Climate Change Adaptation and Implementation Plan for Mediterranean Region of Türkiye

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List of Abbreviations

Abbreviation	Full Name
AFAD	Disaster and Emergency Management Authority (Afet ve Acil Durum Yönetimi Başkanlığı)
DSİ	State Hydraulic Works (Devlet Su İşleri Genel Müdürlüğü)
MoAF	Ministry of Agriculture and Forestry (Tarım ve Orman Bakanlığı)
MoEUCC	Ministry of Environment, Urbanization and Climate Change (Çevre, Şehircilik ve İklim Değişikliği Bakanlığı)
MENR	Ministry of Energy and Natural Resources (Enerji ve Tabii Kaynaklar Bakanlığı)
TSMS	Turkish State Meteorological Service (Meteoroloji Genel Müdürlüğü)
TARSİM	Agricultural Insurance Pool (Tarım Sigortaları Havuzu)
NGOs	Non-Governmental Organizations
MGM	Turkish State Meteorological Service (Meteoroloji Genel Müdürlüğü)
TÜBİTAK	Scientific and Technological Research Council of Türkiye (Türkiye Bilimsel ve Teknolojik Araştırma Kurumu)
UNEP/MAP	United Nations Environment Programme / Mediterranean Action Plan
MedECC	Mediterranean Experts on Climate and Environmental Change
IPCC	Intergovernmental Panel on Climate Change

Abbreviation	Full Name
GIS	Geographic Information Systems
MAR1	First Mediterranean Assessment Report
TSMS	Turkish State Meteorological Service
AI	Artificial Intelligence
SMEs	Small and Medium-Sized Enterprises
HVAC	Heating, Ventilation, and Air Conditioning (implied under cooling/energy systems content)

1. Introduction

The Mediterranean Region of Türkiye is facing some of the most immediate and severe consequences of climate change. As a recognized climate change hotspot, it is warming approximately 20% faster than the global average. This rapid warming, combined with increasing climate extremes, is reshaping the environment, threatening key economic sectors, and putting communities at risk.

The region's diverse ecosystems—ranging from coastal wetlands to mountainous forests—are highly climate-sensitive. Agriculture, tourism, and urban infrastructure are already under stress. Rising sea levels, frequent heatwaves, prolonged droughts, and biodiversity shifts are not future concerns; they are unfolding now and accelerating. These interconnected challenges demand urgent adaptation and mitigation efforts across sectors and governance levels to safeguard human well-being, food security, natural heritage, and economic stability.

2. Most Vulnerable Sectors (Ranked):

- **Agriculture & Food Systems**

  Highly dependent on stable weather and water availability, agriculture is seeing reduced crop yields and increased irrigation demands. Warmer seas also disrupt fisheries and aquaculture, threatening food security and rural livelihoods.

- **Water Resources**

  Declining rainfall and rising evaporation are reducing river flows and groundwater recharge. Chronic droughts strain reservoirs, increasing competition for water among households, farms, and industries.

- **Forests & Biodiversity**

  Droughts and land-use changes weaken forest ecosystems, with tree die-off and wildfire risk rising sharply. Habitat loss and fragmentation reduce biodiversity and ecosystem resilience.

- **Fisheries & Marine Life**

  The Mediterranean Sea is warming faster than global oceans, leading to shifts in fish populations, marine heatwaves, and invasive species like lionfish and jellyfish. These changes harm fishing communities and marine tourism.
- **Public Health**

  Extreme heat increases heat-related illnesses, particularly for vulnerable groups. Changing conditions expand the range of disease vectors (e.g., mosquitoes), raising the risk of outbreaks like West Nile virus and dengue.
- **Urban Areas & Infrastructure**

  Flood-prone cities like Antalya and Mersin face storm surges, heatwaves, and water shortages. Outdated infrastructure struggles with extreme weather, causing damage, service disruptions, and declining quality of life.
- **Tourism**

  Intense summer heat and ecosystem degradation threaten both beach and nature-based tourism. Coastal erosion and wildfire damage reduce the attractiveness of key tourist destinations and heritage sites.
- **Energy Systems**

  Increased cooling demand and reduced hydropower due to drought create energy supply challenges. While solar potential is high, infrastructure upgrades are needed to harness it effectively.

3. Key Climate Hazards in the Mediterranean

- **Extreme Heat & Heatwaves:**

  Hotter, longer summers are reducing productivity, straining health systems, and driving up cooling energy demand.
- **Droughts:**

  Extended dry spells now frequently affect agriculture, water supply, and hydropower, increasing the risk of desertification.
- **Severe Rainfall & Flash Floods:**

  Short, intense storms cause urban flooding and infrastructure damage, especially in cities with poor drainage.

- **Storms & High Winds:**
  Mediterranean cyclones and strong wind events increasingly damage coastal towns, agriculture, and power lines.
- **Wildfires:**
  Drier summers and heatwaves fuel frequent, intense wildfires that destroy forests and threaten nearby communities.
- **Sea Level Rise & Erosion:**
  Coastal flooding and saltwater intrusion endanger agricultural lands and infrastructure, particularly in low-lying deltas.
- **Vector-Borne Diseases:**
  Warmer climates support the spread of diseases like dengue and malaria, previously uncommon in the region.

Climate risks in the Mediterranean are interlinked and intensifying. A drought may increase wildfire risk; a storm atop rising sea levels can devastate coastlines. Effective adaptation requires cross-sector coordination, science-based planning, and immediate action.

