



# Climate and Environmental Change in the Mediterranean Basin – Current Situation and Risks for the Future

**First Mediterranean Assessment Report (MAR1)**

**Edited by**

Wolfgang Cramer  
MedECC Coordinator  
CNRS, France

Mediterranean Institute for terrestrial and  
marine Biodiversity and Ecology (IMBE)

Joël Guiot  
MedECC Coordinator  
CNRS, France

Centre Européen de Recherche et  
d'Enseignement des Géosciences de  
l'Environnement (CEREGE)

Katarzyna Marini  
MedECC Science Officer  
MedECC Secretariat  
Plan Bleu



Mediterranean  
Action Plan  
Barcelona  
Convention



Union for the Mediterranean  
Union pour la Méditerranée  
الاتحاد من أجل المتوسط



Sweden  
Sverige

## MEDECC

The Mediterranean Experts on Climate and environmental Change (MedECC) are an independent network of scientists, founded 2015. MedECC assesses the best available scientific knowledge on climate and environmental change and associated risks in the Mediterranean Basin in order to render it accessible to policy-makers, stakeholders and citizens.

To date (September 2020), MedECC counts more than 600 scientific members, all contributing in individual capacity and without financial compensation. MedECC scientists are based in 35 countries, including 19 countries registered as Contracting Parties to the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention) and 23 countries that are members of the Union for the Mediterranean.

The UNEP/MAP – Barcelona Convention Secretariat, through its Plan Bleu Regional Activity Center, and the Secretariat of the Union for the Mediterranean are working in partnership to support MedECC, and to contribute to establishing a sound and transparent scientific assessment process.

MedECC reports are prepared for use of policy-makers and a broader audience. They are developed on the basis of scientific criteria only; their validity is therefore the responsibility of MedECC Report Authors alone. The available knowledge concerning the risks studied by MedECC has significant certain gaps, often due to limited monitoring systems or scientific research capacity – these have been indicated as clearly as possible. Despite best efforts, errors and omissions are nevertheless not unlikely.

## This report

MedECC has prepared the First Mediterranean Assessment Report (MAR1) on the current state and expected risks of climate and environmental change in the Mediterranean Basin. The report includes a Summary for Policy-makers (SPM), which comprises the key messages of the MAR1. A first draft of the MAR1 was prepared in 2019 and underwent expert peer review.

The second draft, revised to take into account review comments, and now supplied with a SPM, has undergone broad consultation with governments, decision-makers and stakeholders in 2020. The particular aim of the consultation was to ascertain that MAR1 findings, as presented in the SPM, are fully comprehensible and unambiguous. While chapter drafts were also supplied with the SPM under review, they served as background information only and were not part of the review.

The MedECC coordinators are very grateful for the expertise, rigor and dedication shown by the volunteer Coordinating Lead Authors and Lead Authors, working across scientific disciplines in each chapter of the report, with essential help from many Contributing Authors.

At the end of the stakeholder consultation, 453 comments for the SPM had been received and were used to revise the SPM wherever this was possible. The stakeholder review was concluded during the online Plenary Session of stakeholders held on September 22, 2020. Final publication of the MAR1 is planned for end of 2020.

MedECC Authors and Coordinators want to thank all reviewers for their time and effort. A record is being kept on the responses to all review comments.

This publication has been made possible through the collaboration of more than 180 contributors, who are listed in the full report.

**Editors:** Wolfgang Cramer, Joël Guiot, Katarzyna Marini

**Editorial Committee:** Semia Cherif (Tunisia), Wolfgang Cramer (France), Carlo Giupponi (Italy), Joël Guiot (France), Manfred Lange (Cyprus/Germany), Piero Lionello (Italy), Katarzyna Marini (France), Maria Snoussi (Morocco) Andrea Toreti (Italy), Elena Xoplaki (Greece/Germany)

Reproduction is authorised provided the source is acknowledged. An online version of this work is published at <https://www.medecc.org/first-mediterranean-assessment-report-mar1/> which permits re-use, distribution and reproduction in any medium for non-commercial purposes providing appropriate credit to the original work is given. All versions of this work may contain content reproduced under license from third parties. Permission to reproduce this third-party content must be obtained from these third-parties directly.

