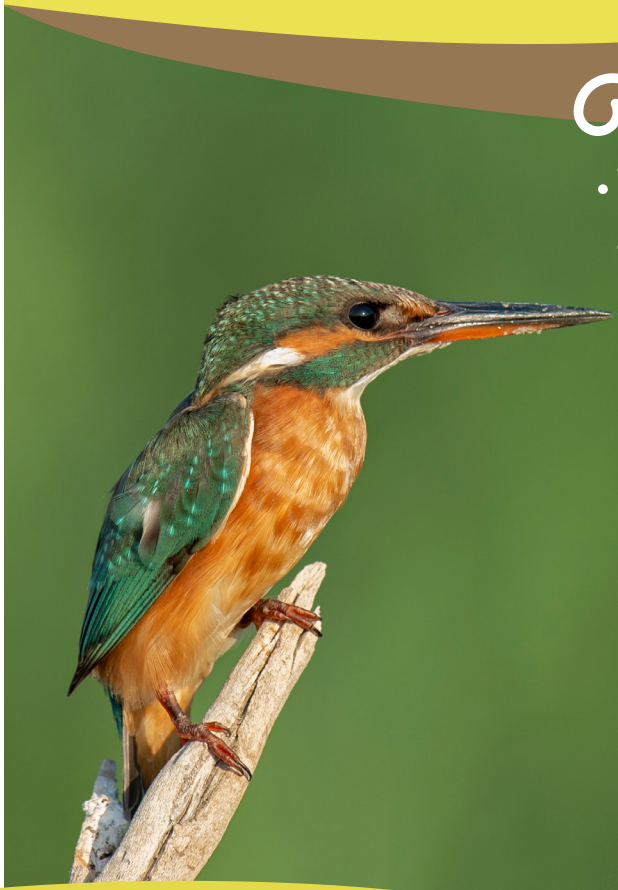
THE STATE OF ENVIRONMENT IN KUWAIT FIRST REPORT-2024

EXECUTIVE SUMMARY

الهيئة العامة للبيئة
دولة الكويت
ENVIRONMENT PUBLIC AUTHORITY KUWAIT

The State of Environment in Kuwait
First Report 2024

Executive summary



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The first Kuwait state of the environment report was prepared by the Environment Public Authority (EPA) of Kuwait, in cooperation with the United Nations Environment Programme – Regional Office for West Asia (UNEP – ROWA). The preparation process followed the integrated environmental assessment methodology used by UNEP in preparing state of the environment and outlook reports at the local, national, regional and global levels.

A team of national experts prepared and drafted the report chapters in collaboration with regional experts. The drafts of the report were carefully reviewed by editors and revisers from the EPA and UNEP – ROWA.

The EPA extends its profound gratitude to all participants for their contributions to the report and expresses its sincere apology for any errors or unintentional omission of participants' names.

Project team (EPA)

Samira Mohamad Al Kandari – Acting Director-General of the EPA - Project Manager

Fatima Hassan Taher – Director of Environmental Data Department - Deputy Project Manager

Dalal Al-Ajmi – National Project Coordinator – Head of Environmental Assessment and Monitoring Section

UNEP team (ROWA)

Abdelmenam Mohamed – UNEP Regional Coordinator

Paul Haddad, Yara El Habre, Awatif Al-Hammadi, Mohamad Ismail, Rayan Al Kak, Abdul-Majeid Haddad, Sami Dimassi

Chief editor

Ibrahim Abdel Gelil – Energy and Environment Expert – Former Director of the Environmental Management Program – Arabian Gulf University

Authors

Chapter 1: Drivers of environmental change

Lead author
Ibrahim Abdel Gelil (Energy and Environment Expert – Former Director of the Environmental Management Program – Arabian Gulf University)

Chapter 2: Climate change

Lead authors
Ibrahim Abdel Gelil (Energy and Environment Expert – Former Director of the Environmental Management Program – Arabian Gulf University)
Yahya Al-Hadban (Kuwait Institute for Scientific Research)

Chapter coordinator
Tiba Al Deyeen (Environment Public Authority)

Contributing authors
Nawaf Al-Hajri (Kuwait University)
Abdullah Jarrag (Environment Public Authority)

Chapter 3: Waste management

Lead author
Mohammed Boutaleb (Kuwait University)

Chapter coordinator
Noura Al Swailem (Environment Public Authority)

Contributing authors
Fatma Al Qahtani (Environment Public Authority)
Hanadi Al Mazeed (Environment Public Authority)

Chapter 4: Land resources

Lead author
Hana Bou Rizk (Kuwait Institute for Scientific Research)

Chapter coordinator
Sara Al Athari (Environment Public Authority)

Co-author
Faten Khalil (Environment Public Authority)

Chapter 5: Water resources

Lead authors
Ali Karnib (Lebanese University)
Muhammad Al Murad (Kuwait Institute for Scientific Research)

Chapter coordinator
Tiba Al Deyeen (Environment Public Authority)

Contributing authors
Rawan Al Momen (Ministry of Electricity, Water and Renewable Energy)
Nour Al Rumi (Environment Public Authority)
Shuaa Al Matiri (Environment Public Authority)

Chapter 6: The atmosphere

Lead author
Nawaf Al-Hajri (Kuwait University)

Chapter coordinator
Tiba Al Deyeen (Environment Public Authority)

Contributing authors
Yaqub Al Matouk (Environment Public Authority)
Khadija Ashknani (Environment Public Authority)
Zahra Taqi (Environment Public Authority)

Chapter 7: Biodiversity

Lead author
Hassan Al-Haddad (Kuwait University)

Chapter coordinator
Sara Al Athari (Environment Public Authority)

Contributing authors
Aisha Al Marhoun (Environment Public Authority)
Nadia Al Saqr (Environment Public Authority)
Shahd Abbas (Environment Public Authority)

Chapter 8: Coastal and marine environment

Lead authors
Hamoud Abdulla Nasser (University of Bahrain)
Al Anoud Al Raqm (Kuwait Institute for Scientific Research)

Chapter coordinator
Noura Al Swailem (Environment Public Authority)

Co-author
Iman Faisal (Environment Public Authority)

Chapter 9: Environmental policies

Lead author
Ibrahim Abdel Gelil (Energy and Environment Expert – Former Director of the Environmental Management Program – Arabian Gulf University)

Chapter 10: Future scenarios

Lead author
Ibrahim Abdel Gelil (Energy and Environment Expert – Former Director of the Environmental Management Program – Arabian Gulf University)

Introduction

Samira Mohamad Al Kandari

Acting Director-General of the Environment Public Authority

This present report provides a snapshot of the state of the environment in Kuwait based on a review of the environmental reality, mechanisms in place to counter environmental challenges, and scenarios that are expected to lead to a greener future.

This report focuses on seven key issues: climate change, waste management, land resources, water resources, the atmosphere, biodiversity, and the coastal and marine environment. It also reviews the institutional and legislative framework for environmental management. Moreover, the report explores some of the country's pathways to environmental sustainability through an analysis of the existing relation between social, economic and environmental driving forces. It also looks into potential future scenarios, with projections on the impact of each scenario on the state of the environment and on development, and possible ways of responding to each scenario. We are pleased to announce that this effort was undertaken through a participatory process, with contributions from 26 governmental and non-governmental actors.

The outcomes of the report are key for setting a baseline for future environmental policies and strategies. Through this integrated environmental assessment, we seek to analyse the driving forces and pressures causing environmental changes and to determine current gaps in environmental governance policies. The ultimate goal is to develop these policies and improve future decision-making by gaining better knowledge of the state of the environment and addressing pressures and their complex impacts.

Therefore, we hope that the present report will contribute to supporting the plans of Kuwait Vision 2035 for achieving sustainable development, and to improving integrated environmental management by incorporating environmental policies as key elements in sectoral plans and programmes. We also hope that it will guide efforts to strengthen capacities, particularly those related to the continuous monitoring of the state of the environment by collecting, analysing and properly using data in the decision-making process.

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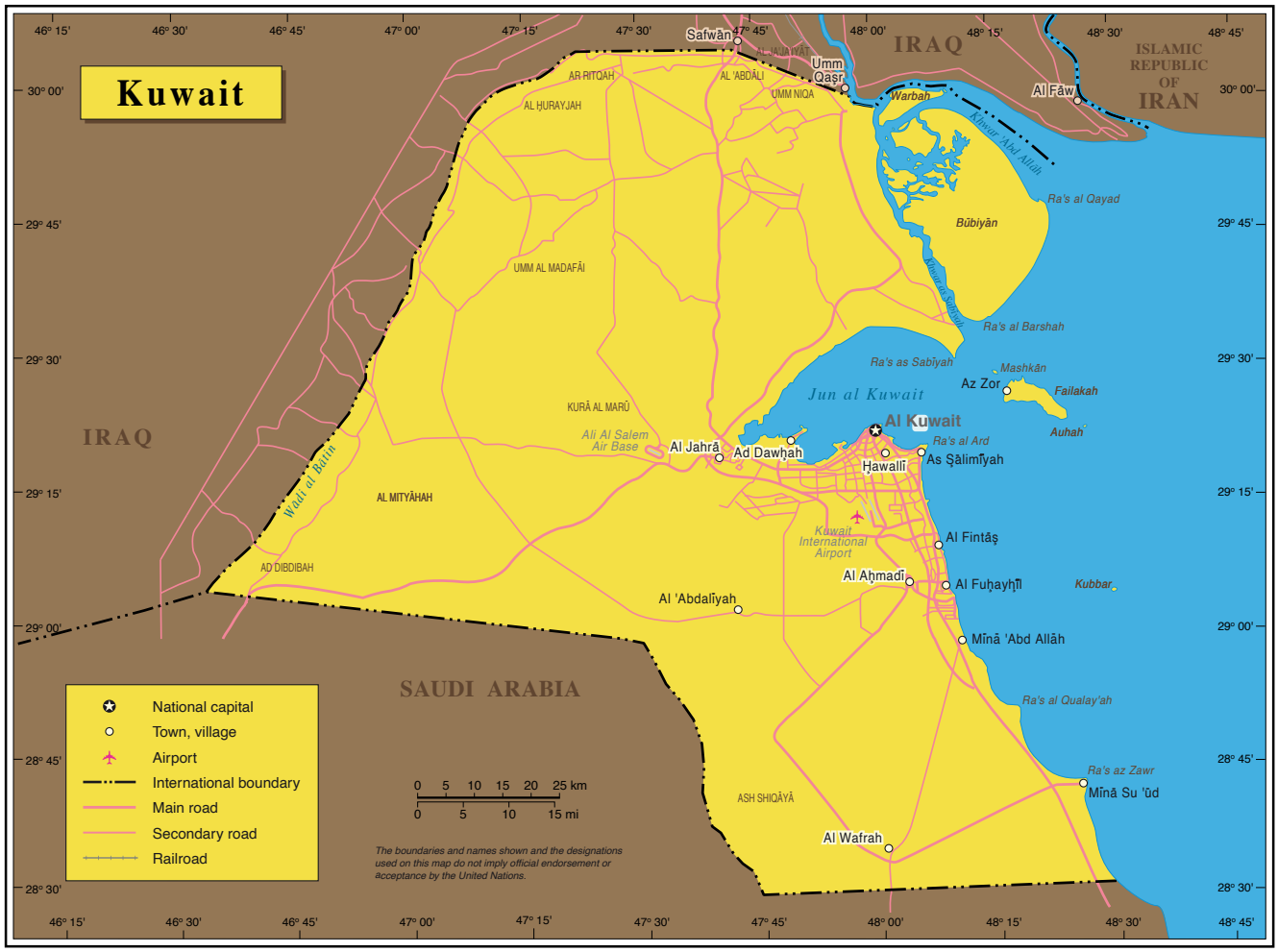


Map No. 4405 UNITED NATIONS
May 2010

Department of Field Support
Cartographic Section

Foreword

The first Kuwait state of the environment report is the result of a collaboration between the Environment Public Authority (EPA) and the United Nations Environment Programme – Regional Office for West Asia (UNEP – ROWA). The report follows UNEP integrated environmental assessment methodology for preparing state of the environment and outlook reports at the local, national, regional and global levels.