4. Sectoral Adaptation and Mitigation Action Plans

For each vulnerable sector identified, this section outlines targeted **adaptation actions** (to cope with and reduce the harm from climate impacts) and relevant **mitigation actions** (to reduce greenhouse gas emissions or enhance carbon sinks, thereby addressing root causes of climate change). Both **short-term actions** (immediate to about 5 years) and **long-term actions** (decadal scale, beyond 5-10 years) are detailed. Each action is paired with practical implementation methods, and key stakeholders (national, regional, local) are noted for responsibility and collaboration. The actions are designed to be **practical and action-oriented**, ensuring they can be translated into on-the-ground projects and policies. Coordination among institutions is emphasized to integrate efforts across different levels of government and sectors.

Below is a shortened, itemized version of the Sectoral Adaptation and Mitigation Action Plans. Each itemized title is followed by a brief explanation of its purpose and benefits.

5. Agriculture and Food Systems

5.1. Introduction

Agriculture and food systems in Türkiye are highly vulnerable to the growing impacts of climate change, including drought, heatwaves, water scarcity, and shifting seasonal patterns. Ensuring long-term food security and rural economic stability requires proactive adaptation measures. This section outlines targeted strategies to increase resilience — from promoting climate-smart agricultural practices and drought-tolerant crops to diversifying rural livelihoods. Each adaptation action is paired with practical implementation steps and the key institutions responsible for delivering change on the ground, ensuring a coordinated and effective response across all levels.

5.2. Adaptation and Implementation Actions

- **Climate-Smart Farming Practices:**
  Promote efficient irrigation, rainwater harvesting, mulching, and no-till practices to conserve water and reduce erosion. These measures help protect crop yields from heat and drought.
- **Drought-Resilient Crop Varieties:**
  Develop and distribute crops that tolerate heat, drought, or salinity, ensuring continuity in production despite climatic shifts. This preserves food security while adapting to changing environmental conditions.
- **Enhanced Insurance and Early Warning Systems:**
  Expand crop and livestock insurance schemes and deploy weather alert systems to help farmers prepare for extreme events. These tools provide a safety net and allow timely preventive actions.
- **Integrated Long-Term Water Management and Crop Diversification:**
  Invest in large-scale water storage, inter-basin transfers, and promote shifts toward crops that require less water. Over time, this stabilizes irrigation supply and diversifies income, reducing vulnerability.
- **Rural Livelihood Diversification and Mitigation:**
  Support alternative income sources (e.g., farm-based tourism, renewable energy on farms) and promote practices that lower emissions, such as precision agriculture or agroforestry. Diversifying livelihoods builds community resilience while contributing to national mitigation goals.

Figure 1. Building Climate Resilience in Agriculture: Key Adaptation Strategies for a Sustainable Future

Table 1. Adaptation and implementation actions for Sustainable Agriculture and Food System – Mediterranean Region of Türkiye

Adaptation Actions	Implementation Actions	Key Institutions Involved
Climate-Smart Farming Practices	Promote water-efficient irrigation (drip systems), rainwater harvesting, soil conservation (mulching, no-till) techniques.	Ministry of Agriculture and Forestry (MoAF), Agricultural Chambers, Farmer Cooperatives, Provincial Directorates, Research Institutes.
Drought-Resilient Crop Varieties	Develop, test, and distribute drought-, heat- and salinity-	MoAF, TUBITAK, Seed Breeders, Agricultural Research Institutes,

Adaptation Actions	Implementation Actions	Key Institutions Involved
	tolerant seeds and cultivars adapted to regional climate risks.	Universities, Local Seed Associations.
Enhanced Insurance and Early Warning Systems	Expand climate-risk crop and livestock insurance coverage; integrate weather-based early warning systems for farmers.	Turkish Agricultural Insurance Pool (TARSIM), MoAF, Turkish State Meteorological Service (TSMS), Local Agricultural Extension Offices.
Integrated Long-Term Water Management and Crop Diversification	Construct water reservoirs, upgrade irrigation networks, encourage low water-use crops, and promote inter-basin transfer projects.	DSİ, MoAF, Basin Management Committees, Regional Development Agencies, Agricultural Irrigation Cooperatives.
Rural Livelihood Diversification and Mitigation	Support agro-tourism, promote renewable energy on farms, and introduce low-emission farming methods (e.g., agroforestry).	MoAF, Ministry of Energy and Natural Resources (MENR), Development Agencies, Municipalities, Chambers of Agriculture, Tourism Promotion Boards.

6. Water Resources

The Mediterranean Region of Türkiye faces mounting water challenges due to rising temperatures, extended drought periods, erratic rainfall, and increasing demand from agriculture, urbanization, and tourism. These pressures are expected to intensify as climate change accelerates, threatening both water security and ecosystem health.

This section outlines a set of integrated water adaptation actions designed to reduce water loss, enhance the resilience of water infrastructure, and improve long-term planning. The actions focus on protecting natural water sources, modernizing monitoring and allocation systems, and ensuring that drought risks are addressed through proactive governance.

The success of these measures will depend on close collaboration between national agencies, regional water boards, municipalities, farmers, and local communities. Together, these efforts will ensure the Mediterranean Region can safeguard its water resources for both people and nature in an increasingly uncertain climate future.

