Ashghal)
7. Qatar General Electricity and Water Corporation (Kahramaa) – Annual Report
8. The Ministry of Education and Higher Education.
9. Public and private universities.
10. CGIS – Qatar
11. Ministry of Municipality and Environment – Annual Agricultural Consumption Bulletin
12. Ministry of Municipality and Environment – Annual Bulletin of Crop Production Tracts
13. Ministry of Municipality and Environment – Annual Bulletin of Fish Statistics
14. Gulf Organisation for Research & Development (GORD)
15. NPC – Water Statistics Report
16. NPC – Annual Statistical Abstract – Environment Statistics Chapter
17. NPC – Annual Statistical Abstract – Agriculture Statistics Chapter
18. NPC – Annual Statistical Abstract – Population Statistics Chapter
19. NPC – Annual Statistical Abstract – Foreign Trade Statistics Chapter
20. NPC – Annual Statistical Abstract – Transport Statistics Chapter
21. NPC – Annual Statistical Abstract – National Accounts Statistics Chapter
22. NPC – Population, Housing and Establishments Census Bulletin
23. NPC – Environment Statistics Bulletin
24. NPC – Bulletin of District Colling in Qatar
25. NPC – Annual Economic Statistics Bulletin
26. NPC – Labour Force Sample Survey
27. NPC – R&D Survey

Appendices

Environment-Related International Conventions 1971-2021

Year	Convention by Type
International Convention	
1972	Convention for the Protection of the World Cultural and Natural Heritage (International)
1972	Convention on the International Regulations for Preventing Collisions at Sea 1972 (COLREGs) (International)
1973	International Convention for the Prevention of Pollution from Ships, 1973 (International)
1973	Convention on International Trade in Endangered Species of Wild Fauna and Flora (International)
1979	SAR Convention - 1979 International Convention on Maritime Search and Rescue as amended by Resolutions MSC.70 (69) and MSC.155 (78) 2006 Edition
1980	Annex I Convention on the Physical Protection of Nuclear Material (International)
1980	Budapest Treaty on the International Recognition of the Deposit of Microorganisms for the Purposes of Patent Procedure, held in Budapest on April 28, 1977, and amended on September 26, 1980 (International)
1987	Vienna Convention (1985) for the Protection of the Ozone Layer, and the Montreal Protocol of 1987 on ODS and its amendments of 1990 and 1992.
1987	Arab Cooperation Agreement Organizing and Facilitating Relief Operations
Decree No. 51 of 1988	International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (Brussels, 1971)
Decree No. 52 of 1988	International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties (Brussels, 1969) and its Annexes
Decree No. 53 of 1988	International Convention on Civil Liability for Oil Pollution Damage (Brussels, 1969), as amended by the 1976 Protocol
1990	International Convention on Oil Pollution Preparedness, Response and Cooperation (OPRC), 1990 (International)
1992	United Nations Convention on Climate Change
1993	Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction (International)
1995	Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, 1989
1996	Comprehensive Nuclear-Test-Ban Treaty (CTBT) (International)
1997	Convention on the Law of Non-Navigational Uses of International Watercourses (International)
Decree 29 of 1999	UN Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (UNCCD)
2001	Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction

Year	Convention by Type
2001	Stockholm Convention on Persistent Organic Pollutants
2004	International Treaty on Plant Genetic Resources for Food and Agriculture
2004	Rotterdam Convention on Prior Informed Consent (PIC) Procedure of Certain Pesticides and Chemicals in International Trade
2005	Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation, 2005 (Complete Text of Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation, 2005) (International)
2005	Protocol for the Suppression of Unlawful Acts against the Safety of Fixed Platforms Located on the Continental Shelf, 2005 (International)
2009	Qatar's Agreement with the International Atomic Energy Agency to apply guarantees within the framework of Nuclear Weapons Non-Proliferation Convention (International)
2016	Paris Agreement to limit the effects of climate change in 2016
2017	Global Dryland Alliance (GDA)
2018	International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM) 2004
2021	Convention on Biological Diversity
2021	Convention on International Trade in Endangered Species of Wild Fauna and Flora
2021	United Nations Convention to Combat Desertification
2021	International Convention on Oil Pollution Preparedness, Response and Cooperation (OPRC), 1990
2021	International Convention for the Control and Management of Ships' Ballast Water and Sediments (BWM), 2004
2021	Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal
2021	The International Convention for the Prevention of Pollution from Ships (MARPOL 78/73) and its Annexes (5-1) only
2021	International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties (Brussels 1969) and its annexes
2021	Minamata Convention on Mercury
2021	Strategic Approach to International Chemicals Management (SAICM)
2021	International Oil Pollution Compensation Fund Convention, 1992
2021	International Convention on Civil Liability for Oil Pollution, 1992
2021	Convention for the Suppression of Unlawful Acts against the Safety of Maritime Navigation and its Protocol
2021	The United Nations Framework Convention on Climate Change (UNFCCC)
2021	Paris Agreement on Climate Change
2021	The Convention on Nuclear Safety (CNS)
2021	The Convention on Early Notification of a Nuclear Accident
2021	Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency

