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الخطة الوطنية للتكيف
National Adaptation Plan

Adaptation For Life

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Abbreviations and Acronyms

Abbreviation/ Acronym	Definition
AI	Artificial Intelligence
CVIA	Climate Vulnerability and Impact Assessment
ESG	Environmental, Social, and Governance
GCC	Gulf Cooperation Council
GGA	Global Goal on Adaptation
GHG	Greenhouse Gas
GSSS Bonds	Green, Social, Sustainability and Sustainability Linked Bonds
IPCC	Intergovernmental Panel on Climate Change
M&E	Monitoring and Evaluation
MECC	Ministry of Environment and Climate Change
MEL	Monitoring, Evaluation and Learning
NCCAP	Qatar National Climate Change Action Plan
NBSAP	National Biodiversity Strategy and Action Plan
NDS3	Third National Development Strategy
QDB	Qatar Development Bank
QNE	Qatar National Environment and Climate Change Strategy
QNV 2030	Qatar National Vision 2030
SDGs	Sustainable Development Goals
UNEP	United Nations Environment Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change

Glossary

Adaptive Capacity: The ability of a system to adjust to climate change, including climate variability and extremes, to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.

Artificial Intelligence (AI): The simulation of human intelligence processes by machines, especially computer systems, including learning (acquiring information and rules), reasoning (using rules to reach conclusions), and self-correction.

Blockchain: A decentralized digital ledger that records transactions across many computers so that the registered transactions cannot be altered retroactively, ensuring security and transparency.

Circular Economy: An economic system aimed at eliminating waste and the continual use of resources by employing reuse, sharing, repair, refurbishment, remanufacturing, and recycling to create a closed-loop system, minimizing resource inputs and waste outputs.

Climate Resilience: The capacity of social, economic, and environmental systems to cope with hazardous events or trends, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation.

Climate-Smart Agriculture (CSA): Is approach for developing actions needed to transform and reorient agricultural systems to effectively support development and ensure food security under climate change. It aims to tackle three main objectives: sustainably increasing agricultural productivity and incomes; adapting and building resilience to climate change; and reducing and/or removing greenhouse gas emissions, where possible.

Early Warning System (EWS): A system that monitors and predicts potential natural or environmental hazards to provide timely information, enabling individuals and institutions to prepare and respond effectively.

Ecosystem Services: The benefits people obtain from ecosystems, including clean water and air, pollination, hazard mitigation, pest control, and carbon sequestration.

Energy Diversification: The process of expanding the variety of energy sources used in a region or country to reduce dependence on any single source or type, enhancing energy security and sustainability.

Energy Efficiency: The ratio of useful output of services from an energy system to the energy input into it, aiming to reduce the amount of energy required to provide products and services.

Exposure: The presence of people, livelihoods, species or ecosystems, environmental functions, services, resources, infrastructure, or economic, social, or cultural assets in places and settings that could be adversely affected.

Green Finance: Financial investments that support sustainable environmental outcomes, including climate adaptation, mitigation, and low-carbon development initiatives.

Hazard: The potential occurrence of a natural or human-induced physical event or trend or physical impact that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources. In this report, the term hazard usually refers to climate related physical events or trends or their physical impacts.

Impact: Effects on natural and human systems. Impacts generally refer to effects on lives, livelihoods, health, ecosystems, economies, societies, cultures, services, and infrastructure due to the interaction of climate changes or hazardous climate events occurring within a specific time and the vulnerability of an exposed society or system. Impacts are also referred to as consequences and outcomes. The impacts of climate change on geophysical systems, including floods, droughts, and sea level rise, are a subset of impacts called physical impacts.

Invasive species: Non-native species that have been introduced, intentionally or unintentionally, to a new area and that spread rapidly, causing harm to the environment, economy, or human health.

Monitoring and Evaluation (M&E): A continuous process of collecting, analysing, and using information to assess the performance, effectiveness, and impact of policies, programs, or projects.

Metaverse: A collective virtual shared space, created by the convergence of virtually enhanced physical reality and physically persistent virtual reality, including the sum of all virtual worlds, augmented reality, and the internet.

Mitigation Co-Benefits: The positive effects of adaptation or development actions that also contribute to reducing greenhouse gas emissions or enhancing carbon sinks.

Multi-criteria analysis: A decision-making tool used to evaluate multiple conflicting criteria in decision analysis, often employed in environmental management and policymaking to assess various options and their trade-offs.

Nature-based Solutions (NbS): Actions aimed at protecting, conserving, restoring and sustainably managing natural or modified terrestrial, freshwater, coastal and marine ecosystems, which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services, resilience and biodiversity benefits.

Sensitivity: The degree to which a system is affected, either adversely or beneficially, by climate variability or change. The effect may be direct (e.g., a change in crop yield in response to a change in the mean, range or variability of temperature) or indirect (e.g., damages caused by an increase in the frequency of coastal flooding due to sea level rise).

Social Inclusion: The process of improving the terms on which individuals and groups participate in society by ensuring equal opportunities and strengthening the ability, opportunity, and dignity of those who may be disadvantaged on the basis of their identity or background, enabling everyone to achieve their full potential in life.

Stakeholder Engagement: The systematic involvement of individuals, groups, and institutions in decision-making processes to ensure transparency, inclusivity, and shared ownership of outcomes.

Vector-borne illnesses: Diseases caused by pathogens transmitted to humans and other animals by vectors such as mosquitoes, ticks, and fleas.

Vulnerability: The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements, including sensitivity or susceptibility to harm and lack of capacity to cope and adapt.



Executive Summary

The State of Qatar's National Adaptation Plan (NAP) serves as a comprehensive framework to address the country's climate vulnerabilities and strengthen resilience across sectors. As global climate conditions evolve, the NAP ensures that Qatar's adaptation efforts are structured, forward-looking, and aligned with national development priorities.

Grounded in scientific assessment, stakeholder engagement, policy integration, and adaptive management, the NAP methodology reflects a proactive and inclusive approach and is closely aligned with key national strategies. The development of Qatar's NAP followed a structured, evidence-based approach to ensure a comprehensive understanding of the country's adaptation needs and priorities. In line with Qatar's commitments under the Paris Agreement (Article 4.7) and Decision 24/CP.18, the NAP explicitly recognizes that many adaptation and diversification measures also generate mitigation co-benefits.

Led by the Ministry of Environment and Climate Change (MECC) the NAP process involves broad coordination with national entities, academia, and civil society. Through collaborative planning, capacity-building, and policy alignment, the NAP aims to reduce climate vulnerability, enhance national resilience, and mainstream adaptation into all levels of development planning.

Below are the contents of the chapters of the report, summarizing Qatar's approach, process, and planned actions to achieve climate resilience.

Chapter 1 – Introduction

Qatar's Journey Towards Climate Resilience

This chapter outlines Qatar's proactive engagement in global climate action under the UNFCCC, emphasizing the country's recognition of adaptation as an urgent and essential response to climate change impacts. Qatar's approach seeks to protect people, ecosystems, and infrastructure while unlocking opportunities for sustainable development. Through its NAP, Qatar demonstrates its long-term commitment to enhancing climate resilience in alignment with national development goals.

The Basis of Qatar's National Adaptation Plan

The NAP is underpinned by five guiding principles: (1) a continuous and iterative planning process, (2) country ownership and leadership, (3) integrated planning across sectors, (4) social inclusivity and stakeholder engagement, and (5) integration of scientific knowledge. These principles form the conceptual and operational foundation for designing and implementing effective adaptation measures.

Chapter 2 – National Circumstances

This chapter provides a comprehensive analysis of Qatar's physical geography and current climate profile. It highlights the country's arid desert climate, extreme summer temperatures, and low annual rainfall. Climatological data from 1992 to 2021 show a clear warming trend, increasing occurrences of dust storms, and persistent exposure to high winds (Shamals). The chapter emphasizes the importance of understanding historical weather patterns to inform future adaptation strategies.

Chapter 3 – Climate Scenarios for Qatar

Utilising global models developed under IPCC frameworks, this chapter presents two climate scenarios: SSP2–4.5/RCP4.5 pathway and SSP5–8.5/RCP8.5 pathway. Both scenarios indicate future warming, sea-level rise, intensified precipitation events, increased aridity, and marine ecosystem stress. These projections form the basis for sectoral vulnerability assessments and planning for climate-resilient development.

Chapter 4 – Vulnerability, Impacts, and Current Adaptation Efforts Across Key Sectors

Qatar has identified six sectors most vulnerable to climate change: agriculture and livestock; biodiversity; energy and industry; water; infrastructure and coastal area, and public health. For each sector, the report details the projected impacts, the socio-economic and environmental consequences, and the ongoing adaptation initiatives already being implemented. This baseline assessment informs targeted interventions within the NAP framework. In addition, the chapter highlights initiatives related to Early Warning Systems (EWS) in Qatar. Strengthening EWS is a critical component of climate resilience, serving as a frontline adaptation measure that enhances preparedness, enables timely response, and reduces risks from a range of hazards, including extreme weather events, industrial incidents, and health-related emergencies.

Chapter 5 – The Development Process of Qatar's National Adaptation Plan

The NAP was developed through a dual-track approach that combined top-down scientific research and bottom-up participatory engagement. Key components included climate vulnerability and impact assessments, stocktaking of existing initiatives, data collection through standardized templates, bilateral meetings, stakeholder workshops, and expert validation. The process ensured that the NAP is technically robust, inclusive, and grounded in both national context and international best practices. This NAP is explicitly linked to Qatar's enhanced NDC (NDC 3.0) and the findings of Qatar's Second National Communication (NC2).

Chapter 6 – Sectoral Adaptation Measures and Actions

This chapter presents detailed adaptation measures and actions for each of the six priority sectors, including: agriculture and livestock; biodiversity; energy and industry; water; infrastructure and coastal resilience; and public health, outlining planned adaptation efforts up to 2030 and beyond.

These measures were developed through scientific analysis and stakeholder engagement and aim to strengthen resilience, reduce climate risks, and enhance adaptive capacity across sectors in line with the QNV 2030.

For each sector, the chapter identifies key climate risks and proposes targeted adaptation measures aimed at strengthening resilience, reducing vulnerability, and enhancing adaptive capacity. These measures include a combination of policy and institutional actions, technological solutions, improved resource management practices, and infrastructure-related interventions designed to support climate-resilient development across Qatar's priority sectors.

Chapter 7 – Cross-Sectoral Adaptation Measures and Actions

This chapter presents cross-sectoral adaptation measures designed to address climate risks that span multiple sectors and require coordinated responses across institutions and policy areas. These measures complement the sector-specific actions outlined in Chapter 7 and support the integration of climate adaptation into broader national development planning.

The chapter focuses on six key cross-sectoral themes: the water–energy nexus, environmental health and ecosystem-linked adaptation, early warning systems and disaster risk management, circular economy and resource efficiency, climate data, monitoring and artificial intelligence (AI) integration, and climate finance and Environmental, Social and Governance (ESG) frameworks. Together, these measures aim to strengthen system-wide resilience, enhance coordination across sectors, and support the effective implementation of climate adaptation across Qatar.

Chapter 8 - Strategic Enablers for Effective Adaptation

This chapter outlines the strategic enablers, a cross-cutting elements essential for implementing the NAP. These include strengthening regulatory frameworks, enhancing institutional and human capacity, promoting research and innovation, building data infrastructure, securing financial resources, forging global partnerships, and ensuring social inclusion. Together, these enablers support an integrated and whole-of-society approach to adaptation.

Chapter 9 – Institutional Arrangements for NAP Coordination and Implementation

This chapter outlines the proposed governance framework for Qatar's National Adaptation Plan, explaining how coordinated institutional roles, cross-sectoral collaboration, and key enablers will support effective implementation of climate adaptation actions. It describes the leadership role of the Ministry of Environment and Climate Change, the responsibilities of public institutions, semi-governmental entities, civil society, academia, and the private sector.

Chapter 10 – Adaptation Financing

Adaptation financing is vital to Qatar's NAP, combining government funding with private-sector investment to strengthen resilience and diversify the economy. With a target of USD 100 billion in

foreign direct investment by 2030, Qatar is reforming its business environment, developing specialized clusters, and expanding public-private partnerships to attract green investment. Complemented by the Qatar Central Bank's Environmental, Social, and Governance (ESG) and Sustainability Strategy and the sovereign Green Financing Framework, these measures transform adaptation priorities into bankable opportunities that engage both domestic and global investors.

Chapter 11 – Monitoring and Reporting Progress of Qatar's National Adaptation Plan

An integrated monitoring and evaluation (M&E) framework is presented to assess NAP performance. The chapter outlines indicators, reporting systems, data utilization protocols, and review mechanisms to ensure that adaptation actions remain responsive to changing conditions. The M&E framework enables adaptive management, promotes accountability, and informs policy adjustments.



Introduction



1. Introduction

1.1 Qatar's Journey Towards Climate Resilience

The United Nations Framework Convention on Climate Change (UNFCCC) serves as the foundation for global efforts to address climate change, coordinating international action to stabilize greenhouse gas (GHG) concentrations. Established in 1992, the UNFCCC aims to mitigate climate impacts and enhance resilience, particularly among nations most vulnerable to its effects. The increasing frequency and severity of climate-related events such as extreme weather patterns, rising sea levels, and their impacts to Qatar's key sectors underscore the urgent need for adaptation planning within the UNFCCC framework.

In this context, Qatar's NAP also contributes to the Global Goal on Adaptation (GGA) established under the Paris Agreement. By focusing on enhancing adaptive capacity, strengthening resilience, and reducing vulnerability, the NAP aligns national priorities with global adaptation objectives. This ensures that Qatar's adaptation efforts not only safeguard its own people, ecosystems, and infrastructure, but also add to the collective progress assessed through the Global Stocktake (GST).

Adaptation plans developed under this framework not only mitigate immediate climate impacts but also provide a long-term strategy for building resilience against evolving environmental challenges. These plans are aimed at:

- Identify vulnerabilities, assess risks, and enhance adaptive capacity.
- Implement diverse adaptation measures, including infrastructure improvements, sustainable resource management, and community preparedness.
- Align with Sustainable Development Goals (SDGs) by integrating climate resilience into national policies and strategies.
- Foster international cooperation through resource mobilization, technology transfer, financial support, and knowledge-sharing, particularly for developing countries.

Qatar's commitment to climate resilience extends beyond responding to environmental pressures—it reflects a broader dedication to safeguarding its people, communities, and economic sectors. The cost of inaction far exceeds the cost of adaptation, making investment in resilience a strategic imperative. By preparing for climate risks, Qatar not only mitigates threats but also unlocks opportunities for sustainable economic growth and development.

While the NAP is informed by the GGA and their associated thematic areas, it is specifically tailored to Qatar's unique climate risks. The plan focuses on reducing vulnerability, enhancing adaptive capacity, and building resilience across key sectors to safeguard national development and long-term sustainability.

These efforts support the overarching objectives of the NAP process: (i) to reduce the country's vulnerability to the impacts of climate change, (ii) enhance its overall climate resilience, and (iii) mainstream climate change adaptation into broader development planning across sectors and levels.

Qatar's NAP is developed through a rigorous, inclusive process that integrates scientific assessments, stakeholder engagement, and policy alignment. Key elements of the NAP methodology include:

Climate Vulnerability and Impact Assessments (CVIA):

Comprehensive assessments are conducted to identify at-risk sectors, communities, and ecosystems, with active involvement from government entities, research institutions, civil society, and local communities.

Targeted Adaptation Measures Based on CVIA:

Adaptation measures are prioritized per sector, focusing on critical areas such as water, energy and industry, infrastructure and coastal resilience, agriculture and livestock, biodiversity, and public health, based on the results of detailed risk assessments and stakeholder engagements.

Monitoring and Evaluation (M&E) Framework and Review Mechanisms

Framework and review mechanisms will be established to monitor and evaluate the implementation of adaptation actions, ensuring adaptive management based on evolving risks.

Qatar's NAP methodology underscores a proactive approach to climate adaptation, grounded in scientific assessment, stakeholder collaboration, policy integration, and adaptive management principles. This is evident in its alignment with key national strategies, including the Qatar National Vision 2030 (QNV 2030), the Third National Development Strategy (NDS-3), the National Climate Change Action Plan (NCCAP), and the Qatar National Environment and Climate Change Strategy (QNE).

In pursuing climate resilience, the NAP serves as a strategic guide to navigating the uncertainties posed by climate-related risks and challenges. Built on principles of continuous improvement, national ownership, integrated planning, stakeholder participation, and knowledge-based decision-making, the NAP lays the foundation for a resilient future. While challenges may arise, Qatar's commitment and collaborative efforts position the nation to emerge stronger, more resilient, and better prepared for the climate challenges of the future.

1.2. The Basis of Qatar's National Adaptation Plan

Qatar's adaptation strategy is based on key guiding principles that serve as the foundation for developing the NAP and designing the adaptation measures outlined in this document. These principles guide the NAP process and shape the implementation of adaptation actions to effectively address the challenges posed by climate change.

Continuous Process

Ensuring a continuous and iterative approach to adaptation planning. A commitment to a continuous process ensures that adaptation planning remains dynamic and iterative, allowing for adjustments and improvements over time in response to changing climate conditions and evolving knowledge.

Country Ownership

Emphasizing country-owned and country-driven action in adaptation efforts. This reflects Qatar's commitment to leading and driving its adaptation efforts, with a focus on initiatives that are tailored to the nation's unique circumstances and priorities.

Integrated Approach

Ensuring that adaptation planning is integrated across sectors and levels of government to promote coordinated and coherent actions. This will support Qatar in developing coherent policies and regulations that are supportive of its adaptation goals.

Social Inclusivity

Implementing social inclusive approaches to adaptation planning. This is prioritized, ensuring that adaptation planning processes are participatory and inclusive, involving diverse stakeholders and communities to foster a sense of ownership and collective responsibility.

Scientific Knowledge Integration

Qatar prioritizes integrating the best available scientific knowledge into its adaptation strategies, recognizing the importance of using evidence-based approaches to enhance resilience and sustainability.



National Circumstances



2. National Circumstances

2.1 Physical Geography of Qatar

The State of Qatar is a peninsula situated along the western coast of the Arabian Gulf, bordered to the south by the Kingdom of Saudi Arabia and surrounded by Gulf waters. It covers approximately 11,637 km², including offshore islands such as Halul, Shira'wa, and Alashat (Baalousha et al., 2018; National Planning Council, 2024). Geographically, it lies between latitudes 24°27'N–26°10'N and longitudes 50°45'E–51°40'E.

Qatar has a 550 km coastline along its western, northern, and eastern boundaries. The terrain is predominantly flat desert, featuring sand dunes in the southeast, limestone outcrops in Dukhan and Jabal Fiwairit, and hill formations in the northwest. Elevations range from 0 to 107 meters above sea level (Baalousha et al., 2018; El-Malah et al., 2022). The country extends nearly 190 km from north to south and 90 km from east to west.

Approximately 80% of the land surface is composed of limestone and dolomite, with gypsum layers present in the south. Vegetation is primarily found in the northern region, particularly in rainwater-draining basins (Riyadh), where fertile soils exist. The landscape also includes numerous coves, inlets, caves, and sinkholes across both rural and urban areas (Baalousha et al., 2018; Duggan et al., 2014; Orndorff et al., 2018).

2.2 The Climate Landscape in Qatar

The State of Qatar is dominated by subtropical dry, hot desert climate with low annual rainfall, very high temperatures in summer and with a large difference between day and night temperatures in the inland areas. The coastal areas are influenced by the Arabian Gulf and experience lower maximum and higher minimum temperatures coupled with higher moisture in the atmosphere. June to September is the peak summer season in the State of Qatar with nearly zero rainfall. The mean daily temperatures during June, July and August are 35.7°C, 36.5°C and 35.9°C respectively in Doha. The mean daily maximum temperatures in these months are 42.2°C, 42.4°C and 41.4°C. During summer, the temperatures can exceed 50°C. Winter (December, January and February) is cooler with occasional rain. Spring and autumn seasons are warm, mostly dry and pleasant with mean daily maximum temperatures between 27°C and 40°C and cooler nighttime temperatures between 18°C and 30°C. On an average, Qatar receives about 77mm rainfall per year with some years receiving nearly zero rainfall in the past 60 years of record. Most of the rain comes in the form of thunderstorms.

The State of Qatar occasionally experiences events of high winds known as Shamals during winter and summer seasons. Days with northerly to north-westerly winds exceeding a speed of 17 knots and persisting for at least 3 hours are considered as Shamal days. Often, Shamals also bring lot of dust to Qatar from upstream wind regions.

Climate Scenarios for Qatar



3. Climate Scenarios for Qatar

The foundational studies, such as the Qatar Climate Profile and Climate Vulnerability and Impact Assessments, have played a crucial role in assessing the country's vulnerability to climate change. These assessments provide the analytical basis for the potential impacts of climate change featured throughout this report, including the sectoral analysis presented in Chapter 5: Vulnerability, Impacts, and Current Adaptation Efforts Across Key Sectors.

The models used in this report are drawn from the Coupled Model Intercomparison Project (CMIP) Phases 5 and 6, which are coordinated by the World Climate Research Program and widely used by the IPCC in its climate assessments. These models use interactions between the atmosphere, ocean, and land to estimate future climate conditions under varying greenhouse gas (GHG) emission scenarios.

To assess potential climate futures, the IPCC employs two key scenarios: Shared Socioeconomic Pathways (SSPs) and Representative Concentration Pathways (RCPs). SSPs consider both emissions levels and socioeconomic factors, while RCPs focus solely on emissions trajectories. This report applies two scenarios: SSP2-4.5 / RCP4.5 and SSP5-8.5 / RCP8.5 to provide insight into Qatar's possible climate future based on different policy and emissions pathways. SSP5-8.5 / RCP8.5 is used as a reference scenario to assess potential climate impacts in the absence of additional mitigation measures. See Table 1.