6.1. Adaptation and Implementation Actions

- **Improved Water Efficiency and Conservation:**

  Launch campaigns and infrastructure upgrades (e.g., leak repairs, efficient fixtures) to reduce water loss in agriculture, industry, and municipal systems. These steps help preserve dwindling water supplies in a changing climate.

- **Smart Water Management Technologies:**
  Employ real-time monitoring (sensors, remote sensing, GIS) to optimize water distribution and quickly identify leaks. Data-driven management supports better allocation during droughts and excess rainfall events.
- **Watershed Protection and Restoration:**
  Restore critical catchments through reforestation, erosion control, and wetland rehabilitation to improve groundwater recharge. Healthy watersheds enhance water quality and supply for all sectors.
- **Drought Preparedness and Emergency Plans:**
  Develop clear management plans with defined triggers for water restrictions and coordinated responses across sectors. Early planning minimizes the impacts of water scarcity and builds community awareness.
- **Long-Term Integrated Water Management:**
  Form basin-wide committees to design new reservoirs, enhance aquifer recharge, and develop inter-basin transfers where necessary. These infrastructure investments support a resilient and sustainable water supply over decades.

Figure 2. Comprehensive Water Management Strategies for Climate Resilience

Table 2. Adaptation and implementation actions for Sustainable Water Resources Management – Mediterranean Region of Türkiye

Adaptation Actions	Implementation Actions	Key Institutions Involved
Improved Water Efficiency and Conservation	Upgrade irrigation systems, repair municipal distribution leaks, install water-saving devices, and launch public awareness campaigns on conservation.	Ministry of Agriculture and Forestry (MoAF), Ministry of Environment, Urbanization and Climate Change (MoEUCC), Water Utilities, Municipalities, Irrigation Cooperatives.
Smart Water Management Technologies	Deploy real-time monitoring systems (sensors, remote sensing, GIS) for water distribution, leakage detection, and drought risk forecasting.	State Hydraulic Works (DSİ), Regional Development Agencies, Universities and Research Institutes, MoEUCC, Municipal Water Departments.
Watershed Protection and Restoration	Implement reforestation, wetland rehabilitation, and soil erosion control in catchment areas to restore natural water cycles.	MoAF, General Directorate of Forestry, Provincial Directorates of Environment, NGOs, Local Conservation Initiatives, DSİ.
Drought Preparedness and Emergency Plans	Develop drought response protocols, early warning systems, and sector-based water rationing strategies; train local authorities and users.	Disaster and Emergency Management Authority (AFAD), MoAF, Provincial Governorates, Water Management Coordination Boards, Municipal Disaster Units.
Long-Term Integrated Water Management	Establish basin-scale water governance platforms, design new reservoir projects, aquifer recharge programs, and inter-basin transfer plans.	DSİ, MoEUCC, Basin Management Committees, Regional Development Agencies, MoAF, General Directorate of State Hydraulic Works, Municipalities.

7. Forests and Biodiversity

7.1. Introduction

Forests and biodiversity are vital components of Türkiye's natural heritage and are essential for maintaining ecological balance. As climate change continues to pose significant risks — from wildfires to biodiversity loss — it is critical to implement robust strategies for conservation and management. This section outlines key adaptation measures focused on enhancing wildfire resilience, restoring forest ecosystems, and protecting biodiversity. Each action is paired with clear implementation steps and identifies the institutions involved in driving these

efforts. A coordinated approach across various sectors will ensure the long-term health of Türkiye's forests and biodiversity in the face of climate change.

7.2. Adaptation and Implementation Actions

- **Enhanced Wildfire Prevention and Response:**
  Increase firefighting capacity, clear dry brush, create fire breaks, and establish community fire watch programs. Quick detection and response help protect forests and adjacent communities.
- **Reforestation with Climate-Resilient Species:**
  Plant and nurture native, drought-tolerant trees in degraded areas and after fires to restore forest cover. This supports habitat recovery, binds soil, and enhances ecosystem services.
- **Biodiversity Conservation and Protected Areas:**
  Expand and better manage protected regions, enforce anti-poaching and logging regulations, and monitor vulnerable species. Preserving critical habitats ensures ecological stability and long-term resilience.
- **Invasive Species Monitoring and Control:**
  Establish rapid response teams to detect and manage invasive pests and species that threaten native ecosystems. This prevents ecological imbalances and preserves biodiversity.
- **Community-Based Ecosystem Management:**
  Involve local communities in sustainable forestry and biodiversity projects such as community forestry, ecotourism, and non-timber product harvesting. Local ownership supports long-term conservation and socioeconomic benefits.
- **Long-Term Landscape-Level Planning:**
  Develop ecological corridors and integrate climate projections into land-use planning to allow species migration and forest adaptation. This holistic approach improves ecosystem connectivity and resilience.

