

REGIONAL CLIMATE CHANGE ADAPTATION FRAMEWORK FOR THE MEDITERRANEAN MARINE AND COASTAL AREAS



United Nations
Environment Programme



Mediterranean Action Plan
Barcelona Convention

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UN Environment/MAP – United Nations Environment Programme – Mediterranean Action Plan Secretariat to the Barcelona Convention

48, Vassileos Konstantinou Avenue 11635
P.O Box: 18019, Athens Greece
Tel: +302107273100 Fax: +30 2107253196
www.unepmap.org

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Foreword

Gaetano Leone

Coordinator of the United Nations Environment Programme/Mediterranean Action Plan
Secretariat to the Barcelona Convention and its Protocols

Climate change is arguably one of the most critical challenges that the Mediterranean region is facing. The Mediterranean basin has been identified as one of the two most responsive regions to climate change globally. The recent IPCC Fifth Assessment Report considers the Region as “highly vulnerable to climate change”, also mentioning that it “will suffer multiple stresses and systemic failures due to climate changes”. The overall risks of climate change impacts can be reduced through mitigation, i.e. by limiting the rate and magnitude of climate change. However, even under the most ambitious mitigation scenarios, risks from adverse climate impacts remain, due to already locked-in climate change. Therefore, adaptation policies and measures anticipating a wide range of potential climate-related risks are essential.

Currently, responses to climate-related pressures and hazards are often limited to short-term and reactive local emergency measures. However, building environmental and socioeconomic resilience against climate change at the regional level is about pro-active, longer term and integrated planning that addresses existing aspects of unsustainable development as drivers of vulnerability and guides the economic development of the region in a more sustainable direction. As climate risks extend well past territorial boundaries, a cross-border collaborative and coordinated regional approach to adaptation is required, promoting synergies with other multilateral environmental agreements.

The main objective of the Framework is to define a regional strategic approach to increase the resilience of the Mediterranean marine and coastal natural and socioeconomic systems to the impacts of climate change, assisting policy makers and stakeholders at all levels across the Mediterranean in the development and implementation of coherent and effective policies and measures.

The development of the Framework was guided by the vision that by 2025 the marine and coastal areas of the Mediterranean countries and their communities have increased their resilience to the adverse impacts of climate variability and change, in the context of sustainable development. This is to be achieved through common objectives, cooperation, solidarity, equity and participatory governance.

The focus of the Framework, coherently with the legal framework set by the Protocols of the Barcelona Convention, is on the marine and coastal environments of the Mediterranean. Its geographical scope is that of the Barcelona Convention, i.e. the Mediterranean Sea and the coastal zones of the 21 countries that border it. The Framework recognizes that climatic changes will have impacts that do not respect the boundaries of a coastal zone as it is usually defined, and that coastal adaptation actions may be required further inland, in particular in inland watersheds.

Following the endorsement of the Framework by the Contracting Parties to the Barcelona Convention at their 19th Ordinary Meeting (COP 19, Athens, Greece, February 2016), the UN Environment/Mediterranean Action Plan system offers it to policy makers and stakeholders in the Mediterranean region as a structured outline to facilitate the identification of strategic objectives, strategic directions and priorities for adapting to climate change.

Decision IG.22/6

Regional Climate Change Adaptation Framework for the Mediterranean Marine and Coastal Areas

The 19th Meeting of the Contracting Parties to the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean, hereinafter referred to as the Barcelona Convention,

Recalling the Protocol on Integrated Coastal Zone Management in the Mediterranean and especially its provisions on the protection of the coastal zone, of related economic activities and of specific coastal ecosystems, on the prevention, response to natural hazards and on the prevention and mitigation and adaptation measures to address the effects of climate change, in particular on natural disasters, land-sea interactions and coastal erosion;

Recalling the Mediterranean Strategy for Sustainable Development (MSSD) and especially its priority field of Action relating to the adaptation to the effects of climate change;

Recalling that the 13th Meeting of the Mediterranean Commission on Sustainable Development (Cairo, 2009) encouraged “*the development of an action-oriented regional approach for adaptation*” and called on Contracting Parties “*to implement adaptation measures on an urgent basis with the view to strengthening the resilience of the Mediterranean region in the face of climate change*”;

Recalling the Marrakesh Declaration (Marrakesh, Morocco, November 2009) which recognized the need to “*promote Mediterranean cooperation to combat the effects of climate change in the region and enhance the institutional mechanisms*” and to “*implement effective coordination to ensure the integration of climate change issues into development policies with the aim of achieving the Millennium Development Goals and the objectives of the MSSD, and ensure the strengthening of cooperation for the sharing of experience in the field of surveillance (early-warning systems) and the development and implementation of adaptation and risk-management strategies*”;

Recalling the UN Environment/MAP Mid-Term Strategy 2016-2021, which makes climate change adaptation a cross-cutting theme;

Recognising the importance of developing appropriate and integrated plans for coastal zone management as set out in Article 4, paragraph 1(e), of the United Nations Framework Convention on Climate Change;

Concerned about the findings of the 5th Assessment Report of the Intergovernmental Panel on Climate Change;

Aware that the environmental and socioeconomic systems of the Mediterranean marine and coastal zones are threatened by multiple climate change-related risks and that increasing their resilience to the effects of climate change is crucial to their sustainable development;

Recalling the support expressed to the development of the Regional Climate Change Adaptation Framework by the Union for the Mediterranean (UfM) through the Ministerial Declarations taken at their Meeting on Environment and Climate Change (Athens, Greece, May 2014) and on Blue Economy (Brussels, Belgium, 17 November 2015) respectively, and the conclusions of the three UfM Climate Change Expert Group Meetings;

Having considered the report of the 16th Meeting of the MCSD (Marrakesh, Morocco, June 2015), which acknowledged the quality and the relevance of the draft Regional Climate Change Adaptation Framework, and recognized its importance and the need for such an instrument;

Endorses the Regional Climate Change Adaptation Framework (herein after referred to as “the Framework”), as a contribution to the Mid-Term Strategy in particular to the Core and Cross-cutting themes on Land-Sea interaction and Processes and Cross-Cutting themes ICZM and Climate Change Adaptation;

Urges the Contracting Parties to further elaborate the Framework and translate it into actions making use of existing and new strategic instruments of the MAP system and in coherence with the legal and policy framework;

Urges the Contracting Parties to take into account and address the Framework in particular in their national and local ICZM and climate change adaptation strategies and plans;

Encourages all relevant intergovernmental organizations, donor agencies, industry, non-governmental organizations and academic institutions to support the Framework including funding as appropriate;

Requests the Secretariat to include appropriate measures for climate change adaptation in the new comprehensive Resource Mobilisation Strategy being prepared for COP 20 in accordance with Decision IG.22/1, which would include identification and mobilisation of external resources to support Contracting Parties in enhancing their capacity and effectively face the challenges of climate change adaptation in the marine and coastal environment.