A team of national experts prepared and drafted the report chapters in collaboration with regional experts. The drafts of the report were carefully reviewed by editors and reviewers from the EPA and UNEP – ROWA.

The report also outlines current gaps in policies and strategies, in addition to the measures taken to address them and mitigate their negative impacts on human health and ecosystems.

Chapter summaries

1. Drivers of environmental change

Many driving forces affect the ecosystems of Kuwait and create pressures on the natural environment and its resources. Kuwait is unique in terms of the factors that play a key role in environmental change. These factors include an almost exclusive reliance on the oil and gas industry for economic and social development, the scarcity of water resources and arable land due to the arid climate, intensive urbanization and rapid economic growth driven by revenues from the export of oil and its derivatives. These factors were accompanied by high population growth rates and a radical change in demographics as a result of waves of labour migration from neighbouring Arab or East Asian countries.

Climate change is among the most important challenges that face sustainable development in Kuwait. To address it, it is necessary to include climate change mitigation and adaptation measures in all sectoral and national policies. The scarcity of freshwater resources and the high per capita consumption of electricity and water underscore the need to strengthen policies that promote the efficient use of resources, and to adopt a water-energy-food nexus approach in the face of climate change. Many environmental challenges need consistent work to address them in the coming period. These include increased dependence on fossil fuels, the high carbon footprint, vulnerability to climate change risks, transboundary air pollutants such as sand and dust storms, marine pollution, coastal degradation and declining fish production.

Economic growth

Kuwait's per capita income is amongst the highest in the world as a result of the country's success in leveraging its oil revenues since the 1940s. The GDP of Kuwait, at constant prices, increased from about 39 billion Kuwaiti dinars in 2012 to about 41 billion in 2016, at an average annual growth rate of 2.5 per cent. However, GDP has declined to about 36 billion Kuwaiti dinars in 2020. Nonetheless, Kuwait is a wealthy economy that has provided its citizens with a very high income, with a per capita income of around 8,600 Kuwaiti dinars in 2020.

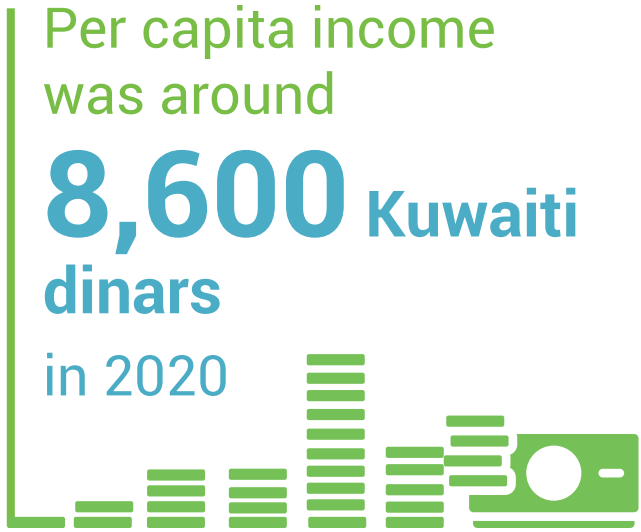
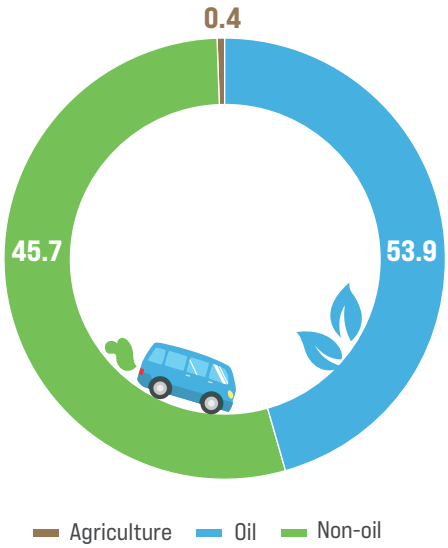


Figure 1. Sectoral distribution ratios of GDP (2020)



Source: International Energy Agency (IEA), Key World Energy Statistics.

Historically, the economy of Kuwait rests on the oil and gas sector, making it the third largest among the Gulf Cooperation Council (GCC) countries. Oil and gas account for nearly half of the GDP of Kuwait, about 95 per cent of exports and about 90 per cent of government revenues (figure 1).

Heavy economic reliance on oil and gas has been the main driving force behind increasing pressures on the fragile land and marine ecosystems of Kuwait and its atmosphere, and a continuous threat to biodiversity.

Population growth and urbanization

Kuwait has a population of approximately 4.8 million people. Migrant workers account for the largest share of the total population (about 66 per cent). The huge influx of migrant workers has changed the demographics of the country, as the number of expatriates in Kuwait is almost twice the number of citizens. The total population of the country is expected to rise to about 6 million by the middle of this century, which may put additional pressure on the already limited environmental resources. Kuwaitis under the age of 20 accounted for 45.2 per cent of all citizens in 2016, meaning they will be the most influential consumer force of Kuwait through 2035 and beyond. It is therefore extremely important to raise awareness among the younger segments of the Kuwaiti society about the importance of sustainable consumption patterns.

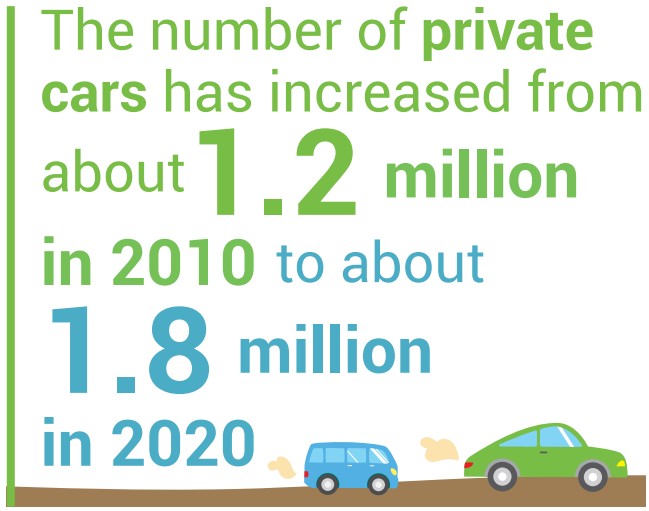
Most of the population in Kuwait (98 per cent) lives in urban areas, mostly along the coast. The overwhelming urbanization is putting intense pressure on sensitive coastal ecosystems such as mangrove swamps and coral reefs, both important habitats for many species. It also exposes low-lying areas to climate change-induced sea level rise.

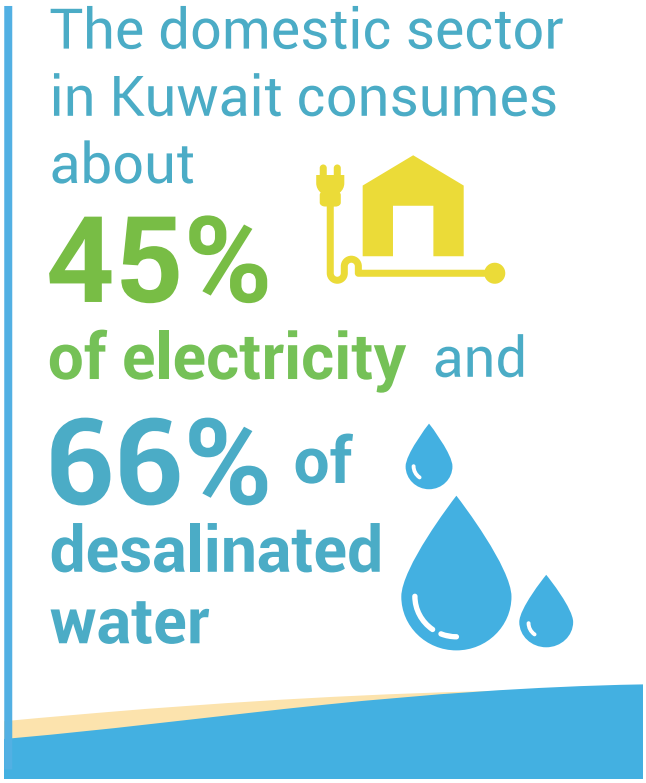
Consumption and production patterns

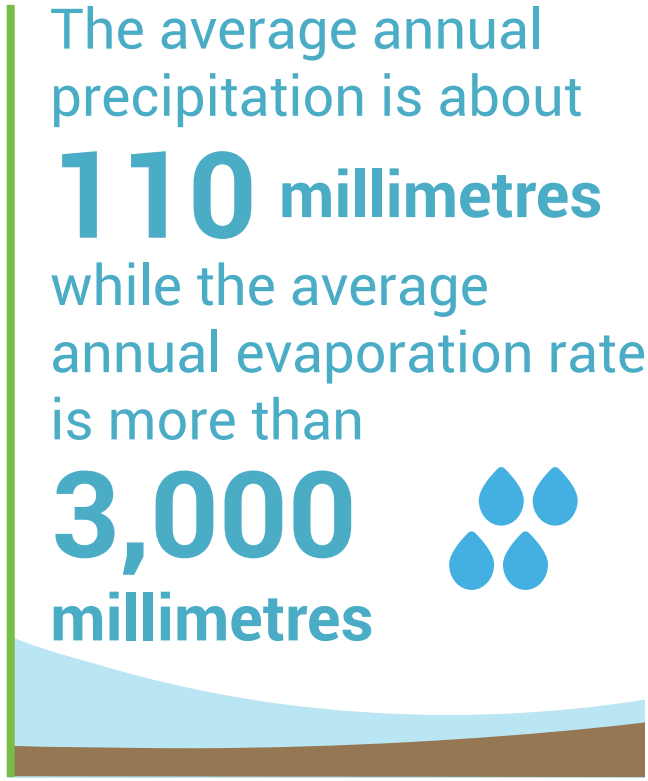
A relatively stable set of policies in the oil sector, coupled with prolonged macroeconomic stability, have resulted in a high standard of living for Kuwaiti citizens. The Government also put in place policies for subsidizing the prices of fuel, electricity, water and food. This has been accompanied by increasing rates of labour migration from regions with different cultures, unprecedented technological development and prevailing climatic and geographical conditions.