Figure 3. Safeguarding Türkiye's Forests and Biodiversity: Strategies for Climate Adaptation and Ecological Resilience

Table 3. Adaptation and implementation actions for Sustainable Forsts and Biodiversity – Mediterranean Region of Türkiye

Adaptation Actions	Implementation Actions	Key Sectors Involved
Enhanced Wildfire Prevention and Response	Increase firefighting capacity, clear dry brush, create fire breaks, and establish community fire watch programs.	Ministry of Forestry and Water Affairs, Local Governments, Firefighting Teams, NGOs
Reforestation with Climate-Resilient Species	Plant native, drought-tolerant trees in degraded areas and after fires to restore forest cover.	Ministry of Forestry and Water Affairs, NGOs, Local Communities
Biodiversity Conservation and Protected Areas	Expand and better manage protected regions, enforce anti-poaching and logging regulations, and monitor vulnerable species.	Ministry of Environment and Urbanization, Ministry of Forestry, NGOs, Local Communities
Invasive Species Monitoring and Control	Establish rapid response teams to detect and manage invasive pests and species that threaten native ecosystems.	Ministry of Environment and Urbanization, Ministry of Agriculture and Forestry, Research Institutions
Community-Based Ecosystem Management	Involve local communities in sustainable forestry and biodiversity projects such as community forestry, ecotourism, and non-timber product harvesting.	Local Communities, Ministry of Forestry and Water Affairs, NGOs, Ecotourism Organizations
Long-Term Landscape-Level Planning	Develop ecological corridors and integrate climate projections into land-use planning to allow species migration and forest adaptation.	Ministry of Forestry and Water Affairs, Ministry of Environment and Urbanization, Local Governments
Forest Fire Risk Assessment and Monitoring	Develop a national database for wildfire risk and regularly assess and monitor fire-prone regions.	Ministry of Forestry, Local Authorities, Firefighting Teams
Forest Health Monitoring and Pest Control	Implement regular monitoring programs to track forest health, detect pests, and manage outbreaks before they spread.	Ministry of Forestry, Research Institutions, Local Communities
Agroforestry and Sustainable Land Use	Promote agroforestry techniques that integrate trees with agricultural systems, supporting biodiversity and improving soil fertility.	Ministry of Agriculture, Ministry of Forestry, Farmers, NGOs
Ecosystem Restoration and Soil Conservation	Implement soil conservation practices like terracing and contour farming in degraded forest areas to prevent erosion and improve soil quality.	Ministry of Forestry, Local Governments, Environmental NGOs, Farmers

8. Fisheries and Marine Ecosystems

8.1. Introduction

Fisheries and marine ecosystems are under increasing stress due to climate change, which impacts species distribution, habitats, and overall ecosystem health. To ensure the sustainability of marine resources, comprehensive adaptation actions are essential. This section outlines key strategies aimed at protecting fisheries, controlling invasive species, restoring marine habitats, supporting aquaculture, and fostering community involvement in marine conservation. These actions are accompanied by implementation steps and identify the key sectors involved, ensuring coordinated efforts for long-term marine resilience.

8.2. Adaptation and Implementation Actions

- **Sustainable Fisheries Management:**
  Adjust fishing quotas, establish seasonal closures, and enforce anti-illegal fishing measures to protect stressed stocks. Science-based management preserves marine resources amid shifting species distributions.
- **Invasive Species Control in Coastal Waters:**
  Implement early detection and rapid response systems (including public reporting) to manage invasive marine species. Controlling these species protects native biodiversity and fishery productivity.
- **Protection and Restoration of Marine Habitats:**
  Expand Marine Protected Areas, enforce restrictions on destructive practices, and restore critical habitats like seagrass meadows and coral reefs. Healthy habitats are more resilient to warming and acidification.
- **Support for Sustainable Aquaculture:**
  Promote climate-resilient aquaculture practices to supplement wild catch and reduce pressure on natural stocks. Modern aquaculture can provide a stable seafood supply under changing marine conditions.
- **Community Involvement and Awareness:**
  Engage local fishers and coastal communities in monitoring, data collection, and

education on marine conservation. Informed communities drive sustainable practices and enhance regional resilience.

- **Long-Term Ecosystem-Based Coastal Management:**
  Integrate fisheries with broader coastal and marine planning, ensuring sustainable development, water quality control, and biodiversity preservation. This fosters a resilient marine environment that supports local economies.

Figure 4. Strengthening Marine Resilience: Adaptation Strategies for Sustainable Fisheries and Coastal Ecosystems

Table 4. Adaptation and implementation actions for Fisheries and Marine Ecosystems – Mediterranean Region of Türkiye

Adaptation Actions	Implementation Actions	Key Sectors Involved
Sustainable Fisheries Management	Adjust fishing quotas, establish seasonal closures, and enforce anti-illegal fishing measures.	Ministry of Agriculture and Forestry, Fisheries Sector, Local Government, NGOs
Invasive Species Control in Coastal Waters	Implement early detection and rapid response systems for invasive species in coastal areas.	Ministry of Environment and Urbanization, Fisheries, Research Institutions, Local Communities
Protection and Restoration of Marine Habitats	Expand Marine Protected Areas, restore critical habitats like seagrass meadows and coral reefs, and enforce restrictions on destructive fishing practices.	Ministry of Environment and Urbanization, Fisheries, Environmental NGOs, Coastal Communities
Support for Sustainable Aquaculture	Promote climate-resilient aquaculture practices and modern technologies to supplement wild fisheries.	Ministry of Agriculture and Forestry, Aquaculture Sector, Fisheries, Local Communities
Community Involvement and Awareness	Engage local fishers and coastal communities in monitoring and educational programs on marine conservation.	Fisheries, Local Communities, NGOs, Educational Institutions
Long-Term Ecosystem-Based Coastal Management	Integrate fisheries with coastal planning, ensuring water quality, biodiversity preservation, and sustainable development.	Ministry of Environment and Urbanization, Fisheries, Coastal Development Authorities

9. Public Health

9.1. Introduction

The Mediterranean region is increasingly vulnerable to the health impacts of climate change, including extreme heat events, the spread of vector-borne diseases, and water and food security challenges. Public health systems are under pressure as climate-related events strain resources and exacerbate existing health risks, particularly for vulnerable populations. In response, a comprehensive adaptation plan for public health is essential to enhance resilience against these emerging threats. This plan focuses on strengthening healthcare infrastructure, improving disease surveillance, and promoting community awareness and preparedness. By integrating

climate change projections into public health strategies, the Mediterranean region can better safeguard the health and well-being of its populations amidst evolving climate conditions.