Background

The UN Environment/MAP has been supporting the assessment of, and responses to the threats posed by climate change on the Mediterranean marine and coastal zones dating back to the publication in 1992 of "Climate change and the Mediterranean: environmental and societal impacts of climatic change and sea level rise in the Mediterranean region". There are strong interlinkages between the Framework and the majority of the existing instruments and documents and there is clear potential that the Framework can significantly contribute to their implementation. This is particularly important also in light of the 2030 Agenda for Sustainable Development and the Sustainable Development Goals (adopted in New York in September 2015), as well as the outcome of the UNFCCC Climate Change Conference of December 2015 in Paris, France. In addition, several of the Regional Activity Centers of UN Environment/MAP have undertaken relevant studies over the years on the impacts of climate change on Mediterranean biodiversity, and identifying climate change-related risks in coastal zones.

Process of Preparation of the Framework

Work on the Framework started in mid-2014. The original draft from 2011 formed the basis of the work. Additionally, a review was made of all relevant adaptation strategies, including the EU Strategy on adaptation to climate change, the Baltic Sea Region Climate Change Adaptation Strategy, and the Black Sea Economic Cooperation Climate Change Adaptation Strategy. Additionally, the Mediterranean countries' communications to the UNFCCC were reviewed as well as major publications from UN Environment and international institutions and initiatives such as the IPCC, the European Environment Agency, the World Bank, the European Commission's Joint Research Centre, the Regional Initiative for the Assessment of the Impact of Climate Change on Water Resources on Socio-Economic Vulnerability in the Arab Region (RICCAR) and others.

An essential aspect of the Framework is that it has been developed in a step-by-step consultation and review process through an ad hoc technical Advisory Panel involving key regional experts on climate adaptation, which was established in autumn 2014. The members of the panel, suggested by partners of the MAP system, included representatives from international and regional organizations, academic and research institutions, NGOs, scientists, and financial institutions.

Inputs to the Framework were also sought from the Union for the Mediterranean Climate Change Expert Group. Coordination with the Union for the Mediterranean was ensured since the beginning of the process. The Union provides for the development of regional policy and action frameworks and projects including in response to climate change challenges; the Union is expecting to use the Framework for the definition of its policies and work on climate change adaptation in the Mediterranean.

The 16th Meeting of the Mediterranean Commission on Sustainable Development (MCSD), acknowledged with appreciation the high quality and the relevance of the Framework, and recognized its importance and the need for such an instrument.

The Framework was submitted to the MAP Focal Points meeting (Athens, 13-16 October 2015) for consideration and was adopted by the 19th meeting of the Contracting Parties to the Barcelona Convention (COP 19).

Introduction

Purpose and scope of the Framework

The development of the Framework is guided by the following vision:

“By 2025 the Marine and Coastal Areas of the Mediterranean countries and their communities have increased their resilience to the adverse impacts of climate variability and change, in the context of Sustainable Development. This is achieved through common objectives, cooperation, solidarity, equity and participatory governance”.

The Mediterranean has long been identified as a global climate change hotspot, one of the two most responsive regions to climate change globally¹. Currently, responses to climate-related pressures and hazards in the region are often limited to short-term and reactive local emergency measures. However, building environmental and socioeconomic resilience against climate change at the regional level is about pro-active, longer term and integrated planning that addresses the root causes of vulnerability and guides the economic development of the region in a more sustainable direction. The Mediterranean countries need to turn the challenges they face under a changing climate into opportunities to increase their resilience by addressing the reasons that have so far led many environmental parameters into almost critical status.

Climate risks extend well past territorial boundaries, and therefore so do the necessary measures to address them. A cross-border collaborative and coordinated approach to adaptation is in line with the UNFCCC's National Adaptation Plan process which among others urges countries to promote “coordination and synergy at the regional level and with other multilateral environmental agreements”² and additionally with the EU Strategy on Adaptation to Climate Change, which encourages EU countries to “establish contact with neighboring countries to inform about the adaptation process and areas of concern with regard to cross-border impacts and identify approaches for coordination over different political, legal and institutional settings”³.

The main objective of the Framework is to set a regional strategic approach to increase the resilience of the Mediterranean marine and coastal natural and socioeconomic systems to the impacts of climate change, assisting policy makers and stakeholders at all levels across the Mediterranean in the development and implementation of coherent and effective policies and measures by identifying strategic objectives, strategic directions and priorities that:

- promote the right enabling environment for mainstreaming adaptation in national and local planning;
- promote and exchange best practices and low-regret measures;
- promote leveraging of necessary funding; and
- exchange and access best available data, knowledge, assessments and tools on adaptation.

Its focus, coherently with the legal framework set by the Barcelona Convention and its Protocols, is on the marine and coastal environments of the Mediterranean. The geographical scope of the Framework is that

1. Giorgi, F. (2006), Climate change hot-spots, *Geophysical Research Letters*, 33, L08707

2. UNFCCC Secretariat, Technical guidelines for the national adaptation plan process, December 2012.

3. European Commission, Guidelines on developing adaptation strategies, April 2013.

of the Barcelona Convention and its Protocols, that is the Mediterranean Sea and the coastal zones of the 21 countries that border it. The Framework recognizes that climatic changes will have impacts that do not respect the boundaries of a coastal zone as it is usually defined and that coastal adaptation actions may be required further inland, in particular in inland watersheds.

