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Draft Regional Climate Change Adaptation Framework for the Mediterranean Marine and Coastal Zones

DRAFT REGIONAL CLIMATE CHANGE ADAPTATION FRAMEWORK FOR THE MEDITERRANEAN MARINE AND COASTAL ZONES

Version 06.02.2015

About this document

This document is the first draft of the Regional Climate Change Adaptation Framework for the Mediterranean Marine and Coastal Zones ("the Framework"). It is submitted as an information document to the Conference on the Review of the Mediterranean Strategy for Sustainable Development that takes place on 17-18 February 2015 in Malta.

This document was prepared by UNEP/MAP in the context of the GEF-funded "Integration of climatic variability and change into national strategies to implement the ICZM Protocol in the Mediterranean" project ("ClimVar & ICZM" Project).

At this stage, the Draft Framework mentions several activities which should be considered as indicative and which need to be reviewed and further assessed in the consultation process for the development of the Framework.

Based on the comments to be received during the Conference as well as on inputs to be received electronically, a more polished draft will be prepared and shared with the members of the Advisory Panel to the Framework for a new round of comments and inputs, leading to the 2nd meeting of the Advisory Panel scheduled for 11 and 12 March 2015 in Athens. The new draft will then be circulated to MAP National Focal Points for their meeting in April 2015.

The development of the Adaptation Framework is the first part of a two-step process. Once the Framework is adopted and based on its priorities, a Regional Adaptation Action Plan will be developed including a more detailed presentation of activities.

Strategic Partnership for the Mediterranean Sea Large Marine Ecosystem
MedPartnership
Together for the Mediterranean

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List of Abbreviations

CIRCE	"Climate Change and Impact Research: the Mediterranean Environment" project
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	International Panel on Climate Change
JRC	Joint Research Centre
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
UfM	Union for the Mediterranean
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change

1. INTRODUCTION

1.1 Background

The Mediterranean has long been identified as a "climate change hotspot" and climate change impacts in the region are becoming increasingly evident: observations over the last decades show that temperatures have risen faster than the global average and that dry spells are becoming frequent. All model projections agree on the region's future warming and drying with potential huge risks and costs to the region's economy, population centers and biodiversity.

UNEP/MAP has been working on the issue of climate change impacts on the marine and coastal zone as far back as in the 1990's. At the 16th meeting of the Contracting Parties to the Barcelona Convention in 2009, the "Marrakesh Declaration" adopted by Ministers of Environment and Heads of Delegation agreed 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*".

In UNEP/MAP's Five-Year Strategic Programme of Work 2010-2014, climate change was one of the six themes the PoW was built on. Following this, the Program of Work for 2014-15 contained several mitigation and adaptation actions, including the preparation of the Framework and its review by the MSCD in order for it to be submitted for consideration by 19th meeting of the Contracting Parties to the Barcelona Convention (COP19).

Finally, the first Mediterranean Strategy for Sustainable Development (MSSD), adopted in 2005, included the mitigation of climate change and adaptation to its effects as one of its 7 Priority Fields of Action. The Assessment on the Implementation of the MSSD report (2011) suggested that the revised MSSD should put more emphasis on orientations, actions and indicators concerning emerging priorities such as adaptation to climate change. The revision process of the MSSD currently under development has climate change as one of its 6 Focus Areas.

1.2 Purpose and scope of the Framework

The overall objective of the Framework is to identify and develop a regional approach to climate change adaptation in the Mediterranean marine and coastal environment, with common regional priorities in order to increase the resilience of the Mediterranean ecosystems, infrastructure and communities to climate change.

The Framework is addressed to decision makers at all levels and aims to provide them with priority actions and guidance regarding the management of marine and coastal zones in the face of climate change.

Once adopted by the COP, the Framework will form the basis for the development of a detailed Regional Climate Change Adaptation Action Plan, within the framework of the Barcelona Convention.

The geographical scope of the Framework is that of the Barcelona Convention, that is the Mediterranean Sea and the coastal zones of the 21 countries that border it. Whilst the Framework will focus on impacts of climate change in the marine and coastal zone, it recognizes that adaptation actions may be required further inland, in particular in inland watersheds.