9.2. Adaptation and Implementation Actions

- **Development of Heat-Health Action Plans:**
  Establish early warning systems, open cooling centers, and conduct public outreach to manage heatwave risks. These steps protect vulnerable populations from heat-related illnesses.
- **Strengthening Healthcare Systems:**
  Train health workers, upgrade facilities for climate resilience, and stockpile essential supplies to respond to emergencies. Enhanced preparedness minimizes health system overload during extreme events.
- **Vector Control and Disease Surveillance:**
  Implement robust programs to monitor and control disease vectors, alongside public education campaigns on preventive measures. These initiatives reduce the risk of vector-borne disease outbreaks amid warming conditions.
- **Ensuring Water and Food Safety:**
  Intensify inspections and improve sanitation practices to guard against contamination, especially during heat and drought periods. Safe water and food supplies are critical to preventing secondary health crises.
- **Community Health Education:**
  Run outreach programs in schools and communities to promote practices that reduce health risks during climate extremes. Increased awareness empowers citizens to take personal and collective action.
- **Long-Term Urban Health Planning:**
  Incorporate climate change projections into public health strategy, update emergency response systems, and integrate resilience into urban planning. Over time, these measures create a more robust and responsive health system.

Figure 5. Protecting Public Health in a Changing Climate: Mediterranean Strategies for Resilience and Adaptation.

Table 5. Adaptation and implementation actions for Sustainable Public Health System – Mediterranean Region of Türkiye

Adaptation Actions	Implementation Actions	Key Sectors Involved
Development of Heat-Health Action Plans	Establish early warning systems, open cooling centers, and conduct public outreach to manage heatwave risks.	Ministry of Health, Local Authorities, Meteorological Agencies
Strengthening Healthcare Systems	Train health workers, upgrade facilities for climate resilience, and stockpile essential supplies to respond to emergencies.	Ministry of Health, Hospitals, Local Governments
Vector Control and Disease Surveillance	Implement robust programs to monitor and control disease vectors, alongside public education campaigns on preventive measures.	Ministry of Health, Public Health Agencies, Local Governments
Ensuring Water and Food Safety	Intensify inspections and improve sanitation practices to guard against contamination, especially during heat and drought periods.	Ministry of Health, Ministry of Agriculture, Local Governments
Community Health Education	Run outreach programs in schools and communities to promote practices that reduce health risks during climate extremes.	Ministry of Health, Education Sector, NGOs, Local Communities
Long-Term Urban Health Planning	Incorporate climate change projections into public health strategy, update emergency response systems, and integrate resilience into urban planning.	Ministry of Health, Ministry of Environment, Local Authorities, Urban Planning Departments
Mental Health Support During Disasters	Establish mental health programs and counseling services for individuals affected by climate-related disasters.	Ministry of Health, Local Governments, Psychologists, NGOs
Nutrition and Food Security Programs	Increase community-based nutrition education and food security initiatives to address climate-induced disruptions to food systems.	Ministry of Health, Ministry of Agriculture, Local Governments, NGOs
Climate-Resilient Health Infrastructure	Design and build health facilities that can withstand extreme weather events (e.g., floods, heatwaves), ensuring continuous service delivery.	Ministry of Health, Construction and Architecture Firms, Local Authorities
Health Impact Assessment of Climate Policies	Conduct regular health impact assessments to evaluate the effects of climate adaptation policies on public health outcomes.	Ministry of Health, Research Institutions, Policy Makers

This table includes an expanded list of actions designed to enhance public health resilience in the face of climate change. The actions focus on proactive measures such as improving

healthcare systems, vector control, water safety, and community health education, with the involvement of key sectors and institutions to ensure coordinated and effective responses.

10. Urban Settlements and Infrastructure

10.1. Introduction

Urban settlements in the Mediterranean region are facing increasing risks from climate change, including flooding, extreme heat, and infrastructure vulnerability. In response, a comprehensive set of adaptation measures is necessary to improve resilience and ensure that urban environments continue to function effectively amidst these challenges. By enhancing flood control systems, mitigating heat island effects, auditing infrastructure resilience, and promoting sustainable mobility, Mediterranean cities can reduce their exposure to climate-related threats. This plan focuses on proactive adaptation and long-term urban planning to safeguard communities and infrastructure, ensuring cities remain liveable, resilient, and sustainable in the face of future climate uncertainties.