Over the past decades, these factors have contributed to changing living patterns in the country. The most prevalent pattern has been the increased consumption driven by rising household incomes. The hot weather conditions for most of the year necessitate the use of power-intensive air conditioners. Similar patterns have emerged in car ownership despite the availability of modern means of mass transport in Kuwait City that are mostly used by residents of other nationalities. The number of private cars has increased from about 1.2 million in 2010 to about 1.8 million in 2020.

Consumption rates indicate that the domestic sector in Kuwait consumes about 45 per cent of electricity and 66 per cent of desalinated water. Although Kuwait is one of the most water-stressed countries in the world,







its per capita consumption of municipal water is one of the highest in the world (447 litres/person/day). Increased reliance on desalination ultimately equates to more oil consumption, more pressure on the marine and coastal environment, as well as increased air pollution and greenhouse gas emissions, with fossil fuel burning accounting for 95.6 per cent of total emissions at the national level. It has become clear that subsidy policies, despite their importance as social safety nets, have led to excessive consumption of energy, water and food. This calls for the reconsidering those policies to encourage more sustainable consumption patterns in the medium and long terms.

Geographical conditions and climate change

Located in the northeastern corner of the Arabian Peninsula, Kuwait has a very dry desert climate with extremely hot summers. The coastline of Kuwait extends for about 500 kilometres over the Arabian Gulf, with a number of small, uninhabited islands. Water stress in Kuwait is among the most severe in the world as a result of low rainfall and high evaporation rates. The annual average precipitation is about 110 millimetres, while the average annual evaporation rate is more than 3,000 millimetres. Bridging the gap between the two rates requires large-scale seawater desalination to meet water demand.

During the spring and summer seasons, northern winds blow on Kuwait, carrying fine dust from frequent sand and dust storms. These frequent dust events have been closely associated with the deterioration of air quality as they increase the concentration of suspended particulate matter. These phenomena also cause soil erosion, which in turn causes land degradation and loss of biodiversity. Extreme weather events such as sand and dust storms, extreme heat waves and heavy precipitation events are projected to increase in severity and frequency due to climate change.

2. Climate change

Climate change is one of the most important challenges that face sustainable development in Kuwait, as it will exacerbate an already fragile environmental situation resulting from the country's geographical and climatic conditions, which include water scarcity, desertification and rising temperatures.

The hot and dry climate of Kuwait requires constant use of air-conditioning systems in all buildings, leading to increased electricity consumption, with air conditioning accounting for about 60 per cent of total electricity consumption. This has led to the construction of more power plants to keep up with growing demand, which

in turn has led to burning large quantities of oil and its derivatives, thus increasing greenhouse gas emissions and air pollutants. The second national communication report of Kuwait on climate change projected a likely rise in temperature of up to 4.5 degrees Celsius above historical levels.

Rapid population growth and urbanization, especially in coastal areas, have contributed significantly to climate change pressures as they have led to burning more fossil fuels, which in turn have caused more greenhouse gas emissions. They have also created more demand for electricity and desalinated water (figure 2).

The updated nationally determined contributions report of 2021 showed that the energy sector was the largest source of greenhouse gas emissions, accounting for 95.6 per cent of total emissions. Most of the emissions in that sector stemmed from the production of electricity and desalinated water (figure 3).

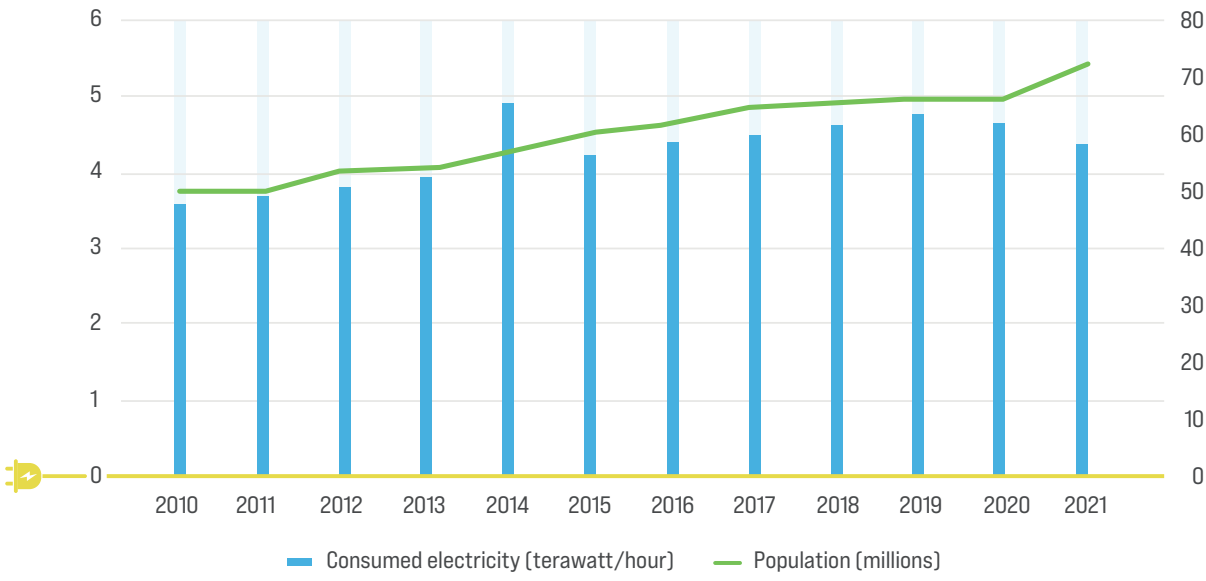
The effects of climate change are beginning to show in Kuwait through increased temperatures, decreased precipitation, more frequent sand and dust storms and rising sea levels. Such climate change phenomena affect different aspects of life, including the economy, public health, ecosystems and food security.

The most apparent consequence of accelerated climate change is the rising of sea levels, as the coastline of Kuwait stretches for more than 500 kilometres and bears utmost importance to the Kuwaiti economy. The effects of the rise in sea level are floods, which threaten infrastructure and degrade the quality of groundwater and agricultural land. Rising sea levels are also expected to impact Kuwaiti islands. For example, in one scenario, half of Bubiyan Island is expected to

Air conditioning accounts for about **60%** of total electricity consumption

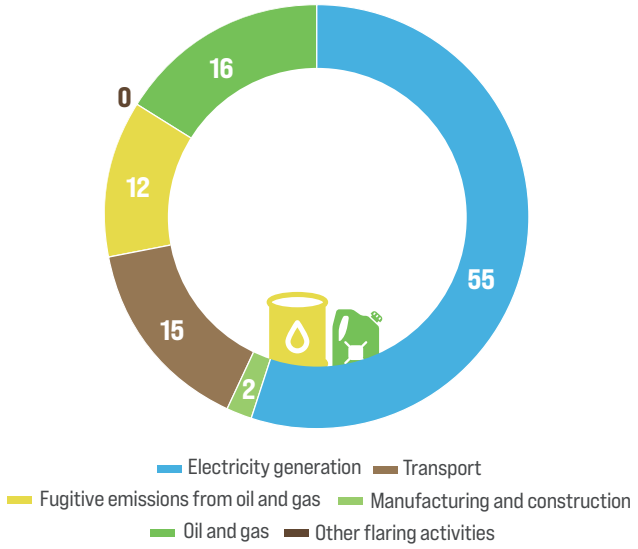
It is likely that there will be a rise in temperature of up to **4.5** **degrees Celsius** above historical level

Figure 2. Steady increase in population coupled with increased electricity consumption



Source: Kuwait, Ministry of Electricity, Water and Renewable Energy (2022). Statistical Year Book - 2021.

Figure 3. Percentages of greenhouse gas emissions from different energy sectors



Source: Kuwait, Environment Public Authority, 2023. Kuwait Low Carbon Strategy 2050.

be flooded by seawater within the next few decades. Warming seawater will cause large-scale migration of fish species to neighbouring areas. It is also likely to affect the breeding periods of fish and shrimp, posing a risk to the fishing industry in Kuwait.

As a party to all international conventions on climate change, the Government of Kuwait has worked to meet its obligations under these conventions. To that effect, the first and second national communication reports have been submitted to the United Nations Framework Convention on Climate Change (UNFCCC), and the third report is in the final phases. Kuwait also submitted its 2019 biennial update report, and its 2021 update report on the nationally determined contributions, which revealed the Government's plan to reduce emissions by 7.4 per cent by 2035 through unconditional national efforts. Kuwait has also announced its commitment to reach carbon neutrality by 2060.

Kuwait is currently implementing a number of national strategies and plans to mitigate climate change and adapt to its potential impacts. Among the most important of these is the low-carbon development strategy, which provides a comprehensive roadmap for a circular carbon economy across all economic sectors by 2050. In 2019, the National Adaptation Plan for 2019–2030 was launched with the aim of minimizing vulnerability to climate change impacts and facilitating the integration of climate change adaptation concepts into policies, programmes and activities in all relevant national sectors. Kuwait is implementing projects aimed at reducing greenhouse gas emissions, such as the Shagaya renewable energy plant, in addition to projects for recovering and utilizing flare gases and preventing their combustion in both the Mina Al Ahmadi and Mina Abdullah refineries.

The country is also implementing several adaptation initiatives, including: developing new water resources by expanding desalination plants, especially those operating through reverse osmosis; building coastal protection measures to protect against storms and sea level rise; designating three marine areas as nature reserves; and issuing legislation banning all fishing in Kuwait Bay to preserve biodiversity and fish stocks. The Kuwaiti Ministry of Health is also partnering with the World Health Organization (WHO) to develop a national adaptation plan for climate change and health, aimed at improving the resilience of the health sector to the potential negative health impacts of climate change.