1.3 Activities so far and process to develop the Framework

UNEP/MAP has been supporting actions to assess climate change impacts in the Mediterranean marine and coastal zone, 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"[1]. A comparative analysis of the main findings, conclusions and recommendations of the site-specific case studies were presented in 1996 in the 2nd Volume[2] of the aforementioned edition. One of the major observations of these studies was the critical role that coastal zone planning has to play in climate adaptation policies. Several of the Regional Activity Centers of UNEP/MAP have undertaken studies[3], such as a series on the impacts of climate change on Mediterranean biodiversity, identifying climate change impacts in coastal zones, and others.

In 2012 the GEF Secretariat endorsed the "Integration of climate variability and change into national strategies for the implementation of the ICZM Protocol in the Mediterranean" (ClimVar & ICZM) project. The ClimVar & ICZM project is a collective effort to promote the use of Integrated Coastal Zone Management (ICZM) as an effective tool to deal with the impacts of climate variability and change in coastal zones in countries sharing the Mediterranean, by mainstreaming them into the ICZM process. It is executed in 11 of the Mediterranean countries[4]. It was agreed that one of the activities of the project would support the finalization of the draft Framework that had been discussed at the 14th Meeting of the Mediterranean Commission on Sustainable Development (MCSD).

The Framework builds upon the original draft from 2011 and considers relevant assessments and major publications from international institutions, initiatives and projects up to this date. It is closely linked with the revised MSSD that is currently being prepared; in particular its Climate Change Chapter, to ensure full coherence between the two strategic documents.

A strong basis for the development of the Framework will be provided by the ClimVar & ICZM project activities on data and information gathering, on assessing the vulnerability of the Mediterranean to the impacts of climate change, and on capacity building and support to integrate climate considerations into national and ICZM planning. During the preparation phase of the project, two regional reports were developed focusing on the region's experience on monitoring and predicting climate change and on assessing its impacts.

[1] Edited by L. Jeftic, J.D. Milliman and G. Sestini
[2] Edited by L. Jeftic, S. Keckes and JC Pernetta
[3] Selected reports:
- SPA/RAC, 2008, Impact of climate change on biodiversity in the Mediterranean Sea
- PB/RAC, 2008, Climate Change and Energy in the Mediterranean
- SPA/RAC, 2009, Synthesis of National Overviews on Vulnerability and Impacts of Climate Change on Marine and Coastal Biological Diversity in the Mediterranean Region
- SPA/RAC, 2010, Impact of climate change on marine and coastal biodiversity in the Mediterranean Sea – Current state of knowledge
- PAP/RAC, 2010, Climate Change in Coastal Zones of the Mediterranean - Background Paper & Position Paper
- PB/RAC, 2011, Adapting to climate change in the water sector in the Mediterranean: situation and prospects

[4] Croatia, Bosnia Herzegovina, Montenegro, Albania, Syria, Palestine, Egypt, Libya, Tunisia, Algeria and Morocco

The schedule for the Framework's development in 2014 and 2015 includes the steps shown in the following Table:

Date	**Framework Development Activity**
November 2014	Establishment of Advisory Panel of leading international, regional and national experts to review the draft Framework and support documents
1 December 2014	Zero Draft of the Framework
18 December 2014	First meeting of the Advisory Panel, providing comments and recommendations for the further revision of the Framework
February 2015	First Draft of the Framework
February 2015	Presentation for comments to the UfM Climate Experts Group
17-18 February 2015	Presentation for review and recommendations to the Conference on the Review of the MSSD
11-12 March 2015	Second meeting of the Advisory Panel, providing final recommendations
End of March 2015	Second Draft of the Framework
28-30 April 2015	Submission to the MAP Focal Points meeting
May 2015	Submission to the MCSD Meeting
Mid October 2015	Submission to the MAP Focal Points meeting
December 2015 (tbc)	Submission for approval by the 19th Meeting of the Contracting Parties

2. CLIMATE CHANGE IN THE MEDITERRANEAN

2.1 Past evidence and current trends

The Mediterranean is characterized by a relatively wide variety of climatic zones and ecosystems. However, as a region it is widely considered as a 'climate hotspot' whose climate is especially responsive to global change and where potential climate change impacts are particularly strong.