Multilateral Agreements

1971	Ramsar Convention on Wetlands
1979	Convention on the Conservation of Migratory Species of Wild Animals
1982	United Nations Convention on the Law of the Sea (UNCLOS), Third Conference of the Law of the Sea (UNCLOS III)
Decree 36 of 1989	Protocol Concerning Marine Pollution Resulting from Exploration and Exploitation of the Continental Shelf 1988
Decree-law 90 of 1996	Biodiversity Convention, 1992
2017	The Islamic Organization for Food Security (IOFS)
2021	Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade

Year	Convention by Type
2021	Stockholm Convention on Persistent Organic Pollutants
2021	The Vienna Convention for the Protection of the Ozone Layer and the Montreal Protocol on Substances that Deplete the Ozone Layer and amendments thereof
2021	Agreement for Arab States in Asia for Research, Development and Training (ARASIA)
Regional Conventions	
1979	Convention on the Establishment of Arab Fisheries Company
2021	Kuwait Regional Convention for Cooperation on the Protection of the Marine Environment from Pollution and its Protocols and the Protocol Concerning Regional Co-Operation in Combating Pollution by Oil and Other Harmful Substances in Cases Of Emergency
1990	Protocol of Protection of the Marine Environment against Pollution from Land-based Sources on February 21, 1990 - Regional Marine Environment Protection Organization in Kuwait
2001	Convention on Conservation of Wildlife and its Natural Habitats in GCC Countries (Regional)
2011	Statute of the GCC Emergency Management Center
International Protocol	
2007	Cartagena Protocol on Biosafety
2017	Nagoya Protocol on Fair Sharing of Benefits Arising from the Utilization of Genetic Resources
2021	Cartagena Protocol on Biosafety
2021	Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization
2021	Protocol for the Protection of the Marine Environment against Pollution from Land-Based Sources
2021	Protocol for the Suppression of Unlawful Acts Against the Safety of Fixed Platforms on the Continental Shelf (SUA PROT)
2021	Protocol Concerning Marine Pollution Resulting from Exploration and Exploitation of the Continental Shelf
2021	The Kyoto Protocol to the United Nations Framework Convention on Climate Change and Doha amendments to the protocol
2021	SOLAS Protocol 1988
Bilateral Agreements	
2008	MoU on bilateral recognition of precious metals stamping, and cooperation in the measurement and monitoring of precious metals and valuable stones between the Government of Qatar and the Government of the Sultanate of Oman
2012	MoU on agriculture, livestock, and fisheries between the Government of Qatar and the Government of Bulgaria (Bilateral)
Decree No. 5 of 2013 • No. 9	Draft MoU for cooperation in the field of environment between the Government of the State of Qatar and the Government of the Republic of Singapore
2014	MoU for Cooperation in the Environmental Field between the Government of the State of Qatar and the Government of the Kingdom of Saudi Arabia
2015	MoU between Qatar General Organization for Standardization and the American Society for Testing and Materials
2015	MoU for Cooperation in the Field of Agriculture between the Government of the State of Qatar and the Government of the Republic of Tunisia
2015	MoU for Cooperation in the Field of Agriculture between the Government of the State of Qatar and the Government of the Republic of Turkey
2015	Twinning Agreement between Doha Municipality and the Libertador Bolivarian Municipality in Venezuela
2016	MoU for Cooperation in the Field of Agriculture between the State of Qatar and Government of Turkish Republic