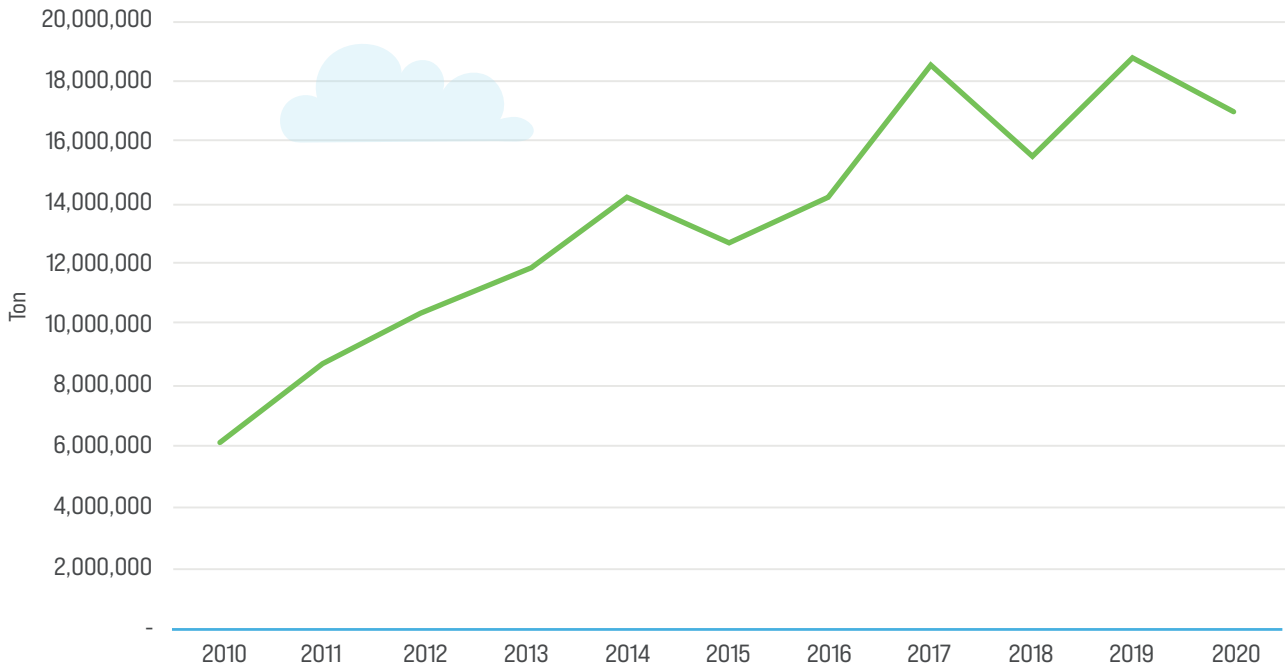
3. Waste management

The amount of waste generated in Kuwait increased from 6 million tons in 2010 to about 17 million tons in 2020 (figure 4). Kuwait generates about 2.5 million tons of municipal waste annually, equivalent to 1.6 kilograms per capita a day, well above the global average of 0.74 kilograms, and slightly above the GCC average of 1.5 kilograms. The volume is projected to continue increasing over the coming years due to population growth, increasing per capita income, accelerated urbanization in addition to some seasonal recreational activities such as seasonal camping, the expansion of residential megacities and the launching of several major industrial and development projects.

Although Kuwait is a relatively small country, it has 19 landfills covering 19.8 square kilometres, of which 13 landfills are no longer operating, while 6 still are. The landfills prevent using these areas for other development purposes and pollute the scarce groundwater of Kuwait.

Kuwait Municipality bears the cost of collecting and transporting municipal waste, and organic waste accounts for about half of the municipal waste collected daily. This municipal waste is transported to landfills that lack insulating layers to prevent leachate from seeping into the soil or groundwater, and do not have gas collection systems. These practices threaten public health and the environment, and pose a particular risk to groundwater, air quality and greenhouse gas emissions.

Figure 4. Total annual solid waste, in tons



Source: Kuwait, Central Statistical Bureau (2023). Statistics and bulletins; Kuwait, Public Authority for Industry (2023). Data on industrial waste incoming to the industrial solid waste plant (according to the document provided by EPA, 2023).

In 2016, carbon dioxide equivalent emissions from landfills accounted for 2 per cent of total national greenhouse gas emissions.

As for liquid waste, it is treated in plants belonging to the Ministry of Public Works and the Public Authority for Industry. Liquid waste can be divided into two main types: sewage and industrial liquid waste, classified as hazardous waste. Industrial liquid waste is now separated from sewage and then channelled for treatment at a separate plant (Wafra plant) under the supervision of the Public Authority for Industry. About 75 per cent of the liquid waste is treated, but only 58 per cent is reused for various purposes such as irrigation and agriculture.

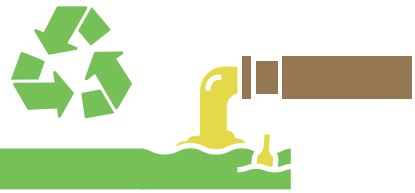
Hazardous waste, including medical waste, is regularly transported by licensed companies. Collection and transportation are monitored daily by the Ministry of Health. Industrial waste is transported to the Shuaiba industrial and hazardous waste treatment facility. The process is regulated by a license from EPA, and the facility has been engineered to process different types of hazardous industrial waste, including medical and pharmaceutical waste, used oils and batteries, hazardous chemicals, and used electrical and electronic equipment.

Chapter 2 of the Environmental Protection Law No. 42 of 2014 deals with waste management. Although the law encourages waste recycling, the country's recycling operations lack regulation. Around 4.8 million tons of waste is recycled annually, meaning about 20 per cent of the total solid waste of Kuwait. Although 24 recycling plants are approved by the EPA, no system is in place to segregate solid waste from its source. Instead, sorting and recycling are conducted randomly.

In 2016, carbon dioxide equivalent emissions from landfills accounted for around

2% of total emissions

About **75%** **of the liquid waste** is treated, but only **58%** is reused for various purposes such as irrigation and agriculture



The Government is preparing a national waste management strategy for 2040, with a focus on the principles of hierarchy and circular economy for waste management. Data and information on the sources, types, properties and quantities of waste have been collected, followed by an assessment of the state of landfills and current management methods, through the project "Survey and establishment of a comprehensive waste management database in Kuwait". In all landfills, a comprehensive monitoring programme for landfill gases, groundwater, solid waste and odours has been implemented, and an environmental risk assessment has been conducted. The Government is also implementing several initiatives to address the problem of waste. To that effect, it has partnered with the private sector in the establishment of two plants to recycle construction waste and utilize its components.

The disposal of used car tires is one of the issues addressed through an integrated waste management methodology, with one company recycling tires to produce different products such as fuel for cement factories or to make coloured rubber floor tiles and artificial turf.

Kuwait also works on meeting its obligations as a State party to several international conventions relating to waste, such as the Minamata Convention on Mercury, the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, and the Stockholm Convention on Persistent Organic Pollutants.

Despite all these efforts, many gaps persist in solid waste management practices. These gaps highlight the need to move from the current pattern of a linear economy to the concept of a circular economy. Given the scarcity of freshwater resources, it is extremely important to focus on maximizing the use of treated wastewater instead of dumping large quantities of it into the sea. It is also necessary to increase the capacity of existing water treatment plants or to build new ones to prevent the discharge of more than 120 million cubic meters of liquid waste into the sea every year.

4. Land resources

The arid climate and the scarcity of precipitation accelerate land degradation in Kuwait, and lead to more frequent extreme weather events, such as sand and dust storms, floods and droughts. Sand and dust storms are the most frequent and they impact all sectors of the country, including transportation (air, land and sea), health, the environment, agriculture, livestock production, drinking water, electricity and communications. They also cause delays in the operational activities of the oil industry, including production, export and exploration, as well as the deterioration of air quality due to suspended particulates during storms, causing significant damage in terms public health and economic loss.

Population growth and urbanization in recent years have led to a 72 per cent increase in land use for housing, roads and infrastructure projects between 2000 and 2016. Rapid urbanization has increased pressure on infrastructure, water and energy sources, and sewage systems. It has also exacerbated air pollution and increased the production of municipal waste.

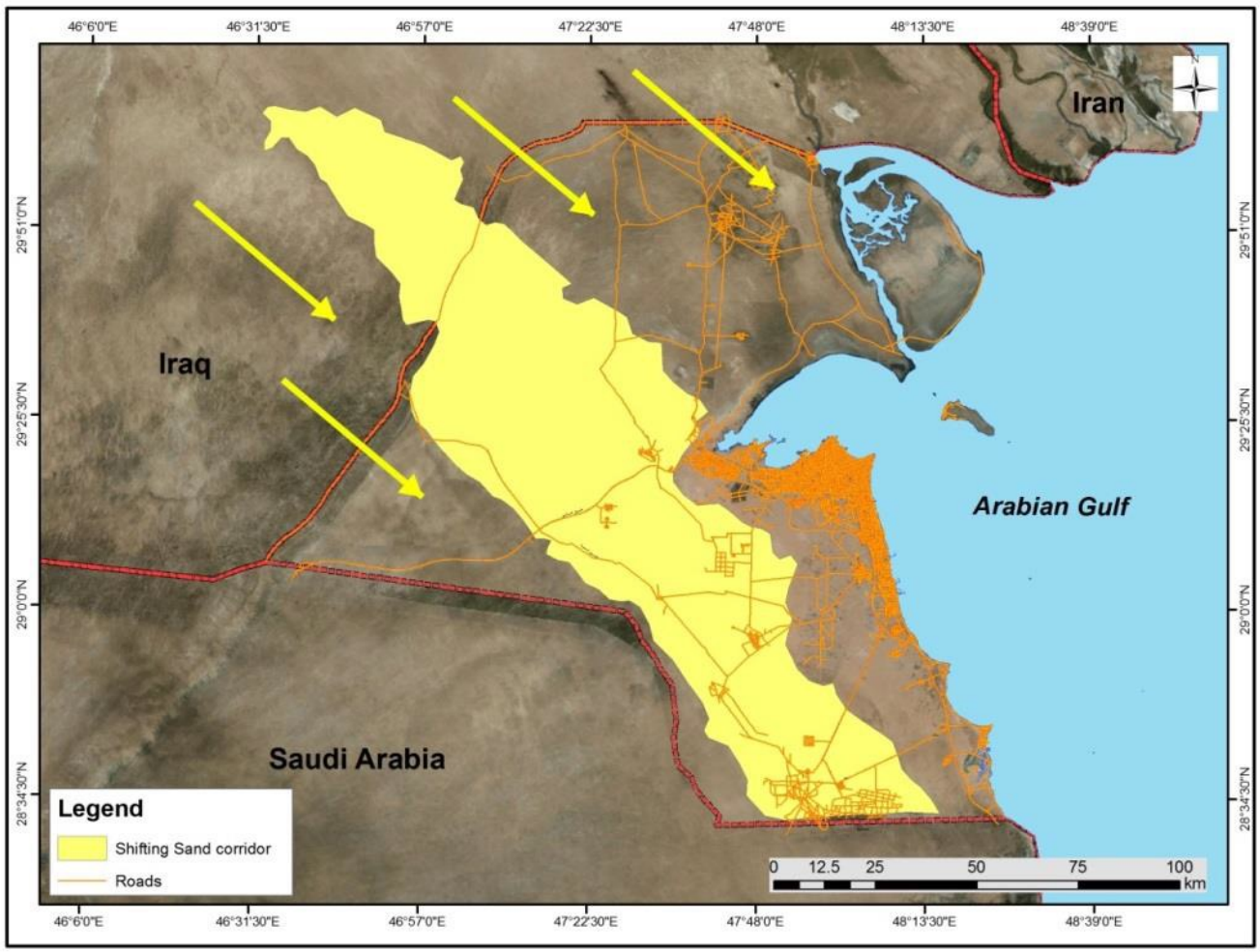
Less rainfall leads to longer periods of drought, thus increasing the incidence of sand and dust storms. Drought is one of the most important natural hazards that cause crop loss, leading in turn to rising food prices. Drought conditions help to concentrate salts in the soil as a result of high evaporation and low precipitation, leading to reduced fertility, less vegetation cover and loss of biodiversity. These conditions drive an increase in the rates of sand erosion by wind during the summer and