Climate variability and change is becoming increasingly evident in the Mediterranean. According to observations referenced in the recent IPCC Fifth Assessment Report (AR5)[5], in recent decades warm days, warm nights, heat waves, extreme precipitation and soil dryness have increased and cold days and nights have decreased.

The Mediterranean also exhibits variability regarding the observed sea level rise. According to the latest EEA indicators assessment[6], in the Mediterranean Sea there are areas with increases of more than 6 mm/year, and with decreases of more than -4 mm/year.

2.2 Modeling and 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 regions of the Mediterranean will of course witness different changes to their climate. On average however, estimates for the whole Region mentioned in the IPCC AR5 and for the period 2081-2100 compared to 1986-2005 include an increase in surface mean air temperature of 2-4^{o}C for the medium-low emissions scenario (RCP 4.5), 10-20% decreases in mean annual precipitation, increased risk of desertification, soil degradation, an increase in duration and intensity of droughts, changes in species composition, increase of alien species, habitat losses, agricultural and forests production losses.

The World Bank in its latest "Turn down the Heat" report[7] notes among others that in a 2°C warmer world, rainfall in North Africa and Middle East is predicted to decline by 20–40% and annual river discharge levels which are already low are projected to drop further by more than 15 percent. The period of consecutive hot days is expected to increase, particularly in cities due to the urban heat island effect. In the 4°C warmer world scenario, the number of hot days is projected to exceed the equivalent of four months in most capital cities.

Regarding sea level, 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. However it should be noted that for relatively small isolated and semi-isolated basins, such as the Mediterranean, making multi-decadal regional projections is even more difficult than for the global ocean. 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.

2.3 Overview of expected biophysical and socioeconomic impacts

As a result of climate change, the Mediterranean is expected to face significant biophysical and socioeconomic impacts, which will of course depend on the magnitude of changes. A brief overview

[5] Working Group I Contribution to the 5th IPCC Assessment Report, Climate Change 2013 - The Physical Science Basis, http://www.ipcc.ch/report/ar5/wg1/
[6] European Environment Agency, Global and European sea-level rise (CLIM 012) - Assessment published Sep 2014http://www.eea.europa.eu/data-and-maps/indicators/sea-level-rise-2/assessment
[7] World Bank Group, Turn Down the Heat : Confronting the New Climate Normal, 2014

of such impacts and the respective challenges for adaptation is presented below, based on the most recent relevant reports by international organizations[8]:

Ecosystems, biodiversity and forests: The Mediterranean includes areas of rich marine and coastal biodiversity which are already under stress due to human activities and which could be further threatened by changes in water availability, sea surface temperature, frequency and intensity of extreme events. Redistribution of species due to changes in environmental conditions, including the introduction of non-native and invasive species, may disrupt this delicate balance, modify species interactions and ultimately lead to loss of species. At the same time, ocean acidification is currently occurring at a geologically unprecedented rate, subjecting marine organisms to an additional, and worsening, environmental stress. The region's coastal zones would be subject to erosion due to increased sea level rise and sea flood surges. Warming and reduced rainfall is expected to lead to a decrease in trees and plants growth while forest fires and plant diseases are expected to increase. Annual burned area due to forest and wildland fires is projected to significantly increase in many areas bordering the Mediterranean Sea.

Water resources and agriculture: Existing stresses in water availability would be multiplied because of projected declines in total runoff and depletion of groundwater resources. Depending on the region, the frequency of extreme events like droughts and flood would increase. Coastal aquifers would become threatened by salinization due to rising sea levels and by overexploitation which declines their resilience to saline intrusion. Agriculture in the coastal zones will be affected with significant decreases in some crop yields which could reach alarming levels under high emissions scenarios, making poor communities increasingly vulnerable to malnutrition.

Fisheries: Wild fish stocks seem to be responding to changing temperatures and food supply by changing their geographical distribution, leading to possible decreased catch potential in the Mediterranean for some species. Climate change can also influence where aquaculture is possible, which species are raised, and the efficiency of the production.

Health: Heat waves can have dramatic impacts on public health with increases in cardiovascular and respiratory diseases and overall mortality. Oceans and lands warming also imply a redistribution of infectious diseases. The World Health Organization has estimated that 33 infectious diseases are influenced by climate, and are gradually extending to the North.