10.2. Adaptation and Implementation Actions

- **Urban Flood Control and Drainage Upgrades:**
  Assess flood risks, clear blockages, and install or improve pumping stations to enhance drainage capacity. Improved infrastructure reduces flood damage and protects critical urban areas.
- **Heat Mitigation in Cities:**
  Expand urban greenery, implement cool roofs and reflective coatings, and deploy passive cooling technologies. These measures lower urban temperatures, decrease energy use, and improve livability.
- **Resilient Infrastructure Audits:**
  Regularly inspect and reinforce roads, bridges, and utilities to withstand extreme weather. Immediate fixes prevent catastrophic failures and enhance overall urban resilience.
- **Sustainable Urban Mobility Initiatives:**
  Expand public transit, build safe bicycle lanes, and transition municipal fleets to low-emission vehicles. Promoting sustainable mobility reduces congestion, emissions, and urban heat.

- **Community-Based Resilience Programs:**
  Engage residents in local adaptation projects, such as neighborhood gardens, volunteer-based emergency check-ins, and local resilience planning. Grassroots involvement ensures that solutions meet local needs and gain broad support.
- **Long-Term Integration into Urban Planning:**
  Update zoning, master plans, and building codes to integrate climate resilience into new development. Planning for the future safeguards urban growth against recurring climate risks.

Urban Flood Control and Drainage Upgrades

Heat Mitigation in Citles

Sustainable Urban Mobility Initiatives

Sustainable Urban Mobility Initiatives

Community-Based Resilience Programs

Long-Term Integration Into Urban Planning

Figure 6. Climate-Resilient Cities: Adaptation Strategies for Urban Settlements and Infrastructure in the Mediterranean

Table 6. Adaptation and implementation actions for Sustainable Urban Settlements and Infrastructure–Mediterranean Region of Türkiye

Adaptation Actions	Implementation Actions	Key Sectors Involved
Urban Flood Control and Drainage Upgrades	Assess flood risks, clear blockages, and install or improve pumping stations to enhance urban drainage capacity.	Urban Planning, Water Management, Civil Engineering
Heat Mitigation in Cities	Expand urban greenery, apply cool roofs and reflective coatings, and deploy passive cooling technologies to reduce heat island effects.	Urban Planning, Environmental Engineering, Public Health
Resilient Infrastructure Audits	Conduct regular inspections and reinforce roads, bridges, and utility networks to withstand extreme weather events.	Infrastructure, Civil Engineering, Disaster Risk Management
Sustainable Urban Mobility Initiatives	Expand and modernize public transportation, develop bicycle lanes, and transition municipal fleets to low-emission or electric vehicles.	Transportation, Urban Planning, Energy
Community-Based Resilience Programs	Mobilize residents in neighborhood-based projects like community gardens, emergency support networks, and participatory climate adaptation planning.	Community Development, Urban Planning, Public Health
Long-Term Integration into Urban Planning	Update zoning regulations, revise master plans, and enforce building codes to integrate climate adaptation and resilience principles into urban development.	Urban Planning, Architecture, Environmental Policy

11. Tourism (Coastal and Inland)

11.1. Introduction

The Mediterranean region of Türkiye, renowned for its rich cultural heritage, stunning coastlines, and diverse ecosystems, faces increasing challenges due to climate change. Rising temperatures, sea-level rise, and extreme weather events threaten both natural assets and tourism infrastructure. To safeguard this vital sector, a shift toward sustainable and climate-resilient tourism is essential. This includes diversifying tourism offerings beyond the summer season, climate-proofing facilities, protecting coastal attractions, and integrating low-carbon

and adaptive strategies into long-term planning. By enhancing resilience and reducing environmental impact, the region can continue to thrive as a premier destination while supporting local livelihoods and preserving its unique character for future generations.

11.2. Adaptation and Implementation Actions

- **Diversification of Tourism Seasons and Offerings:**
  Develop off-peak and alternative tourism (eco, cultural, culinary) to reduce dependency on hot summer months. Diversification helps maintain stable tourist inflows even during extreme weather.
- **Climate-Proof Tourist Facilities:**
  Retrofit hotels and coastal facilities with shading, cooling systems, and water-efficient technologies to improve comfort and safety. Adapted infrastructure ensures a better visitor experience and minimizes disruption during extreme events.
- **Protection of Coastal Attractions:**
  Undertake beach nourishment, dune reinforcement, and restoration projects to protect erosion-prone areas and cultural heritage sites. Maintaining natural assets preserves the region's appeal as a tourist destination.
- **Training and Awareness Programs for the Tourism Sector:**
  Educate industry stakeholders on climate adaptation and sustainable practices to enhance overall sector resilience. Informed operators can proactively adjust practices and improve emergency readiness.
- **Emergency Preparedness for Tourist Areas:**
  Establish clear evacuation routes, multilingual emergency communication systems, and coordinated response plans in tourist hotspots. Preparedness ensures visitor safety and minimizes disruption during climate events.
- **Long-Term Sustainable Tourism Planning:**
  Integrate climate projections into development strategies, relocate vulnerable infrastructure, and invest in climate-resilient attractions. Strategic planning safeguards the tourism industry over the long haul.
- **Promotion of Low-Carbon Tourism:**
  Encourage the use of renewable energy, local food sourcing, and electric transportation in tourism operations. Reducing emissions not only meets mitigation goals but also enhances the destination's sustainability credentials.