by rain during storms, leading to further degradation of vegetation cover. Overgrazing and logging exert further pressures on vegetation covers and increase the erosion of soil particles by surface winds. Wind erosion is the most common cause of soil quality degradation in Kuwait, accounting for at least 70 per cent of degraded lands in Kuwait.

The arid climate and the scarcity of precipitation have **accelerated land degradation in Kuwait**

One of the most important factors increasing sand movement in Kuwait is the presence of two large belts of shifting sand dunes, the first on the northwestern border between Kuwait and Iraq in Al-Huwaymiliyah area, and the second on the northern border in Al-Qashaniya area. This so-called "shifting sand corridor" is home to many strategic facilities, such as highways and oil fields (figure 5). Sand movement cause the formation of sand dunes, and shifting sands threaten many of those facilities.

Figure 5. The shifting sand corridor in yellow with the network of highways crossing the corridor



Source: AlDousari, A., Alsaleh, A., Ahmed, M., Misak, R., AlDousari, N., AlShatti, F., Elrawi, M., and William, T. (2019b). Of Road Vehicle Tracks and Grazing Points in Relation to Soil Compaction and Land Degradation.

Camping is a human recreational activity that exerts much pressure on land resources. Around 1,600 square kilometres of land is being used for this seasonal activity. The camping season leads to increased mechanical compaction of the soil due to higher vehicular traffic, thus contributing to the destruction of desert ecosystems. These anthropogenic activities cause soil erosion and destruction of flora and fauna. Some studies have shown that about 1,390 square kilometres of land (7.8 per cent of the country's area) has been affected by soil compaction due to vehicle traffic in desert and grazing areas.

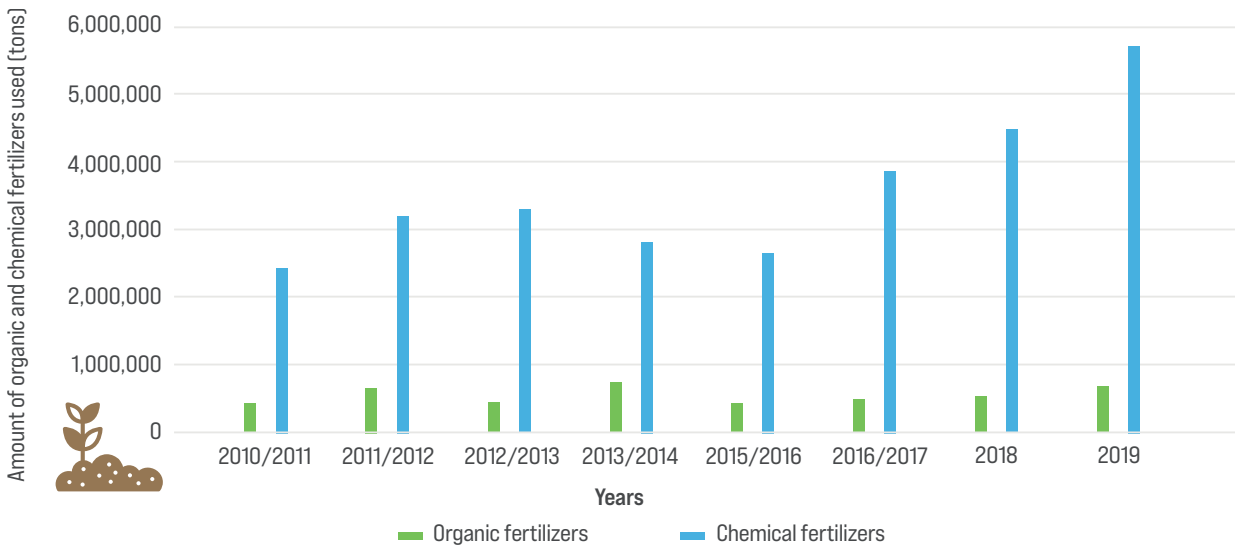
Poor agricultural practices are a major factor in soil contamination. For example, excessive use of chemical fertilizers leads to soil contamination, which is passed to crops and then to humans. The intensive use of these chemicals leads to the accumulation of harmful heavy metals in soil and plants, which poses a risk to human and animal health. Figure 6 shows a significant increase in the use of chemical fertilizers between 2010 and 2019. Poor agricultural waste management leads to the accumulation of agricultural waste that pollutes the environment and groundwater, in addition to increasing greenhouse gas emissions.

To control soil erosion caused by wind, Kuwait has focused on putting in place protections against the dangers of sand and dust storms. This was conducted through initiatives such as using porous fences and green belts in Kabd and Al-Wafra areas to serve as windbreaks, and increasing soil resistance to wind erosion by planting trees that live in a dry environment and covering the soil with environmentally friendly materials to stabilize it and increase its resistance to the wind, in addition to cooperating with Iraq to limit storms at their source.

To regulate camping activities, the EPA conducted a study to identify sites for spring camping, and to ensure that campers stay away from nature reserves and areas with highly sensitive environments, such as Al Khiran and Al Khuwaisat. The EPA is reviewing the terms and conditions of camping licenses, which include now many requisites relating to the environment. Such controls have resulted in a 74 per cent reduction in the approved campsite area between 2010 and 2022 (figure 7).

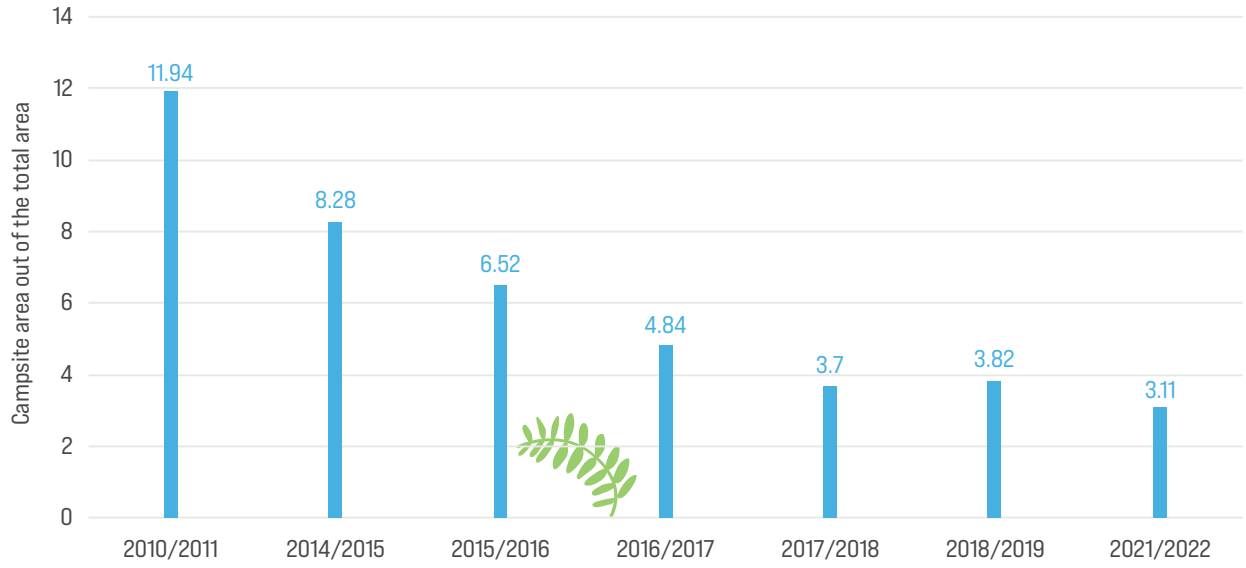
To fight desertification and land degradation, Kuwait signed the United Nations Convention to Combat Desertification (UNCCD) in 1995. National programmes to reduce land degradation are a main tool for implementing the UNCCD. To that end, Kuwait, through its EPA, has coordinated with the concerned authorities in the country to prepare a ten-year action plan (2008–2018). Kuwait also fulfils its obligations under the UNCCD by sending national reports every four years to the UNCDD secretariat.

Figure 6. Amount of organic and chemical fertilizers used in the agricultural sector



Source: Kuwait, Central Bureau of Statistics reports, 2010–2019.

Figure 7. Percentages of areas licensed as campsites



Source: Kuwait, Environment Public Authority, 2023. http://epa.gov.kw.

5. Water resources

Kuwait is one of the driest countries in the world with a per capita share of renewable water resources of 5 cubic meters per year. It faces major challenges in the water sector as a result of its dry climate and freshwater scarcity. This leads to heavy reliance on groundwater, which is mostly non-renewable, in addition to seawater desalination and the reuse of treated wastewater. These challenges are exacerbated by the growing impact of climate change. As temperatures rise and rainfall patterns fluctuate, climate change increases evaporation rates and exerts significant pressure on water sources.

Extreme weather events, such as severe storms and flash floods, pose an additional threat to water infrastructure. With the continued overuse of resources, the groundwater table tends to decline, and saltwater intrusion threatens the sustainability of groundwater resources. Despite these challenges, Kuwait has endeavoured to achieve coherence between the Sustainable Development Goals (SDGs) and Kuwait Vision 2035, and has attained almost all indicators related to SDG 6.

The steady population growth leads to increased water consumption. The population of Kuwait is expected to rise to about six million before the middle of the 21st century, which will increase the demand for water resources (figure 8).