Tourism: The Mediterranean is the world's most popular touristic destination with about half of the region's tourists visiting its coastal zones. Climate change is expected to have a wide range of negative consequences for tourism in the region, including heat waves, spread of diseases, drought, the associated risk of fires, as well as sea level rise potentially leading to coastal erosion and loss of natural attractions. In general climatic conditions for outdoor tourist activities are expected to deteriorate in summer but at the same time be more attractive during other seasons. However, vulnerability in this field is hard to assess because there is considerable uncertainty about how tourists will respond to the effects of climate change.

Cities, infrastructure, transport and energy: The resilience of Mediterranean coastal cities to climate change is critical as more than a third of the region's population live in coastal zones. Many emerging climate change risks are concentrated in urban areas with key issues including rising temperatures, heat stress, water security and pollution, sea-level rise and storm surges, extreme weather events, inland flooding.

[8] - IPCC Working Group II Contribution to AR5, Climate Change 2014: Impacts, Adaptation, and Vulnerability
- World Bank Group, Turn Down the Heat : Confronting the New Climate Normal, 2014
- European Environment Agency, Climate change, impacts and vulnerability in Europe 2012
- Joint Research Centre/IPTS, Climate Impacts in Europe - The JRC PESETA II project, 2014

Climate change impacts such as sea-level rise, coastal storms, droughts, and floods are also exacerbating the hazards that threaten wastewater systems and transport infrastructure such as roads, railways and ports. The energy sector in the Mediterranean will also be affected by climate change. Energy transmission infrastructure could be at risk; changes in water availability will affect hydropower generation and may lead to increased deployment of desalination options. Higher temperatures will increase the demand for cooling in the summer months but at the same time reduce heating demand during the winter.

Gender: Different gender roles make men and women more and less vulnerable in different contexts. In the majority of cases, rural women tend to be vulnerable in more ways than are rural men. Moreover, climate change could force more rural men to move to cities to seek paid employment, leaving rural women with additional challenges.

3. INITIATIVES, POLICIES AND CAPACITIES RELEVANT TO ADAPTATION

3.1 Regional initiatives

Next to the activities ongoing under the auspices of UNEP/MAP-Barcelona Convention in relation to the creation of an adaptation framework for the Mediterranean coast and marine environment, there are various other regional initiatives, with which cooperation will be an absolute necessity.

At the international level, the UNEP Programme of "Ecosystem-based Adaptation" (EbA) uses biodiversity and ecosystem services as part of an overall adaptation strategy to help people and communities adapt to the negative effects of climate change, at the same time providing many other benefits to communities.

Through EbA, UNEP helps vulnerable communities adapt to climate change through good ecosystem management practices and their integration into global, regional, national and local climate change strategies and action plans. UNEP's EbA Flagship is being implemented in diverse ecosystem settings, including mountains, river basins, dry-lands and low-lying coasts. The work is delivered through three main overarching components:

- Assessments and knowledge support
- Capacity building and demonstration
- Integration of EbA options into national development and adaptation plans

In April 2013 the European Commission adopted an EU Strategy on Adaptation to Climate Change which identifies three priority areas, namely: 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. 3. Better informed decision-making by addressing gaps in knowledge about adaptation.

The EU's European Climate Adaptation Platform (Climate-ADAPT), launched in March 2012, provides several useful resources to support adaptation policy and decision making, such as: a toolset for adaptation planning; a database of projects and case studies; and information on adaptation action at all levels.

The climate-related UfM policy framework provides for the development of regional policy and action frameworks and projects in response to climate change challenges. The decisions of the UfM Ministerial Conference on Environment and Climate Change (13 May 2014, Athens) 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 the 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. However, coordination at the regional level between EU and Arab initiatives remains weak.

The South East Europe 2020 Strategy was developed in the framework of the Regional Cooperation Council (RCC) and aspires to provide a major vehicle for growth in the region, closely following the

vision of the EU 'Europe 2020 Strategy'. The Strategy's Environment Dimension tackles adaptation issues, including by linking water, agriculture, forestry, tourism and risk management elements. An Action Plan is expected to be completed by the end of 2014.