Year	Convention by Type
2016	MoU for Cooperation in the Field of Evaluation between Qatar General Organization for Standardization and Turkish Standards Institution
2016	MoU in the Field of Environment and Conservation between the Government of the State of Qatar and the Government of the Sultanate of Oman
2016	Twinning Agreement between Doha Municipality in the State of Qatar and Ankara Municipality in the Republic of Turkey
2016	MoU for Economic, Scientific and Technical Cooperation in the Field of Agriculture between the Government of the State of Qatar and the Government of Georgia
2016	MoU for Cooperation in the Field of Veterinary Health and Livestock Production between the Ministry of Municipality and Environment of the State of Qatar and the Ministry of Agriculture of the Republic of Georgia
2016	MoU for Cooperation in the Field of Agriculture between the Government of the State of Qatar and the Government of the Republic of Azerbaijan
2016	MoU for Cooperation in the Field of Climate Change, Risk Assessment, Adaptation and Mitigation between the Ministry of Municipality and Environment of the State of Qatar and the Italian Ministry for the Environment Land and Sea
2016	MoU for Cooperation in the Field of Agriculture between the Ministry of Municipality and Environment of the State of Qatar and the Ministry of Agriculture and Environment Protection of the Republic of Serbia
2017	MoU in the Field of Biodiversity and Wildlife Conservation between the Ministry of Municipality and Environment of the State of Qatar and the State Committee for Environment Protection and Land Resources of Turkmenistan
2017	Agreement on Cooperation in the Fields of Standardization, Metrology, Certification and Accreditation between the Government of the State of Qatar and the Government of Turkmenistan
2017	MoU for the Protection of Endangered Fungal Species and the Preservation of Their Natural Environment between the Government of the State of Qatar and the Government of the Republic of Azerbaijan
2017	MoU for Cooperation in the Field of Agriculture between the Government of the State of Qatar and the Government of the Republic of Uganda
2017	Agreement for Cooperation in the Field of Environment and Nature Protection between the Government of the State of Qatar and the Government of the Republic of Croatia
2017	MoU on water resources between the Government of Qatar and the Government of the People's Democratic Republic of Algeria, signed in the city of Doha, Petar.
2018	MoU for cooperation in the agricultural field between the Government of the State of Qatar and the Government of the Kingdom of Morocco
2018	Agreement for cooperation in the field of agriculture, livestock and fisheries between the Ministry of Municipality and Environment in the State of Qatar and the Ministry of Agriculture in the State of Palestine
2018	MoU on Food Security and Cooperation in the Field of Agriculture, Agro-food industry between the Ministry of Municipality and Environment in the State of Qatar and the Ministry of Agricultural Food, Forest Policies and Tourism in the Republic of Italy
2018	MoU for cooperation in the field of agriculture between the Ministry of Municipality and Environment in the State of Qatar and the Ministry of Agriculture and Rural Development in Romania
2018	MoU for cooperation in the field of agriculture and food security between the Government of the State of Qatar and the Government of Nepal
2018	MoU / Ecuador
2018	MoU / Mali
2018	MoU for cooperation between the Ministry of Municipality and Environment in the State of Qatar and the Ministry of Production and Labor in the Republic of Argentina, represented by the State Secretariat for Agricultural Industries
2018	A joint declaration of intent for cooperation in the agricultural field between the Ministry of Municipality and Environment in the State of Qatar and the Ministry of Agriculture and Livestock Resources of the Republic of Ecuador