At national level the implementation of this strategic framework should be linked to the work carried under the Barcelona Convention, and complementary to the implantation of the ICZM protocol, MSSD implementation, and other relevant instruments.

The time scale of the Framework is in line with the Mediterranean Strategy for Sustainable Development 2016-2025.

The Framework is structured around four Strategic Objectives. Each Strategic Objective includes separate Strategic Directions and suggested priorities for their realization.

The Framework builds upon and is supported by two reports prepared by the UN Environment/MAP. The "Background document to the Regional Climate Change Adaptation Framework"⁴ provides an overview of key concepts and perspectives around adaptation to climate change, of the latest knowledge regarding the climate change-related challenges that the Mediterranean is facing, of the relevant national and international capacities and efforts, of recommended responses and approaches and of available and emerging financing options. In addition an "Analysis on how Regional Climate Change Adaptation Framework priority fields of action and climate-related issues in general are already reflected in Protocols and other strategic instruments of the MAP"⁵ was prepared to show how climate change adaptation considerations have been taken into account throughout the Barcelona Convention's Protocols, strategies and plans, and to provide a basis on how the Framework can bring together these elements towards a coordinated approach towards enhancing the resilience of the Mediterranean marine and coastal environment to the impacts of climate change by ensuring marine and coastal environment conservation and good environment status (GES) is achieved.

The Mediterranean Changing Climate

Climate change poses significant challenges to the Mediterranean countries and is expected to worsen already acute situations present in the region. Essential resources like fresh water, soil, agricultural production and fish provisions may become endangered while coastal communities, ecosystems and infrastructure will be challenged by increased physical risks. More importantly, human lives may become endangered, health risks increased and even stability compromised in a changing climate. A Mediterranean-wide response to these risks should reduce the vulnerability and exposure of the region's society, economy and ecosystems to climate-related hazards, and increase the overall resilience of the Mediterranean marine and coastal areas.

4. UNEP(DEPI)/MED IG 22/Inf.11 - Background document to the Regional Climate Change Adaptation Framework

5. UNEP(DEPI)/MED IG 22/Inf.12 - Analysis on how Regional Climate Change Adaptation Framework priority fields of action and climate-related issues in general are already reflected in Protocols and other strategic instruments of the MAP

The Region's climate is already changing

Climate variability and change is becoming increasingly evident in the Mediterranean. According to observations and studies referenced in the recent IPCC Fifth Assessment Report (AR5)⁶ and in IPCC's SREX Report⁷, in recent decades, summer heat waves' intensity, number, and length have increased alongside extreme precipitation events and soil dryness. Major increases have been observed in warm temperature extremes. The shallow waters of the Mediterranean Sea have already warmed by almost 1°C since the 1980s. Trends of decreasing precipitation and discharge indicate a trend toward increased freshwater deficits. The Mediterranean also exhibits variability regarding the observed sea level rise. According to the latest EEA indicators assessment⁸, in the Mediterranean Sea there are areas with increases of more than 6 mm/year, and with decreases of more than -4 mm/year.

Projections for the future

The IPCC AR5 considers the Mediterranean Region as "highly vulnerable to climate change" and states that it "will suffer multiple stresses and systemic failures due to climate changes". Different sub-regions of the Mediterranean will witness different changes to their climate. On average however for the whole Region, estimates mentioned in the IPCC AR5 for the medium-low emissions scenario (RCP 4.5) and for the period 2081-2100 compared to 1986-2005 include an increase in surface mean air temperature of 2 - 4°C, 10-20% decreases in mean annual precipitation, increased risk of desertification, soil degradation, an increase in duration and intensity of droughts, summer heat-waves and heavy precipitation events, changes in species composition, increase of alien species, habitat losses and agricultural and forests production losses.

Sea level rise in the Mediterranean Sea involves local as well as global contributions. Thus multi-decadal regional projections involve larger uncertainties than those for the global ocean. A rise of 0.4-0.5m is projected for most of the Mediterranean under IPCC AR5's medium-low emission scenario RCP 4.5. The effect of sea level rise due to global warming is more important in most of the Mediterranean Sea where, due to the small tidal range, coastal infrastructure and coastal communities are located closer to mean sea level. In addition, vertical land movements caused by tectonic as well as other causes pose additional risks for such areas.

Overview of expected climate change-related risks

Climate change is expected to apply additional stresses on ecosystems and socioeconomic sectors and systems by modifying land degradation rates and the recurrence of droughts, floods and other extreme climate events, as well as through changes in temperatures, in the precipitation regime and in the level as well as the acidity of the sea.

Natural and managed resources and systems: The Mediterranean region is among the richest in biodiversity of global importance. However, many of its ecosystems have already been weakened by

6. Working Group I Contribution to the 5th IPCC Assessment Report, Climate Change 2013 - The Physical Science Basis, <http://www.ipcc.ch/report/ar5/wg1/>

7. IPCC, 2012: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change.

8. European Environment Agency, Global and European sea-level rise (CLIM 012) - Assessment published Sep 2014, <http://www.eea.europa.eu/data-and-maps/indicators/sea-level-rise-2/assessment>