3.2 Other relevant international policy initiatives and thematic strategies

All Mediterranean countries are signatories to the UN Framework Convention on Climate Change (UNFCCC). Other major international Conventions that are relevant in a climate adaptation context are:

- the Barcelona Convention and its Protocols, especially the Integrated Coastal Zones Management Protocol;
- the United Nation Convention on the Law of the Sea;
- the Ramsar Convention on Wetlands;
- the UNECE Water Convention;

At the same time, various regional policy initiatives address adaptation among other issues, such as:

- The Union for the Mediterranean;
- The European Neighborhood Policy, and its Climate Window;
- The 'Horizon 2020 Initiative to De-pollute the Mediterranean';
- The Mediterranean Component of the EU Water Initiative (MED EUWI);
- FAO's Regional Water Scarcity Initiative (RWSI) in the Near East and North Africa.

At the EU level, noting that currently work is ongoing to mainstream climate change to all policy initiatives of the EU, significant legislation exist relating to climate change adaptation of the marine and coastal area of the EU, including:

- the Marine Strategy Framework Directive (2008/56);
- the Water Framework Directive (2000/60)
- the Habitats Directive (1992/43);
- the Birds Directive (2009/147), with particular respect of Art. 1, 2 and 3;
- the Floods Directive (2007/60).

3.3 Weather and climate monitoring capacity in the Region

Monitoring changes in weather and climatic parameters, beyond identifying relevant trends, is also a useful tool for policy makers in order to select among available adaptation options.
The countries of the Mediterranean have national observation and monitoring systems of varying data quality and availability.

Mediterranean countries participate, to a different extent in the Global Climate Observing System (GCOS) international monitoring programme as well as the following regional initiatives:

- Monitoring Network System for Systematic Sea Level Measurements in the Mediterranean and Black Sea (MedGLOSS);
- Mediterranean Operational Oceanography Network (MOON);
- Mediterranean Global Ocean Observing System (MedGOOS);
- Mediterranean Hydrological Cycle Observing System (MED-HYCOS).

EU member countries participate also in the Global Monitoring for Environment and Security (GMES) European Earth Observation Programme.

3.4 Climate models and the Mediterranean region

Climate simulations at the Mediterranean scale were performed in the framework of previous EU Projects, such as for example PRUDENCE and ENSEMBLES. However their interest was more focused on the European continent, whereas the Mediterranean area (especially the southern shore) was only very marginally considered. Furthermore, the climate simulations performed within these

projects were carried out with atmospheric only regional models, which did not take into account any air-sea feedbacks.

The Med-CORDEX initiative, proposed by the Mediterranean climate research community as a follow-up of previous and existing initiatives, takes advantage of new very high-resolution Regional Climate Models (RCM, up to 10 km) and of new fully coupled Regional Climate System Models (RCSMs), coupling the various components of the regional climate.

4. CHALLENGES AND GAPS

Based on the analysis of the national reports produced under the "ClimVar & ICZM" Project and a range of publicly available information, the following gaps, barriers and constraints regarding the countries' capacity to adapt to climate change have been identified.

4.1 *Research, Systemic Observation and vulnerability assessments*

In most of the Mediterranean countries there are substantial gaps in science and knowledge on the impacts of climate change, on vulnerability levels to those impacts and on the screening and effectiveness of adaptation options. Better understanding of climate change and its consequences, not only at the global or regional but at the national and local scale, is needed towards better planning and implementation of adaptive measures. This requires further research focused on the Mediterranean region and tailored to its specificities, including with respect to atmospheric and oceanic patterns, biological aspects and socio-economic issues.

More specifically, commonly identified gaps relative to research are:

- Uncertainty in the climate elements and interactions, including nonlinearities and the identification of thresholds, feedback loops, and delays. Weak understanding of the link between climate change and extremes events.
- Low resolution of regional climatic prediction models. Improvement is needed in the downscaling of climate models, the accuracy of precipitation modeling.
- Insufficient cooperation among scientific networks in order to promote and conduct good social, economic and ecological science, and to develop ways to integrate science into policy making.