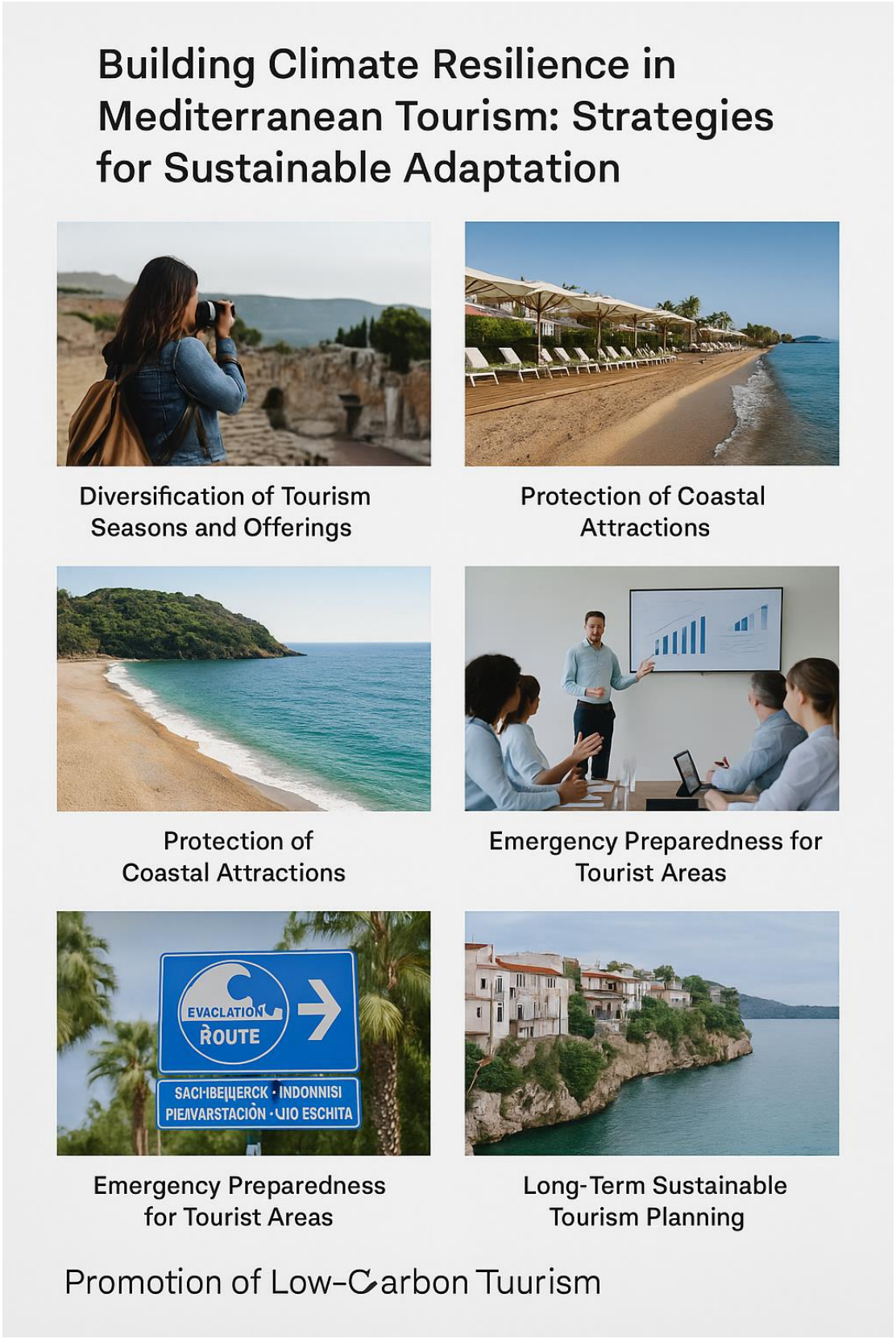

Figure 7. Sustainable Tourism in a Changing Climate: Adaptation Strategies for Coastal and Inland Destinations in Mediterranean Regionof Türkiye.

Table 7. Adaptation and implementation actions for Sustainable Tourism –Mediterranean Region of Türkiye

Adaptation Actions	Implementation Actions	Key Sectors Involved
Urban Flood Control and Drainage Upgrades	Assess flood risks, clear blockages, and improve pumping stations to enhance drainage capacity.	Urban Planning, Water Management, Civil Engineering
Heat Mitigation in Cities	Expand urban greenery, implement cool roofs, reflective coatings, and passive cooling technologies to lower urban temperatures.	Urban Planning, Environmental Engineering, Public Health
Resilient Infrastructure Audits	Regularly inspect and reinforce roads, bridges, and utilities to withstand extreme weather conditions.	Infrastructure, Civil Engineering, Disaster Risk Management
Sustainable Urban Mobility Initiatives	Expand public transit, build bicycle lanes, and transition municipal fleets to low-emission vehicles to reduce congestion and emissions.	Transportation, Urban Planning, Energy
Community-Based Resilience Programs	Engage residents in neighborhood gardens, emergency check-ins, and local resilience planning to address climate impacts.	Community Development, Urban Planning, Public Health
Long-Term Integration into Urban Planning	Update zoning, master plans, and building codes to integrate climate resilience into new development.	Urban Planning, Architecture, Environmental Policy
Energy-Efficient Buildings	Promote retrofitting of existing buildings, enforce energy-efficient building codes, and incentivize green building designs.	Architecture, Construction, Energy, Policy
Stormwater Management Systems	Implement green infrastructure like permeable pavements, rain gardens, and urban wetlands to manage excess rainfall.	Urban Planning, Water Management, Environmental Engineering
Climate-Resilient Public Spaces	Design and implement parks, public squares, and community spaces that can withstand climate extremes such as heatwaves and flooding.	Urban Planning, Environmental Design, Public Health
Smart City Technologies	Integrate sensors, data analytics, and AI to monitor infrastructure, optimize energy use, and predict climate-related risks.	Technology, Urban Planning, Civil Engineering, Energy

This table captures a broader range of adaptation actions aimed at improving resilience in urban settlements across the Mediterranean region. Each implementation action outlines the specific steps to take, while the key sectors involved ensure that relevant parties are engaged in the process.