pollution, overexploitation, fragmentation of habitats, and biological invasions. Such stresses are expected to be amplified under climate change. The composition of most of the present marine and coastal ecosystems will probably change and there will be a greater risk of extinction of species, especially those with a restricted climatic distribution, those that need highly specific habitats and/or those small populations which are naturally more vulnerable to modifications in their habitats. Climate change is also expected to amplify biological invasions and proliferation of pathogens and diseases, fostered by the rise in temperature of the marine waters⁹. At the same time, sea acidification is currently occurring at an unprecedented rate, subjecting some marine organisms to an additional, and worsening, environmental stress¹⁰. The region's water resources are already subject to various interacting pressures such as rapid population growth, urbanization, tourism, alongside environmental degradation. These stresses would be multiplied under climate change because of projected declines in precipitation and runoff, and depletion of groundwater resources. Agriculture in the coastal zones will be affected by increased temperatures and land degradation, and reduced water availability, with significant decreases in some crop yields which could reach alarming levels under high emissions scenarios, threatening food security especially for poor communities. Changes in the geographical distribution of wild fish stocks can lead to possible decreased catch potential for some species. Climate change can also influence where aquaculture is possible, which species are raised, and the efficiency of the production. The coastal zones, which face high risks due to sea-level rise, host most of one third of the world tourism that visit Mediterranean countries. The region's coastal systems and low-lying areas would be subject to submergence and erosion due to increased sea-level rise and sea flood surges. Coastal aquifers, already overexploited, would become increasingly threatened by salt water intrusion due to rising sea levels and/or over-extraction. Warming and reduced rainfall is expected to lead to a decrease in trees and plant growth while annual burned area due to forest and wild land fires is projected to significantly increase in many areas bordering the Mediterranean Sea.

Human Settlements, Industry, and Infrastructure: As coastal populations and assets in coastal areas continue to grow, exposure to climate change-related hazards –and especially those associated with sea-level rise- is also increasing. The key expected impacts of climate change in coastal urban areas include inland flooding; coastal flooding and storm surges in low-lying and unprotected coastal zones; heatwaves, exacerbated by the urban heat island effect; wind storms; water shortages and drought; enhanced air pollution; other geo-hydrological hazards, such as salt water intrusion and landslides. The crucial tourism industry could face negative consequences due to possible loss of beaches, natural attractions and tourism infrastructure, especially during the summer months because of heat waves, drought and the associated risk of fires. However, impacts on the sector will not be uniform across the region and occupancy rates may increase during spring and autumn. Port infrastructure, but also coastal roads, railways, and airports, are expected to be at risk mainly due to temporary and permanent flooding arising from sea-level rise, high winds and storm surges. Energy transmission infrastructure could be at risk; changes in water availability will affect hydropower generation and may lead to increased deployment of energy-intensive desalination options. Higher temperatures will increase the overall and peak demand for cooling in the summer months but at the same time reduce heating demand during the winter.

9. UNEP-MAP-RAC/SPA, 2010. Impact of climate change on marine and coastal biodiversity in the Mediterranean Sea: Current state of knowledge.

10. Mediterranean Sea Acidification in a changing climate (MedSeA) Project.

Human Health, Well-Being, and Security: The overall health effects of a changing climate in the Mediterranean are likely to be negative. Extreme high air temperatures contribute directly (through heat stress) and indirectly (through raised levels of ozone and other secondary pollutants) to an increase of the number of heat-related illnesses and deaths from cardiovascular and respiratory disease, particularly among elderly people, but also children, people with medical conditions, and the poor. Extreme heat also raises pollen and other aeroallergen levels which trigger asthma. Rising sea levels and increasingly extreme weather events may destroy homes, medical facilities and other essential services therefore increasing risks to public health. Lack of safe water can compromise hygiene and increase the risk of diarrheal disease while floods can contaminate freshwater supplies, heighten the risk of water-borne diseases, and create breeding grounds for disease-carrying insects, threatening especially those with already limited access to water and sanitation. Decrease in the production of staple foods will increase the prevalence of malnutrition and undernutrition and food insecurity in general, especially among those on low incomes. Finally, changes in the climate are likely to lengthen the transmission seasons of important vector-borne diseases and to alter their geographic range, while some toxic marine species could expand their distribution range.

A threat Multiplier: Finally, climate change could act as a threat multiplier in the Mediterranean region, predominantly in countries outside of the EU, by placing additional pressure on already scarce resources (especially water and land), reinforcing preexisting threats as political instability, poverty, and unemployment, and overstressing societies' adaptive capacities.

Other Relevant Policy and Institutional Frameworks and Initiatives

Alongside the activities ongoing under the auspices of UN Environment/MAP - Barcelona Convention in relation to climate change adaptation, there exist various other regional initiatives, with which cooperation will be a necessity. For the purpose of this document, we mention the following ones.

The European Commission adopted in April 2013 the EU Strategy on Adaptation to Climate Change which identifies three priority areas:

1. Promoting action by Member States, through encouraging the adoption of comprehensive adaptation strategies and providing funding to help them build up their adaptation capacities.
2. 'Climate-proofing' action by further promoting adaptation in key vulnerable sectors and ensuring that Europe's infrastructure is made more resilient, and
3. Better informed decision-making by addressing gaps in knowledge about adaptation. The Commission states that priority will be given to adaptation flagship projects that address key cross-sectoral, trans-regional and/or cross-border issues. In order to support the development and implementation of climate change adaptation strategies and actions in Europe, the European Climate Adaptation Platform Climate-ADAPT¹¹ has been launched since 2013.

The Union for the Mediterranean (UfM), is a multilateral partnership created in July 2008, consisting of the 28 member states of the EU and 15 other Mediterranean partner countries. Its climate-related policy framework provides for the development of regional policy and action frameworks and projects in response

11. <http://climate-adapt.eea.europa.eu>

to climate change challenges. The decisions of the UfM Ministerial Conference on Environment and Climate Change (13 May 2014, Athens, Greece) aim at enhancing coherence of and promoting joint action within a Mediterranean climate change agenda. In that context, the UfM Climate Change Expert Group and the UfM Working Group for Environment and Climate Change were established.

The Arab Framework Action Plan on Climate Change, 2010-2020, which was elaborated in the League of Arab States (LAS) framework, aims at enhancing the Arab countries' capacity to take appropriate measures for addressing climate change issues while achieving sustainable development targets and MDGs in the Arab Region. Its adaptation focus is on:

- Vulnerability assessments of climate change impacts on economic and social development;
- Adaptation strategies in a range of sectors;
- Preparation and implementation of strategies for disaster risk reduction.

Linkages have been secured with other relevant LAS strategies such as the Arab Strategy for Disaster Risk Reduction 2020 and the Arab Water Security Strategy 2010-2030.