Regarding the region's monitoring capacity, challenges that have been identified include:

- The need to develop or enhance specific national programmes for monitoring climate variability and change with an integrated and standard approach for collecting, storing, quality controlling and disseminating of climate observation data;
- The general inadequacy of systematic observation networks (including infrastructure issues, limited coverage, insufficient coordination between authorities);
- The need for data sharing agreements and protocols;
- Low availability and insufficient robustness of data on socioeconomic and biophysical changes;
- Limited use or monitoring of climate change impact indicators.
    - Limited collecting, storing, quality controlling and disseminating relevant data and indicators, including those related to vulnerabilities and exposure

Finally an integrated adaptation assessments for the region are lacking, especially ones that also address possible changes in the social determinants of vulnerability

4.2 Institutional Arrangements and Capacity Building

The following gaps are among the most commonly identified in many of the Mediterranean countries:

- Limited institutional capacities for data verification, dissemination and analysis;
- Inadequate capacities and human resources to conduct integrated assessments to evaluate the impacts of climate change on different sectors;
- Poor coordination within national institutions on issues relative to climate change;
- Inadequate climate change regulatory frameworks as well as enforcement capacities;
- Inadequate or inappropriate communication of scientific results, available tools and best practices to the relevant national stakeholders;
- Low national priorities and funding to climate related projects;
- Inadequate provision of University-level education on climate issues.

4.3 Financing

At this stage, there are no studies covering the whole of the Mediterranean on the cost of climate adaptation actions and the cost of non-action. In this context, the overall cost will depend on the severity of climatic changes and the range of measures chosen.

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.

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.

Overlapping or even duplication of the outputs of projects has also been identified, raising the need for enhanced coordination and strategizing between donors and key stakeholders.

At the national level, beyond the insufficient allocation of public resources, the involvement of the private sector which could be essential for the sharing of investments costs, risks, rewards and responsibilities, has not yet been fully tapped.

In a broader sense, it may not be useful or cost-effective to address adaptation measures and their financing as separate from the overarching goal of sustainable economic and social development. In that context and given the limited finance available at the national and international level, an integrated approach and synergies need to be developed.

5. REGIONAL FRAMEWORK OBJECTIVES

Based on the challenges, issues and gaps described above, the Framework has been structured around the following 4 Strategic Objectives, each of which includes one or more Operational Objectives:

i. Foster research and scientific cooperation on climate change and improve availability and use of reliable data, information and tools to ensure better informed decision-making;
ii. Promote institutional, policy and legal reforms for the effective mainstreaming of adaptation measures;
iii. Enhance regional cooperation
iv. Leverage existing and emerging climate finance mechanisms, including international and domestic instruments.

Strategic Objective 1: Foster research and scientific cooperation on climate change and improve availability and use of reliable data, information and tools to ensure better informed decision making

Operational Objective 1.1: To reduce uncertainties in regional climate information at a resolution suitable for adaptation planning

- Activity 1.1.1: Implement coupled atmosphere-ocean models with a high resolution (7-10 Km) in the Mediterranean basin able to reproduce the small scale processes related to the complex physiography of the region;
- Activity 1.1.2: Include a realistic representation of the various components of the Mediterranean Sea water, heat, salt and mass budgets in climate models;
- Activity 1.1.3: Implement a suite of ocean models that will allow the telescoping zoom to a very high resolution of specific coastal areas under study in order to understand geomorphological changes in the coasts.

Operational Objective 1.2: To enhance capacities for climate monitoring at the national and regional levels

- Activity 1.2.1: Promote the provision of long-term funding and other resources needed to sustain and modernize meteorological infrastructure and related monitoring programmes and networks in the region, and digitize and rescue historical climate data;
- Activity 1.2.2: Strengthen and sustain oceanographic climate monitoring in the Mediterranean by supporting GLOSS, MedGLOSS, MOON, MedGOOS related ongoing developments and extensions in the Northern African countries;
- Activity 1.2.3: Ensure the free and full access to the public of all environmental and socioeconomic information including primary data and metadata.
- Activity 1.2.4: Establish a web-based Regional Information System that will contain information on climate change monitoring and research;
- Activity 1.2.5: Establish early warning systems for extreme events.