**Preferred citation:**

MedECC (2020) Climate and Environmental Change in the Mediterranean Basin – Current Situation and Risks for the Future. First Mediterranean Assessment Report [Cramer, W., Guiot, J., Marini, K. (eds.)] Union for the Mediterranean, Plan Bleu, UNEP/MAP, Marseille, France, 600pp, in press

Cover design and graphs (re)design : Pandaroo (Péronnas)

Copy-editing by Connected Language Services

The UNEP/MAP – Barcelona Convention Secretariat, through its Plan Bleu Regional Activity Center, and the Secretariat of the Union for the Mediterranean are working in partnership to support MedECC. The MedECC Secretariat is supported and funded by UfM, through a grant provided by the Swedish International Development Cooperation Agency (SIDA), hosted by Plan Bleu in Marseille, France.

**Supporting institutions:**



The content and views expressed in this document are purely those of the authors and may not, in any circumstances, be interpreted as stating an official position of the supporting institutions. Neither the supporting institutions nor any person acting on their behalf may be held responsible for the use, which may be made of the information contained therein.

The supporting institutions does not guarantee the accuracy of the information included in this document, nor does it accept any responsibility for any use thereof. Reference herein to any specific products, specifications, processes or services by trade name, trademark, manufacturer or otherwise does not necessarily constitute or imply its endorsement, recommendation or favoring by the supporting institutions.

## Foreword

Climate change is possibly the most crucial challenge for the future of the Mediterranean: the pace and magnitude of climate change and its impacts in the region can turn it into a serious stability risk if untamed and not integrated organically in national and regional policy.

In accordance with their respective mandates, the Secretariats of the Union for the Mediterranean (UfM) and of the United Nations Environment Programme / Mediterranean Action Plan – Barcelona Convention (UNEP/MAP) have joined efforts to support the work undertaken by the network of Mediterranean Experts on Climate and environmental Change (MedECC) and its Secretariat, which is hosted by Plan Regional Activity Centre (UNEP/MAP) in Marseille, France.

Despite the pressing need to better understand the current state of play and the present and future risks of climate and environmental change in the Mediterranean, there was until recently a dearth of reliable, robust and scientific data combined with a deficit in knowledge sharing with decision-makers and stakeholders.

Thanks to MedECC, the First Mediterranean Assessment Report (MAR1) now bridges the gap.

The methodology used by MedECC is based on key principles of the Intergovernmental Panel on Climate Change (IPCC) and of the Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). This approach is innovative, but its application was fraught with challenges specific to the Mediterranean region. We commend MedECC for the results achieved.

For the UfM Secretariat, it is clear that MAR1 is a major deliverable of the 1<sup>st</sup> UfM Ministerial Declaration on Environment and Climate Change; it is also a cornerstone between the first and the second UfM Ministerial Declarations.

From the UNEP/MAP perspective, the support to MedECC is a major achievement under the Mediterranean Strategy for Sustainable Development (MSSD), which identifies the establishment of a regional science-policy interface on climate change as a priority (Flagship Initiative). MAR1 will take centre stage in the context of the 22<sup>nd</sup> Meeting of the Contracting Parties to the Barcelona Convention, which will adopt the UNEP/MAP Medium-Term Strategy (MTS) 2022-2027.

At a time when an unprecedented health crisis having severe impacts on Mediterranean societies and economies, regional cooperation and multilateralism underpinned by robust science have never been more sorely needed. In this vein, MedECC offers a unique synthesis on best available scientific knowledge on climate and environmental changes in the Mediterranean, thus allowing for an evidence-based, basin-wide policy response.

This is also a report of great importance to our partners in the Mediterranean region as MAR1 will inform integrated programming in ways that can improve cooperation to address urgent needs and to inform long-term climate and environmental action. Its findings constitute a foundation for meeting sustainable development needs whilst informing strategic planning and investment at the regional level.