Rapid urbanization is causing challenges in wastewater management, making it difficult to safeguard public health and protect the environment. The amount of polluted wastewater discharged into the sea is expected to increase significantly as water demand increases.

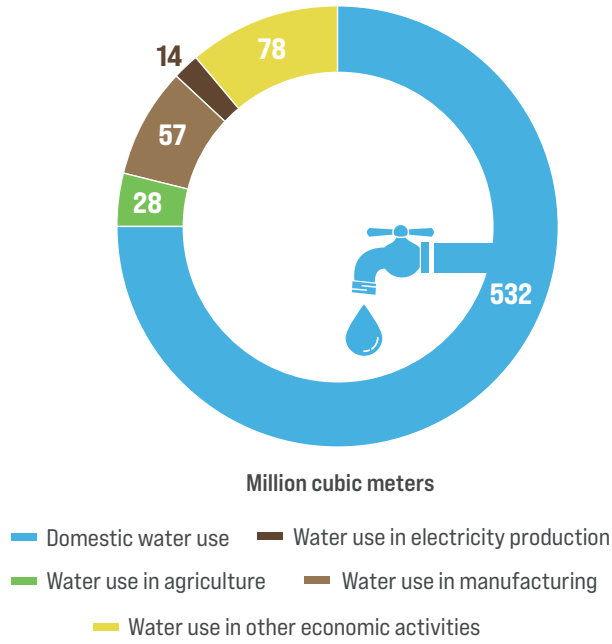
In Kuwait, special attention is paid to the relation between water and economic growth due to the scarcity of water resources. Per capita water consumption grows as GDP per capita increases, which creates significant environmental pressures due to desalination and wastewater discharge. The rates of freshwater use for domestic purposes in Kuwait are high compared to the global average, with the domestic sector accounting for about three quarters of total freshwater consumption.

Although agriculture contributes less than 1 per cent of GDP, it consumes about 39 per cent of water resources, including about 100 million cubic meters of quadruple-treated irrigation water distributed to farmers through special networks. The agricultural sector remains inefficient in the use of irrigation water as the over-extraction of groundwater beyond safe production limits arises primarily from agricultural uses. This excessive use has led to the depletion of aquifers and to reduced quality and increased salinity of their water, making it unfit for consumption without desalination. The inefficient use of brackish water to irrigate agricultural lands in Al-Wafra agricultural area between 1995 and 2006 is one of the important factors that increased soil salinity, which negatively affected the agricultural productivity of those lands.

Seawater desalination plants meet nearly 100 per cent of the freshwater needs of Kuwait and about 90 per cent of its drinking water needs. Desalinated water is produced in six multi-stage flash evaporation plants and three reverse osmosis plants. Freshwater production grew from 210 million cubic meters in 1993 to 740 million cubic meters in 2022, resulting in increased operational costs and high energy consumption. In parallel with this production, Kuwait subsidized water prices for consumers, notably about 92 per cent of water supply costs in 2021, making water prices among the lowest in the world.

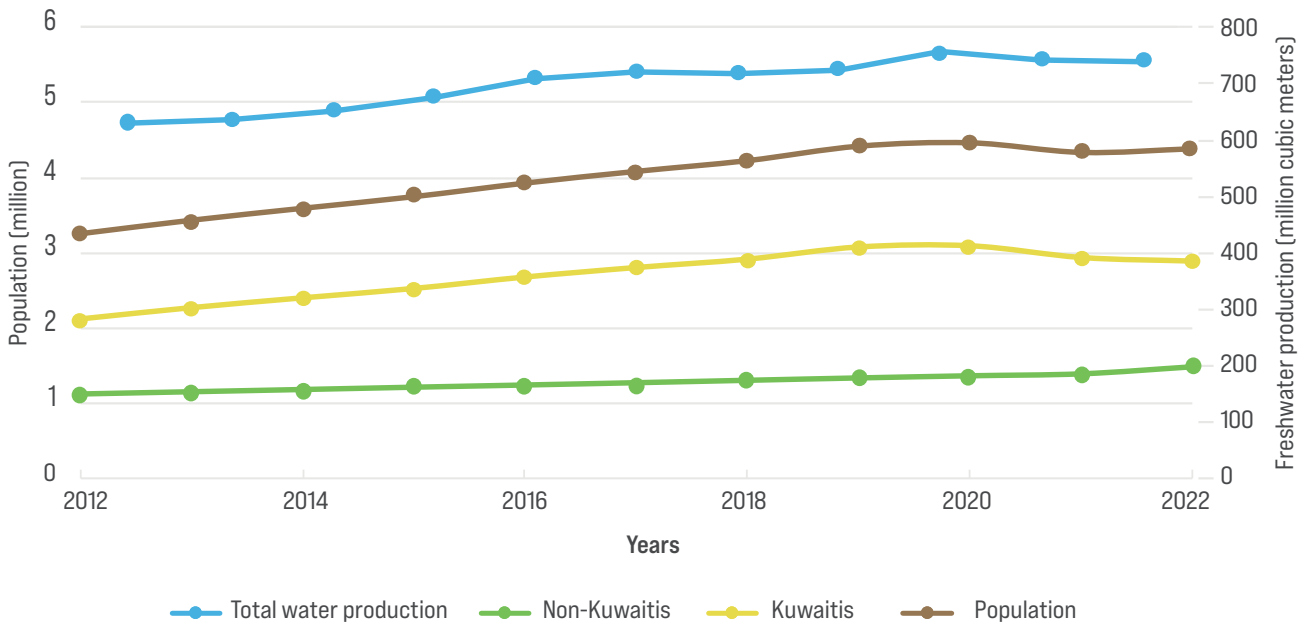
As part of its mandate to oversee the development of water and sanitation infrastructure, the Ministry of Public Works has built and operated the world's largest plant that uses reverse osmosis technology to treat and purify wastewater to make it on a par with the quality and specifications of drinking water. This plant was established through a public-private partnership and a build-operate-transfer (BOT) system. Treated wastewater is an important alternative to limited fresh water, yet reused wastewater accounted for only 36 per cent of the volume of treated wastewater in 2018.

Figure 8. Freshwater consumption across sectors in 2021



Source: Kuwait, Central Statistical Bureau (2023). Annual Statistical Bulletin of Environment 2022. Accessed in December 2023.

Figure 9. The population and freshwater production in Kuwait



Source: Authors based on Kuwait, Central Statistical Bureau (2023). Population estimates in Kuwait by age, nationality and gender; Kuwait, Ministry of Electricity, Water and Renewable Energy (2022). Statistical Year Book - Water.

Subsidized water tariffs encourage wasteful water consumption, as low water prices do not reflect the real value of services provided from this limited resource. The Kuwaiti Government is therefore reforming water tariff policies to promote awareness of sustainable water use and ensure that long-term sustainability goals are met. Possible options for achieving this include raising awareness of the importance of water conservation, encouraging the use of effective water-saving technologies and improving the necessary legislation and policies. The State has adopted a series of comprehensive policies and initiatives aimed at improving the management of water resources and ensuring the protection of water quality and effective water use. It has also adopted a series of techniques and strategies, including saltwater desalination, wastewater recycling and aquifer recharge.

6. The atmosphere

A national strategy to improve air quality and reduce carbon emissions is being developed and efforts are underway to link it to global indicators. Means of achieving the strategy include: developing an integrated air quality monitoring and management system; improving the national air quality monitoring network; enhancing the monitoring of air emissions from stationary and mobile sources; developing a unified geographical database of air pollutants; studying the impact of air pollution on human health; and reviewing and updating national air quality standards and permissible limits for emissions from all sources.

The air quality in Kuwait is affected by emissions from power plants, oil refineries and petrochemical industries, as well as automobile exhaust. The demand for these activities is increasing as a result of population growth and rapid urbanization. Power generation and water production plants are among the most important sources of pollutants in Kuwait. These plants still run on fossil fuels, which are a major source of air pollution. The installed capacity of power plants has increased significantly, from 14,700 megawatts in 2011 to 20,250 megawatts in 2021. Freshwater production has also increased by an estimated year-on-year increase of 3.3 per cent over the same period. As a result, the consumption of fossil fuels that cause air emissions has increased (Ministry of Electricity, Water and Renewable Energy, 2022). The effects of fossil fuels on ambient air quality vary. Emissions of sulfur dioxide and nitrogen oxides can cause acid deposition, and emissions of nitrogen oxides can lead to the eutrophication of aquatic and terrestrial ecosystems, negatively impacting land and marine biodiversity.

Freshwater production grew from **210 million cubic meters** in 1993 to **740 million cubic meters** in 2022

Subsidized water tariffs encourage wasteful water consumption, as low water prices do not reflect the real value of **services provided from this limited resource**

Although agriculture contributes less than **1%** of GDP, it consumes about **39%** of water resources

Transportation is one of the largest contributors to air pollution in Kuwait. Statistics from the General Department for Information Systems indicate an

increase in the number of licensed vehicles between 2010 and 2020. Industrial activities, especially the oil and gas industry and other petroleum-based industrial activities, are among the most important sources of air pollutants. The oil, gas and petrochemical sector calculates carbon emissions only, and no data is available on emissions of other key gaseous pollutants such as nitrogen oxides or sulfur dioxide.

Due to the desert nature of the region and its climatic conditions, sand and dust storms are the main sources of air pollution with suspended particulate matter. Winds and storms cause high concentrations of this fine suspended particulate matter, most of which (70 per cent) comes from the erosion of desert soils. Numerous studies have proven that sandstorms are mainly composed of dust particles of various sizes, most of which settle on the land surface due to the large size of dust particles (greater than 50 micrometres). Smaller dust particles remain suspended in the ambient air and can be inhaled, posing serious public health risks, especially since they contain high concentrations of heavy metals.

The concentrations of fine suspended particulate matter (PM 2.5 and PM 10) have exceeded permissible limits, although these limits are much higher than those allowed by the WHO. Increased levels of fossil fuel consumption at power plants have led to concentrations of sulfur dioxide and nitrogen dioxide exceeding permissible limits.

The EPA operates a network of 15 fixed air quality monitoring stations distributed in most regions, measuring a number of pollutants and fine particulate matter. The results are compared with the national air quality standards issued by the EPA as per Decision No. 8 of 2017. The air quality index is also calculated at each station. In accordance with article 51 of the Environmental Protection Law, which provides for the installation of air quality monitoring systems within the boundaries and scope of work of each entity, Kuwait Oil Company, in cooperation with the EPA, has installed and operated a number of air quality monitoring stations in areas close to oil fields and some residential areas.

Due to the importance of fine particles as air pollutants that are extremely dangerous to public health, the Ministry of Health has conducted studies on the impact of sandstorms on human health, and has found that the number of cases of respiratory diseases is increasing every year owing to dust waves in the surrounding environment.