Operational Objective 1.3: To enhance capacities for vulnerability assessments at the national and regional levels, building on existing initiatives and processes

- Activity 1.3.1: Establish a regional Science-Policy Interface in the form of a "MED IPCC" platform endorsed by all the Contracting Parties, with a view to prepare IPCC-type scientific assessments of climate change trends, impacts and adaptation and mitigation options for the Mediterranean region;
- Activity 1.3.2: Promote the understanding of drivers, interactions, impacts and responses within the Water-Food-Energy-Ecosystems-Climate Change Nexus;
- Activity 1.3.3: Develop and implement methodologies to estimate the socio-economic costs of climate change and the costing of adaptation options;

- Activity 1.3.4: Promote the development of integrated risk and vulnerability models introducing socioeconomic feedbacks
- Activity 1.3.5: Promote the engagement of insurance companies;
- Activity 1.3.6: Develop innovative climate services and products, linked to relevant EU initiatives, tailored to the needs of key public and private stakeholders.
- Activity 1.3.7: know about other regional stressors, and the way these increase vulnerability or affect adaptive capacity
- Activity 1.3.8: Develop coastal vulnerability maps at the national and local level and identify coastal adaptation priorities, combining both top-down and bottom-up approaches;
- Activity 1.3.9: Assess non-climate related threats to the marine and coastal zones (e.g. pollution, damming, overfishing, sand mining) and how they undermine human and natural capacities for adaptation to climate change.

Operational Objective 1.4: To enhance knowledge in key sectors

Marine and coastal ecosystems

- Activity 1.4.1: Develop adequate research lines addressing gaps on knowledge about the effects of climate change on marine and coastal Mediterranean biodiversity;
- Activity 1.4.2: Assess the sensitivity of ecosystem services to the various aspects of climate change at the scale of the Mediterranean, especially in the case of islands, with the help of pilot studies in selected locations, including "hot spots";
- Activity 1.4.3: Investigate variability in organisms' response to ocean acidification and the impacts of external stressors;
- Activity 1.4.4: Establish a monitoring network of sampling sites, preferably within the system of Mediterranean Marine Protected Areas, to measure biodiversity variables linkable to climate change.

Coastal freshwater resources

- Activity 1.4.5: Strengthen the hydrological programmes for monitoring water resources and the water cycle, including important variables such as surface discharge, evapotranspiration and groundwater storage and flux.

Coasts

- Activity 1.4.6: Investigate the uplift/subsidence geological behavior of certain coasts in order to assess the potential impact of sea level rise;
- Activity 1.4.7: Develop or improve existing monitoring systems for sea level rise and salt water intrusion;
- Activity 1.4.8: Investigate the impacts of climate change on current and wave patterns, sediment movement, and erosion patterns Activity 1.4.9: Assess the role of ecosystems in providing shoreline stability at the local level;
- Activity 1.4.10: Assess potential socioeconomic impacts of migration of vulnerable coastal communities.

Coastal tourism

- Activity 1.4.11: Develop Tourism Carrying Capacity Assessments at the local level.

Agriculture

- Activity 1.4.12: Identify vulnerable hotspots of agricultural production;
- Activity 1.4.13: Support agricultural research aiming at crop selection and development of varieties best suited to new conditions (drought resistant and saline resistant);
- Activity 1.4.14: Promote research and data collection on crop yields and the economics of farms.

Urban areas
- Activity 1.4.15: Implement vulnerability assessments and auditing of major infrastructures (e.g. ports, airports, sewage treatment plants);
- Activity 1.4.16: Improve early warning systems for floods, storms and tidal conditions.

Energy
- Activity 1.4.17: Assess possible stresses on grid stability and security of supply in view of expected increased energy demand for cooling.
- Activity 1.4.18: Exchange of best practices for the management of current hydro-meteorological / climate variability in energy projects.
- Activity 1.4.19: Exchange best practices on sustainable energy options for desalination.

Health
- Activity 1.4.20: Fortify surveillance and early-warning systems for climate-sensitive infectious diseases like malaria, dengue and cholera.
- Activity 1.4.21: Map local vulnerabilities to better understand current and possible future risks related to climate change

Fisheries
- Activity 1.4.22: Integrate fisheries data with key climate data on the marine environment.

Operational Objective 1.5: To gather and centralize available information and knowledge

- Activity 1.5.1: Centralize all documents, data, and information into a Knowledge Management Platform to be integrated into an existing structure (e.g.UNEP-Live) for long-term maintenance.
- Activity 1.5.2: Transform information into knowledge for different stakeholders and produce dedicated reports to be addressed to these stakeholders and disseminated to the general public.
- Activity 1.5.3: Provide capacity to countries so that this knowledge can be regularly updated

Strategic Objective 2: Promote adequate institutional, policy and legal systems for the effective mainstreaming of climate change stresses into national adaptation and development plans.