Table 1. The scenarios and their differences[1]

Scenario	Name of Corresponding SSP	Name of Corresponding RCP	Socio-economic conditions (according to SSPs only)	Global Warming by 2100
"SSP2-4.5 / RCP4.5"	SSP2-4.5	RCP4,5	• Emissions will continue to increase. • Moderate global efforts to mitigate emissions and adapt. • Population growth will peak between 2070-2080 at 9.5 billion.	3.5 to 4.2 deg C
"SSP5-8.5 RCP8.5"	SSP5-8.5	RCP8,5	• Global intensification of fossil fuels. • Minimal global efforts to mitigate emissions and adapt. • Population growth will peak between 2050-2060 at 8.5 billion.	4.7 to 5.1 deg C

[1] The SSP2-4.5 / RCP4.5 scenario does not assume either the best or worse case, but somewhere in the middle. It assumes that emissions will continue to increase while moderate global efforts will be made to reduce GHG emissions and prepare for the impacts of climate change. On the other hand, the SSP5-8.5 / RCP8.5 scenario assumes the worst-case scenario with minimal efforts to reduce GHG emissions and prepare for the impacts of climate change.

Using the above climate models simulations under two scenario pathways, the assessments project possible future climate outcomes for Qatar based on different policy and emission trajectories. These assessments examine how sectors are affected by climate hazards (sensitivity) and their ability to adapt (adaptive capacity). The findings highlight climate hazards to Qatar's environment, infrastructure, and public health as below.

Key Climate Hazards in Qatar

Qatar's geographic and climatic characteristics make it particularly vulnerable to the impacts of climate change. Its arid environment, flat topography, and extensive coastline increase its exposure to extreme heat, rising sea levels, and variability in precipitation. Key climate hazards in Qatar include rising mean air temperature, changing precipitation patterns, extreme events, and wind-related, coastal, and marine hazards.

These climate hazards pose significant threats to Qatar's infrastructure, economy, biodiversity, and public health, with cascading effects across critical sectors. To address these risks and enhance the resilience of its people, communities, and economic sectors, Qatar has engaged in the development of its National Adaptation Plan (NAP), grounded in robust sectoral climate vulnerability and impact assessments across six sectors, including agriculture & livestock, biodiversity, water, energy & industry, public health, and infrastructure & coastal resilience.



Vulnerability, Impacts and Current Adaptation Efforts Across Key Sectors



4. Vulnerability, Impacts and Current Adaptation Efforts Across Key Sectors

Qatar has identified six key sectors as particularly vulnerable to climate change: water, energy and industry, infrastructure and coastal resilience, agriculture and livestock, biodiversity, and public health. The impacts of climate change on these sectors may affect the country's economy, environment, and social well-being. In response, Qatar is implementing targeted adaptation initiatives to strengthen resilience and mitigate potential risks. While the analysis focuses on these sectors, the section also highlights cross-sectoral mechanisms, such as early warning systems, that support climate risk management and resilience across multiple sectors. This section outlines the climate change impacts on these sectors and the current adaptation efforts underway to safeguard Qatar's future.

Agriculture and Livestock Sector

The agriculture and livestock sector depends on stable climatic conditions for its crops, livestock, and workforce, making it vulnerable to increasing temperatures, shifting precipitation patterns, and sea-level rise. While Qatar has made commendable strides in adopting climate-smart agriculture practices, the sector remains vulnerable to water scarcity and rising temperatures. Similarly, the fishing industry is vulnerable to changing sea temperatures while fluctuation in nutrient levels impact fish stock, causing them to migrate in more favourable regions and environments.

The potential impacts of climate change on Qatar's agriculture and livestock sector are outlined in the table below.

The potential impacts of climate change on Qatar's agriculture and livestock sector are outlined in the table below.

Table 2. Impacts on the agriculture and livestock sector

Direct Impact	Description of Direct Impact	Type of Impact
Decreased crop yield.	Decrease in crop yield due to worsening climate and environmental conditions, which may affect the cost of production and profitability of the sector.	Economic
Reduction in strength of natural capital.	Reduction in natural capital, through decreased soil and water quality, leading to a reduction in the resilience of crops and livestock.	Economic
Change to characteristics of coastal ecosystems.	Change in characteristics of coastal ecosystems, including the number and health of fish species, and the size and health of corals.	Environmental
Increase in consumption of fossil fuels to address cooling needs.	Increased greenhouse gas emissions from fossil fuels used for space cooling for livestock farming.	Environmental

Current Adaptation Initiatives in the Agriculture and Livestock Sector

In Qatar, government-led agriculture and livestock initiatives are steadily evolving, driven by the nation's commitment to food security.

National Food Security Strategy 2018-2023

The National Food Security Strategy 2018-2023 contributed significantly to developing the food security system in Qatar by implementing four key pillars, one of which is the development of domestic agricultural production. Key initiatives to increase domestic production and productivity included:

- Increasing vegetable production by establishing a hydroponics greenhouse cluster (e.g., tomatoes, peppers, cucumbers, squash, lettuce).
- Expanding and improving production capacity for a relevant range of livestock and fisheries.
- Capping production of fresh milk and poultry and redirecting additional capacity toward milk derivatives, frozen poultry, or egg production.
- Reducing groundwater-based fodder production by switching to TSE.
- Promoting smart irrigation systems to optimize water use and enhance agricultural resilience.

The strategy was also backed by a support system combining easy access to capital, efficient transport and logistics, and attractive subsidy programs and public-private partnerships, which provided the right ecosystem for private sector participation. This strategy has resulted in a significant increase in farmlands, with over 950 agricultural productive farms operating across the country, including a significant increase in land used for farming organic products.

National Food Security Strategy 2024-2030

The new National Food Security Strategy 2024-2030 includes 17 initiatives aimed at achieving sustainable food security through guiding principles that include promoting healthy consumer habits, ensuring food safety and quality, enhancing sustainability and adaptation to climate change, and building effective partnerships. The strategy aims to further increase self-sufficiency in vegetables, fresh red meat (sheep and goats), and fresh fish, while maintaining self-sufficiency in the production of fresh dairy and poultry. This will be achieved by enhancing local production using modern agricultural techniques and sustainable practices, reducing dependence on external food supplies and ensuring the sustainability of meeting market needs through local production. The national focus is on increasing self-sufficiency, while improving the productivity of agricultural lands. This will be achieved by using agricultural technology, regulating quality assurance, and facilitating licensing processes.

Strengthened Enabling Environment

environment to maximize the private sector's participation in the agricultural sector. The government is aiming to:

- Facilitate the deployment of more efficient and sustainable greenhouse technology, including climate control solutions.
- Review pricing mechanisms and achieve a balance between protecting producers and consumers.

- Encourage efficiency and professionalism through production-based support and farmers support programs.
- Set up a dedicated fund to finance high-tech greenhouses and upgrade existing facilities, notably greenhouse technology and irrigation systems.
- Adapt agricultural licensing processes and standards to enhance farmland productivity and efficiency.
- Establish a framework to enable the implementation of current and future projects in vegetable production and improve public-private sector collaboration, by (1) establishing a "single-window" system to provide guidance and support throughout the project process, and (2) conducting joint feasibility studies.
- Set up a knowledge and digital data bank in the agriculture field to enable monitoring the implementation of strategy and data-driven decision-making; establish a specialized entity/team to collect, analyse and digitize data.
- Diversify local production of fertilizers.

Biodiversity Sector

Qatar's biodiversity includes a wide range of marine and terrestrial species that have adapted to the harsh and variable conditions of the Arabian Peninsula. Its ecosystems support diverse flora and fauna, and new species continue to be discovered. Along Qatar's coast, marine life thrives in environments, such as coral reefs, salt marshes, mangroves, and seagrass beds. The country is home to a diverse range of species, including important discoveries, such as branchiopods and mysid shrimp. Marine species, such as the endangered hawksbill turtle and the vulnerable dugong, are also part of the marine ecosystem. For terrestrial species, Qatar is rich in terrestrial animals and plant species, many of which are rare.

Both terrestrial and marine biodiversity in Qatar faces growing exposure to extreme heat and other climate related risks. Coastal ecosystems are particularly vulnerable to shifts in sea temperatures, rising sea levels, intense storm events, and ocean acidification, potentially affecting various animal species. Similarly, terrestrial biodiversity faces threats from sea-level rise, droughts, and humidity changes, impacting habitats and migratory patterns.
The potential impacts of climate change on Qatar's biodiversity sector are outlined in the table below.

The potential impacts of climate change on Qatar's biodiversity sector are outlined in the table below.

Table 3. Impacts on the biodiversity sector

Direct Impact	Description of Direct Impact	Type of Impact
Damage to commercially important habitats and species.	Hazards, such as storms, may damage commercially important habitats, including mangroves and seagrass, and threaten commercially important species, such as shrimp and crustaceans.	Economic
Contamination of natural habitats of local flora and fauna.	Flooding of waste and wastewater facilities can contaminate water sources and soil, harm natural habitats and expose local plants and animals to pollutants.	Environmental
Increase in desalination costs.	Increased jellyfish blooms could impose maintenance costs on desalination plants.	Economic
Decrease in food security.	Reduction in food security due to potential impacts on fishery stocks.	Social
Increase in species' mortality and extinction rates.	Mortality and extinction rates could increase for terrestrial and marine species if already sensitive habitats are altered or degraded.	Environmental
Reduction in sea and land quality.	The overall sea and land quality may be reduced due to biodiversity loss and ecosystem degradation.	Environmental

Current Adaptation Initiatives in the Biodiversity Sector

Current adaptation initiatives in the biodiversity sector are described in the bullets below.

Strong Institutional Framework

Qatar is committed to biodiversity conservation through various national strategies that align with its QNV 2030. The National Biodiversity Strategy and Action Plan 2025 (NBSAP) serves as a key framework for raising awareness, conserving ecosystems, and safeguarding vulnerable species. Other national strategies, such as the Integrated Coastal Zone Management Plan and the Integrated Coastal Zone Management Plan for Ecological Assessment (2014), emphasize sustainable coastal development, conservation, and enhancing resilience against risks associated with sea-level rise. More recently, the QNE identifies biodiversity as one of the five key pillars to be prioritized through five goals: (1) Conserve and effectively manage and protect land, (2) Protect and recover threatened species with protection and recovery plans in place, (3) Ensure all fish sustainably caught, (4) Enhance awareness, participation and capabilities of biodiversity conservation, and (5) Ensure biodiversity conservation is incorporated in national and corporate planning.

Land Conservation

Qatar is designating protected land areas to conserve and effectively manage land-based resources.

Mangrove Rehabilitation

Enhancing mangrove cover in Qatar is part of a broader effort to protect biodiversity and enhance coastal resilience, while providing mitigation co-benefits. This includes advancing coastline mapping efforts and undertaking collaborative projects to identify the best conditions for mangrove restoration.

Biodiversity Rehabilitation

To strengthen marine conservation, Qatar is working on the rehabilitation of coral reefs, vital for marine biodiversity, and the preservation of the Al Thakira Mangroves, which provide essential ecological functions, such as coastal protection and habitat for various species. In addition, efforts are underway to conserve migratory bird species, such as flamingos and ospreys, by creating protected wetlands and designated breeding sites, and deploying turtle-nesting monitoring programs to mitigate biodiversity loss. Qatar is also actively involved in protecting endangered species, such as the Arabian Oryx and dugong, which are key symbols of the nation's commitment to preserving its unique wildlife. Furthermore, Qatar is tackling the issue of invasive species, which threaten the integrity of local ecosystems, through comprehensive control and management strategies. Qatar is also investing in terrestrial biodiversity through projects aiming to preserve the fragile desert landscapes while promoting biodiversity and ecosystem services.

Energy and Industry Sector

The energy sector in Qatar is sensitive to extreme heat, humidity, sea-level rise, storms, and flooding. These climate hazards may affect both energy supply and demand. To strengthen the resilience of the energy and industry sector, Qatar invests in research related to climate-resilient technologies. There are also plans to diversify energy sources by expanding renewable energy, through solar power plants, such as those in Mesaieed and Ras Laffan industrial cities.

The potential impacts of climate change on Qatar's energy and industry sector are outlined in the table below.

Direct Impact	Description of Direct Impact	Type of Impact
Increased expenditure on maintenance and repair of energy and industry infrastructure.	Extreme heat, humidity and sea-level rise may damage energy infrastructure and industry facilities, increasing maintenance costs, repairs, and generate operational disruptions.	Economic
Increase in costs associated with cooling energy generation.	Higher temperatures increase cooling demands in energy generation, leading to higher operational costs and potentially higher energy prices.	Economic

Direct Impact	Description of Direct Impact	Type of Impact
Higher cooling demand and population growth drive up emissions.	Rising temperatures, extreme events, and population growth boost energy and water demand and associated emissions.	Environmental
Power outages and health risks from extreme heat.	Extreme heat can cause power outages and health risks, reducing productivity in energy and industry sectors.	Social

Current Adaptation Initiatives in the Energy and Industry Sector

Qatar's current adaptation initiatives in the energy and industry sector aim to address climate change challenges by minimizing economic, environmental, and social impacts. These measures focus on enhancing energy efficiency, reducing emissions, and ensuring the resilience of industrial infrastructure to secure long-term sustainability in these sectors.

Economic Diversification

Qatar is promoting a diversified and resilient economy while enhancing energy security.

Industrial Resilience

Qatar is undertaking climate risk assessments for major industrial sites to safeguard critical infrastructure.

Adaptive Capacity

Research into urban heat alleviation techniques has shown promise in highly urbanized areas of Doha. This research, supported by government funding, highlights Qatar's commitment to climate resilience.

Water Sector

Qatar's water sector is sensitive to climatic changes due to the intrinsic link between water supplies and the climate. The combination of arid climate, high evaporation rates, low annual rainfall, and groundwater dependence increases the sensitivity of Qatar's water sector. Enhancing groundwater recharge and strengthening sustainable water management is important to ensure this vital resource remains a reliable buffer against the impacts of climate change. Groundwater recharge depends on stable temperatures, rainfall, and humidity levels, and is therefore sensitive to extreme heat and drought events. Desalination, a vital water source, is sensitive to ocean temperature and salinity levels, affecting both water quality and process efficiency. The sector's water storage facilities, and especially underground storage, are also sensitive to sea-level rise and coastal flooding.

In Qatar, both water supply and demand are highly exposed to increase in mean temperature and occurrences of extreme heat. Water sources and water network infrastructure, including piping and groundwater aquifers, are exposed to rising temperatures. Located along Qatar's coast, desalination plants are exposed to sea-level rise, storms, and coastal inundation.

On the demand side, with most consumers located in cities, the urban heat island effect exacerbates hot extremes, leaving consumers highly exposed to temperature variability.

The potential impacts of climate change on Qatar's water sector are outlined in the table below.

Table 5. Impacts on the water sector

Direct Impact	Description of Direct Impact	Type of Impact
Increase in operational costs of desalination.	Rising ocean temperatures, acidity, and salinity could increase desalination costs by requiring additional treatment to make the water suitable for us.	Economic
Increase in government spending to sustain provision of desalinated water.	Rising desalination costs may lead to higher government spending, thereby reducing resources available for other sectors.	Economic
Increase in demand for drinking water.	Higher temperatures increase the need for drinking water, while droughts and changes in sea conditions reduce water availability. Reduced rainfall and rising evaporation rates also decrease groundwater recharge, further limiting freshwater supplies.	Social
Increase in greenhouse gas emissions due to intensifying desalination.	Increased desalination needs may raise energy consumption, leading to higher emissions. Simultaneously, declining groundwater recharge due to higher temperatures and reduced precipitation increases reliance on desalination	Environmental

Current Adaptation Initiatives in the Water Sector

Qatar's current adaptation initiatives are designed to address the challenges posed by climate change to its water sector. Through these measures, Qatar aims to minimize the economic, environmental, and social impacts of climate change on its water resources and ensure long-term water security.

Advancing Research and Innovation

Qatar is transforming water management through innovation and strategic planning to ensure long-term sustainability. Advanced irrigation systems are being pioneered to optimize water use through electronic management. Additionally, researchers are developing cutting-edge technologies, such as membrane distillation and hybrid processes, to enhance water recovery from brine streams, making desalination more efficient and sustainable.

Smart Monitoring and Management Systems

Qatar is spearheading the Smart Monitoring and Management of Water Cycle Project to improve rainfall monitoring and optimize stormwater infrastructure. By identifying the best locations for water storage and infiltration, Qatar is maximizing rainwater utilization to support long-term water security.

Water Conservation Measures

Qatar has made considerable progress in water recycling, making it suitable for landscape irrigation and other non-potable uses. Following the prohibition of potable water use in cooling stations, 33 out of 76 district cooling plants have transitioned to recycled water for cooling purposes, with plans to convert the remaining facilities.

Groundwater Replenishment

313 recharge wells have been rehabilitated, and 370 new recharge wells have been developed to enhance groundwater replenishment, strengthening the country's resilience against water scarcity. In addition, 328 production wells in five potable well fields have been rehabilitated and are ready to be used for water security during emergencies.

Increased Emergency Water Storage Capacity

Qatar has been increasing its emergency water storage capacity since 2009, reaching 10.6 million m^3 in 2021.

Community Engagement for Water Conservation

At the community level, the National Program for Conservation and Energy Efficiency (Tarsheed) Program, launched in 2012, successfully raised awareness, and reduced per capita water consumption, driving behavioural change toward sustainability.

Infrastructure and Coastal Resilience Sector

A large proportion of Qatar's critical infrastructure and urban development is concentrated in low-lying coastal areas, increasing vulnerability to sea-level rise. Qatar's flat terrain places much of its infrastructure just a few meters above sea-level, making it highly susceptible to coastal inundation. At-risk infrastructure includes transportation networks, residential and commercial developments, healthcare and education facilities, energy and utility systems, telecommunications, cultural institutions, public administration buildings, and sports venues. In addition to sea-level rise, infrastructure is exposed to extreme heat, which accelerates material degradation, particularly in urban areas affected by the heat island effect.

The potential impacts of climate change on Qatar's infrastructure and coastal resilience sector are outlined in the table below.

Table 6. Impacts on the infrastructure and coastal resilience sector

Direct Impact	Description of Direct Impact	Type of Impact
Increased expenditure on maintenance and repair of infrastructure.	Increased expenditure on maintenance and repair due to increased deterioration of infrastructure and potential damage from extreme events, such as storms and flooding.	Economic
Disruption to economic activity.	Transport disruptions and power outages interrupt economic activities, leading to revenue losses.	Economic

Direct Impact	Description of Direct Impact	Type of Impact
Damage to coastal infrastructure.	Rising sea levels and storm surges weaken foundations and damage coastal infrastructure leading to higher maintenance costs, service disruptions, and economic losses.	Economic
Impact on food security due to disrupted supply chains.	Qatar is highly reliant on imported products, including consumables. Disruption to the supply chain through damage to infrastructure may decrease food security.	Social

Current Adaptation Initiatives in the Infrastructure and Coastal Resilience Sector

Qatar, with its rapidly expanding cities and distinct geographical landscape, faces a unique set of challenges when it comes to infrastructure and coastal resilience. As a developing nation, Qatar continues to address challenges through strategic research and investments to protect its shores and ensure sustainable development for future generations.



Guarding the Coastline

With the growing threat of storm surges and rising sea levels, saltwater intrusion is increasingly affecting freshwater systems, raising salinity levels and thereby requiring additional treatment for use in drinking water, irrigation, and ecosystem maintenance. In response, Qatar has invested in reinforced sea walls and breakwater structures as robust defences designed to reduce coastal erosion and protect urban areas from the impacts of climate change.



Managing Stormwater Efficiently

Qatar has introduced cutting-edge drainage systems designed to manage stormwater and reduce flood risks, especially in its low-lying coastal zones. These efforts not only protect infrastructure but also ensure that future growth remains uninterrupted by natural disasters.



Green Cities for the Future

Green spaces, wetlands, and parks are strategically placed throughout urban areas, reducing the impact of stormwater and helping the country adapt to rising sea levels. These spaces create a harmonious balance between development and the environment.



Data-Driven Resilience

Qatar has invested heavily in satellite mapping, tide gauges, and environmental sensors to monitor climatic changes in real time. This research enables decisions that ensure the country's coastal areas and infrastructure remain protected.



Strategic Transportation, Infrastructure Development and Smart Mobility

Qatar's adaptation efforts in the transport and infrastructure sector centre on enhancing the resilience and reliability of mobility systems in response to climate risks. This includes upgrading and expanding road networks, modernizing drainage and sewage systems, and strengthening port and airport operations to withstand environmental stress. The country is also reviewing and updating infrastructure codes and standards to integrate climate-resilient design practices.

Green Buildings

Qatar's green building transformation sets mandatory standards for energy efficiency and sustainable design in new constructions, leading to widespread adoption of energy-efficient technologies, reducing electricity and water consumption, and promoting the use of renewable energy solutions. As a result, Qatar has seen a significant increase in the number of green-certified buildings, contributing to lower greenhouse gas emissions, improved indoor environmental quality, and enhanced climate resilience across the built environment.

Urban Waste Management

Qatar's adaptation efforts in urban waste management focus on strengthening systems to handle growing waste volumes in a changing climate. These initiatives include improving waste treatment capacity, expanding integrated waste management facilities, and promoting circular economy approaches that enhance resource recovery and reduce pressure on landfills. The country is also advancing waste prevention, recycling, and reuse practices to build a more resilient and sustainable waste management system capable of adapting to environmental and urbanization challenges.