The Framework's Objectives, Strategic Directions and Priorities

The Framework is structured around four Strategic Objectives, each of them identifying several Strategic Directions with Priorities for consideration. The Strategic Objectives and Strategic Directions are presented below and elaborated in the following section:

1. **Appropriate institutional and policy frameworks, increased awareness and stakeholder engagement, and enhanced capacity building and cooperation:**
 - 1.1. Enhancing awareness and engagement of key stakeholders on climate adaptation
 - 1.2. Promoting adequate institutional and policy frameworks
 - 1.3. Promoting a regional approach on Disaster Risk Management
 - 1.4. Improving implementation and effectiveness of adaptation policies through monitoring and reviewing progress
 - 1.5. Integrating climate adaptation into local plans for the protection and management of areas of special interest
2. **Development of best practices (including low regret measures) for effective and sustainable adaptation to climate change impacts:**
 - 2.1. Identifying adaptation needs and best practices
 - 2.2. Mainstreaming, exchanging and adopting best practices
3. **Access to existing and emerging finance mechanisms relevant to climate change adaptation, including international and domestic instruments:**
 - 3.1. Prioritizing public spending relative to climate adaptation and mobilizing national sources of climate finance
 - 3.2. Accessing international financing
 - 3.3. Building alliances with the banking and insurance sectors
4. **Better informed decision-making through research and scientific cooperation and availability and use of reliable data, information and tools:**
 - 4.1. Understanding of the vulnerability of natural and socioeconomic systems and sectors and of possible impacts
 - 4.2. Building capacities for and promoting the use of vulnerability and risk assessment at regional to local levels
 - 4.3. Strengthening Science-policy interface and accessibility of related knowledge
 - 4.4. Developing Regional climate information at a resolution suitable for adaptation planning

Strategic Objective 1: Appropriate institutional and policy frameworks, increased awareness and stakeholder engagement, and enhanced capacity building and cooperation

Climate change and its impacts are placing Mediterranean stakeholders in the position that requires maximum coordination, harmonization and integration of different sectoral policies. In order to reach results, institutional capacities, relationships, policies and practices to assess and manage climate change risks and opportunities and national development goals must be strengthened. Coordination within and between national institutions on climate change adaptation in the coastal and marine areas is a necessary prerequisite to create an enabling environment for the formulation and implementation of efficient solutions to such a complex and cross-cutting problem.

Strategic Direction 1.1: Enhancing awareness and engagement of key stakeholders on climate adaptation

Public support and engagement is essential for the acceptance and implementation of adaptation activities. This will require an appreciation of the importance of the issues involved and the potential costs of inaction. Improving awareness on climate change, its impacts and adaptation options is something that must also permeate education, the business sector and local authorities. Building awareness on the adaptation needs is a slow and complex process which requires immediate, sustained and well-resourced action. Competent civil society actors are valuable partners in this effort.

In this context priorities for consideration include:

- i.** Cross-party political interest, support and commitment.
- ii.** Integrated awareness campaigns addressed to the general public, public bodies and the private sector, communicating a consistent and effective message about climate change risks and adaptation options.
- iii.** Targeted awareness campaigns tailored for specific audiences, sectors or circumstances aiming to integrate adaptation measures in a most efficient way.
- iv.** E-learning and massive open online course (MOOC) programmes on climate change impacts in the Mediterranean.
- v.** Involvement of networks and organizations of stakeholders (including local authorities, civil society institutions, farmers, fishermen, tourism managers and coastal and marine protected areas managers) in order to promote awareness raising, provide salient information and enhance their ability to respond to hazard events.
- vi.** Involvement of journalists including through the establishment of a central information e-desk for the provision and communication of relevant information.

Strategic Direction 1.2: Promoting adequate institutional and policy frameworks

Planning for adaptation to climate change and increased resilience to its impacts should not be considered as a separate policy field, disconnected from other aspects of sustainable development, but should rather be integrated across development and economic strategies and plans. Support is required to develop the countries' capacities to use the available knowledge base in the decision making processes and access the right tools.

In this context priorities for consideration include:

- i.** Regional policy instruments to promote adaptation to the impacts of climate change. Assessment on how the Barcelona Convention can be a tool to assist countries build coastal resilience, and on the future implementation of its protocols and action plans in the light of climate change.
- ii.** Identification and addressing of relevant institutional, legal and cultural barriers to adaptation policies, beginning with the transposition of the concepts of "adaptation", "resilience", "vulnerability" and "risk" into legislative procedures.
- iii.** Support to countries to develop and adopt comprehensive national adaptation strategies and share them with neighboring countries.
- iv.** Support and guidance on best practices and integrated approaches to mainstream climate change considerations in developmental and environmental plans and strategies. Coordination between sectoral plans in order to derive synergies and co-benefits and avoid maladaptation.
- v.** Integrated approach for the reduction of non-climate related threats that have a strong influence on risk and undermine the capacities of communities and ecosystems to adapt to climate change (water pollution, overfishing, sand mining, damming).
- vi.** Strategic Environmental Assessment, including the assessment of climatic factors and adaptation implications, for all major plans and strategies.
- vii.** Risk and Impacts assessment in relation to climate change prior to major infrastructure investments in coastal and marine areas.
- viii.** Maritime planning process, taking into account land-sea interactions, including climate change effects.

Strategic Direction 1.3: Promoting a regional approach on Disaster Risk Management

Despite many overlaps, Disaster Risk Management (DRM) and adaptation have traditionally evolved separately, but recently, the two approaches are increasingly being linked. As climate change and socioeconomic trends boost the number of people exposed to hazards such as floods and heatwaves, improved early warning systems and greater coordination of disaster management activities will be needed to manage risks and protect lives and property.

In this context priorities for consideration include:

- i.** Integration of regional climate related data into disaster risk management.
- ii.** Regional and transboundary cooperation and assistance to cope with climate-related extreme events and emergency situations.

- iii. Exchange of best practices on disaster risk management in the region.
- iv. Innovative climate services and products to inform Risk Management, tailored to the needs of key public and private stakeholders.
- v. National and regional contingency plans to handle crisis situations, incorporating environmental, social and economic aspects.