The **air quality in Kuwait** is affected by **emissions from power plants, oil refineries and petrochemical industries**, as well as automobile exhaust

The installed capacity of power plants has increased from **14,700 megawatts** in 2011 to **20,250 megawatts** in 2021

Winds and storms cause high concentrations of fine suspended particulate matter, **70%** of which comes from the **erosion of desert soils**

The EPA is preparing a national air quality strategy, in conjunction with the Kuwait Institute for Scientific Research and in collaboration with the Harvard School of Public Health in the United States of America. This project aims to develop an air quality management system to fill many of the current gaps in air quality management, such as completing monitoring systems, information systems and forecasting programmes, and conducting environmental load reporting, which will enhance the institutional and human capacities needed for better air quality management. Policies on transitioning to low-sulfur fuels, such as natural gas in power plants, will reduce emissions of air pollutants and greenhouse gases.

As a State party to the Vienna Convention and the Montreal Protocol on Substances that Deplete the Ozone Layer, Kuwait prepared a national plan to eliminate ozone-depleting substances. The first phase of the plan was approved by the Executive Committee of the Multilateral Fund in 2012, in cooperation with UNEP and the United Nations Industrial Development Organization, and was set for the period 2012–2020.

7. Biodiversity

The coastal residents of Kuwait have long relied on the biodiversity of their country's land and sea for survival, sustenance and medical treatment. Although Kuwait is a small country located in one of the world's driest and warmest regions, its environments host about 3,500 different living organisms, 60 per cent of which are concentrated in the sea or on the coasts, as shown in table 1.

The most diverse environment in Kuwait is the sea and the coastline. The concentration of biodiversity on the coast increases its vulnerability to pressures, such as urbanization in coastal areas, various sources of pollution, especially desalination plants, wastewater treatment plants and wild camping activities.

The small size and desert environment of Kuwait limit the variety of species that can live in the country. Species that can survive in this environment are the ones that adapt to stressors, such as unpredictable extreme weather events and scarce resources.

These stressors are compounded by human activities, most notably rapid urbanization, which has a significant and direct impact, especially in areas with greater biodiversity, such as coastal areas. A planning of this urban sprawl is therefore needed to contain it in areas with little biodiversity or far from the coast. Stressful human activities also include irrational grazing, which threatens plant diversity, especially if it occurs in the habitats of endangered species or out of season, hence the need to regulate the locations and durations allowed for grazing. Living organisms of all kinds are vitally correlated and interdependent in their environments. This correlation is key to biodiversity. One effect of natural and anthropogenic pressures is that marine species that people feed on are declining or even disappearing from the market. Due to the economic importance of the fishing sector in Kuwait, the fishing of certain species of fish and shrimp has been legalized and regulated in line with the breeding cycle of each individual species to ensure their stability and sustainability.

The Environmental Protection Law No. 42 of 2014 and its amendments are considered an essential pillar for preserving the environment and, in particular, biodiversity. The law includes a special chapter on biodiversity (Section V), and several decisions and regulations addressing biodiversity conservation have been issued in line with the obligations of Kuwait as a State party to relevant international conventions, such as the Convention on Biological Diversity, the Convention on International Trade in Endangered Species, the Ramsar Convention on Wetlands, the Nagoya Protocol on Access and Benefit-sharing, the

The most diverse environment in Kuwait is the **sea and the coastline**

More than **12%** of the country's area **(about 2,000 square kilometres)** is dedicated to natural reserves (12 natural reserves)

Cartagena Protocol on Biosafety, and the Convention on the Conservation of Wildlife and their Natural Habitats in the Countries of the Gulf Cooperation Council. The EPA monitors compliance with Section V of the Environmental Protection Law, which deals with the protection of biodiversity.

In 2010, the Conference of the Parties to the United Nations Convention on Biological Diversity adopted the "Strategic Plan for Biodiversity 2011–2020", which contained 20 specific targets to address and mitigate biodiversity loss worldwide (the Aichi Targets). Table 2 illustrates the implementation status of these targets in Kuwait.

Multiple governmental and non-governmental organizations are collaborating to protect biodiversity as part of the implementation of the National Biodiversity Strategy for the State of Kuwait (figures 7 and 8). The EPA bears the greatest responsibility for achieving the biodiversity-related goals, supported by the Public Authority of Agriculture Affairs and Fish Resources, the Kuwait Institute for Scientific Research and Kuwait University. Another 17 governmental organizations, as well as volunteer groups and private sector companies, are involved in achieving the goals of the National Biodiversity Strategy. Within the framework of this strategy, Kuwait is implementing a set of projects under five clusters: production, cultivation, assessment, awareness and management. More than 12 per cent of the country's area (about 2,000 square kilometres) is dedicated to natural reserves (12 natural reserves), including land, marine and coastal reserves. It may be useful to increase the number of these reserves and bring them under the umbrella of a unified supervisory authority.

8. Coastal and marine environment

The natural habitats of coastal and marine species in Kuwait are subject to multiple pressures, notably: pollution from land or marine sources; urban development on coasts; discharge water from seawater desalination plants and untreated wastewater; oil and gas production and transportation; drilling and backfilling activities in shallow waters and coastal areas; ballast water and invasive species; overexploitation of marine resources, especially fisheries; and climate change and its effects on environments and living organisms.

The discharge of industrial wastes that flow directly into the marine environment from desalination plants, energy production and other industrial activities affects the quality of the marine environment, causing negative impacts on marine organisms and habitats near waste sources.

Oil pollution is one of the most serious risks affecting the marine and coastal environment in Kuwait, as oil spills affect seabirds, waders and benthic organisms, and cause economic losses associated with clean-up operations, coastal closures and banned fishing in affected areas. Seawater desalination can have several physical and chemical effects that may alter the characteristics of the marine environment near desalination plants. Invasive alien species in the

Table 1. Number of species in Kuwait by classification

Biotic group	Examples	Number of species	Representation ratio*
Microorganisms (plankton)	Dinoflagellates - diatoms - zooplankton - brown algae	471	13.47
Segmented worms (annelids)	Polychaete segmented worms	141	4.03
Cnidarians	Hydrozoa - jellyfish - corals	84	2.40
Mollusks	Cephalopods - gastropods - bivalvia	541	15.47
Arthropods	Arthropods - copepods - crustaceans - insects	1,006	28.77
Chordates	Cartilaginous and bony fish - reptiles - birds - mammals	814	23.28
Plants	Green algae - eukaryotic algae - monocots and dicots	396	11.32
Other species	Flatworms - echinoderms	44	1.26
Total 3,497			100%

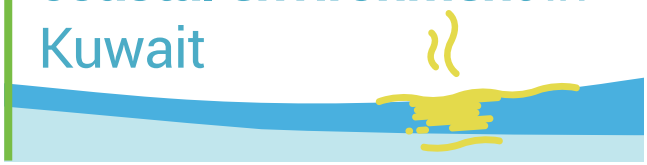
Source: Amr, Z. S. (2021). The State of Biodiversity in Kuwait. International Union for Conservation of Nature (IUCN).
* The representation ratio is approximate.

Table 2. Progress of Kuwait towards implementing the Aichi Biodiversity Targets

Responses of Kuwait	Aichi Targets																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Adoption of the National Biodiversity Strategy		2															17			20
Preparation and review of laws and legislation	1	2					7	8	9	10	11	12						18	19	
Establishment of the Office of Inspection, Control and Environmental Emergencies	1	2					7	8	9	10	11	12						18	19	
Awareness programmes, publications, lectures, workshops	1																		19	20
Establishment of the Environmental Centre	1																		19	
Biodiversity studies and research	1			4	5	6	7	8	9	10	11	12	13		15	16	17		19	
Creation of the "Beatona" (Our Environment) website	1																		19	20
Creation of a database	1																		19	20
Increased area of nature reserves	1	2				6					11	12	13	14	15					
Coral reef rehabilitation	1			4	5	6	7	8			11	12		14	15				19	
Rehabilitation of degraded areas	1		3	4							11	12	13	14	15				19	
Environmental impact assessment				4					9				13	14						
Regulating marine fishing	1	2	3	4	5			8		10		12							19	
Regulating wild hunting	1	2	3				7	8	9	10		12	13					18	19	
Provision of subsidies and incentives for agricultural activities			3	4				8	9											
Creation of a seed bank				4			7					12	13					18	19	
Regulating spring camps	1						7													
Nagoya Protocol		2											13			16			19	
Biosafety		2																	19	
Invasive species		2		4			7	8		10	11	12							19	
Endangered species		2		4			7	8				12	13						19	
Fish stocks	1	2	3	4				8	9	10		12						18	19	
Environmental compensation	1	2				6								14			17		19	
Organic farming	1			4			7	8	9							16			19	

Source: Kuwait, Environment Public Authority, 2020.

Oil pollution is one of the most serious risks affecting the marine and coastal environment in Kuwait



Dredging and reclamation activities to create artificial islands have intensified

marine environment are one of the most serious threats to biodiversity, and international shipping activities contribute to their propagation in marine and coastal habitats. These species often enter through ballast water or the so-called stabilizing water that large crude oil tankers and freighters use in significant amounts and discharge into the sea before reaching Gulf ports to load oil and cargo. Moreover, dredging and reclamation activities to create artificial islands have intensified in Kuwait, along with economic developments and rapid population growth.

Eutrophication or the abundance of nutrients caused by wastewater affects biodiversity in general and leads to the death of fish and many other marine organisms. Kuwait has witnessed several incidents of marine life mortality over the past two decades. The incidents involved pelagic and demersal fish, sea cucumbers and mollusks, including pearl oysters. Most mortality incidents occurred in the shallow and semi-enclosed Kuwait Bay, particularly in Sulaibikhat Bay, whose coastal waters have become eutrophic due to wastewater discharges.

Fishing bears significant economic, social and traditional importance in Kuwait, but it is also one of the major anthropogenic pressures affecting biodiversity. Overfishing is one of the main factors depleting fish stocks. The rate of depletion of living marine resources has increased significantly in the past two decades, resulting in a significant decrease in landings for both fish and shrimp, which threatens food security.

Climate change has caused elevated seawater temperatures, acidification and rising sea levels. Kuwait is expected to lose 1.4 to 3 per cent of its coastal land if sea level rises by 0.5 – 2 meters, affecting 5 per cent of its GDP with adverse impacts on biodiversity and other economic and social activities.

In December 2014, the EPA prepared a national marine environment management plan, aimed at pursuing environmental goals related to the marine environment (SDG 14). In cooperation with the Kuwait Institute for Scientific Research and Kuwait University; the EPA seeks to develop and implement a national plan for integrated coastal zone management through institutional coordination and stakeholder engagement.