Public Health Sector

The public health sector exhibits vulnerabilities due to the relationship between health service demand, supply, and climate hazards. On the demand side, the public health sector is vulnerable to temperature-related risks such as extreme heat events and high humidity. This exposure is further amplified by the urban heat island effect in Doha, where most of the population is situated. These risks are closely linked to health issues, such as heat stress, exhaustion, and other illnesses. Consequently, healthcare demand may escalate, potentially increasing the vulnerability of service delivery.

On the supply side, rising sea levels and flooding may compromise access to public health services by damaging transport infrastructure or making it inaccessible. Moreover, medical facilities are concentrated in Doha, which is situated in low-lying areas and therefore exposed to risks of sea-level rise and associated coastal flooding, which places additional strain on the public health sector.

The potential impacts of climate change on Qatar's public health sector are outlined in the table below.

Table 7. Impacts on the public health sector

Direct Impact	Description of Direct Impact	Type of Impact
Increased expenditure on maintenance and repair of infrastructure.	Increase in the number of cases of heat stress and exhaustion admitted to hospitals. Potential increase in vector- or water-borne diseases due to flooding and insufficient drainage. Increase in respiratory health conditions due to sandstorms.	Economic and Social

Direct Impact	Description of Direct Impact	Type of Impact
Increased operational cost.	Increase in operational cost of healthcare services; increase in staff cost, replacement of equipment, etc.	Economic
Increase in greenhouse gas emissions.	Increase in emissions of greenhouse gases due to increase in energy use to accommodate increases in demand.	Environmental
Increase in waste generation.	Increases in waste, including toxic and hazardous waste, as well as household medical waste.	Environmental

Current Adaptation Initiatives in the Public Health Sector

Adaptive capacity within the public health sector is primarily focused on initiatives aimed at addressing extreme heat conditions and their impact on vulnerable populations. Qatar has implemented strategies to mitigate the impacts of extreme heat on the population, such as educational campaigns and structural measures including hydration stations, and climate literacy programs.

New Air Quality Platform

In 2024 Qatar launched the Air Quality Platform, which provides real-time data from 40 monitoring stations, using a color-coded index accessible to the public.

Heat Stress Prevention Measures

Recognizing the impact of rising temperatures, Qatar has introduced heat stress prevention measures, including shaded rest areas, hydration stations, and revised work schedules to protect outdoor workers from extreme heat exposure.

Food Safety Regulation

Food and water security remain a priority, with ongoing investments in desalination technologies, water conservation strategies, and strengthened food safety regulations to mitigate contamination risks under extreme climate conditions.

Enhanced Readiness

Qatar is integrating climate resilience into its healthcare infrastructure, ensuring that hospitals and emergency services are well-equipped to respond to climate-induced health crises.

Early Warning Systems (EWS) and Linkages to Loss and Damage

Early Warning Systems (EWS) are pivotal for building resilience across sectors – public safety, environmental protection, and health. Within the NAP framework, EWS serves as a frontline adaptation measure by enhancing preparedness, enabling rapid response, and reducing risks from diverse hazards such as extreme weather, industrial accidents, and health-related emergencies.

EWS also play a crucial role in the loss and damage agenda by providing the information and tools needed to minimize climate-related impacts that cannot be fully avoided. Strengthened EWS reduces the human, economic, and environmental costs of disasters by preventing escalation into irreversible loss, while supporting risk transfer mechanisms and recovery planning when damage does occur.

Integrating EWS into the NAP ensures that adaptation measures are not only forward-looking but also directly address the growing challenge of loss and damage in line with global frameworks under the UNFCCC, the Sendai Framework for Disaster Risk Reduction, and the Santiago Network.

Current Initiatives in the EWS in Qatar

Below are some of the ongoing efforts to advance early warning and climate risk management in Qatar.



Smartphone-Based Public Warning System for Public Safety

Qatar has launched a Public Warning System that delivers emergency alerts via smartphones. Messages are bilingual (Arabic and English) and paired with distinctive vibration and ringtone signals to ensure urgent visibility. The system can broadcast alerts rapidly – nationwide or to specific regions – enabling fast and widespread communication in crises. Notably, it was deployed during the Watan Exercise 2023, demonstrating its nationwide reach and operational preparedness.



Enhancing Rapid Response in High-Risk Settings

Qatar underscores the crucial role of EWS in facilitating immediate detection and response to fires, thefts, and incidents in high-risk facilities. Under Qatari law, certain facilities are mandated to install systems linked directly to the Ministry of Interior's central operations room, ensuring that alerts, particularly fire alarms – are transmitted in seconds for swift Civil Defence mobilisation.



Satellite-Based Early Warning System to Monitor Marine Oil Pollution

Qatar has deployed a satellite-based early warning system to monitor oil pollution across Qatar's marine environments. Co-developed with international partners, the system can detect spillage volumes as small as 40 litres, regardless of weather conditions, and delivers daily imagery and reports to the ministry. This aligns with Qatar's National Environment and Climate Change Strategy (QNE) and the International Convention on Oil Pollution Preparedness, Response and Cooperation (OPRC Convention, 1990), enabling swift environmental protection and response.[1]

[1] Ministry of Environment and Climate Change, State of Qatar. (2023, June 18). Ministry launches advanced satellite system to monitor marine oil pollution [News release]. Sharek. Retrieved August 27, 2025, from Sharek website.



Ambient Air Quality Monitoring and Alerting

Qatar operates one of the region's most comprehensive air quality monitoring frameworks. Over 40 fixed and mobile stations across Doha and beyond measure components (e.g. SO_2, NO_2, O_3, CO, PM, VOCs) and meteorological data. All stations integrate with the National Network for Ambient Air Quality Monitoring, ensuring compliance with Environmental Protection Law No. 30 (2002) and its executive bylaw Resolution No. 4 (2005). At its core lies the Air Quality Data Monitoring and Analysis Unit, which processes real-time data, conducts forecasts, and issues early alerts via the Qatar Air Quality Index (AQI) in accordance with international standards.[3]



Radiation Early Warning Network

Qatar also oversees a Radiation Monitoring and Early Warning Network spanning air, land, and territorial waters. Equipped with advanced detection stations (including offshore buoys), the system feeds into a central data centre. It continuously tracks radiation levels and issues immediate alerts if safety thresholds are exceeded, underpinning public health and environmental protection.[4]

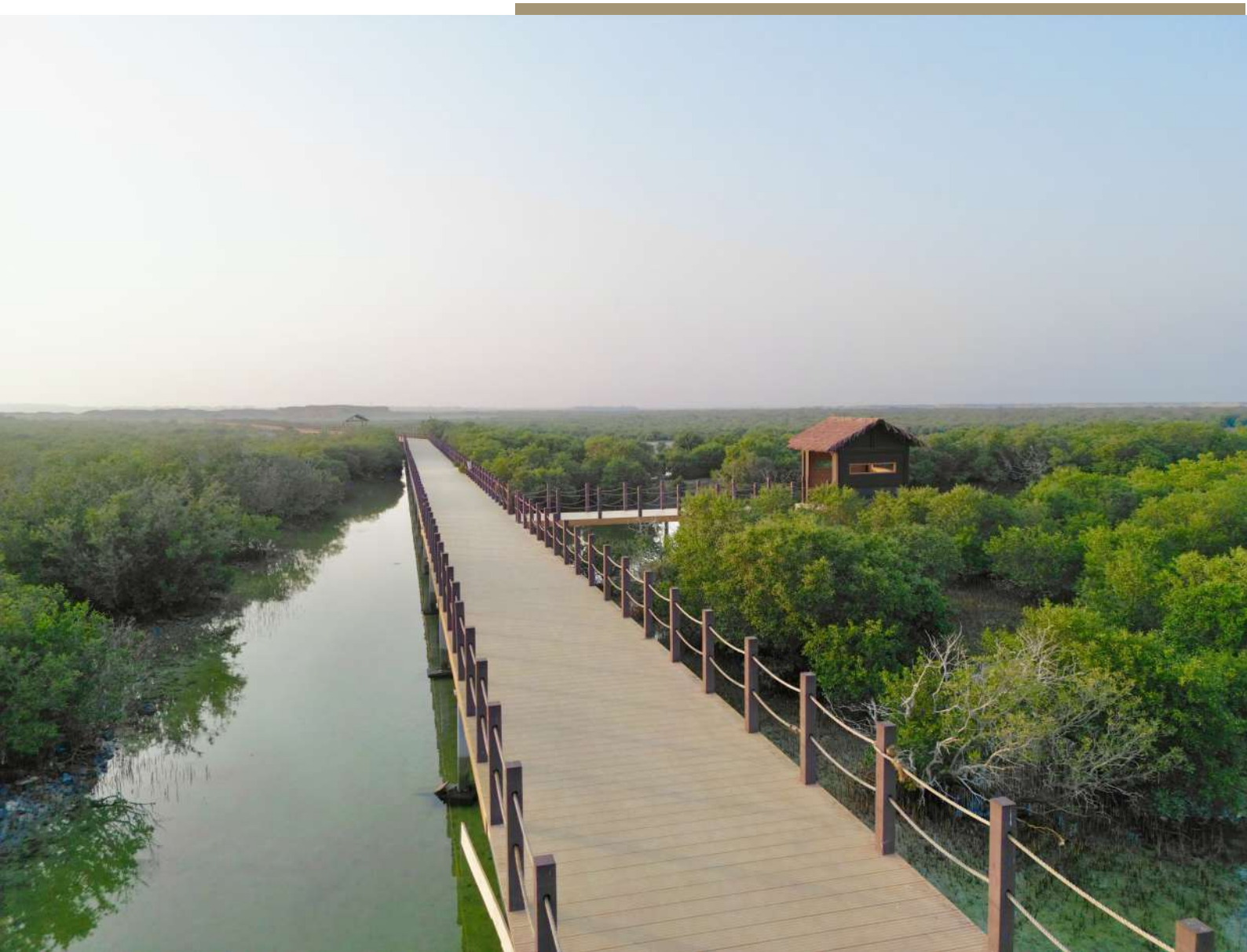
Table 8. Summary of Qatar's Early Warning Systems

Sector	System Name	Key Strengths and Role within NAP
Public Safety	• Public Warning System	Rapid, bilingual smartphone alerts; nationwide coverage
Critical Facilities	• Civil Defence-linked building systems & EWS	Legally mandated; advanced, networked emergency detection
Marine Environment	• Satellite-based Oil Spill Monitoring • Radiation Monitoring and Early Warning Network	Sensitive detection; all-weather capability; legal compliance
Air Quality	• Nationwide Monitoring Network & AQI Alerts • Radiation Monitoring and Early Warning Network	High fidelity air monitoring; real-time public alerts

By expanding early warning systems to address emerging climate-induced hazards (such as heatwaves, dust storms, and flash floods), enhancing collaboration across key ministries , and investing in capacity building and advanced technologies such as AI-driven analytics, Qatar is poised to ensure its Early Warning Systems remain agile, integrated, and effective in safeguarding its people and environment in a changing climate.

[3] Ministry of Environment and Climate Change, State of Qatar. (n.d.). Air quality conferences [Webpage]. Retrieved August 27, 2025, from the Ministry of Environment and Climate Change (MECC) website.
[4] Ministry of Environment and Climate Change, State of Qatar. (2025, June 22). Monitoring stations did not record any increases in radiation levels in Qatar [News release]. Qatar Tribune. Retrieved August 27, 2025, from Qatar Tribune website.

The Development Process of Qatar's National Adaptation Plan



5. The Development Process of Qatar's National Adaptation Plan

The Ministry of Environment and Climate Change (MECC) leads the development of Qatar's National Adaptation Plan (NAP), coordinating with national agencies, research institutions, academia, and other stakeholders. MECC oversees assessments, capacity-building, and engagement processes to identify and prioritise national adaptation needs.

The NAP covers six key sectors including water; agriculture and livestock; energy and industry; infrastructure and coastal resilience; biodiversity; and public health as well as six cross-cutting themes. The NAP emphasizes social inclusivity, and the needs of vulnerable groups, communities, and ecosystems. It promotes systems-based approaches and is guided by the best available science, utilising science-based indicators, metrics, and targets as well as local knowledge systems. Approaches such as ecosystem-based adaptation, disaster risk reduction, and intersectional strategies are incorporated to ensure adaptation is integrated into relevant socioeconomic and environmental policies and actions where appropriate.

The NAP was developed using a structured, evidence-based approach in line with the Paris Agreement and relevant UNFCCC guidelines. It recognises that many adaptation and diversification measures also provide mitigation co-benefits while ensuring consistency with Qatar's economic diversification objectives. At the same time, the plan acknowledges provisions under the UNFCCC and Kyoto Protocol regarding potential adverse economic impacts of global response measures on economies dependent on oil and gas exports. The NAP therefore balances resilience-building with economic welfare considerations.

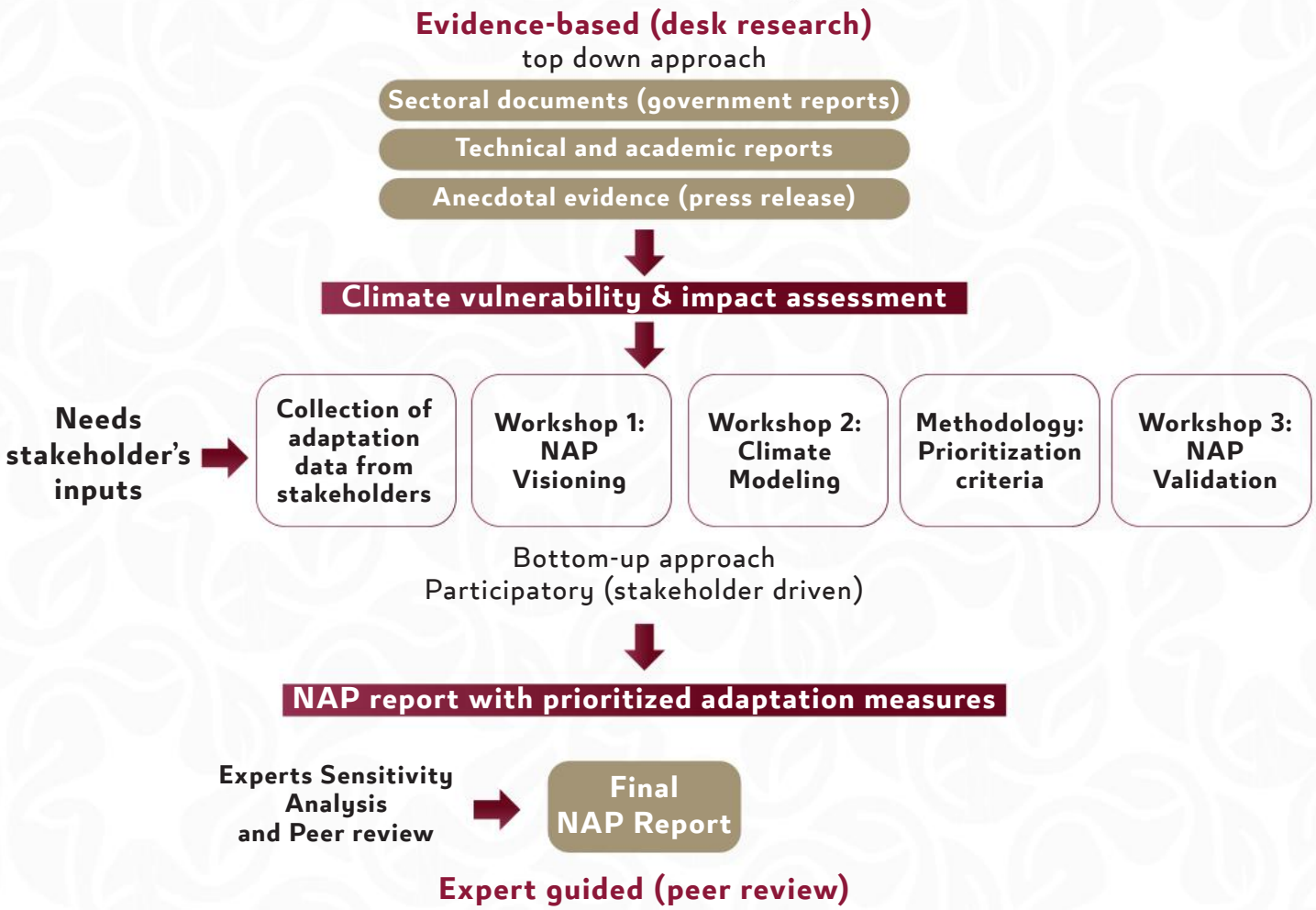
A national stocktaking exercise assessed existing adaptation measures, policies, and strategies, informed by international guidance, regional experiences, and national planning documents. This ensured the NAP reflects both best practice and Qatar's unique environmental, social, and economic context. The methodology combined top-down, evidence-based assessments with bottom-up, stakeholder-driven inputs. The top-down component synthesised available scientific, technical, and policy information to identify climate risks, vulnerabilities, and gaps. In parallel, the bottom-up component included structured consultations, bilateral engagements, and workshops across sectors to validate needs, identify priorities, and refine options.

To support decision-making, the NAP applied a prioritisation methodology based on Multi-Criteria Analysis (MCA). This approach evaluated adaptation options against stakeholder identified criteria, ensuring alignment with national objectives, climate risks, and economic considerations. Final prioritisation results were validated with Qatar sector experts to ensure feasibility, relevance, and cross-sectoral coherence.

The NAP complements Qatar's broader climate policy framework by supporting coherence between mitigation, economic diversification, and resilience-building efforts while contributing to sustainable development and green growth. National enabling activities such as awareness initiatives, institutional programs, and research further support implementation. Academic institutions also

contribute through research, training, and knowledge generation that enhance national capacity for climate resilience.

Figure 1. Methodological approach to stocktaking of data for Qatar's National Adaptation Plan





Sectoral Adaptation Measures and Actions



6. Sectoral Adaptation Measures and Actions

A total of 28 adaptation measures, 127 adaptation actions and more than 280 adaptation projects have been identified across six priority sectors and six cross-sectoral thematic areas. These were developed through a comprehensive and participatory stakeholder engagement process, which included desk-based research, adaptation questionnaires, national workshops, and bilateral consultations with relevant ministries and institutions. The identified measures and actions represent stakeholders planned adaptation efforts up to 2030 and are aligned with the Qatar National Vision 2030.

In line with UNFCCC reporting standards, which classify adaptation under policies, programs, and projects, the NAP structures its priorities into measures, actions, and projects. These terms are used here for clarity, but they directly correspond to internationally recognized categories, ensuring consistency with global NAP practice.

Adaptation measures (i.e. policies in UNFCCC terminology) are broad strategies aimed at reducing climate risks and increasing resilience.
Example: Climate-resilient and smart farming practices.

Adaptation actions (i.e. programs in UNFCCC terminology) are specific steps taken to implement a measure, often with clear targets or outputs to be achieved by 2030-2040.
Example: Promote climate-smart agriculture through techniques such as drip irrigation, precision agriculture, permaculture, and hydroponics.

Adaptation projects are concrete initiatives led by implementing agencies. These projects constitute the combined actions under a defined goal, with timeline.
Example: A project by the Ministry of Municipality to revise agricultural licensing procedures, including new quality standards, water use regulations, and other criteria to improve land productivity and efficiency.

Medium- and Long-Term Visions for Adaptation Planning in Qatar

Qatar aims to enhance climate resilience through a comprehensive, forward-looking adaptation strategy aligned with its national vision and global climate goals. These ambitions are framed around two key timelines:

- By 2030, the country aims to implement robust monitoring systems, regulatory measures, and awareness programs, integrating climate resilience into key sectors including water, biodiversity, energy and industry, agriculture and livestock, infrastructure and coastal resilience, and public health.
- By 2040, Qatar envisions an adaptive and sustainable society supported by advanced technologies. This long-term vision includes resilient infrastructure, smart cities, and ecosystem restoration initiatives, along with comprehensive climate education at all levels of society.

The following tables present a summary of the adaptation efforts which highlights the inclusive and participatory nature of Qatar's National Adaptation Planning process.

Table 9. Sectoral Adaptation Measures in Qatar's NAP

Sectors	Adaptation Measures (22)	Proposed Adaptation Actions No. (Count)
Agriculture and Livestock	1. Climate-Resilient and Smart Farming Practices. 2. Climate-Smart Livestock and Aquaculture. 3. Facilitating Climate-Informed Advisory and Risk Management Services in Agriculture.	17
Biodiversity	4. Regulatory, Policy Instruments, and Educational Campaigns for Biodiversity Protection. 5. Protected Areas, Natural Habitat Conservation and Ecological Connectivity. 6. Species and Genetic Conservation (In Situ and Ex Situ). 7. Monitoring, Research and Early Warning Systems for Biodiversity Conservation.	16
Energy and Industry	8. Economic Diversification. 9. Adaptation Measures with Mitigation Co-Benefits. 10. Mitigation and Energy Efficiency Measures with Adaptation Benefits. 11. Energy Infrastructure to Support and Improve Existing Adaptation Measures.	19
Water	12. National Strategy for Water Use, Reuse Efficiency, and Monitoring. 13. Development and Modernization of Water Infrastructure. 14. Water Resource Management and Ecosystem Restoration Measures. 15. Enhancing Awareness and Outreach including National Scale Studies.	13
Infrastructure and Coastal Resilience	16. Urban Planning, Green Infrastructure and Drainage Management. 17. Coastal and Flood Resilience. 18. Sustainable Transport and Mobility.	15
Public Health	19. Climate-Resilient Public Health Systems and Infrastructure. 20. Heat Stress Protection and Emergency Preparedness. 21. Monitoring, Surveillance, and Climate-Health Research. 22. Climate-Health Programs, Health Education and Training	15
Total (Sectoral Adaptation Actions)		**95**

Table 10. Cross-Sectoral Adaptation Measures in Qatar's NAP

	Adaptation Measures (6)	Proposed Adaptation Actions No. (Count)
1.	Integrated Water-Energy Nexus Adaptation Measures	4
2.	Environmental Health and Ecosystem-Linked Adaptation	4
3.	Early Warning Systems and Disaster Risk Management	7
4.	Circular Economy, Water Recycling and Circular Resource Use, Waste Management and Resource Efficiency	8
5.	Climate Data, Monitoring, and AI Integration	6
6.	Green Finance for Climate Adaptation and Environmental, Social, and Governance (ESG) Goals	3
	Total (Cross-Sectoral Adaptation Actions)	**32**

Each adaptation action is described in detail in Tables 11–38 below.