Strategic Direction 1.4: Improving implementation and effectiveness of adaptation policies through monitoring and reviewing progress

Appropriate measurement and reporting of the progress towards achieving the objectives of Adaptation policies and plans, at both the national and regional level, is essential for effectiveness, transparency and accountability. It is therefore necessary that adaptation policies are designed as a continuous and flexible process, including feedback through monitoring and evaluation, both in terms of the validity of the underlying scientific assumptions and of the appropriateness and effectiveness of projects and policies.

In this context priorities for consideration include:

- i. Reporting on the implementation of national climate adaptation policies related to the coastal and the marine environment is made under the ICZM protocol or MSSD process.
- ii. Identification of responsible institutions for monitoring progress and adequate monitoring and review mechanisms in place at sectoral and local levels. Availability of good quality relevant data.
- iii. Development of a monitoring and evaluation framework including objectives, benchmarks, indicators and timescales for reviews to take place.
- iv. Dynamic updating and refining of adaptation plans as experience increases and more data on impacts becomes available.

Strategic Direction 1.5: Integrating climate adaptation into local plans for the protection and management of areas of special interest

Not all marine and coastal areas of the Mediterranean face the same climate-related risks. Some areas may exhibit special characteristics that render them particularly vulnerable to climate hazards, others may host very significant socioeconomic assets exposed to climate change impacts, while others have an iconic or special interest status. Early planning and implementation of adaptation measures in such areas should be a regional priority.

In this context priorities for consideration include:

- i. Identification of areas of special interest (such as heritage sites, nature reserves, biodiversity and other kinds of hotspots, coastal mega-cities, river deltas etc.) and undertaking of risk assessment for various climate change scenarios.
- ii. Development of methodologies and guidelines at the regional level for the integration of climate adaptation dimensions into their development and management plans, using Ecosystems-based Adaptation and ICZM as priority tools.

Strategic Objective 2: Development of best practices (including low regret measures) for effective and sustainable adaptation to climate change impacts

Improved knowledge and understanding is essential for more reliable forecasts of future conditions that would guide policy makers. However, uncertainty will remain inherent to adaptation decision making. But there exist low-regret measures with proven effectiveness and practically no negative side effects the implementation of which should not be delayed while waiting for more certain information and knowledge to be available. Many of these low-regret measures produce co-benefits, help address other development goals, and help minimize the scope for maladaptation.

Strategic Direction 2.1: Identifying adaptation needs and best practices

In the face of identified key climate risks (and opportunities) for a country or a region, decision makers need to focus on the most pressing needs and the best available and most efficient options to manage these risks.

In this context priorities for consideration include:

- i.** Identification by countries of their adaptation needs for the coastal and marine environment and of relevant technology needs and inclusion in their National Adaptation Plans.
- ii.** Criteria to identify, select and prioritize the most effective best practices and adaptation options in the coastal and marine environment.
- iii.** Identification and addressing of challenges and constraints for the transfer and adoption of best practices (including low-regret measures) and technologies across the Mediterranean basin.

Strategic Direction 2.2: Mainstreaming, exchanging and adopting best practices

In this context priorities for consideration include:

- i.** Mainstreaming and implementation of best practices into national adaptation planning processes.
- ii.** Maximization of synergies with relevant mitigation efforts (eg climate smart agriculture and forestry, energy efficiency in buildings, "blue carbon" policies etc) and minimization of possible conflicts.
- iii.** Local authorities and communities to implement adaptation actions tailored effectively to localized impacts of climate change including innovative, grass root responses and applying participatory science to monitor progress.
- iv.** Ecosystem based Adaptation approaches, the ICZM Protocol and the SAP/BIO as priority policy tools for encouraging adaptation efforts.
- v.** Innovative information sharing tools for the exchange of best practices and stakeholders' engagement.

Strategic Objective 3: Access to existing and emerging finance mechanisms relevant to climate change adaptation, including international and domestic instruments

In the face of a changing climate and related risks, the cost of inaction can be huge. The measures to increase the resilience of our natural and socioeconomic systems should therefore not be considered as economic costs but rather as investments that are even economically profitable as they reduce risks and expected damages and losses, while at the same time exploiting opportunities towards sustainable development. Even if global emissions are cut to the level required to keep global warming below 2°C thus avoiding the most catastrophic consequences of climate change, the total costs of adaptation could exceed \$250 billion per year by 2050, according to UN Environment's Adaptation Gap Report. Such financial resources should not be expected to come from only one or a few sources. For developing countries, international assistance could be the primary source but mobilizing public and private funds domestically is essential.

Strategic Direction 3.1: Prioritizing public spending relative to climate adaptation and mobilizing national sources of climate finance

Country-led approaches are essential for a strategic allocation of funds to key areas, especially taking into account that national sources are expected to cover most of the costs of adaptation measures. Beyond public resources, the involvement of the private sector which could be essential for the sharing of investments costs, risks, rewards and responsibilities, needs to be fully tapped. Existing and emerging economic instruments can foster adaptation by providing funds as well as incentives for anticipating and reducing impacts. It should be noted that mainstreaming climate-related considerations into sectoral policies would also allow to pursue adaptation objectives partially relying on already available financial resources.

In this context priorities for consideration include:

- i.** Review of the national portfolio of response options in order to efficiently and effectively allocate funds, e.g. through a Climate Public Expenditure and Institutional Review.
- ii.** Economic valuations of the costs of climate change as foundation for governments to allocate national funding on adaptation.
- iii.** Avoidance of maladaptive actions and non-efficient "hard" infrastructures to low-regret measures that improve climate resilience.
- iv.** Appropriate share of public spending to climate adaptation measures as part of an integrated sustainable development agenda.
- v.** Socially sensitive and transparent public-private partnerships for adaptation action encouraging the involvement of the private sector in related schemes.

Strategic Direction 3.2: Accessing international financing

The Contracting Parties to the UNFCCC have set up a number of funding mechanisms for channeling the international assistance envisaged in the Convention, such as the Adaptation Fund and the Green Climate Fund. Funds have also been set up through multilateral agencies such as the World Bank. On July 2015, UN Environment was accredited as a partner institution to the Green Climate Fund, thus opening new opportunities and enhancing capacities for adaptation-related activities.