Year	Convention by Type
2018	Agreement for cooperation in the field of agriculture between the Ministry of Municipality and Environment and Vito Middle East WLL Qatar
2018	MoU between the Government of the State of Qatar represented by the Ministry of Municipality and Environment and the Government of the Sultanate of Oman represented by the Ministry of Agriculture, Fisheries and Livestock Resources
2018	A joint letter of intent for cooperation in the agricultural field between the Ministry of Municipality and Environment in the State of Qatar and the Ministry of Agriculture and Food in the French Republic
2018	Twinning Agreement between the Municipality of Doha in the State of Qatar and the Municipality of Sarajevo in the Republic of Bosnia and Herzegovina
2018	Twinning Agreement between the Municipality of Doha in the State of Qatar and the Municipality of Quito in the Republic of Ecuador
2018	Twinning Agreement between the Municipality of Doha in the State of Qatar and the Municipality of San Salvador in the Republic of El Salvador
2018	MoU between the Government of the State of Qatar and the Government of the Federal Republic of Somalia
2019	Decree No. (6) of 2019 ratifying MoU for cooperation in the agricultural field between the government of the State of Qatar and the government of the Kingdom of Morocco
2019	Decree No. (22) of 2019 ratifying MoU for cooperation in the field of energy between the Ministry of Energy and Industry in the State of Qatar and the Ministry of Energy in the Republic of Bulgaria
2019	MoU for Cooperation in the field of agriculture and food security with United Kingdom of Great Britain
2019	MoU for Cooperation in the field of agriculture and food security with Ireland
2019	MoU for Cooperation in the field of agriculture and food security with Oman
2020	Draft MoU On the Prevention of Illicit Trafficking of Nuclear Materials and Other Radioactive Substances between the Ministry of Municipality and Environment in Qatar and the Department of Energy in the United States of America (under procedure)
2020	MoU for cooperation in the field of climate change and environmental protection between the Ministry of Municipality and Environment in Qatar and the Ministry of Environment in the Republic of Romania (under procedure)
2020	Appendix of the Executive Protocol between the Government of the State of Qatar and the Government of the Islamic Republic of Iran regarding the establishment of a natural reserve, a Houbara breeding center and a competition arena (under procedure)
2020	Draft MoU On cooperation in the field of protecting endangered wildlife and preserving their natural environment between the government of Qatar and the government of the Republic of Tajikistan (under procedure)
2020	Draft MoU on cooperation in various agricultural fields between the government of the State of Qatar and the government of the State of Kuwait (under procedure)
2020	Draft Agreement for cooperation in the field of agricultural quarantine between the Ministry of Municipality and Environment in the State of Qatar and the Ministry of Agriculture, Food Industry and Improvement in the Kyrgyz Republic (under procedure)
2020	Draft Agreement for cooperation in the field of veterinary services and animal production between the government of the State of Qatar and the government of the Republic of Azerbaijan (under procedure)
2020	Draft MoU on cooperation in the agricultural field between the government of the State of Qatar and the government of the Republic of Portugal (under procedure)
2020	Draft MoU on cooperation in the field of agriculture and food security between the government of the State of Qatar and the government of the United States of Mexico (under procedure)

Year	Convention by Type
2020	MoU for cooperation in the field of agriculture and food security between the Ministry of Municipality and Environment in the State of Qatar and the Ministry of Agriculture in the Republic of Tajikistan (under procedure)
2020	Draft MoU in the field of agriculture between the government of the State of Qatar and the government of the Republic of Nicaragua (under procedure)
2020	Animal Health and Welfare Protocol on Live Animal Trade between the Ministry of Municipality and Environment of the State of Qatar and the Ministry of Agriculture of the Islamic Republic of Iran (under procedure)
2020	MoU on cooperation in the field of agriculture and food security between the State of Qatar and the Republic of Ukraine (under procedure)
2020	MoU on cooperation in the field of agriculture between the government of the State of Qatar and the government of the Bolivarian Republic of Venezuela (under procedure)
2020	MoU on cooperation in the agricultural field between the State of Qatar and the Republic of Kazakhstan (under procedure)
2020	Draft agreement for cooperation in the field of veterinary medicine between the government of the State of Qatar and the government of the Kyrgyz Republic. (Under the procedure)
2020	Draft cooperation agreement between the municipality of Chisinau and the municipality of Doha (under procedure)
2020	Draft twinning agreement between the Municipality of Doha in the State of Qatar and the Municipality of the City of Baku in the Republic of Azerbaijan (under procedure)
2020	Draft twinning agreement between the Doha Municipality in the State of Qatar and the Municipality of Banjaluka in Bosnia and Herzegovina (under procedure)
2020	Draft twinning agreement between the Municipality of Doha in the State of Qatar and the Municipality of the city of N'Djamena in the Republic of Chad (under procedure)
2020	Draft twinning agreement between the Doha Municipality in the State of Qatar and the Municipality of the city of Nur-Sultan in the Republic of Kazakhstan (under procedure)
2021	MoU with the Global Green Growth Institute

GCC Agreement

2011	Statute of the GCC Emergency Management Centre
2021	Convention on the Conservation of Wildlife and Natural Habitats in the Countries of the GCC

Source: Ministry of Environment and Climate Change

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