As part of Qatar's NAP development, a workshop was held to prioritize climate adaptation measures across the country's most climate-vulnerable sectors. Participants used a participatory, evidence-based process guided by pre-selected evaluation criteria. These criteria formed the basis for identifying and ranking adaptation measures into top, middle, and lower priorities within each sector and across sectors.

- **Criteria 1 - Effectiveness in reducing risk:** Extent to which a measure reduces vulnerability and mitigates climate risks
- **Criteria 2 - Environmental Sustainability:** Minimization of negative environmental impacts
- **Criteria 3 - Win-win Measures:** Address climate risks while also yielding socio-economic benefits
- **Criteria 4 - Strategic Importance:** Relevance of the measure in national strategies or sectoral planning
- **Criteria 5 - Importance of Damage Prevention:** Necessity of the measure to prevent major damages
- **Criteria 6 - Early Action Requirement:** Necessity of acting now to avoid higher future costs or damages
- **Criteria 7 - Efficacy:** How well the measure meets its intended objectives.

As a developing country, Qatar may require additional support to effectively implement the adaptation measures and actions outlined in this Plan, in accordance with Articles 4.7 and 12.4 of the UNFCCC.

Agriculture and Livestock Adaptation: Safeguarding Qatar's Food Security

The NAP envisions a climate-resilient agricultural and livestock sector that ensures food security, supports environmental sustainability, and aids economic diversification. This vision includes precision agriculture, smart irrigation, and sustainable feed practices to boost productivity while conserving resources.

By 2030, Qatar aims to increase domestic food production and improve agricultural performance by expanding local output and adopting modern, efficient technologies as outlined in the Qatar National Food Security Strategy 2030. National planning frameworks call for coordinated action among government entities, private sector actors, and research institutions to support sustainable production systems and strengthen national food security, consistent with the objectives described in Qatar's food-system pathway. Qatar's climate and environmental strategies set sector-wide mitigation and adaptation measures—covering land use, water, agriculture, and livestock—as part of the country's broader commitment to reduce emissions and enhance resilience.

Agriculture and Livestock (17 actions)

1. Climate-Resilient and Smart Farming Practices (7 actions)

Promotes drought-tolerant crops, regenerative agriculture, and climate-controlled greenhouses, including smart irrigation systems, seed banks, and algal tanks to boost food security, restore soil health, and adapt to rising temperatures and water stress.

2. Climate-Informed Advisory and Risk Management Services (4 actions)

Strengthens early warning systems, institutional coordination, and agricultural R&D, including irrigation efficiency studies and disease outbreak prevention, to help farmers manage climate risks and maintain productivity under extreme weather events.

3. Climate-Smart Livestock and Aquaculture (6 actions)

Enhances livestock and fishery resilience by introducing passive cooling systems, expanding local feed production, and developing coastal fish farms using Recirculating Aquaculture Systems (RAS) to adapt to heat stress, prevent overfishing, and minimize supply disruptions.



Table 11. Adaptation Measure 1. Climate-Resilient and Smart Farming Practices

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
1	Promote climate-smart agriculture, including smart irrigation (drip irrigation, precision agriculture, permaculture, and hydroponics).	• Modifying procedures and standards for issuing agricultural licenses to enhance the productivity and efficiency of agricultural lands. • Improve crop yields through climate-smart agricultural practices that support food security, including solutions for smart irrigation using IoT and AI Innovative technology. • Enhance soil health by adopting sustainable land management techniques. • Diversify and localize fertilizer production.	Improvement of existing adaptation measure.
2	Adopt organic and regenerative agriculture (e.g., composting, soil inoculation, mulching, and tree planting).	• Restore soil fertility through regenerative agricultural practices and organic matter enrichment. • Enhance biodiversity by promoting diverse crop species and supporting natural ecosystems. • Increase carbon sequestration by improving soil organic carbon levels and vegetation cover.	Improvement of existing adaptation measure.
3	Cultivate diverse, drought - resistant, salt-tolerant,and indigenous food crop varieties.	• Enhance food security by promoting resilient and sustainable agricultural systems. • Adapt to climate impacts such as rising temperatures, droughts, and floods through climate-smart practices.	Improvement of existing adaptation measure.
4	Establish seed-saving programs and seed banks.	• Ensure access to climate-resilient seeds to support sustainable agriculture under changing climate conditions. • Secure future harvests by improving seed quality, availability, and suitability for local environments. • Improve adaptation capacity of farmers and communities through resilient crop varieties and seed systems.	Improvement of existing adaptation measure.
5	Expand protected agriculture areas, including climate - controlled greenhouses.	• Shield crops from climate variability through protected agriculture systems (e.g., greenhouses, net houses). • Reduce pest exposure using controlled environments and integrated pest management. • Enhance yield and food security by ensuring stable growing conditions year-round. • Improve water efficiency and support sustainable resource use. • Target 55% self-sufficiency in key vegetable crops to strengthen local food production.	Improvement of existing adaptation measure.

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
6	Implement carbon sequestration through soil enrichment, algal tanks, tree planting and agroforestry	• Enhance soil organic content through practices like composting and cover cropping. • Stabilize ecosystems by promoting biodiversity and balanced land use. • Support climate resilience in agricultural landscapes through regenerative and sustainable farming practices.	Improvement of existing adaptation measure.
		• Installed solar-powered algal tanks using local algae to sequester carbon, enrich soil health, and improve air quality.	Planned adaptation measure.
7	Develop regenerative food supply chains to boost local farming and climate resilience.	• Expanded local market access for regenerative organic produce via farm sales, markets, deliveries, supermarkets, and premium hotels. • Improve nutritional diversity by encouraging the consumption of a variety of nutrient-rich crops. • Increase agricultural sustainability and food security by boosting local production and reducing reliance on food imports	Improvement of existing adaptation measure.

Table 12. Adaptation Measure 2. Facilitating Climate-Informed Advisory and Risk Management Services

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
8	Strengthen early warning systems for climate risks in agriculture.	• Improve preparedness and disaster response to extreme weather events, mitigating financial losses and ensuring continuity in food systems.	Improvement of existing adaptation measure.
9	Strengthen institutional coordination and climate adaptation planning.	• Enhance cross-sectoral collaboration by integrating agriculture, livestock, and water resource management into climate adaptation policies.	Improvement of existing adaptation measure.
10	Invest in agricultural R&D, including irrigation efficiency and market competitiveness.	• Adapt agriculture to water scarcity through research-driven innovation that boosts food production and reduces import dependence.	Planned adaptation measure.
11	Strengthening biosecurity and food safety (disease prevention, veterinary care, and emergency response)	• Preventing plant and animal disease outbreaks, improve livestock health, and ensure food safety and production continuity.	Improvement of existing adaptation measure.

Table 13. Adaptation Measure 3. Climate-Smart Livestock and Aquaculture

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
12	Expand local livestock feed production and improve efficiency in dairy and poultry farming.	• Strengthen self-sufficiency and reduce market vulnerability through contingency planning and optimized local feed production.	Improvement of existing adaptation measure.
13	Develop climate-resilient livestock management, including rotational grazing and adaptive feeding strategies.	• Enhance pasture resilience through sustainable grazing and land management practices. • Prevent overgrazing by promoting rotational grazing and vegetation recovery. • Improve livestock productivity by ensuring healthier forage and better pasture conditions. • Reduce dependency on imported feed by strengthening local fodder production systems.	Improvement of existing adaptation measure.
14	Introduce passive design and nature-based solutions for livestock cooling, including renewable energy use	• Reduce heat stress and emissions by integrating shading, ventilation, and alternative cooling technologies in livestock systems.	Improvement of existing adaptation measure.
15	Expand sustainable aquaculture and marine stock enhancement.	• Ensure seafood availability by advancing aquaculture to offset declining wild catch and reduce overfishing, with a focus on high-value species.	Improvement of existing adaptation measure.
16	Promoting sustainable fisheries and aquaculture to enhance climate resilience and ensure long-term food security.	• Enhance marine fish stock through production and release of juvenile fish and monitor impacts on fish populations. • Support fish farms by providing essential inputs such as feed to maintain productivity. • Improve fishing ports and facilities to enhance resilience and efficiency in the fisheries sector. • Support fishermen and related activities through targeted initiatives that improve livelihoods and adaptive capacity.	Improvement of existing adaptation measure.
		Establish coastal fish farms using Recirculating Aquaculture Systems (RAS) in partnership with the private sector to boost sustainable fish production	Planned adaptation measure.
17	Promote private-sector engagement in sustainable livestock production (red meat, dairy, and poultry).	• Build resilience in the livestock sector through modernized production methods, knowledge transfer, and adoption of market-driven sustainability practices.	Improvement of existing adaptation measure.

Biodiversity Conservation: Preserving Qatar's Natural Heritage

- Qatar's 2030 objectives for the biodiversity sector include developing open-access data platforms and comprehensive biodiversity mapping systems to enable effective monitoring and conservation of high-biodiversity areas. Industrial stakeholders will be engaged to support conservation efforts, and a National Biodiversity Action Plan will establish governance frameworks, enforce policies, and define stakeholder roles in ecosystem preservation.
- By 2040, Qatar envisions healthier and more resilient ecosystem (both marine and terrestrial) supported by targeted restoration and conservation programs. Preservation of local species will be pursued and conservation projects will be driven by data-informed policies. Qatar also aims to strengthen its role as a regional leader in applied biodiversity science, promoting cross-sector collaboration to safeguard natural assets.

vent overfishing, and minimize supply disruptions.

Biodiversity (16 actions)



1. Regulatory, Policy Instruments, and Educational Campaigns for Biodiversity Protection (4 actions)

Strengthens Qatar's resilience to biodiversity loss by enacting net-positive biodiversity legislation, considering offset programs and building public awareness through education and stakeholder capacity-building initiatives.



2. Protected Areas, Natural Habitat Conservation, and Ecological Connectivity (4 actions)

Enhances ecosystem resilience to climate change by expanding protected areas, creating wildlife corridors, restoring wetlands, such as Al Thakira, and safeguarding terrestrial, coastal, and aquifer habitats.



3. Species and Genetic Conservation (In Situ and Ex Situ) (4 actions)

Safeguards biodiversity under climate stress through genomics research on Qatari flora, in vitro propagation of endangered plants, and species conservation plans that protect genetic diversity and control invasive species.



4. Monitoring, Research, and Early Warning Systems for Biodiversity Conservation (4 actions)

Improves adaptive management by tracking ecosystem changes through biodiversity assessments of temporary desert meadows (known as "Rawdat"), digitized herbarium records, AI-based threat detection, and expanded research and early warning systems.

Table 14. Adaptation Measure 1. Regulatory, Policy Instruments, and Educational Campaigns for Biodiversity Protection

No.	Adaptation Actions	Outputs for 2030-2040 Timelinet	Type of Adaptation Actions
1	Introduce a legislative obligation for all projects to demonstrate net-positive design measures for biodiversity protection and conservation.	• Enact legislation mandating net-positive biodiversity measures, requiring all development projects to contribute to biodiversity conservation. • Establish a compliance framework with clear guidelines, assessment criteria, and approval processes to ensure biodiversity-positive project design. • Implement monitoring and enforcement mechanisms, including audits, field inspections, and penalties for non-compliance.	Planned adaptation measure.
		• Strengthening legal and institutional frameworks for species protection by enhancing enforcement, promoting stakeholder collaboration, and raising public awareness.	Improvement of existing adaptation measure.
		• Using treated wastewater (TSE) instead of potable water for cooling, the system significantly reduces pressure on natural water resources and minimizes impacts on coastal, wetland, and mangrove ecosystems. The project integrates environmental impact assessments in site selection and operational practices, supporting NAP priorities for sustainable resource use and biodiversity protection while demonstrating the application of net-positive design principles in urban infrastructure.	Planned adaptation measure. Biodiversity-Positive Infrastructure
2	Expand the use of marine spatial planning (MSP) for biodiversity conservation.	• Develop an integrated Marine Spatial Planning (MSP) framework to regulate marine resource use with a strong focus on biodiversity conservation. • Identify and designate key biodiversity areas within Qatar's Exclusive Economic Zone (EEZ) to guide protection and sustainable use. • Establish marine protection zones aligned with international best practices for sustainable ocean governance. • Implement stakeholder engagement initiatives to ensure inclusive planning involving fisheries, energy, and conservation sectors.	Improvement of existing adaptation measure.

No.	Adaptation Actions	Outputs for 2030-2040 Timelinet	Type of Adaptation Actions
3	Establish a biodiversity offset program to promote sustainable development.	• Create a regulatory framework mandating developers to offset biodiversity loss through targeted conservation investments. • Establish a national biodiversity fund, financed by biodiversity impact fees collected from development projects. • Implement ecological restoration projects using offset funds, with a focus on rehabilitating degraded coastal and terrestrial habitats.	Planned adaptation measure.
4	Build capacity and promote educational campaigns on the value of natural capital, biodiversity protection and conservation.	• Promote biodiversity awareness through social media, TV, public events, and outreach materials; integrate biodiversity into school curricula and community initiatives; support citizen science and community-led conservation projects. • Train educators, tour operators, and community leaders to effectively promote biodiversity awareness and stewardship. • Equip research institutions, government bodies, and the private sector with tools, infrastructure, and best practices for biodiversity conservation, offset implementation, and plant biotechnology. • Conduct capacity-building programs for regulatory authorities, policymakers, and stakeholders to enhance implementation of biodiversity-positive practices and long-term sustainability.	Improvement of existing adaptation measure.

Table 15. Biodiversity Conservation Adaptation Measure 2. Protected Areas, Natural Habitat Conservation and Ecological Connectivity

No.	Adaptation Actions	Outputs for 2030-2040 Timelinet	Type of Adaptation Actions
5	Establish new and enhanced protected areas, ensuring connectivity through ecological corridors.	• Designate new protected areas and upgrade existing ones to conserve Qatar's terrestrial and marine biodiversity effectively. • Create ecological corridors to connect fragmented habitats, enabling species migration, genetic flow, and increased ecosystem resilience to climate change and habitat loss. • Develop habitat maps and conduct ecological baseline studies to inform strategic conservation planning, trend monitoring, and adaptive management. • Strengthen surveillance and enforcement mechanisms using ranger deployment, remote sensing, and compliance systems to protect conservation zones from illegal activities and degradation.	Improvement of existing adaptation measure.

No.	Adaptation Actions	Outputs for 2030-2040 Timelinet	Type of Adaptation Actions
6	Protect and enhance natural spaces, including terrestrial ones, coastal, and aquifers.	• Designate and expand protected natural areas to ensure legal protection and effective management of critical terrestrial, coastal, and aquifer ecosystems. • Restore and conserve ecosystems through reforestation, habitat rehabilitation, and resilience-building measures. • Implement habitat enhancement projects, including native vegetation planting, erosion control, and sustainable water resource management to support biodiversity. • Develop long-term management strategies that integrate ecological monitoring, community engagement, and adaptive conservation planning.	Improvement of existing adaptation measure.
7	Improving Qatar's biodiversity and ecosystem sustainability to enhance the management and conservation of protected areas	• Strengthening management plans for protected areas by incorporating adaptive strategies, stakeholder input, and sustainable resource use practices. • Implement ecosystem restoration initiatives, including habitat rehabilitation, native species reintroduction, and improving ecological connectivity. • Enhance biodiversity monitoring and reporting systems through remote sensing, field surveys, and data analytics to assess ecosystem health and track conservation progress.	Improvement of existing adaptation measure.
8	Strengthen the sustainable management of Qatar's wetlands	• Implement a wetland restoration program targeting critical ecosystems such as Al Thakira Mangroves and inland sabkhas. • Develop policies for regenerative tourism and promote eco-friendly recreational activities in wetland areas to support conservation and sustainable use. • Establish water management strategies to maintain optimal salinity levels and support the ecological health of wetland habitats.	Improvement of existing adaptation measure.

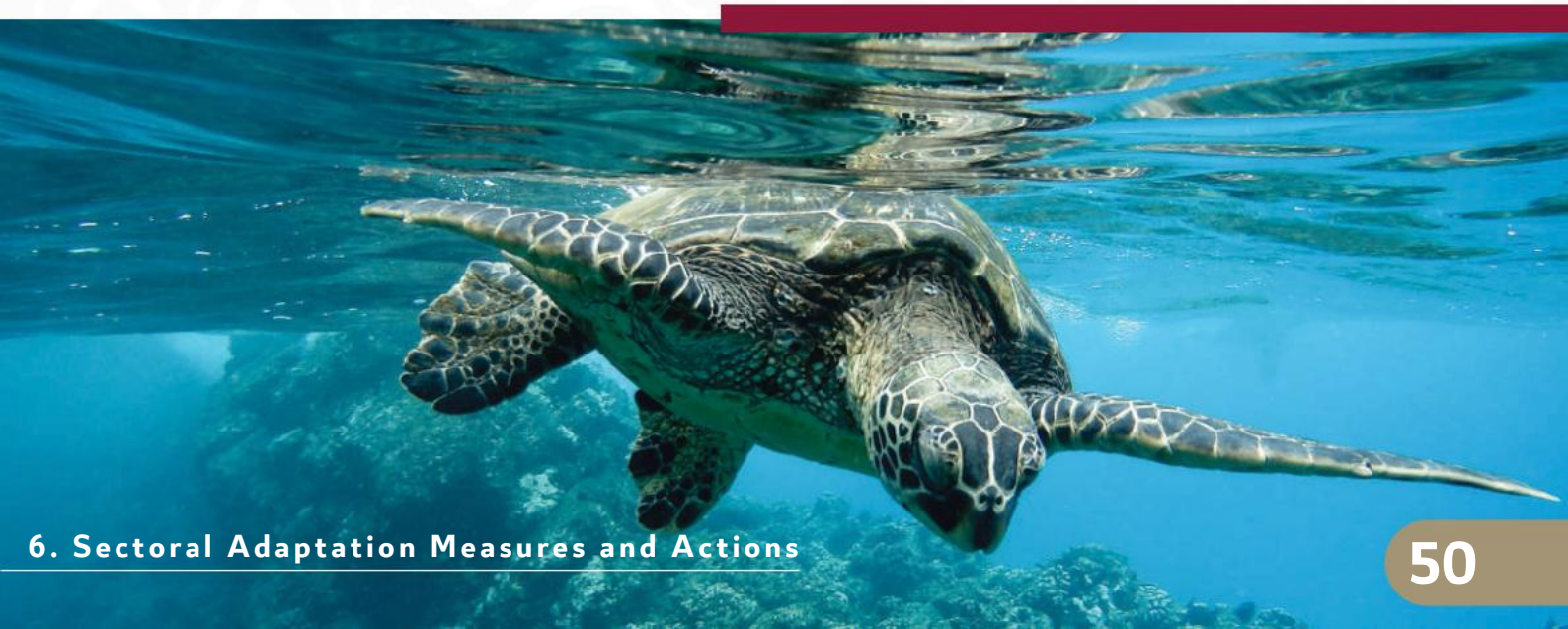


Table 16. Biodiversity Conservation Adaptation Measure 3. Species and Genetic Conservation (In Situ and Ex Situ)

No.	Adaptation Actions	Outputs for 2030-2040 Timelinet	Type of Adaptation Actions
9	Multi-omics analysis to provide key genomic adaptation of Qatari flora to climate change	• Develop a genomic database of Qatari flora to document adaptations to climate change, aiding researchers and conservationists in understanding genetic resilience. • Identify climate-resilient plant species and traits to guide targeted conservation and restoration of native vegetation. • Produce scientific publications and policy recommendations to ensure research findings inform national biodiversity policies and climate adaptation strategies. • Apply genomic insights in habitat restoration and agriculture to support the selection and propagation of climate-adapted species for long-term ecosystem sustainability.	Improvement of existing adaptation measure
10	Developing in vitro regeneration protocols to maintain biodiversity in endangered native Qatari plant species	• Establish in vitro regeneration protocols for endangered native plant species to enable large-scale propagation and conservation. • Conserve genetic material through seed banks and tissue culture to ensure long-term viability and availability for future restoration efforts. • Integrate in vitro propagation into habitat restoration projects, supporting the reintroduction of endangered species to enhance biodiversity resilience.	Improvement of existing adaptation measure.
11	Exploring the genetic diversity of Qatari native plants to identify the key genetic factors for their conservation	• Develop a comprehensive genetic diversity database of Qatari native plants, documenting species variations, genetic markers, and population dynamics to inform conservation planning. • Identify key genetic traits for adaptation and resilience, enabling targeted protection of robust plant species and ecosystems. • Produce scientific reports and policy recommendations to ensure genetic research supports national biodiversity protection strategies and environmental policymaking. • Apply genetic insights in habitat restoration and species management by selecting and propagating climate-adapted native plants to strengthen ecosystem resilience.	Improvement of existing adaptation measure.

No.	Adaptation Actions	Outputs for 2030-2040 Timelinet	Type of Adaptation Actions
12	Species conservation and management, including protection of threatened species and preservation of genetic diversity as well as controlling the spread of invasive species	• Develop conservation action plans for threatened species, outlining targeted measures for habitat protection, population recovery, and long-term sustainability. • Preserve genetic diversity through seed banks and breeding programs to ensure the survival of native plant and animal species facing environmental and climate threats. • Implement invasive species control programs with robust monitoring systems, early detection, rapid response, and long-term management to safeguard biodiversity.	Improvement of existing adaptation measure.