More specifically in the Mediterranean context, international financing for adaptation measures can be available through international banking institutions such as the European Investment Bank / Facility for Euro-Mediterranean Investment and Partnership, the European Bank for Regional Development, the Global Environment Facility, the African Development Bank and the Islamic Development Bank. However, many countries in the region are not yet fully prepared to take advantage of opportunities offered by existing and emerging financing instruments related to adaptation.

In this context priorities for consideration include:

- i.** Supporting countries' capacities to prepare schemes and proposals in order to effectively access and manage international and regional funding for climate change adaptation.
- ii.** Maximization of multilateral funding for areas of common interest and concern.
- iii.** Coordination mechanisms between donors and key actors in the Region and beyond in order to agree on an integrated funding strategy and priorities, for avoiding overlapping or duplication of efforts and activities.
- iv.** Feasibility and potential of a regional approach to risk transfer mechanisms.
- v.** Innovative financing mechanisms such as the issuance of Green Bonds, carbon markets, biodiversity offsets, etc.

Strategic Direction 3.3: Building alliances with the banking and insurance sectors

Integrating risk management into business practices could be best achieved through pricing it. Communicating risks associated with climate change through pricing may impact on awareness better than any other communication tool. Therefore, alliances between government, banks and the insurance sector could result with smarter risk management and reduced future climate related costs for the society.

In this context priorities for consideration include:

- i.** Integration of climate risk management into business and management practices.
- ii.** Cooperation with the insurance (including re-insurance) and banking sectors in the Mediterranean countries.
- iii.** Standardized international metrics related to climate risk and exposure.
- iv.** Assessment of reinsurance and insurance practices in the Mediterranean countries, exchange of best practices and provision of targeted information for different coastal stakeholders.

Strategic Objective 4: Better informed decision-making through research and scientific cooperation and availability and use of reliable data, information and tools

Decisions on adaptation policies should be informed by scientific research into the changes in the climate system, the impacts of climate change, the vulnerabilities of natural and socio-economic systems to those impacts and the effectiveness of adaptation options.

Strategic Direction 4.1: Understanding of the vulnerability of natural and socioeconomic systems and sectors and of possible impacts

In order to formulate informed, effective and sustainable adaptation strategies and plans, it is vital that knowledge is developed and uncertainties are reduced, especially regarding the understanding of ecosystem-scale interactions and of socioeconomic consequences, including the socio-cultural specificities of the Mediterranean communities. Thematic and sectorial assessments have been carried out in the past years by various institutions and a significant body of knowledge exists that can be built upon. However, more coordination is needed, knowledge gaps still need to be addressed and socioeconomic trends and scenarios need to be assessed. Better approaches and methods to identify key vulnerabilities and major risks are required in order to prioritize the actions.

In this context priorities for consideration include:

- i.** Sensitivity and adaptive capacity of marine species and ecosystem responses to changes and cumulative impacts in oceanic conditions, including the introduction of alien species.
- ii.** Mapping of coastal and marine ecosystems and assessment of the role of services they provide to climate resilience.
- iii.** Environmental and socio-economic vulnerability of Marine Protected Areas.
- iv.** Sea level rise and salt water intrusion affecting groundwater resources and wetlands.
- v.** Current and wave patterns, and sediment movement affecting shoreline dynamics.
- vi.** Subsidence of certain coasts.
- vii.** Water resources and the water cycle.
- viii.** Vulnerability and interactions of socioeconomic systems and sectors such as: Agriculture and forestry; Water resources management; Health; Tourism; Urbanization; Fisheries; Energy; Transport and trade; and Key infrastructure.
- ix.** Combined effects and interactions of climate change and socioeconomic dimensions and trends and scenarios, taking into account the socio-cultural specificities of the Mediterranean communities, such as: Migration; Demographics; Conflict and social stability; Gender; and Vulnerable groups (e.g. children, older people, and indigenous populations).
- x.** Assessment of potential positive consequences and opportunities to different sectors from a changing climate.

Strategic Direction 4.2: Building capacities for and promoting the use of vulnerability and risk assessment at regional to local levels

In order to support policy makers at the regional, national and local levels, capacities and tools need to be developed for a better understanding of climate change risks, of options for adaptation, and of how climate change adaptation links to national development goals. The risks, which compose of hazard, vulnerability and exposure, need to be assessed in all dimensions: environmental (biodiversity losses of marine and coastal ecosystems), social (health, mortality) and economic (potential losses in all sectors). Direct and indirect effects of climate forcing on natural hazards must be explored and disentangled. Special attention should be given to the vulnerability component of risk where the level of uncertainties is much higher.

Despite the fact that the Mediterranean is a global climate hotspot, the region has been rather under-investigated in terms of comprehensive analyses and assessments. Numerous sub-regional projects and initiatives exist whose results need to be brought together in a consistent way in order to move towards the development of a complete and integrated Risks and Vulnerability Assessment for the whole Mediterranean region.

In this context priorities for consideration include:

- i. Understanding of the drivers, interactions, impacts and responses within the socioeconomic and environmental nexus.
- ii. Integrated risk and vulnerability models introducing socioeconomic feedbacks.
- iii. Economic valuations of the costs of climate change impacts on vulnerable sectors and hotspots.
- iv. Development of easy-to-use risk assessment methods such as index-based methods to be applied at regional, national and local levels.
- v. Technical assistance and capacity building activities to competent local and national institutions and civil society organizations for the monitoring of climate change impacts and assessing the cost of adaptation options.
- vi. Georeferencing of the Mediterranean Sea and coasts and their resources and threats.
- vii. Auditing of strategically important coastal assets and assessment of their vulnerability.
- viii. University Departments, curricula and modules on climate change issues and exchange programmes for adaptation scientists.