We acknowledge with appreciation MedECC's efforts, which also have an important impact in terms of capacity-building. UfM and UNEP/MAP reiterate their commitment to bolstering MedECC and its linkages with global processes. We will deploy additional support for the best-possible use of MAR1 in the context of the enforcement of the three UN Rio conventions in the region.



**Mr. Nasser KAMEL**

*Secretary General*

*Union for the Mediterranean*



**Mr. Gaetano LEONE**

*Coordinator*

*UNEP/MAP – Barcelona Convention*

Within the mandate given by the Contracting Parties to the Barcelona Convention to Plan Bleu in its role of Regional Activity Centre of the UNEP/MAP system, and in the framework of an agreement with the Secretariat of the Union for the Mediterranean, Plan Bleu has hosted the MedECC Secretariat and supported directly its activities since its creation.

We would like to commend all the scientists who contributed to this report, MedECC Steering Committee and especially its Coordinators and Scientific Secretary for the delivery of this outstanding report. This work would not have been possible without the financial support of the Swedish International Development Agency (SIDA), the Principality of Monaco, the French Agency for Ecological Transition (ADEME), the French Ministry of Ecological Transition and Solidarity, the French National Centre for Scientific Research (CNRS) and the French Research Institute for Development (IRD) via the MISTRALS programme, the Aix-Marseille University via the Laboratory of Excellence (Labex) OT-Med, the Advisory Council for the Sustainable Development of Catalonia of the Government of Catalonia (CADS) and the Aix-Marseille Provence Metropole.

Plan Bleu will maintain its support to the MedECC network to disseminate the key MAR1 findings to all stakeholders, including to policymakers through UfM and UNEP/MAP processes; and to dive in the assessment of thematic issues in its next phase of activities.



**Mr. Thierry LAVOUX**

*Président, Plan Bleu*

## Acknowledgements

The MedECC report is the outcome of the work of many people, supported by many institutions. While we cannot mention all of them here, the editors and authors wish to acknowledge and thank the following individuals and institutions who provided their help at different stages of the process: Plan Bleu director, its current François Guerquin, as well as his predecessors Elen Lemaître-Curri and Anne France-Didier, also the Plan Bleu team, in particular Antoine Lafitte, Lina Tode, Sandra Dulbecco and Anna Goubert; the Union for the Mediterranean, its Climate Adviser Arnault Graves, its Senior Deputy Secretary General Grammenos Mastrojeni, its previous Climate Adviser Nicolas Debaisieux, the team of the Union for the Mediterranean Energy and Climate Action, as well as the UfM Communication and Public Affairs Unit; the UN Environment Programme/Mediterranean Action Plan Coordinating Unit, its Coordinator Gaetano Leone and its Programme Management Officer Julien Le Tellier.

We also wish to thank wholeheartedly the reviewers of various drafts of the report – all their comments have been considered carefully even if it was not always possible to accommodate them. The many participants of the Conference "Climate Our Common Future" in Paris 2015 and numerous following scoping meetings made very important contributions to the report.

We received important support from the hosting institutions of several workshops: Mohammed V University in Rabat (Morocco), University of Palermo (Italy), Venice International University (VIU) (Italy), Scientific Centre of Monaco (CSM), Oceanographic Museum of Monaco, National Research Council CNR Congress Center in Milan (Italy) and Aix-Marseille University (France). The Summary for Policymakers (SPM) was crucially refined during a day-long discussion with focal point representatives of the main stakeholders, chaired by Valentina Mauriello and Grammenos Mastrojeni. The report preparation was also supported by the team of the Labex OT-Med (including administrative staff: Sophie Pékar, Barbara Bourlion), the team of AIR Climat (Aurore Aubail and Antoine Nicault), Acterra (Stéphane Simonet), Service Informatique Pythéas (OSU Institut Pythéas, France), Stéphanie Wicha, Aurore Pfitzmann and Marie-Aimée Gros-Rosanvallon.