Table 17. Biodiversity Conservation Adaptation Measure 4. Monitoring, Research and Early Warning Systems for Biodiversity Conservation

No.	Adaptation Actions	Outputs for 2030-2040 Timelinet	Type of Adaptation Actions
13	Assessment of habitat biodiversity in Qatar's Rawdat to understand the influence of the current and future climate change scenarios.	• Produce a comprehensive biodiversity assessment report for Qatar's Rawdat habitats, documenting species diversity, ecosystem health, and conservation priorities. • Conduct climate change impact analysis on terrestrial ecosystems to assess current and future effects on biodiversity, habitat stability, and ecosystem functionality. • Establish a centralized database of species distribution and habitat conditions to support biodiversity monitoring and inform policy and research. • Develop adaptive management strategies with science-based recommendations to mitigate climate risks and strengthen ecosystem resilience.	Improvement of existing adaptation measure.
14	Digitisation of herbarium collection specimens to track changes in desert ecosystems over time, providing insights into climate change impacts.	• Develop a digitized herbarium database with high-resolution specimen images and metadata to support accessible research and conservation efforts. • Conduct comparative analyses of historical and current plant distributions to track species presence, abundance, and habitat range shifts over time. • Generate insights into long-term climate change impacts on desert ecosystems to inform predictions and conservation planning. • Integrate digital herbarium data into biodiversity monitoring programs, enabling real-time tracking of vegetation trends and ecosystem health in Qatar.	Improvement of existing adaptation measure.

No.	Adaptation Actions	Outputs for 2030-2040 Timelinet	Type of Adaptation Actions
15	Strengthen monitoring and research frameworks to support biodiversity conservation and adaptation.	• Enhance biodiversity monitoring systems using standardized protocols for consistent data collection, analysis, and reporting to effectively track ecosystem changes. • Expand conservation and climate adaptation research programs to advance scientific understanding of species resilience, habitat restoration, and adaptive management. • Establish centralized biodiversity databases, advanced monitoring tools, and regional cooperation in data sharing and research. Integration of regional risk scoring and predictive modelling would enhance Qatar's capacity to assess species vulnerability, ecosystem productivity, and climate-driven stressors, improving the effectiveness of adaptation actions. • Develop data-driven decision-making tools for policymakers by integrating real-time biodiversity and climate data into legislative and conservation planning.	Improvement of existing adaptation measure.
16	Develop an early warning and response system for biodiversity threats.	• Implement an AI-based monitoring network to detect and respond to biodiversity threats such as habitat destruction and illegal poaching in real time. • Enhance the national biodiversity emergency response framework to effectively manage and mitigate ecosystem degradation events. • Conduct training programs for enforcement agencies and conservationists on rapid response and intervention techniques. • Create a centralized biodiversity threat database to improve stakeholder coordination, data sharing, and informed decision-making.	Improvement of existing adaptation measure.



Energy and Industrial Resilience: Securing Qatar's Energy and Industrial Future

- In the energy sector, Qatar's 2030 objective focuses on adoption of district cooling systems and enhancing green building standards to reduce urban energy consumption, which are considered one of the effective solutions for climate change adaptation. The national Tarsheed Program plays a key role in reducing greenhouse gas emissions and enhancing the energy sector's resilience to rising temperatures. Strengthened solar energy infrastructure and mandatory energy-efficient cooling technologies in buildings will also play key roles in reducing emissions.
- Qatar's Transportation Master Plan for Qatar sets a foundation for a sustainable and low-carbon transport future. It envisions an efficient, environmentally friendly system that promotes the use of electric and low-emission vehicles, supported by modern public transit networks such as electric buses, metro lines and trams. The plan also encourages active and integrated mobility through walking and cycling pathways, reflecting Qatar's commitment to reducing emissions and improving urban liveability. TMPQ marks a significant step towards greener, more resilient transportation systems aligned with the nation's climate and sustainable development goals.

Energy and Industry (19 actions)



1. Mitigation and Energy Efficiency Measures with Adaptation Benefits (6 actions)

Enhances energy system resilience by adopting solar power, electric vehicles, green appliances, energy-efficient HVAC systems, and solar water heaters.



2. Energy Infrastructure to Support and Improve Existing Adaptation Measures (3 actions)

Strengthens foundational infrastructure through greenfield projects and retrofits to ensure energy reliability and support broader climate adaptation efforts.



3. Economic Diversification (5 actions)

Reduces climate and market vulnerability by expanding sustainable economic zones, investing in clean tech Research and Development (R&D), building a future-ready workforce, and supporting circular industries.



4. Adaptation Measures with Mitigation Co-Benefits (5 actions)

Improves climate resilience while cutting emissions through smart energy actions, such as installing peaking power units, weather-responsive cooling systems, and smart meters, to optimize utility use and reduce stress on infrastructur.

Table 18. Adaptation Measure 1. Mitigation and Energy Efficiency Measures with Adaptation Benefits

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
1	Adoption of solar power energy, electric vehicles (EVs) and EV charging stations.	• This measure is being implemented to significantly reduce carbon emissions and reduce air pollution that can mitigate the health risks associated with respiratory diseases, providing a dual benefit for climate adaptation and public well-being.	Improvement of existing adaptation measure.
2	Promote energy efficient technologies for cooling for both consumers and producers (e.g., green labels for appliances and other electronics).	• Introducing green labels for appliances and other electronics to promote energy-efficient choices and raise consumer awareness.	Improvement of existing adaptation measure.
3	Specify High Efficiency Heating, Ventilation, and Air Conditioning (HVAC) systems, mainly for chilled water system.	• Use high-efficiency chillers (air-cooled or water-cooled) in buildings to significantly reduce energy consumption and operational expenses.	Improvement of existing adaptation measure.
4	Design and install solar-powered hot water systems.	• Implement solar water heating systems in buildings with high hot water demand to reduce energy use and operational costs.	Improvement of existing adaptation measure.
5	Adopt inverter type compressor to enhance performance and energy saving.	• Improve HVAC system performance and lifespan through energy-saving inverter technology.	Improvement of existing adaptation measure.
6	Utilize climate-aligned financial mechanisms to scale energy - efficient development.	• Mobilize climate-aligned financing and incentive mechanisms to support energy-efficient district cooling systems, delivering mitigation benefits while enhancing resilience to increasing cooling demand and heat stress.	Improvement of existing adaptation measure.



Table 19. Adaptation Measure 2. Energy Infrastructure to Support and Improve Existing Adaptation Measures

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
7	Develop a framework for the Qatar Building Energy Certificate program.	• Promote energy-efficient building practices to lower building-related emissions and strengthen the resilience of the energy system.	Improvement of existing adaptation measure.
8	Increase operational efficiency by repurposing materials and upgrading systems.	• Support emission reduction through building retrofits, circular practices, passive cooling, and natural lighting.	Improvement of existing adaptation measure.
9	Deploy Battery Energy Storage Systems to ensure backup power, stabilize renewable supply, and reduce reliance on vulnerable grids during climate disruptions.	• Enhance energy resilience, stabilize renewable power supply, and ensure continuous operation of critical services during climate-related disruptions.	Improvement of existing adaptation measure.

Table 20. Adaptation Measure 3. Economic Diversification

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
10	Establish climate-resilient economic zones.	• Develop and expand special economic zones with resilient infrastructure to attract low-carbon industries.	Improvement of existing adaptation measure.
11	Promote climate innovation and green technology through industrial decarbonisation and green manufacturing.	• Support research and development in clean energy, water efficiency, and climate-smart industrial technologies. • Advance the accreditation and growth of Energy Services Companies (ESCOs) to foster green enterprises, generate employment, and improve energy efficiency for climate resilience. • Implement circular economy practices by converting industrial waste into green alternatives, decreasing reliance on raw materials and supporting low-emission manufacturing.	Improvement of existing adaptation measure.
12	Strengthen climate-resilient tourism.	• Develop eco-tourism, cultural tourism, and sports tourism in line with the Qatar National Tourism Strategy 2030.	Improvement of existing adaptation measure.

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
13	Support research and innovation in clean energy.	• Establish climate-energy innovation hubs focused on solar, and smart grids, creating a new knowledge-based economy sector. • Provide funding incentives for startups and universities working on clean technology solutions.	Improvement of existing adaptation measure.
14	Develop green workforce and skills in energy sector.	• Launch specialized training programs in renewables and energy management, equipping workers with future-ready skills. • Create new jobs across the clean energy value chain, including manufacturing, installation, and system operations.	Improvement of existing adaptation measure.

Table 21. Adaptation Measure 4. Adaptation Measures with Mitigation Co-Benefits

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
15	Install peaking power units to ensure grid stability during extreme weather.	• Optimize their operation to reduce emissions, providing additional capacity during peak demand while enhancing climate resilience.	Improvement of existing adaptation measure.
16	Implement smart meters to monitor utility consumption.	• Enhance monitoring and efficient management of utility consumption through smart meters leading to reduced resource use and lower operational emissions.	Improvement of existing adaptation measure.
17	Establish control mechanisms for weather-responsive cooling systems.	• Reduce energy consumption of cooling systems through a winter savings plan, enhancing climate resilience while lowering greenhouse gas emissions and operational costs.	Improvement of existing adaptation measure.
18	Implement an intelligent street lighting control management system.	• Use smart systems to dim lights automatically based on real-time demand, maintaining safety while saving energy. • Equip with motion sensors that activate higher lighting levels only when movement is detected. • Minimize power use by switching off lights in unoccupied areas.	Improvement of existing adaptation measure.
19	Design of Domestic Water pumping system with Variable Speed Drives (VSD).	• Install Variable Speed Drives (VSD) on pumping systems to reduce continuous pump operation, resulting in energy savings and longer equipment lifespan.	Improvement of existing adaptation measure.

Water Management: Sustainable Use of Qatar's Water Resources

- By 2030, Qatar aims to establish an efficient water management system across residential, commercial, and agricultural sectors. Advanced monitoring technologies will minimize water losses and enhance data-sharing frameworks will improve coordination among water-related stakeholders. Regulatory reforms will promote responsible water use, including tariff adjustments and policies that encourage greywater reuse and treated wastewater for irrigation.
- By 2040, Qatar envisions an integrated water resilience model featuring low-carbon desalination technologies. Sustainable drainage systems, groundwater reserve protection, and predictive analytics will enable proactive water management. Ecosystem-based strategies will also be incorporated to safeguard coastal and marine water resources.

Water (13 actions)



1. National Strategy for Water Use, Reuse Efficiency, and Monitoring (5 actions)

Improves water security by regulating usage, expanding greywater and treated sewage reuse in Heating, Ventilation, and Air Conditioning (HVAC) and agriculture, reducing non-revenue water losses, and enabling real-time monitoring through a national water database.



2. Development and Modernization of Water Infrastructure (2 actions)

Strengthens system reliability through green infrastructure, smart reservoir systems, aquifer storage projects, and upgraded wastewater facilities that increase recycling and resilience during peak demand or drought conditions.



3. Water Resource Management and Ecosystem Restoration Measures (3 actions)

Restores natural systems by reactivating wadis, assessing groundwater resources, and designing wetlands to improve water retention, biodiversity, and flood control under climate stress.



4. Enhancing Awareness and Outreach including National-Scale Studies (3 actions)

Builds public and institutional adaptive capacity through conservation campaigns, water footprint education, and comprehensive studies on sustainability and desalination impacts to inform national policy.

[5] Wadis are valleys, ravines, or channels that are dry except in the rainy season

Table 22. Adaptation Measure 1. National Strategy for Water Reuse, Resue Efficiency and Monitoring

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
1	Implement comprehensive measures to regulate and reduce water usage across all sectors, focusing on efficiency	• Establish a centralized data management system for real-time water monitoring and data sharing to support improved decision-making and stakeholder coordination.	Improvement of existing adaptation measure.
		• Develop and operationalize an Integrated Water Resource Database for Qatar, integrating research and studies in alignment with Qatar National Vision 2030, under the guidance of the Permanent Water Resources Committee. • Design greywater systems to collect, treat, and reuse water from showers and washbasins for irrigation, car washing, and toilet flushing. • Strengthen and expand Tarsheed Program and Building Efficiency Code to promote water conservation, enhance demand management, and integrate behavioural change initiatives across residential, commercial, and industrial sectors. • Enhance coordination between Tarsheed initiatives and national water efficiency programs to ensure integrated management of water and energy resources.	Planned adaptation measure.
2	Reduction of Non-Revenue Water losses and improvement of water network efficiency.	• Conduct a Pipe Turbidity Study to assess the durability and defects of pipe materials and evaluate water losses, as a basis for developing a strategy and action plan to reduce Non-Revenue Water. • Identify and address sources of water loss, especially from shallow groundwater and distribution systems, to ensure adequate water supply and strengthen resilience during droughts or periods of water scarcity. • Complete Zero Pressure Testing in District Metered Areas, carry out water balance assessments and leak detection, use in-line acoustic leak detection for medium and large diameter mains, and implement a three-year leak detection program for large pipelines.	Improvement of existing adaptation measure.

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
3	Store surplus treated sewage effluent (TSE) in winter and expand the treated water distribution network to ensure reliable water availability during peak summer demand.	• Store excess TSE during periods of low demand in winter for reuse during summer peak demand. • Develop a supply network for treated water reuse in landscaping, cooling plants, agriculture, and industries.	Improvement of existing adaptation measure.
		• Design and specify the use of TSE in water-cooled chilled systems to reduce reliance on freshwater and enhance water efficiency. • Assess existing foul and treated effluent water infrastructure within natural catchments to identify opportunities for safe and efficient water reuse.	Planned adaptation measure.
4	Utilize treated wastewater in Heating, Ventilation, and Air Conditioning (HVAC) systems instead of potable water to conserve freshwater resources.	• Implement agreements with local authorities to shift HVAC systems from potable water to treated sewage effluent (TSE), eliminating potable water use and enhancing water resource sustainability. • Qatar Cool has pioneered the use of treated sewage effluent (TSE) in district cooling systems, replacing potable water with non-potable sources to enhance water resource sustainability and reduce reliance on energy-intensive desalination.	Improvement of existing adaptation measure.
5	Implement the Water Law (issued in October 2025; Law No. 23/2025) and its regulations.	• Enforce the Water Law to regulate water use, management, and conservation, ensuring clear enforcement mechanisms, institutional coordination, and compliance measures are established.	Planned adaptation measure

Table 23. Adaptation Measure 2. Development and Modernization of Water Infrastructure

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
6	Develop green and smart infrastructure for efficient water management, including rainwater harvesting, flood control, and improved irrigation methods.	• Expand rainwater harvesting infrastructure to reduce reliance on desalinated water for supply. • Design and operate large-scale water reservoirs using advanced technologies and best practices to enhance structural integrity, flexibility, and resilience to climate change, integrating smart water management systems (e.g., SCADA) for demand management, optimized operations, leak detection, and water quality monitoring.	Improvement of existing adaptation measure.

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
7	Develop and upgrade infrastructure to promote water reuse and recycling through the safe and efficient use of treated wastewater across all sectors.	• Establish permanent industrial wastewater treatment facilities to enable the reuse of treated effluent in light to medium industries. • Rehabilitation of sewage treatment plant facilities by enhancing wastewater treatment capacity and efficiency and implementing advanced technologies - to recycle and use treated sewage effluent (TSE).	Improvement of existing adaptation measure.
		• Construct and Implement the ASR (Aquifer Storage and Recovery) project to ensure that domestic demand for water is met. • Enhance coordination through the Tarsheed Program to improve water–energy efficiency. • Implement Strategic Project INWARD to integrate water data from all sector stakeholders for coordinated management.	Planned adaptation measure.

Table 24. Adaptation Measure 3. Water Resources Management and Ecosystem Restoration Measures

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
8	Reactivation of natural wadis (streams) to harness and manage water resources efficiently.	• Restore vegetation and ecosystems, manage water quality, and apply seasonal water management strategies to reduce flood risks and support natural water systems. • Strengthen coordination and promote the integration of energy and water efficient cooling technologies that complement natural water resource management and reduce demand on freshwater and energy systems.	Planned adaptation measure.
9	Ground water assessment and surficial ground water collection.	• Evaluate groundwater levels, recharge areas, and water quality, as well as surface–groundwater interactions within catchment areas, and incorporate surficial groundwater collection and purification techniques for dry-weather periods. • Promote energy and water efficiency upgrades in groundwater extraction, treatment, and distribution systems through Tarsheed initiative acting as a national Super ESCO, facilitating performance contracting and investment in efficiency improvements.	Improvement of existing adaptation measure.
10	Wetland design, restoration and storage assessments.	• Conduct field surveys and apply ecological modelling to identify potential wetland sites, assess their environmental characteristics, and evaluate their impact on biodiversity and water treatment within the watershed.	Improvement of existing adaptation measure.

Table 25. Adaptation Measure 4. Enhancing Awareness and Outreach including National Scale Studies

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
11	Community Awareness Programmes for Water Conservation in Residential Sectors.	• Encourage sustainable water conservation behaviour and mindset in society to optimize household water usage. • Strengthen Tarsheed Program as the national driver of water-conservation awareness and behavioural change.	Improvement of existing adaptation measure.
12	Improve water footprint through awareness raising and educational campaigns on reducing consumption.	• Increase the adaptive capacity of the water sector by reducing water consumption among the public, as well as public and private establishments.	Improvement of existing adaptation measure.
13	Enhanced policies that support water sustainability.	• A comprehensive study on water management in Qatar to support sustainability policies, covering four components on water resources, management practices, and the environmental impact of desalination across the country. • Integrate water-efficiency and conservation standards into national policies supporting long-term water sustainability. • Implement the new Qatar Water Law to strengthen regulation, coordination, and sustainable water management.	Improvement of existing adaptation measure.

Infrastructure and Coastal Resilience: Ensuring Infrastructure Endurance

- Qatar's 2030 objectives for the infrastructure sector focus on developing flood-prevention systems, updating urban development standards to address climate risks, and incorporating smart technology for climate impact monitoring and response. A comprehensive Master Plan for transportation and urban infrastructure will ensure all new projects adhere to resilience standards.
- By 2040, Qatar envisions resilient smart cities capable of withstanding extreme climate conditions. Green spaces will be integrated to mitigate heat, while advanced technologies will enhance infrastructure management. Coastal zones will be fortified with physical defences like seawalls and nature-based solutions such as mangrove restoration. Real-time data collection and predictive analytics will be embedded in infrastructure planning to bolster resilience and safety for both urban and coastal communities.

Infrastructure and Coastal Resilience (15 actions)



1. Urban Planning, Green Infrastructure, and Drainage Management (9 actions)

Improves resilience to floods and heat by integrating stormwater systems, green-certified buildings, shaded walkways, underground utilities and tree planting.



2. Coastal and Flood Resilience (3 actions)

Protects vulnerable coastlines and infrastructure through sea wall upgrades, storm surge modelling, shoreline monitoring, and flood prevention plans using nature-based drainage solutions, such as environmental focal areas.



3. Sustainable Transport and Mobility (3 actions)

Supports climate-resilient mobility by piloting autonomous vehicles, transitioning taxi fleets to low-emission vehicles, and studying climate risks to transport infrastructure, such as metro networks.

Table 26. Adaptation Measure 1. Urban Planning, Green Infrastructure and Drainage Management

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
1	Integrating sustainable urban drainage and sponge city principles into urban planning.	• Increase resilience to extreme rainfall and flooding by enhancing drainage infrastructure and reducing urban waterlogging and flood risks. • Reduce the exposure of urban areas to climate-related disasters by integrating nature-based solutions and resilient urban planning, supporting long-term sustainability.	Improvement of existing adaptation measure.
		• Conduct stormwater drainage studies informed by flood risk assessments to enhance urban flood resilience and adaptive water management. • Integrate wetlands into the Sustainable Urban Drainage Master Plan to support stormwater management, enhance biodiversity, and promote community well-being.	Planned adaptation measure.
2	Development of green spaces, public parks, and landscaped areas across the country.	• Implement urban tree planting initiatives to improve air quality, reduce the urban heat island effect, expand green spaces, lower surface runoff, and contribute to carbon emission reduction.	Improvement of existing adaptation measure.
3	Subterranean utilities in urban areas.	• Install sanitation, water, gas, electricity, and telecommunication networks underground in urban areas to safeguard infrastructure from extreme weather events.	Improvement of existing adaptation measure.
		• Implement underground infrastructure in newly developed areas to reduce surface clutter, enhance visual appeal, and protect natural landscapes.	Planned adaptation measure.

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
4	Promote sustainable building through green-certified design and construction.	• Apply the assessment standards across design and construction phases to ensure sustainability throughout the building lifecycle, incorporating local environmental conditions and regional needs. • Promote green building practices to minimize ecological impact, reduce resource consumption, and support a sustainable built environment. • Adopt Building Information Modelling (BIM) to integrate sustainability in design and construction, reduce material waste, and optimize energy use.	Improvement of existing adaptation measure.
5	Implement climate - responsive architectural design to reduce urban heat island effect through shading, greening, and material selection.	• Implement the Qatar Utility Management Manual to ensure unified, sustainable standards for services in public spaces, rail protection zones, and utility corridors.	Planned adaptation measure.
		• Provide shaded walkways and design station entrances with a main air-conditioned area and open-air remote shelters to enhance comfort and reduce cooling demand. • Improve energy efficiency by integrating shading systems, special surface coatings, and high-performance glass on station facades.	Improvement of existing adaptation measure.
6	Implement landscape integration measures in environmentally protected areas, new roads and utility infrastructure.	• Tree-planting initiatives aligned with national targets, with plans to expand into mangrove restoration to enhance biodiversity and coastal resilience. • Enhance Right-of-Way with tree planting and green landscaping to support the 10 million Tree Program, reduce emissions, and boost urban resilience.	Planned adaptation measure.
7	Improving drainage systems to manage heavy rainfall and flooding.	• Enhance flood management by conducting hydrological assessments, modelling, and designing Wadi channels, along with estimating water storage and recharge capacities. • Expand and upgrade surface and groundwater drainage systems to reduce flooding risks in vulnerable and low-lying areas, enhancing stormwater management and flood prevention.	Planned adaptation measure.
		• Promote the multi-use of Ecologically Functional Areas (EFAs) as flood management zones and recreational spaces by integrating them as final discharge points and surface runoff collection areas within natural catchments to enhance urban resilience and usability.	