Strategic Direction 4.3: Strengthening science-policy interface and accessibility of related knowledge

The strengthening of adaptive capacities requires an increasing systematization and communication of scientific and traditional knowledge, as well as their integration into public policies and programs. However, institutional and cultural barriers between researchers, policy-makers and the public that hinder the transformation of knowledge into plans and actions still remain a challenge in the Mediterranean. There is a need to pay more systematic attention to strengthening the science/policy interface, and to recognize the three way relationship between scientists, policymakers and the public, as well as the leveraging role that civil society plays.

In this context priorities for consideration include:

- i.** Strategy for communicating scientific and other types of knowledge to policy makers at all levels as well as key stakeholders.
- ii.** Process for science-policy-business-community-managers dialogues at and between all governance levels, both regionally and nationally.
- iii.** Development of a Mediterranean Regional Network under the UN Environment-facilitated Global Adaptation Network in order to share lessons, knowledge and information and highlight research and guidance needs and priorities.
- iv.** Regional Clearinghouse / repository of best practices and relevant reports and publications.

Strategic Direction 4.4: Developing regional climate information at a resolution suitable for adaptation planning

In order for scientists and stakeholders to be able to assess the impacts of climate change and develop adaptation plans it is essential that they have access to the best possible information from observation systems that monitor the climate system and detect and attribute climate change.

The countries of the Mediterranean have national observation and monitoring systems of varying data quality and availability, with northern countries enjoying more long-term and high-quality climate data than southern ones. Nevertheless, monitoring systems related to marine ecosystems (biotic and abiotic components) in the coastal and open waters are still lacking. Infrastructure, spatial coverage and data issues at the national level are challenges that need to be addressed. Crucial coordination issues, however, are also essential to be addressed at the regional level.

In this context priorities for consideration include:

- i.** Availability of environmental and socioeconomic data required for adaptation, including the maintenance and modernization of monitoring programmes and networks in the region.
- ii.** Sharing and standardization of collection, quality and storage, of all data relevant to adaptation planning, following WMO Resolution 40
- iii.** Regional information platform that will contain information on climate change monitoring and research, interconnecting or harvesting information from relevant databases and platforms.
- iv.** Development of regional climate models integrating socioeconomic trends and threats.
- v.** A strategic approach to climate adaptation research in the region involving academic, industry and government bodies and their partnerships.

Glossary of Terms

Adaptation ¹³	The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects.
Climate change	Climate change refers to a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcing such as modulations of the solar cycles, volcanic eruptions, and persistent anthropogenic changes in the composition of the atmosphere or in land use.
Climate variability ¹⁴	Climate variability refers to variations in the mean state and other statistics (such as standard deviations, the occurrence of extremes, etc.) of the climate on all temporal and spatial scales beyond that of individual weather events. Variability may be due to natural internal processes within the climate system (internal variability), or to variations in natural or anthropogenic external forcing (external variability).
Disaster risk management ¹³	Processes for designing, implementing, and evaluating strategies, policies, and measures to improve the understanding of disaster risk, foster disaster risk reduction and transfer, and promote continuous improvement in disaster preparedness, response, and recovery practices, with the explicit purpose of increasing human security, well-being, quality of life, and sustainable development.
Ecosystem Approach	A strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. An ecosystem approach is based on the application of appropriate scientific methods, focused on levels of biological organization, which encompass the essential structure, processes, functions and interactions among organisms and their environment. It recognizes that humans, with their cultural diversity, are an integral component of many ecosystems.
Exposure ¹³	The presence of people, livelihoods, species or ecosystems, environmental functions, services, and resources, infrastructure, or economic, social, or cultural assets in places and settings that could be adversely affected.

13. IPCC, 2014: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

14. Protocol on Integrated Coastal Zone Management in the Mediterranean.

Hazard¹³	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.
Integrated coastal zone management (ICZM)¹⁴	A dynamic process for the sustainable management and use of coastal zones, taking into account at the same time the fragility of coastal ecosystems and landscapes, the diversity of activities and uses, their interactions, the maritime orientation of certain activities and uses and their impact on both the marine and land parts.
Impacts¹³	Effects on natural and human systems of extreme weather and climate events and of climate change. 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 period and the vulnerability of an exposed society or system.
Low regret measures	Low cost activities that yield benefits even in the absence of climate change. The implementation of these actions often constitutes a very efficient first step in a long-term adaptation strategy.
Maladaptation¹³	Actions that may lead to increased risk of adverse climate-related outcomes, increased vulnerability to climate change, or diminished welfare, now or in the future.
Resilience¹³	The capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation.
Risk¹³	The potential for consequences where something of value is at stake and where the outcome is uncertain, recognizing the diversity of values. Risk is often represented as probability of occurrence of hazardous events or trends multiplied by the impacts if these events or trends occur. Risk results from the interaction of vulnerability, exposure, and hazard, following the IPCC AR5 WGII (2014).
Vulnerability¹³	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.

13. IPCC, 2014: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

14. Protocol on Integrated Coastal Zone Management in the Mediterranean.

LIST OF ABBREVIATIONS

EcAp	Ecosystem Approach
EEA	European Environment Agency
GCOS	Global Climate Observing System
GEF	Global Environment Facility
GLOSS	Global Sea-Level Observing System
ICZM	Integrated Coastal Zone Management
IPCC	Intergovernmental Panel on Climate Change
JRC	Joint Research Centre
LAS	League of Arab States
MAP	Mediterranean Action Plan
MCSD	Mediterranean Commission on Sustainable Development
MedGOOS	Mediterranean Global Ocean Observing System
MOON	Mediterranean Operational Oceanography Network
MSSD	Mediterranean Strategy for Sustainable Development
PoW	Program of Work
RCP	Representative Concentration Pathways
SREX	IPCC's Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation
UfM	Union for the Mediterranean
UN	Environment United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change



United Nations
Environment Programme



Mediterranean Action Plan
Barcelona Convention

United Nations Environment Programme
Coordinating Unit for the Mediterranean Action Plan
Barcelona Convention Secretariat
Vassileos Konstantinou 48, Athens 11635, Greece
Tel: +302107273100 - Fax: +302107253196
www.unepmap.org