Kuwait has ratified many international and regional conventions that may contribute to the protection of the marine and coastal environment and the preservation of biodiversity, including the Kuwait Regional Convention for Cooperation on the Protection of the Marine Environment from Pollution and its protocols. The Environmental Protection Law in Kuwait dedicates Chapter 1 of Section IV to protecting water and coastal environment against pollution, and provides for penalties, civil liability and remedies for environmental damage.

Kuwait is adopting many initiatives that contribute to the protection of the marine and coastal environment and the development of its habitats, such as the mangrove plantation projects initiated in 1968; which proved successful as the area of mangrove cover reached around 0.58 square kilometres in 2017. Kuwait is also implementing several ambitious projects related to the sustainability and management of marine resources. The second Voluntary National Review report on SDGs referred to projects currently implemented by the Kuwait Institute for Scientific Research, such as building and operating a complex for the economic production of fish and shrimp using modern technologies, designing specialized facilities for marine research and management of marine resources, and establishing a sea-level rise monitoring station in Salmiya, which became operational in February 2023.

9. Environmental policies

Kuwait ranked 87th out of 180 countries globally in the 2022 Environmental Performance Index and ranked second after the United Arab Emirates among the GCC countries. The institutional and legislative framework for environmental management in Kuwait has evolved since 1995, when the EPA was established, until the Environmental Protection Law No. 42 was promulgated in 2014 along with its amendments in 2019. In addition to the institutional framework, the law provides for several actions for environmental protection and management, including a system for assessing the environmental and social impact of development projects, environmental control and monitoring systems (for air, water and soil), environmental data management systems and others. The law also stipulates, for the first time, the creation of a special environmental protection fund to encourage investment in green projects and respond to environmental disasters. It also specifies a wide range of controls to regulate the environment-development relation along with the necessary compliance mechanisms. To that end, the law provides for the establishment of an environmental police force in addition to courts specialized in environmental cases. The law also includes provisions that take into account the obligations of Kuwait as a State party to several international environmental conventions, such as conventions on the protection of the ozone layer, conventions on chemicals management, conventions on biodiversity, climate change and others. For this institutional framework to be complete, it is necessary to establish specialized environmental departments in all State institutions and define their institutional relationships with the EPA.

Environmental legislation and executive regulations rely primarily on a command-and-control approach and rarely take into account market mechanisms such as pollution taxes, licensing systems or financial incentives to encourage compliance, such as customs and tax exemptions.

Climate change is a priority environmental issue as it aggravates the current environmental challenges facing Kuwait. The increasing rise in average temperatures and the scarcity of rainfall can compound water scarcity, increase drought and desertification rates, exacerbate the negative impacts on biodiversity, food security and public health, and aggravate the frequency and severity of sand and dust storms. Due to its coastal and low-lying nature, the country is exposed to sea level rise and can lose between 1.4 per cent and 3 per cent of its coastal land. Rising temperatures also increase demand for both energy and water. Considering that the per capita consumption of both energy and water in Kuwait is one of the highest rates compared with other GCC countries that have similar economic and climatic conditions, it is imperative to develop a national plan to improve energy efficiency and rationalize water consumption with specific goals supported by implementation policies.

The EPA serves as the national focal point for several international organizations concerned with climate change issues such as the UNFCCC, the Green Climate Fund and the Paris Agreement, among others. These efforts fall within the framework of the institutional structure of climate change, led by the First Deputy Prime Minister of Kuwait in his capacity as Chairman of the Supreme Council for the Environment, of which the EPA is a member. The EPA is also responsible for leading the negotiating team that represents the country at the UNFCCC and Paris Agreement events. Kuwait issued its first national communication to the UNFCCC in 2012, its second national communication in 2019 and its first biennial update report in 2019. It also released its enhanced nationally determined contributions in 2021. In the present report, Kuwait has set a voluntary target to reduce greenhouse gas emissions by 7.4 per cent for 2035 under the business-as-usual scenario. In 2019, Kuwait issued the National Adaptation Plan 2019–2030, which identified gaps to be addressed in four priority sectors: marine life and fisheries, water resources, coastal areas and public health. The Kuwaiti Ministry of Health is also partnering with the WHO to develop a national adaptation plan for climate change and health, aimed at improving the resilience of the health sector to the potential negative health impacts of climate change. Across these efforts, it may be important to incorporate the interconnectedness of the water, energy and food

Kuwait ranked
87th out of **180**
countries globally in the 2022 Environmental Performance Index

sectors in the development and implementation of these sectoral policies. As a major oil producer, Kuwait is also working to reduce its carbon footprint by finalizing the low-carbon development strategy, which provides a comprehensive roadmap to achieve sustainable economic growth in the circular carbon economy for all economic sectors by 2050 and aims to achieve carbon neutrality by 2060.

It is therefore necessary to fill the current gaps in climate action policies to fulfil the obligations of Kuwait as a State party to the UNFCCC and the Paris Agreement, and achieve SDG 13. In this context, a national action plan is needed to achieve the national renewable energy goal by adopting policies and legislation that incentivize the private sector to invest in renewable energy, such as the feed-in tariff for renewable energy, the renewable power purchase agreement and land access facilities, among others. It is also necessary to develop a national plan to improve energy efficiency in the building and transportation sectors, promote the use of natural gas instead of oil in electricity generation, increase the contribution of renewable energy in electricity generation and desalinated water production, complete flare gas recovery projects in oil refineries, and develop a national plan for a low-carbon hydrogen industry.

As Kuwait is a rapidly urbanizing country, with the majority of the population living in urban areas (98 per cent), urban environmental issues are a top priority. The burning of fossil fuels for energy production, transportation and industrial processes in Kuwait has increased air pollution, which has been further aggravated as a result of sand and dust storms, especially in the summer, leaving severe impacts on human health, the environment and infrastructure. To meet its water needs, Kuwait relies heavily on seawater desalination, which is a fossil-energy-intensive process that contributes to the high carbon footprint of the Kuwaiti economy. Rapid urbanization and rising living standards also lead to increased demand for desalinated water and higher wastewater production. About 75 per cent of the total liquid waste is treated, while about 58 per cent is reused and the rest is discharged into the sea. It is therefore important to focus on maximizing the use of this water, especially by increasing green spaces and belts around urban areas, and to build windbreaks around highways and oil facilities to ensure protection against sand and dust storms. Unregulated urbanization, industrial activities and poor waste management practices have caused soil contamination. Extreme weather conditions can also lead to increased soil erosion and more frequent sand and dust storms. The country is facing challenges in solid waste management, with most of the waste ending up in landfills that lack proper environmental conditions. Proper initiatives are therefore needed to recycle waste, reduce waste production and transition to a circular economy through the waste management strategy that is currently being prepared. Urban sprawl represents another challenge in the urban environment, causing the destruction of natural habitats and loss of biodiversity, in addition to extreme weather conditions that lead to a decline in native plant and animal species in Kuwait. To address these challenges in the urban environment, the Kuwaiti Government is investing in initiatives that fulfil the goals of Kuwait Vision 2035, such as: preparing a national air quality strategy 2040; transitioning to natural gas instead of liquid fuels for electricity generation; recycling wastewater; promoting water conservation in buildings; spreading awareness of water scarcity and the importance of water conservation; and encouraging the transition towards a circular economy.

The marine and coastal environment plays an important and vital role in the life of the Kuwaiti people, as Kuwait has about 500 kilometres of coastline along the Arabian Gulf. Beaches and coastal areas are exposed to increasing pressure as a result of urbanization, industrial growth, oil exploration and export, tanker traffic, backfilling and dredging, unsustainable methods of overfishing, unregulated tourism, agriculture and seawater desalination. The EPA is working to improve water quality by reducing pollution from wastewater and industrial waste. The Kuwait Oil Company has also implemented a number of measures to minimize oil spills. However, it is necessary to complete the construction of infrastructure for the monitoring and control of the marine and coastal environment and to finalize databases for the proper management of marine resources in support of the blue economy.

10. Future scenarios

Various future scenarios were planned with the participation of stakeholders to select two scenarios and assess their impacts on the environment and human well-being in Kuwait. The planning process included a field survey to identify the driving forces influencing the future of Kuwait through 2035. The survey, conducted with the participation of 26 stakeholders (governmental and non-governmental organizations), aimed to gather different perspectives in order to: 1) identify the most important drivers of environmental change; 2) distinguish between certain and uncertain outcomes resulting from each driver (degree of uncertainty). Two

scenarios were developed based on the field survey results, in addition to the business-as-usual scenario of Kuwait Vision 2035 "New Kuwait".

The outcomes of scenarios were as follows:

- **Business-as-usual scenario (New Kuwait):** This is the baseline scenario until 2035. It is based on Kuwait Vision 2035, which seeks to achieve five interconnected strategic goals through five development plans. The Vision aims to position the country as a trade and finance hub, create favourable conditions to attract foreign investment, strengthen the role of the Kuwaiti private sector in economic growth, educate and train the youth, and achieve overall development. The Vision emphasizes the crucial role of scientific research in achieving peace, prosperity and sustainable economic development.
- **Green Kuwait:** This scenario envisions a transition to circular economy that would achieve security in the areas of water, energy and food, all of which are priorities for Kuwait. To support the transition, this scenario assumes the use of market mechanisms, such as imposing carbon taxes, phasing out energy price subsidies in its various forms, and directing some of these subsidies towards financial incentives to expand the use of renewable energy sources, low-carbon hydrogen production technologies and electric vehicles, and provide the necessary infrastructure for them. The scenario also involves developing mass transit networks and encouraging citizens to use them. In this scenario, the environmental assessment of projects plays a key role in investment policies and trends. It mainly contributes to creating a healthy environment, providing opportunities for more sustainable economic growth in Kuwait, generating new jobs through carbon capture and reuse technologies, and developing renewable energy industries, waste recycling industries, organic fertilizer industries and sustainable agriculture.
- **Secure Kuwait:** This scenario envisions an unstable regional or global situation that makes national security a top priority issue for policymakers and decision makers. Regional and global instability leads to further economic slowdowns with ripple effects that can extend to various aspects of economic and social activities. Key impacts include: reduced investment and trade; declining oil prices; increased security costs; impact on tourism and the service sector; pressures on the labour force; and disruptions in the supply chain. In light of these challenges, it is essential for the Kuwaiti Government to accelerate the diversification of its economy, promote sustainability, and invest in innovation and green transition to boost its resilience and minimize the impact of regional or global conflicts on its economy and the standard of living of its citizens.

Preparing for these scenarios requires a set of integrated and coherent policies to promote a green transition. It is important to recognize that building resilience to instability is a long-term process that may require many years. However, current investments in resilience imply investing in a more secure and stable future for all.

A transition to **circular economy** would achieve security in the **areas of water, energy and food**

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