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
8	Storm water drainage studies and design.	• Establish pre- and post-development scenarios for stormwater conveyance and apply advanced industry modelling techniques to design sustainable urban drainage systems.	Planned adaptation measure.
9	Airport Carbon Accreditation (ACA)	• Strengthen climate-resilient infrastructure by maintaining and advancing MATAR's carbon-accredited airport, targeting higher ACA levels to enhance adaptive capacity and reduce emissions	Improvement of existing adaptation measure.

Table 27. Adaptation Measure 2. Coastal and Flood Resilience

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
10	Enhance sea and coastal defences.	• Protect coastal infrastructure and communities from sea level rise, storm surges, and coastal erosion to reduce climate-related damage. • Assess historical coastal changes using satellite data to better understand long-term shoreline dynamics.	Planned adaptation measure.
11	Develop infrastructure resilience strategies based on assessments of coastal dynamics and storm surge risks to protect vulnerable areas and enhance adaptive capacity.	• Model storm surge scenarios using available tidal data to inform adaptation strategies for extreme climatic events. • Develop engineering solutions to enhance the resilience of critical infrastructure—such as roads, bridges, culverts, and utilities—within watersheds and coastal zones, accounting for shoreline changes from sedimentation, tidal shifts, and storm surges.	Planned adaptation measure.
12	Prepare a flood prevention plan, considering potential future impact of climate change.	• Complete a risk assessment for each station/location to identify climate-related vulnerabilities. • Develop adaptation measures incorporating defect resolution and lessons learned. • Review and update the flood prevention plan annually based on findings from the Rainy Season Preparedness exercise. • Integrate Environmental Focal Areas (EFAs) as final discharge points and surface runoff collection zones within catchment areas to enhance urban resilience.	Improvement of existing adaptation measure.



Table 28. Adaptation Measure 3. Sustainable Transport and Mobility

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
13	Automated vehicles with upskilling of drivers/workforce.	• Launch a pilot program for driverless vehicles within the public fleet on select routes to assess feasibility and public acceptance. • Roll out upskilling programs to help employees transition into technical roles supporting autonomous vehicle operations. • Develop a long-term plan for full integration of autonomous fleets and smart transit infrastructure backed by ongoing training and capacity building.	Planned adaptation measure.
14	Transition taxi fleets to low-emission vehicles tailored to the local climate.	• Traditional taxi fleet transitioned to climate-resilient fleet (plug-in hybrid, hybrid, and electric vehicles) operating alongside the existing eco-fleet.	Planned adaptation measure.
15	Perform a study on extreme weather and climate change impacts, as well as overall readiness of Qatar's railway system.	• Study conducted on extreme weather and climate change impacts, including assessment of Qatar's railway system overall readiness. • Climate risk vulnerabilities identified and addressed through incorporation of targeted remediation measure.	Improvement of existing adaptation measure.

Qatar has established a set of regulations covering district cooling, electric vehicle charging, solar energy deployment, and energy efficiency. Together, these measures create an integrated framework that advances sustainable energy management, emissions reduction, and resource efficiency in the country.

Health Preparedness: Protecting Public Health from Climate Risks

- By 2030, Qatar's health sector aims to deploy AI-driven climate surveillance for public health, and expand preventive care programs. New health insurance schemes will ensure access to climate-related health services for vulnerable populations, while educational initiatives in schools will raise awareness of climate-linked health risks.
- By 2040, Qatar envisions a health sector seamlessly integrated with climate resilience strategies. Emergency response systems will be optimized for extreme weather events, supported by air quality monitoring and water efficiency technologies to safeguard public health. Qatar also seeks to become a hub for climate-health research, enhancing both local and global understanding of climate-related health impacts.

Public Health (15 actions)



1. Climate-Resilient Public Health Systems and Infrastructure (5 actions):

Strengthens healthcare resilience through eco-friendly hospitals, the integration of the internationally recognized "One Health" framework, low-carbon operations, and improved medical waste management—ensuring the system withstands climate shocks while reducing environmental impact.



2. Heat Stress Protection and Emergency Preparedness (2 actions):

Protects communities and workers from rising temperatures through early warning systems, heat action regulations, such as Decree 17/2021, and coordinated emergency responses that reduce heat-related health risks.



3. Monitoring, Surveillance, and Climate-Health Research (4 actions):

Builds adaptive capacity by expanding air quality and indoor air monitoring, enhancing disease surveillance (e.g., vector-borne diseases), and conducting climate-health research on respiratory illnesses to guide evidence-based public health planning.



4. Climate-Health Programs, Health Education and Training (4 actions):

Enhances the knowledge of professionals in climate actions through training, workshops, knowledge exchange, etc.

Table 29. Adaptation Measure 1. Climate-Resilient Public Health Systems and Infrastructure

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
1	Increase availability of preventative healthcare.	• Deliver integrated health interventions focused on clinical excellence, sustainability, and innovation to reduce non-communicable disease (NCD) deaths by 36%, in line with NDS3. • Modernize care delivery and patient pathways using evidence-based approaches to rebalance the healthcare system toward primary and community-based care. • Increase utilization of primary care services by emphasizing preventative care across communities to reduce reliance on hospital-based curative care.	Improvement of existing adaptation measure.

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
2	One Health Approach	• Develop and implement a One Health framework (2022–2027) that integrates human, animal, and environmental health to build climate-resilient healthcare systems. • Prevent diseases and promote well-being by minimizing risks from pollution, zoonotic and vector-borne diseases, and ecosystem disruptions. • Align with the Qatar National Health Strategy (2022 and 2030) by strengthening multisectoral coordination across health, agriculture, and environmental sectors. • Enhance laboratory and surveillance systems to detect and respond to climate-induced health threats more effectively. • Promote community involvement and awareness to support early intervention and long-term sustainability of health initiatives in the context of climate change.	Improvement of existing adaptation measure.
3	Climate-resilient and environmentally sustainable low-carbon health systems.	• Strengthen health infrastructure resilience to climate-related disruptions by enhancing system sustainability, governance, financing, and operational efficiency. • Reduce healthcare sector emissions through the adoption of green policies and energy-efficient practices across the health system. • Promote nationwide adoption of climate-resilient healthcare facilities, including the development of eco-friendly hospitals and clinics with sustainable, energy-efficient designs.	Improvement of existing adaptation measure.
4	Medical Waste Management	• Integrate eco-friendly waste management systems in healthcare facilities, focusing on advanced segregation, recycling, and safe disposal of hazardous medical waste. • Build healthcare sector knowledge, capacity, and systems to ensure the appropriate and sustainable management of medical waste.	Improvement of existing adaptation measure.
		• Develop policies promoting sustainable waste treatment technologies, aligned with international environmental standards. • Ensure compliance and monitoring to reduce the environmental impact of healthcare waste through robust governance and operational practices	Planned adaptation measure.

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
5	Sustainable hospital waste management infrastructure.	• Implement and use recyclable materials and color-coded containers to support proper segregation and environmentally friendly disposal of medical waste. • Monitor infrastructure effectiveness by tracking the performance and outcomes of waste and recycling initiatives to ensure continuous improvement.	Improvement of existing adaptation measure.

Table 30. Adaptation Measure 2. Heat Stress Protection and Emergency Preparedness

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
6	Public Early Heatwave Warning Systems	• Enhance early warning systems with the latest technology to enable quick notifications to the public and authorities about extreme heat events, reducing heat-related illnesses and mortality. • Expand real-time alerts and emergency response coordination to ensure swift action during extreme events, contributing to improved public safety.	Improvement of existing adaptation measure.
		• Integrate early warning systems into national climate resilience planning to support the National Adaptation Plan (NAP) and ensure a coordinated response to climate-induced risks.	Planned adaptation measure.
7	Heat Stress Regulation Decree 17/2021	• Enforce expanded working hours for outdoor workers during heat periods. • Implement the buddy system to empower workers to monitor each other's health and safety, helping avoid exposure to extreme conditions. • Enforce the worker protection law to ensure that all regulations regarding worker safety and health under extreme heat conditions are strictly followed. • Monitor compliance to safeguard the well-being of outdoor workers through targeted inspection visits during high-temperature periods.	Improvement of existing adaptation measure.



Table 31. Adaptation Measure 3. Monitoring, Surveillance, and Climate-Health Research

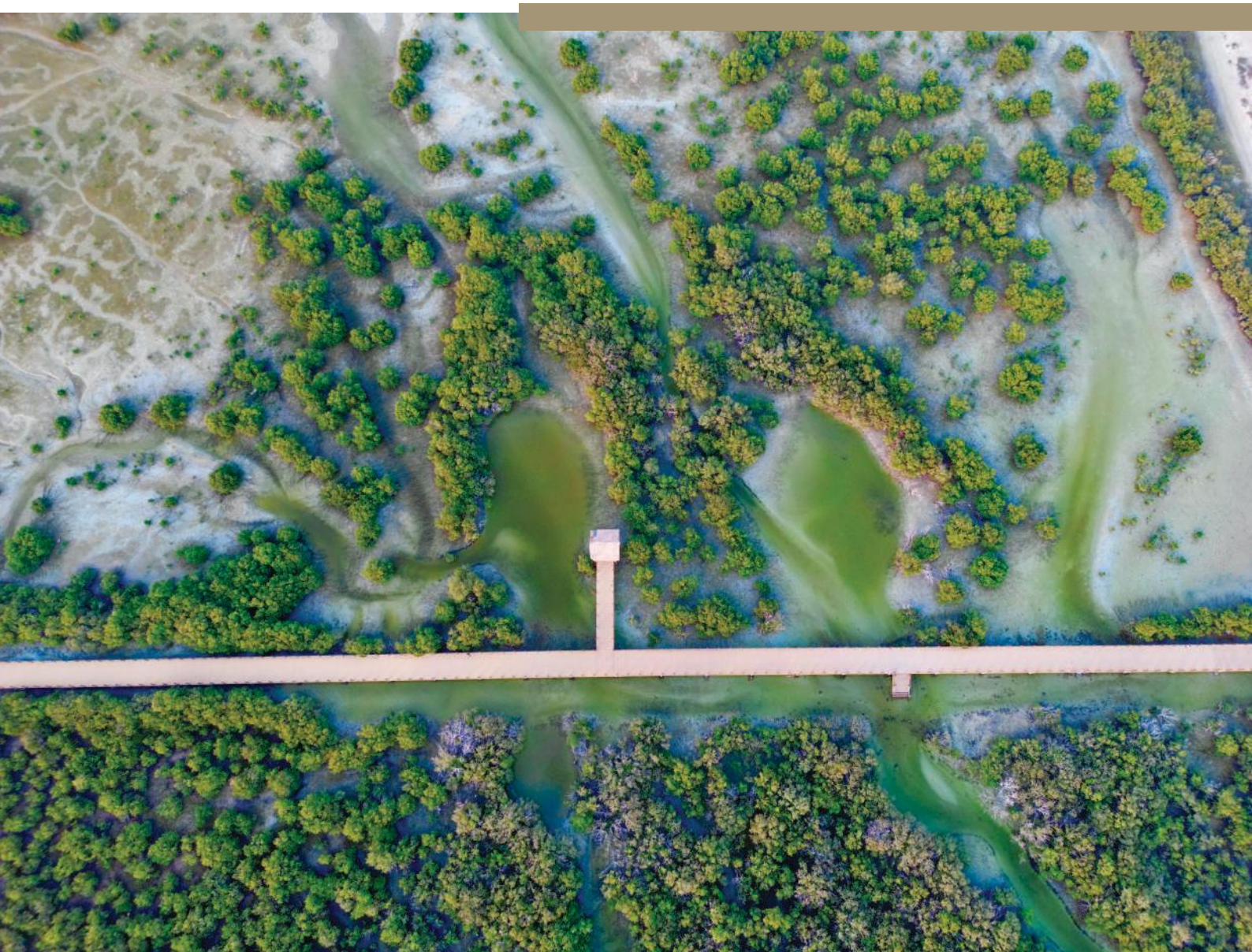
No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
8	Invest in research on the increase in respiratory diseases in Qatar	• Support local research, development, and adoption of innovative solutions in both clinical and non-clinical areas, including environmental health, as outlined in the NHS 2024–2030. • Enhance adaptive capacity by equipping the health system with skilled personnel, modern equipment, and updated knowledge to monitor and address respiratory diseases and long-term climate-related health impacts.	Improvement of existing adaptation measure.
9	Air quality monitoring and transparent reporting	• Operate a robust nationwide network of air quality monitoring stations to collect reliable environmental data. • Share real-time air quality information through Qatar's dedicated national reporting platform to raise awareness and enable public health responses. • Use collected data to guide targeted mitigation efforts, aligning with national environmental and public health goals.	Improvement of existing adaptation measure.
10	Indoor Air Quality (IAQ) assessment check in the indoor settings.	• Scale up existing indoor air quality monitoring from schools to include healthcare facilities, labour camps, hotels, and offices—especially those housing or serving vulnerable populations. • Create a coordinated program to regularly assess indoor air quality in public and private buildings across key sectors. • Set clear regulatory standards and technical monitoring protocols to guide IAQ management across all indoor environments. • Launch inspection campaigns to identify and phase out ozone-depleting substances like R-22 in air conditioning systems. • Raise awareness among building operators and facility managers on the health and climate risks of R-22 and encourage adoption of safer alternatives.	Improvement of existing adaptation measure.
11	Vector-Borne Disease Surveillance and Climate-Health Research.	• Strengthen the monitoring of climate-induced vector-borne diseases by integrating climate data with epidemiological surveillance systems. • Build capacity for real-time analysis and decision-making by linking disease monitoring with climate modelling for improved emergency preparedness and public health protection.	Improvement of existing adaptation measure.
		• Develop and apply predictive models and climate-health forecasting tools to anticipate disease outbreaks and inform early warning systems.	Planned adaptation measure

Table 32. Adaptation Measure 4. Climate-Health Programs, Health Education and Training

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
12	Climate-Health Related Training Program for Healthcare Workers	• Enhancing the Knowledge of professionals in climate actions through training, workshops and knowledge exchange through expertise, and enhancing the capacities of national institutions to manage and implement climate actions.	Improvement of existing adaptation measure.
13	Robust Environmental Health Awareness Campaign	• Design an inclusive environmental campaign that addresses cultural differences and language barriers.	Improvement of existing adaptation measure.
14	Sustainable hospital waste management program	• Implement mandatory e-learning courses on sustainable waste management through the Learning Management System (LMS) for all healthcare employees. • Provide regular training to healthcare and housekeeping staff to ensure safe and proper waste disposal practices. • Appoint waste management champions across all levels of care to promote awareness, conduct inspections, and report waste-related events. • Implement a comprehensive sustainable medical waste management program by using recyclable materials and color-coded bins, mandating e-learning and regular staff training, and continuously monitoring program performance for improvement.	Improvement of existing adaptation measure.
15	Community-Based Disaster Preparedness Training	• Conduct drills and workshops in schools, mosques, and community centres on how to respond to heatwaves, fires, and sandstorms. Include first aid, emergency contacts, and evacuation procedures.	Improvement of existing adaptation measure.



Cross-Sectoral Adaptation Measures and Actions



7. Cross-Sectoral Adaptation Measures and Actions

In addition to sector-specific adaptation actions, Qatar has identified a set of six cross-sectoral themes that support climate resilience across multiple sectors and institutions. These themes address systemic climate risks, promote integrated resource management, strengthen data and knowledge systems, and mobilize finance and innovation for adaptation. The NAP includes six cross-sectoral adaptation measures, each accompanied by associated actions and expected outputs for the 2030–2040 period, designed to enhance coordination across sectors and strengthen the overall effectiveness of adaptation efforts. By advancing integrated approaches, these cross-cutting priorities support the mainstreaming of climate resilience into national development planning and implementation.



Integrated Water-Energy Nexus Adaptation Measures (4 actions)

Improves resource efficiency and resilience by using reverse osmosis desalination, treated sewage effluent for energy cooling, and passive cooling systems that reduce the interlinked vulnerabilities of water and energy sectors.



2. Environmental Health and Ecosystem-Linked Adaptation (4 actions)

Protects public health and ecosystems through safe pesticide use, pest surveillance, expanded foul sewer networks, and low-emission odour control systems to address pollution and biodiversity risks together.



3. Early Warning Systems and Disaster Risk Management (7 actions)

Reduces disaster risk and enhances preparedness by integrating flood forecasts, climate-health alerts, asset protection plans, and climate-aware business continuity and emergency response systems.



4. Circular Economy, Water Recycling and Circular Resource Use, Waste Management, and Resource Efficiency (8 actions)

Advances sustainable resource use through sludge reuse in cement, recycled construction materials, ESG platforms, and sustainable procurement policies that reduce waste and support climate-resilient markets.



5. Climate Data, Monitoring, and Artificial Intelligence (AI) Integration (6 actions)

Enhances climate decision-making by embedding AI into infrastructure monitoring, flood modelling, air quality systems, and risk management tools across transport and building sectors.



6. Green Finance for Adaptation and ESG Goals (3 actions)

Mobilizes climate finance through Qatar's Sovereign Green Financing Framework, sustainable finance data platforms, and ESG-aligned investment criteria that drive funding toward climate-resilient development.

Table 33. Cross-Sectoral Adaptation Measure 1. Integrated Water-Energy Nexus Adaptation Measures

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
1	Develop wetlands for carbon storage and increase natural aquifer storage.	• Improve water availability for energy generation to reduce the energy sector's vulnerability and enhance its adaptive capacity.	Improvement of existing adaptation measure.
2	Substitute potable water for energy generation cooling with treated sewage effluent.	• Ensure a reliable and alternative water source for energy generation to reduce the sensitivity of energy supply and mitigate risks linked to water scarcity.	Improvement of existing adaptation measure.
3	Design and implement energy efficient and passive cooling systems (e.g., the use of condensation capture for reuse in cooling).	• Reduce energy demand for cooling by promoting measures that decrease heat pollution, contribute to lower energy consumption and increased energy sector resilience.	Improvement of existing adaptation measure.
4	Implement energy-efficient desalination systems alongside rainwater harvesting to enhance water security under climate stress.	• Pilot of a high-efficiency, solar-powered groundwater desalination system and planned implementation of rainwater harvesting to improve water use efficiency.	Planned adaptation measure.

Table 34. Cross-Sectoral Adaptation Measure 2. Environmental Health and Ecosystem-Linked Adaptation

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
5	Pest Control and Climate Change	• Enforce safe pesticide practices and laboratory testing of all imported food and beverages for contamination, ensuring protection of public health and biodiversity. • Strengthen customs inspections at ports of entry to prevent unauthorized importation of harmful pesticides. • Regulate pesticide use in food storage areas to maintain food safety, quality, and biosafety across the food value chain. • Train communities, workers, managers, and healthcare professionals on climate-induced vectors, associated risks, and non-chemical prevention strategies to reduce pesticide reliance.	Improvement of existing adaptation measure.
6	National Survey Program for Agricultural Pests and Plant Diseases Affecting Crops in Qatar	• Conduct a comprehensive survey on agricultural pests and diseases to identify potential risks to crop production and develop targeted, data-driven solutions to enhance agricultural resilience.	Improvement of existing adaptation measure.

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
7	Foul Sewer Network and Treatment Facilities	• Expand foul sewer network and treatment facilities to improve wastewater management, reduce public health risks, and support water reuse for climate resilience.	Improvement of existing adaptation measure.
8	Use of Biological Odour Control Treatment System	• Implement Biological Odour Control Units (BOCUs) to reduce energy use and carbon emissions in odour management by replacing energy-intensive chemical scrubbers with eco-friendly biological treatment. • Minimize waste generation and improve worker safety by eliminating the use of hazardous chemicals in odour control processes.	Improvement of existing adaptation measure.

Table 35. Cross-Sectoral Adaptation Measure 3. Early Warning Systems and Disaster Risk Management

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
9	Develop Asset Protection and Compensation Plans.	• Apply Asset Management Framework to major assets, ensuring a proactive approach to asset integrity and climate resilience. • Integrate climate risk assessments into project design phases, using tools like Hazard Identification (HAZID) and Hazard and Operability Studies (HAZOP) for safer and climate-adaptive design. • Establish cross-functional governance teams to oversee implementation of asset protection and adaptation strategies. • Prioritize maintenance and upgrades of vulnerable infrastructure in coastal and high-temperature areas. • Creating a comprehensive disaster compensation scheme to support farmers during climate-related losses.	Improvement of existing adaptation measure.
10	Expand Disaster Risk Reduction Systems.	• Conduct regular joint emergency response drills with internal teams and external partners to simulate responses to climate-related disasters (e.g., storm surges, industrial hazards). • Develop emergency communication protocols and warning systems tailored for fast-changing weather conditions. • Embed HSE (Health, Safety, Environment) risk assessments in routine operations to detect and address disaster vulnerabilities early. • Integrate climate scenarios into Enterprise Risk Management System (ERMS) to inform disaster risk strategies.	Improvement of existing adaptation measure.