12. Sustainable Energy Systems

12.1. INTRODUCTION

The Mediterranean Region faces increasing climate-related challenges, including extreme heat, shifting energy demands, and infrastructure vulnerability. Ensuring a resilient, low-carbon, and secure energy future requires a shift toward sustainable energy systems. By improving efficiency, diversifying energy sources, modernizing grids, and embracing decentralized solutions, the region can reduce emissions while safeguarding energy access during extreme events. Integrated planning, technological innovation, and active community participation will be essential to build an adaptive and climate-resilient energy infrastructure for the decades ahead.

12.2. Adaptation and Implementation Actions for Energy Systems

- **Boosting Energy Efficiency and Demand Management**:
  - Implement incentive programs for energy-efficient appliances and building retrofits, and introduce smart meter systems to reduce peak loads.
- **Maintenance and Climate-Proofing of Power Infrastructure**:
  - Upgrade transmission lines, substations, and generation facilities to withstand high winds, heat, and flood conditions.
- **Decentralization through Distributed Generation**:
  - Accelerate rooftop solar, community micro-grids, and solar water heaters to reduce dependency on central grids and enhance local resilience.
- **Promotion of Alternative Cooling Techniques**:
  - Invest in passive and low-energy cooling methods such as district cooling systems, cool roofs, and evaporative coolers to reduce energy demand.
- **Emergency Energy Planning**:
  - Develop contingency plans for backup generators, load shedding, and emergency power supplies for critical infrastructure during extreme events.
- **Long-Term Diversification and Modernization of the Energy Mix**:
  - Transition to a renewable-heavy energy portfolio with large-scale solar, wind, and energy storage investments, and modernize the grid with smart systems.
- **Energy Storage Solutions**:

- Invest in energy storage technologies (e.g., batteries) to store excess renewable energy and balance supply and demand during peak hours and emergencies.

- **Smart Grid Development**:
  - Implement advanced grid technologies (e.g., sensors, real-time monitoring) to optimize energy distribution, enhance fault detection, and improve resilience.
- **Micro-Grid Systems in Vulnerable Areas**:
  - Deploy micro-grids in remote or vulnerable areas to provide localized energy resilience and ensure power availability during disruptions.
- **Public Awareness and Education Campaigns**:
  - Conduct public education programs on energy conservation, renewable energy adoption, and climate-resilient energy practices.

Figure 8. Resilient and Sustainable Energy Systems: Climate Adaptation Strategies for the Mediterranean Region

Table 8 Adaptation and Implementation Actions for Sustainable Energy Systems

Adaptation Actions	Implementation Actions	Key Sectors Involved
Boosting Energy Efficiency and Demand Management	Implement incentive programs for energy-efficient appliances, building retrofits, and introduce smart meter systems.	Energy, Urban Planning, Technology
Maintenance and Climate-Proofing of Power Infrastructure	Upgrade power transmission lines, substations, and generation facilities to withstand extreme weather conditions.	Energy, Infrastructure, Civil Engineering
Decentralization through Distributed Generation	Accelerate rooftop solar, micro-grids, and solar water heaters to enhance local resilience and reduce dependency on central grids.	Energy, Renewable Energy, Technology
Promotion of Alternative Cooling Techniques	Invest in passive cooling methods such as district cooling, cool roofs, and evaporative coolers to reduce energy demand.	Energy, Urban Planning, Climate Engineering
Emergency Energy Planning	Develop contingency plans for backup power, load shedding, and emergency energy supplies for critical infrastructure.	Energy, Disaster Risk Management, Infrastructure
Long-Term Diversification and Modernization of the Energy Mix	Invest in large-scale solar, wind, and energy storage systems while modernizing the grid with smart, redundant systems.	Energy, Renewable Energy, Policy
Energy Storage Solutions	Invest in storage technologies like batteries to store excess renewable energy for peak demand and emergency situations.	Energy, Technology, Infrastructure
Smart Grid Development	Implement smart grid technologies for real-time monitoring, fault detection, and energy distribution optimization.	Energy, Technology, Infrastructure
Micro-Grid Systems in Vulnerable Areas	Deploy micro-grids in isolated or disaster-prone areas to ensure a stable power supply during disruptions.	Energy, Renewable Energy, Infrastructure

Conclusion

The Mediterranean Region, with its rich biodiversity, extensive coastline, and dynamic socio-economic structure, faces significant challenges from climate change. This adaptation plan presents a comprehensive framework to enhance resilience across critical sectors such as water

resources, agriculture, biodiversity, public health, and tourism. By integrating science-based strategies with local knowledge and institutional collaboration, the plan aims to safeguard natural ecosystems and support sustainable development. Continued commitment, stakeholder engagement, and adaptive governance will be key to ensuring the long-term success of climate adaptation efforts in the region.

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