Operational Objective 2.1: To enhance national institutional and policy reforms

- Activity 2.1.1: Strengthen national climate change coordinating units to which technical assistance and capacity-building support shall be given in order to integrate climate change stresses into developmental and environmental policies and plans;
- Activity 2.1.2: Promote Ecosystem based Adaptation approaches in the Mediterranean;
- Activity 2.1.3: Promote the ICZM Protocol in the Mediterranean as priority tool for encouraging adaptation efforts and integrate climate considerations into national ICZM strategies and plans;
- Activity 2.1.4: Revise coastal and urban land use planning to address climate change stresses;

Operational Objective 2.2: To enhance awareness, engagement and education in key stakeholders

- Activity 2.2.1: Implement a regional public and institutional awareness programme on climate change impacts;
- Activity 2.2.2: Increase the number of University Departments and PhDs on climate related issues;
- Activity 2.2.3: Support networks and organizations of stakeholders (including farmers, fishermen and tourism managers) to promote awareness raising, provide salient information and enhance their ability to respond to hazard events.

Operational Objective 2.3: To enhance national technical capacities and training

- Activity 2.3.1: Provide technical assistance and capacity building activities for the monitoring of climate change impacts;
- Activity 2.3.2: Develop training components for local personnel in implementation projects;
- Activity 7.3: Provide technical assistance and build capacity for designing governance tools including institutional settings, policies, regulations, enforcement and monitoring mechanisms, etc.

Strategic Objective 3: Enhance Regional cooperation

Operational Objective 3.1: To enhance regional cooperation and coordination

- Activity 3.1.1: Assess the options for the establishment of a potential Regional Climate Observation System Centre in the Mediterranean Basin;
- Activity 3.1.2: Enhance the collaboration and coordination among existing scientific networks in the region;
- Activity 3.1.3: Initiate a regional agreement on data sharing protocols;
- Activity 3.1.4: Support the assessment of national technology needs and promote technology transfer initiatives for the development and diffusion of environmental sound technologies;
- Activity 3.1.5: Provide support to education/research institutions in countries of the South Mediterranean. Develop a Fellowship and Exchange programme for adaptation scientists from Mediterranean countries;
- Activity 3.1.6: Increase regional and transboundary cooperation and assistance to cope with emergency situations arising from droughts and floods;
- Activity 3.1.7: Increase coordination among donors and key stakeholders to strategize funding priorities.
- Activity 3.1.8: Exchange best practices on disaster risk management in the region and establish a regional cooperation mechanism for climate related disasters;

Strategic Objective 4: Leverage existing and emerging finance mechanisms relevant to climate change, including international and domestic instruments

Operational Objective 4.1: To support access to international financing

- Activity 4.1.1: Countries develop strategies, priorities and valuation approaches for adaptive actions in each key sector, and build their related capacities in order to effectively access, mobilize, manage and utilize necessary funds;
- Activity 4.1.2: Promote and support innovative financing mechanisms such as the issuance of Green Bonds and the involvement of pension and insurance funds, including their gradual divestment from fossil fuel-related investments;
- Activity 4.1.3: Establish coordination mechanisms between donors and key actors in the Region and beyond in order to agree on integrated funding strategy and priorities, for avoiding overlapping or duplication of efforts and activities.
- Activity 4.1.4: Develop partnership schemes, leading to related project proposals, in assistance to countries towards accessing climate financial mechanisms such as the Green Climate Fund, Adaptation Fund, etc.

Operational Objective 4.2: To strengthen mobilization of national sources of climate finance

- Activity 4.2.1: Raise the attention on the importance of climate adaptation measures and secure an appropriate share of related public spending;

- Activity 4.2.2: Build capacity for socially sensitive and transparent public-private partnerships for adaptation action and where appropriate encourage the involvement of the private sector in related schemes;
- Activity 4.2.3: Shift subsidies from maladaptive actions (e.g. fossil fuels) to measures that improve climate resilience.