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
11	Integrate Climate Considerations into Business Continuity Plans.	• Identify critical business functions and supply chain nodes vulnerable to climate impacts and develop alternative continuity strategies. • Ensure top-down and bottom-up risk identification processes include long-term climate change considerations. • Conduct climate-specific scenario planning sessions across entities to validate and update business continuity plans regularly.	Improvement of existing adaptation measure.
12	Maintain and strengthen environmental emergency response operation center capacity.	• Establish emergency preparedness drills to respond effectively to extreme weather conditions. • Conduct periodic training sessions for relevant staff to enhance response capabilities.	Improvement of existing adaptation measure.
13	Flood risk assessments and forecasts.	• Strengthen flood early warning systems by optimising rain gauge networks and integrating Artificial Intelligence/Machine Learning algorithms to improve the accuracy and reliability of rainfall monitoring. • Enhance disaster preparedness and response by enabling precise flood assessments and real-time flood inundation mapping across the State of Qatar.	Improvement of existing adaptation measure.
14	Embed detailed weather forecasting (early warning system) in operations to swiftly adopt countermeasures or restrictions, allowing for increased safety of services.	• Maintain operational dependency on real-time weather data and analytics. • Use forecasting records from the Qatar Meteorological Authority to validate and adjust warning thresholds for weather-related events. • Assess potential upgrades to the existing early warning system by integrating data from Qatar's ecosystem and international weather Application Programming Interface to enhance accuracy and enable timely preventive actions.	Improvement of existing adaptation measure.
15	Climate-Health Early Warning System	• Develop a digital platform that integrates air quality data, heatwave forecasts, and disease risk models to enhance early warning systems and support climate-resilient public health planning.	New adaptation measure.



Table 36. Cross-Sectoral Adaptation Measure 4. Circular Economy, Waste Management and Resource Efficiency

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
16	Environmental, Social, and Governance (ESG) Platform	• Develop an ESG platform that supports businesses in adopting climate-smart strategies by providing transparent data, compliance monitoring, and risk management tools. • Reduce environmental impact by minimizing duplication, optimizing resource use, and supporting circular economy principles.	Improvement of existing adaptation measure.
17	Collection of waste in streets and Road Right of Ways.	• Develop a plan for integrating dedicated waste collection spaces within Right-of-Way, prioritizing aesthetics, pedestrian accessibility especially in built-up areas.	Planned adaptation measure.
18	Establish Sludge Management Facility.	• Develop a sludge management facility for effective waste treatment and resource recovery.	Planned adaptation measure.
19	Circular Economy and Life Cycle Assessment (LCA) Platform.	• Develop a digital Circular Economy and Life Cycle Assessment platform that enables sustainable resource management, waste reduction, and product lifecycle optimization. • Expand treated sludge from sewage treatment facilities to be used as alternative fuel in cement production.	Improvement of existing adaptation measure.
20	Promote the development of a circular economy market.	• Establish public procurement guidelines and ensure adherence across key organizations. • Launch Extended Producer Responsibility to encourage producers to produce and package more sustainable products and invest in recycling. • Create incentive mechanisms to encourage individuals as well as private and public entities to purchase recycled products to promote the growth of a thriving circular economy market.	Planned adaptation measure.
21	Driving Infrastructure Resilience and Sustainability Certifications for Better Energy Optimization.	• Enhanced the resilience of infrastructure in Qatar to climate risks through targeted adaptation and sustainability measures. • Strengthened collaboration on energy efficiency initiatives, accelerating the adoption of sustainability standards throughout the group.	Improvement of existing adaptation measure.
22	Sustainable Procurement and Waste.	• Transitioning to a paperless operational model through digital transformation. • Enhance sustainable sourcing by using energy-efficient, environmentally friendly materials and digitizing procurement and supply chain management to reduce waste and improve climate resilience.	Improvement of existing adaptation measure.

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
23	Use of recycled materials in construction projects.	• Incorporate recycled materials into city beautification projects to reduce reliance on fresh raw materials and lower environmental and carbon impacts.	Improvement of existing adaptation measure.

Table 37. Cross-Sectoral Adaptation Measure 5. Climate Data, Monitoring and Artificial Intelligence Integration

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
24	Introducing the use of AI to monitor damage and deterioration of existing infrastructure.	• Enhanced early warning and preventive maintenance for infrastructure affected by climate change, such as heat stress and flooding. • Deploy AI-driven leak detection systems to minimize water loss from district cooling networks.	Improvement of existing adaptation measure.
25	Integrate AI-driven technologies and smart retrofits to optimise district cooling systems, enhance water and energy efficiency, and reduce operational emissions.	• Improved system performance, reduced energy and water consumption, and lower greenhouse gas emissions through intelligent monitoring, predictive maintenance, and efficiency upgrades.	Improvement of existing adaptation measure.
26	Strengthening buildings and infrastructure to withstand extreme weather (e.g., floods, storms, heatwaves)	• Implementation of flood-resistant design principles and climate adaptation measures to minimize damage during extreme weather events. • Develop engineering solutions that enhance the resilience of critical infrastructure within the watershed, including roads, bridges, culverts and utilities.	Improvement of existing adaptation measure.
27	Ambient Air Quality Monitoring Network using real-time air quality modelling technology.	• Ambient air quality monitoring stations are installed in industrial and residential areas, with independent audits every three years, contributing data to the national network to manage air quality risks.	Improvement of existing adaptation measure.
28	Monitor of the temperature of stations and railway tracks to protect infrastructure and prepare appropriately.	• Collect long-term temperature forecast data from the Qatar Meteorological Authority to inform climate risk planning. • Monitor temperature levels at specific locations, such as tunnels, to support Tunnel Ventilation System (TVS) operations for both LRT and Metro systems. • Conduct regular inspections and measurements of expansion joints as part of periodic maintenance to ensure structural integrity under rising temperature conditions.	Improvement of existing adaptation measure.

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
29	Incorporate climatic hazards into the regular planning and management of activities.	• Establish a dedicated climate taskforce or working group to oversee the development and cross-departmental implementation of climate adaptation and resilience initiatives and guidelines. • Promote cross-functional collaboration to mainstream climate risk management across Qatar railway system's operations and planning processes.	Improvement of existing adaptation measure.

Table 38. Cross-Sectoral Adaptation Measure 6. Green Finance for Climate Adaptation and Environmental, Social, and Governance (ESG) Goals

No.	Adaptation Actions	Outputs for 2030-2040 Timeline	Type of Adaptation Actions
30	Integrate environmental and social risks into finance decisions to support sustainable, climate-resilient investments.	• Financial institutions are directing investments using Environmental and Social Risk Management Policy and Sustainable Finance and Product Framework. These frameworks exclude activities that harm biodiversity, water resources, or human rights, aligning with the UN Sustainable Development Goals (SDGs), IFC Performance Standards, and Qatar National Vision 2030.	Improvement of existing adaptation measure.
31	Sustainable finance data platform.	• Develop a data repository to collect and aggregate relevant data for climate, environmental and social risks assessments.	Improvement of existing adaptation measure.
32	Establish a Sovereign Green Financing Framework to mobilize funding for climate adaptation and resilience projects.	• The Framework enables Qatar to issue green bonds and sukuk to finance environmentally sustainable projects, aligning with the nation's climate objectives and the Qatar National Vision 2030.	Improvement of existing adaptation measure.



Strategic Enablers for Effective Adaptation



8. Strategic Enablers for Effective Adaptation

As Qatar faces the multifaceted challenges posed by climate change, a cross-sectoral approach to adaptation becomes essential. This chapter explores the interconnected nature of various sectors and the importance of developing integrated strategies that address these interdependencies. By recognizing that climate impacts extend beyond individual sectors, Qatar aims to foster resilience through coordinated efforts that span energy and industry, agriculture and livestock, water resources, infrastructure and coastal resilience, biodiversity conservation and public health.

The holistic strategies outlined in this chapter emphasize the need for collaborative planning and action, leveraging synergies across sectors to maximize the effectiveness of adaptation measures. By adopting an integrated approach, Qatar seeks to ensure that adaptation efforts are not only efficient and cost-effective but also capable of addressing the complex and dynamic nature of climate risks. Through comprehensive planning, stakeholder engagement, and innovative solutions, Qatar is committed to building a resilient future that safeguards its environment, economy, and society against the impacts of climate change.

Enhancing Regulatory Landscapes

The State of Qatar is strengthening its climate adaptation agenda by enhancing its regulatory and institutional frameworks across key sectors to promote coherence, resilience, and long-term sustainability. Recent efforts include updates to food security strategies that support sustainable production, efficient resource use, improved storage systems, and diversified trade. In parallel, biodiversity protection is being advanced through revised fishing requirements for development projects to adopt net-positive design measures. Infrastructure resilience is also being prioritized through the integration of sustainable drainage, coastal protection, and climate-responsive design standards. Qatar also implements green construction practices, enforcing conservation measures, and monitoring key environmental indicators. In the water sector, Qatar regulates water consumption and groundwater use in coordination with relevant authorities, and advances efficiency through the Tarsheed program, while also tracking key indicators including water use, groundwater extraction, and water quality.

Building Capacity and Skills for Resilience

In response to increasing climate variability and environmental challenges, Qatar underscores the strategic importance of capacity building as a cornerstone for enhancing national resilience. Recognizing that effective adaptation requires informed, empowered, and coordinated action, the country is advancing a range of initiatives aligned with the National Adaptation Plan (NAP). These initiatives aim to strengthen technical knowledge, practical skills, and institutional coordination across sectors and governance levels, enabling diverse stakeholders to actively contribute to adaptation and sustainable development.

Qatar is advancing broad-based environmental awareness and sustainability through collaborative efforts across public institutions, civil society, and community-focused organizations. Greener construction practices are promoted through industry engagement, recognition programs, and capacity building, while environmental learning is integrated into formal education and extracurricular activities, supported by initiatives that strengthen environmental literacy among students and families. Community-based programs foster hands-on learning in regenerative agriculture for both children and adults, and youth initiatives cultivate environmental leadership through advocacy, citizen science, and climate-focused education. Complementing these efforts, nationwide water and energy conservation campaigns encourage more sustainable household behaviours, reinforcing a culture of environmental responsibility across the country.

Shaping the Future with Innovative Technologies

Qatar is strategically integrating innovative technologies to strengthen climate resilience and sustainability across key sectors. By deploying tools such as Artificial Intelligence (AI), the Internet of Things (IoT), blockchain, and advanced data analytics, the country is enhancing its capacity to anticipate climate risks, improve resource efficiency, and implement adaptive responses across environmental, social, and economic systems.

Qatar's Digital Agenda 2030 provides a national foundation for digital transformation, creating advanced infrastructure, stronger innovation systems, and a more digitally empowered society, all of which support climate adaptation and resilience across key sectors. Qatar hopes to integrate AI, IoT, data analytics, and smart systems to enhance climate-smart agriculture, improve the durability and safety of transport and infrastructure, strengthen energy efficiency through real-time operations and cooling innovations, and advance sustainable water management with smart grids, leak detection, and predictive tools. These digital solutions help optimize resources, improve early-warning capabilities, and enable more adaptive, resilient, and efficient operations across climate-sensitive sectors.

Building the Infrastructure for Data and Knowledge

A strong data and knowledge system is essential for effective climate adaptation in Qatar. This includes collecting and integrating reliable climate, environmental, social, and health data from national, international, and community sources. Ensuring data quality, consistency, and accessibility supports informed decision-making. To fully benefit from this data, Qatar must invest in tools like GIS, climate models, and AI, along with training and cross-sector collaboration. Sharing knowledge through digital platforms and communication efforts will raise awareness and engagement. Policies and institutions are needed to embed data use in national planning. Overcoming gaps and challenges requires innovation, funding, and global cooperation.

Qatar is steadily building a comprehensive knowledge and data ecosystem to support climate adaptation by advancing research, monitoring, and evidence-based planning across multiple sectors. National institutions are strengthening data systems for agriculture, infrastructure, water, transport, health, and environmental management—ranging from pest and disease surveys, material recycling studies, and flood-risk assessments to large-scale water balance research and integrated national water databases. Complementary initiatives, such as Tarsheed's public awareness campaigns and health sector education on heat and air pollution, further promote informed decision-making and resilient behaviours. Collectively, these efforts reflect Qatar's commitment to science-driven adaptation, improved resource management, and community engagement in line with national sustainability goals.

Aligning with Global, Regional and Local Partners

The State of Qatar recognizes the vital role of international cooperation in strengthening national adaptation planning. As part of its NAP, Qatar aligns its strategies with key international frameworks and initiatives to ensure that its climate actions are consistent with global efforts. This alignment enhances the effectiveness of adaptation measures, promotes knowledge sharing, and opens opportunities for technical and financial support from global partners. Complementing this, Qatar may also establish dedicated knowledge-sharing platforms at the national and Gulf Cooperation Council (GCC) regional levels to document good practices, foster peer-to-peer learning, and strengthen collaboration with academic and expert communities.

Beyond global partnerships, an equally important step during the NAP's implementation stage is to create a knowledge-sharing platform at the local level. This platform would document good practices, foster peer-to-peer learning, and encourage collaboration with local academic institutions and expert communities within Qatar.

Furthermore, a regional knowledge-sharing platform would be highly beneficial for GCC countries due to the commonality of adaptation challenges in the Arabian Gulf. This facility could be critical for sharing data, strategies, and lessons learned, allowing for more cohesive and effective climate action across the region.

Qatar's NAP aligns closely with major international climate frameworks. It integrates the goals of the Paris Agreement, the Sendai Framework for Disaster Risk Reduction, and UNFCCC guidance,

adopting a science-based, inclusive, and iterative approach to strengthening adaptive capacity across sectors. It promotes early warning systems, disaster preparedness, and evidence-based decision-making while mainstreaming adaptation into national development processes. The NAP also contributes to the Global Goal on Adaptation (GGA) and acknowledges the importance of addressing loss and damage, an area that captures impacts beyond the limits of adaptation and to position Qatar within global discussions on recovery and climate resilience.

Table 39. UNFCCC NAP Process: Mapping Qatar's Actions

UNFCCC Element	Key Action	Qatar's NAP Response
Laying the Groundwork	Institutional setup, stocktaking, capacity assessment	MECC as overall coordinating body, national stocktake in 2021, capacity building activities (workshops)
Preparatory Elements	Climate data, vulnerability assessments, adaptation options	Use of climate scenarios and vulnerability studies.
Implementation Strategies	Prioritization, long-term strategy, coordination	Sectoral planning by line ministries, inter-agency collaboration using prioritization methodology.
Monitoring and Review	Monitoring and Evaluation (M&E) systems, learning, reporting (Indicators will still be developed in Phase 2 NAP Implementation from 2026 to 2030).	Using National MRV system, with commitment to iterative learning from evaluations and review.
Country Reporting under the Paris Agreement	Information on climate change impacts & adaptation under article 7 of Paris Agreement	Biennial Transparency Reporting (BTR) and NDC

How Qatar's NAP Aligns with International Guidelines

Qatar's NAP is designed according to the UNFCCC technical guidelines, which emphasize:

- **Continuous, progressive, and iterative planning**
  Qatar's NAP is structured to evolve through ongoing stocktaking, stakeholder engagement, and phased implementation.
- **Country-owned and country-driven processes**
  Qatar leads its adaptation planning, ensuring alignment with national priorities (e.g., Qatar National Vision 2030) and coordination across ministries and sectors.
- **Social-inclusive, participatory, and transparent approaches**
  The NAP incorporates social inclusion by involving socially diverse groups and consulting youth and vulnerable communities.
- **Science-based and informed by traditional knowledge**
  Institutions such as Qatar Meteorology Department contribute climate data, modelling, and research, aligned with best available science.
- **Mainstreaming adaptation into development planning**
  Qatar integrates adaptation into urban planning, infrastructure, energy, water, agriculture, public health, and finance, ensuring a whole-of-government approach.

Promoting Social Inclusivity in Adaptation

Social inclusion is essential for sustainable climate governance, ensuring adaptation measures address the needs of marginalized groups. It drives economic productivity, poverty reduction, and inclusive growth, supporting Qatar's green transition.

Qatar recognizes that inclusive adaptation is essential to building climate resilience across all sectors of society. Several initiatives reflect efforts to ensure that stakeholders from diverse backgrounds are meaningfully engaged in climate adaptation planning and action:

1. Stakeholder Engagement in the National Adaptation Plan (NAP) Process

During the development of Qatar's NAP, the Ministry of Environment and Climate Change (MECC) actively engaged stakeholders from diverse backgrounds. This ensured that adaptation priorities reflect the needs and vulnerabilities of different social groups, enhancing equity in decision-making.

2. Social Inclusivity in Academia: Women in Academia Committee (WiAC)

Hamad Bin Khalifa University (HBKU), a member of Qatar Foundation, has been recognized by UNESCO for its pioneering efforts in promoting inclusivity in academia through the establishment of its Women in Academia Committee (WiAC). This initiative, the first of its kind in Qatar and the region, aims to create an inclusive academic environment by addressing barriers and enhancing opportunities for women in higher education and research. The WiAC operates within a framework that respects the socio-cultural and religious values integral to Qatari society.

Through targeted interventions such as mentorship programs and leadership training for female staff and students, the initiative seeks to close gaps and support the advancement of women to senior academic and leadership positions. It directly addresses the underrepresentation of women in higher academic ranks, often described as the 'leaking pipeline'.

3. Accessible Infrastructure Development – Msheireb Downtown Doha

The Msheireb Downtown Doha project, designed as a smart and sustainable city district, incorporates inclusive urban planning principles such as barrier-free pedestrian access, accessible public facilities, and shaded walkways. These climate-adaptive features help protect vulnerable groups, including the elderly and people with disabilities, from extreme heat.

4. Youth and Community Climate Awareness – Earthna Centre for a Sustainable Future

Earthna, an initiative under Qatar Foundation, conducts climate awareness campaigns and workshops involving youth, local communities, and school programs. These initiatives promote inclusive participation in sustainability dialogues, equipping different segments of society with knowledge and skills to adapt to climate change.

The KAHRAMAA Awareness Park has been identified as a UNESCO Water Network Museum for its role in promoting awareness among youth and students in Qatar from both School & Universities.

5. Support for Women in Agriculture – Qatar Development Bank (QDB) Initiatives

Through grants and advisory services, QDB supports women entrepreneurs and youth involved in sustainable agriculture and agricultural technology. These programs contribute to building climate-resilient livelihoods and food systems while promoting equality in climate-sensitive sectors.

Institutional Arrangements for NAP Coordination and Implementation



9. Institutional Arrangements for NAP Coordination and Implementation

Qatar's National Adaptation Plan (NAP) is a strategic initiative aimed at building resilience to climate change across key sectors. A robust governance framework is critical for ensuring its successful implementation. This proposed framework is designed to provide a coordinated, inclusive, and effective approach to addressing the challenges posed by climate change. By focusing on sector-specific strategies in areas such as water, energy and industry, infrastructure and coastal resilience, agriculture and livestock, biodiversity, and public health, Qatar aims to address climate change in a comprehensive and integrated manner.

The Ministry of Environment and Climate Change plays a pivotal role in providing strategic oversight, ensuring that the NAP aligns with national development goals, climate policies, and international commitments.

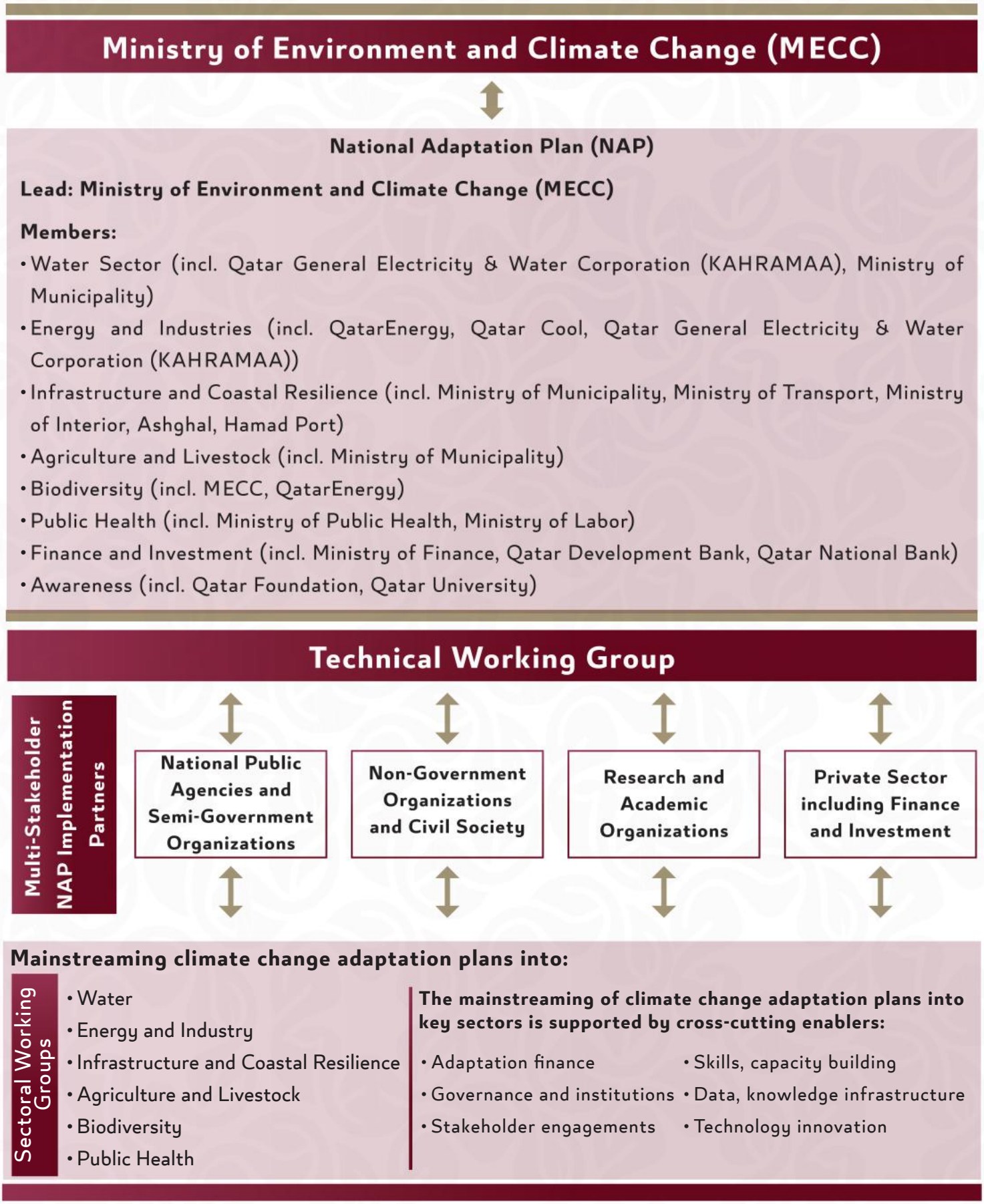
National public agencies and semi-governmental organizations are central to the development and implementation of sector-specific adaptation plans, prioritizing actions and ensuring cross-sectoral coordination. Non-governmental organizations and civil society contribute by promoting inclusivity, engaging local communities, raising awareness, and advocating for sustainable and equitable adaptation practices. Research institutions and academia support the framework by providing evidence-based policy development, fostering innovation, and evaluating the effectiveness of adaptation efforts. The private sector plays a key role through investments in climate-resilient infrastructure, technological innovation, and public-private partnerships.

The governance framework is supported by essential enablers that span across sectors, ensuring effective NAP implementation. Adaptation finance ensures the necessary funding is available for projects, leveraging both public and private resources. Stakeholder engagement promotes collaboration and inclusivity, ensuring all groups are involved in decision-making. Capacity building strengthens the ability of institutions and communities to plan and implement adaptation actions through training and knowledge development. Data and knowledge infrastructure provides the necessary tools for monitoring climate risks and assessing adaptation effectiveness. Finally, technological innovation drives the development of new solutions to enhance climate resilience and supports the integration of climate-smart technologies across sectors.

This governance framework underscores Qatar's commitment to ensuring an inclusive, sustainable, and comprehensive response to climate change. By fostering collaboration among diverse stakeholders and sectors, the NAP governance framework aims to strengthen Qatar's resilience and support its broader sustainable development objectives.

For further details, see Figure 2 and Table 40.

Figure 2. Proposed governance framework for the NAP implementation



Key Components of the Proposed Governance Framework:

1 **National Public Agencies and Semi-Governmental Organizations:**
National public agencies and semi-governmental organizations are established for key sectors such as water, energy and industry, infrastructure and coastal resilience, agriculture and livestock, biodiversity, and public health. These organizations are tasked with developing sector-specific adaptation plans, identifying priority actions, and coordinating implementation efforts.

2 **Non-Government and Civil Society Organizations:**
These organizations play a vital role in NAP implementation by applying their expertise in climate science and sustainable practices. They engage with communities through awareness campaigns and capacity-building initiatives, strengthening local resilience and promoting inclusive adaptation strategies. Additionally, they advocate for climate adaptation policies and collaborate with government agencies, the private sector, and international partners to mobilize resources and expertise, ensuring a comprehensive approach to addressing climate risks.

3 **Research and Academia Organizations:**
Provide crucial research, knowledge, evidence, scientific expertise and foster innovation which is essential in identifying the climate impacts and adaptation strategies. They inform policy development with evidence-based recommendations, contribute to capacity building through education and training, and monitor the effectiveness of adaptation measures. These groups enhance Qatar's climate resilience through international collaboration, sharing best practices, and advancing sustainable development goals via inclusive community engagement and stakeholder participation.

4 **Private Sector:**
The private sector drives innovation investments in climate-resilient infrastructure and technologies and integrates adaptation measures into business strategies. Companies contribute to sustainable development by developing resilient practices, collaborating in public-private partnerships to finance and execute adaptation projects, and enhancing risk management through climate-conscious investments and insurance solutions.[6] Through community engagement, corporate social responsibility initiatives and aligning to environmental, social and corporate governance (ESG) criteria, the private sector fosters awareness of climate risks and supports local resilience efforts, aligning business operations with national adaptation goals.

The integration of climate change adaptation plans into key sectors is supported by various cross-cutting enablers. These enablers include adaptation finance, governance and institutions, stakeholder engagements, skills and capacity building, data and knowledge infrastructure, and technology innovation.

The proposed governance framework for the NAP implementation is crucial for understanding the distribution of responsibilities among key multi-stakeholder organizations, their interactions, and the specific roles they fulfil, as outlined in the Table below.

[6] Insurance solutions provide financial protection against climate-related risks, helping businesses and communities manage the economic impacts of extreme weather events and other climate challenges. These solutions include climate risk insurance, catastrophe bonds, and other financial instruments designed to mitigate the financial burden of climate events.

Table 40. Composition and responsibilities of entities in the proposed governance framework

	Entity	Composition	Responsibilities
1	The Ministry of Environment and Climate Change (MECC) will lead the implementation of Qatar's National Adaptation Plan. MECC is responsible in overseeing and coordinating adaptation initiatives, integrating climate resilience into national policies, and engaging stakeholders to enhance the country's resilience to climate impacts.		
2	Technical Working Group	Composed of technical experts from relevant government agencies, academic institutions, and private sector organizations.	• Review and approve detailed adaptation implementation plans. • Conduct technical assessments and analyses of adaptation implementation plans. • Monitor progress and provide technical advice on NAP implementation. • Facilitate knowledge sharing and capacity building
3	Multi-Stakeholder NAP Implementation Partners	Encompass all organizations and institutions involved in executing adaptation strategies within the framework of the National Adaptation Plan. These partners play interconnected roles in ensuring a comprehensive, inclusive, and effective response to climate change impacts.	• Implement adaptation projects, monitor progress, and foster partnerships. • Align and coordinate adaptation plans through sector working groups for a cohesive approach. • Raising awareness, training communities to understand climate risks and actively engage in building resilience. • Drive technological innovation, research, and secure financial resources.
4	Sectoral Working Groups	Composed of experts from specific sectors (water, agriculture and livestock, energy and industry, infrastructure and coastal resilience, biodiversity and public health).	• Develop sector-specific adaptation strategies and action plans. • Identify and prioritize adaptation measures for implementation. • Coordinate with other sectoral working groups to ensure consistency and coherence of adaptation strategies. • Monitor progress and report to the Technical Working Group.

This governance framework not only strengthens Qatar's capacity to adapt to climate challenges but also promotes sustainable development by fostering collaboration, inclusivity, and innovation. By aligning national efforts with global best practices, Qatar positions itself as a leader in climate resilience, ensuring a sustainable and equitable future for its people.

It is essential that these various institutions foster cross-sectoral collaboration and promote information exchange to collectively tackle climate-related challenges rather than addressing them in isolation. By working together across different sectors and sharing knowledge, resources, and expertise, Qatar can develop more comprehensive and effective adaptation plans. This collaborative approach not only improves Qatar's ability to address the multifaceted impacts of climate change but also ensures that the country's efforts are cohesive and mutually reinforcing, leading to more resilient and sustainable outcomes.



Adaptation Financing



10. Adaptation Financing

Achieving Qatar's climate adaptation goals, as outlined in its NAP, requires significant investment through a combination of government and private-sector contributions. Mobilizing private finance, including Foreign Direct Investments (FDI), remains of significance to achieve national climate ambitions. This aligns with the country's broader aim to position the private sector as an important driver of economic growth, while reducing reliance on government spending.

Adaptation bonds represent a vital financial mechanism designed to mobilize private capital, effectively bridging the substantial global financing gap for climate resilience projects. Their core value proposition lies in funding initiatives that proactively mitigate physical climate risks, such as coastal protection, water security, and resilient infrastructure. The effectiveness and integrity of these bonds rely heavily on robust taxonomies and frameworks that clearly define what constitutes an "adaptation investment." By providing a consistent, science-based approach to identifying and evaluating eligible projects, these frameworks ensure that financed activities genuinely contribute to enhancing resilience and adaptive capacity. Moreover, transparent reporting, third-party verification, and alignment with international standards—such as those established by the ICMA and multilateral development banks—build investor confidence, attract diversified participation, and facilitate the creation of a scalable, high-impact market for adaptation finance.

Measures to Leverage Private Finance for Climate Goals

1. Improve the business environment

To leverage private finance, Qatar is continuously developing an attractive investment environment through a business-friendly regulatory framework and significant government support that encourages FDI. In line with the country's goal of establishing a diversified, knowledge-based and sustainable economy, Qatar introduced reforms to its legislation governing foreign investment, foreign property ownership, and public-private partnerships.

2. Increase Qatar's global competitive advantage through specialized clusters

To further attract private investments, the State of Qatar is transforming its economic growth model by concentrating efforts on high-productivity and specialized economic clusters where Qatar already has, or can establish, a competitive advantage. These clusters complement the energy sector, specializing in manufacturing, logistics, and tourism, hence contributing significantly to economic growth, while those focused on agriculture and health provide additional national resilience. In addition, the clusters centred on IT, education, and finance aim to support the growth of other economic sectors.

3. Facilitate and promote technological innovation for green/low-carbon technologies led by the private sector

The State of Qatar aims to further tailor fiscal and financial incentives to enhance R&D activities from local and multinational companies. Qatar is already leveraging the established research and innovation hubs to offer tailored incentives for climate-focused R&D, such as energy efficiency. This includes funding grants that partially cover R&D project costs to mitigate financial risks typically associated with R&D investment.

4. National budget to fund critical but unbankable climate priorities

The State of Qatar finances foundational projects, especially those strengthening the enabling environment (laws, policies, research), public infrastructure (water, transport, energy access), and social equity measures, while enabling private investors through mechanisms, such as blended finance support when necessary (such as PPP described below).

5. Strengthening Public-Private Partnerships (PPPs)

To increase private sector contribution to climate action, Qatar aims to improve the coordination and management of PPP projects and schemes. PPPs can significantly boost climate-focused investments by deploying targeted de-risking instruments and creating bankable project pipelines. PPPs are being used across diverse projects, including desalination plants and waste-to-energy facilities. By combining climate policy and enhanced risk-sharing mechanisms, Qatar aims to transform climate ambitions into investable opportunities.

6. Aligning Domestic Financial Systems with National Climate Goals

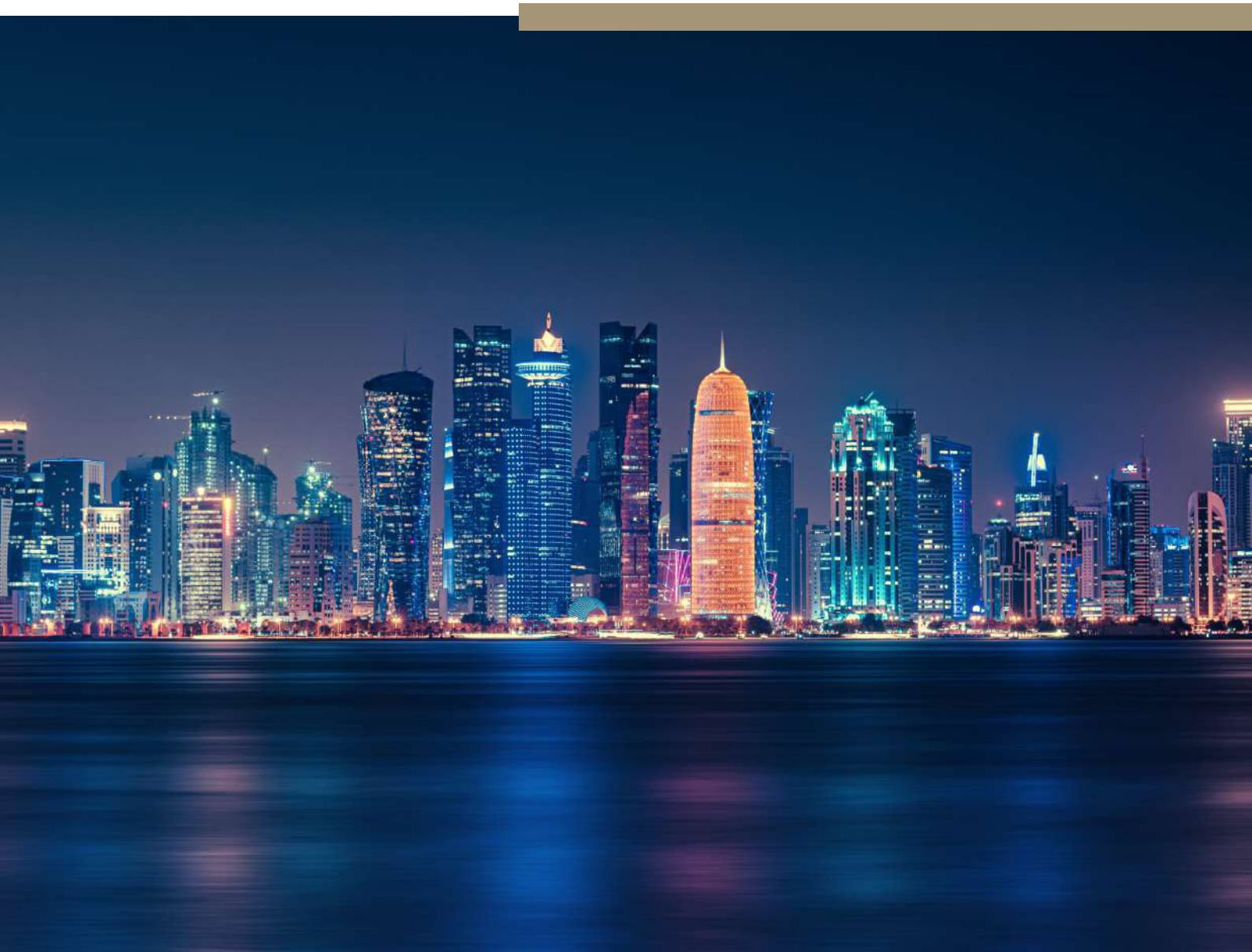
In 2024, a national strategy focusing on ESG and sustainability for the financial sector was launched, recognizing the importance of aligning domestic financial systems with climate mitigation and adaptation goals. The aims of the strategy are to strengthen the financial system's human and institutional capacity, and to enhance its resilience.

7. Accessing International Green Capital Markets

In 2023, Qatar introduced its first sovereign Green Financing Framework, which will allow investors to support Qatar's investments in climate action, environmental protection and sustainable development. To operationalize the framework, the State of Qatar established a Sustainable Finance Committee, whose mandate is to evaluate, select, and monitor eligible projects, and thus ensure their alignment with the framework's eligibility criteria, international standards, and national priorities. Qatar's debut green bond proceeds have been allocated toward clean transportation, sustainable water and wastewater management, and climate change adaptation projects.



Monitoring and Reporting Progress of Qatar's National Adaptation Plan



11. Monitoring and Reporting Progress of Qatar's National Adaptation Plan

Global Practice and NAP Monitoring Framework

The National Adaptation Plan (NAP) of the State of Qatar aligns its sectoral goals and monitoring framework with global practices to ensure coherence with international best standards. These practices are guided by the Paris Agreement, the UNFCCC adaptation cycle, the SDGs, and the Sendai Framework. They emphasize resilience-building, risk reduction, sustainable development, and transparent reporting, providing a benchmark against which Qatar can track national progress and demonstrate contributions to global climate action.

Monitoring for Effective Implementation

To translate these global indicators into measurable national outcomes, the Ministry of Environment and Climate Change (MECC) is advancing the development of a Climate Action Measuring, Reporting, and Verification (MRV) System as a core national tool for tracking climate progress in Qatar. The MRV system will serve as an integrated platform to monitor implementation of Qatar's Nationally Determined Contribution (NDC), covering mitigation actions, adaptation measures, and climate finance flows, in line with UNFCCC transparency requirements.

The adaptation component of the MRV system will play a central role in tracking progress on National Adaptation Plan (NAP) implementation. It will enable systematic monitoring of adaptation actions across sectors, assess progress against defined indicators, and support evidence-based reporting to national and international stakeholders. By consolidating data from relevant entities, the system will enhance transparency, strengthen accountability, and facilitate timely identification of implementation gaps and emerging risks.

Consistent with Article 4.7 of the Paris Agreement, Qatar underscores that many adaptation and economic diversification measures yield mitigation co-benefits—strengthening resilience while reducing emissions. To capture these synergies, the NAP monitoring framework will align with the NDC, Biennial Transparency Reports (BTR), and the national MRV system. This integration maximizes efficiency, avoids duplication, and ensures coherence with Qatar's global commitments.

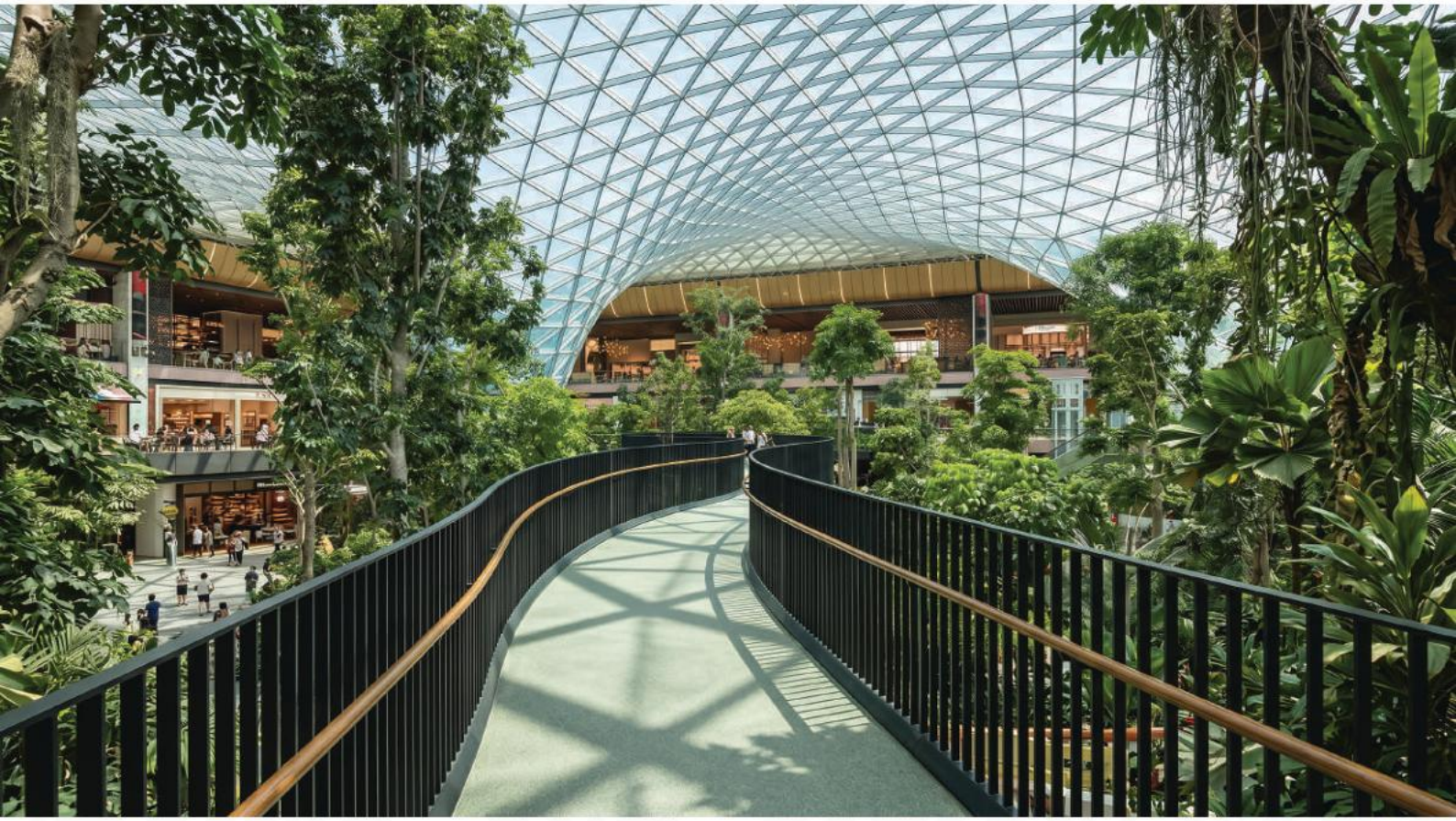
A central challenge lies in developing robust methodologies and algorithms to quantify and monitor mitigation co-benefits from adaptation. MECC, with technical partners, will continue to refine these methodologies to ensure both international compatibility and scientific rigor.

Next Steps

Moving forward, the implementation of the monitoring framework will focus on:

1. **Defined Methodologies:** Establishing clear data collection protocols, assigning responsibilities, and setting evaluation processes to assess effectiveness.
2. **System Harmonization:** Integrating MECC's centralized M&E Tool with monitoring systems of other ministries to enable efficient data sharing and avoid duplication.
3. **Strengthening Monitoring, Evaluation and Learning (MEL):** Conducting a comprehensive review of existing mechanisms across ministries and agencies, followed by the harmonization of MECC's MEL system with sectoral goals
4. **Global Alignment:** Ensuring coherence with global reporting obligations under the UNFCCC, SDGs, and the Sendai Framework, allowing Qatar to meet its international commitments while advancing national adaptation priorities.

These actions will be undertaken as part of the next phase of NAP implementation.



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Ministry of Environment and Climate Change
State of Qatar • دولـــة قطـــر