

MedECC Reports – Key Points for Media

The Mediterranean Experts on Climate and Environmental Change (MedECC) is an independent network of scientists founded in 2015 to provide decision-makers and the public with assessments of the latest scientific information available. To date, more than 300 voluntary authors have contributed to MedECC reports.

The network is a response to calls from several regional institutions, such as the Union for the Mediterranean or the UN Environment Program/Mediterranean Action Plan (UNEP/MAP). The MedECC Secretariat is hosted by Plan Bleu/RAC in Marseille as part of a partnership with the Union for the Mediterranean.

MedECC's latest special reports address two specific challenges identified in the [First Mediterranean Assessment Report \(MAR1\)](#) from 2020 and will be presented in Baku on November 18, 2024 during COP29.

1) MedECC Special Report on Climate and Environmental Coastal Risks in the Mediterranean

- Written by 55 volunteer authors from 17 countries
- Report Coordinators: Salpie Djoundourian (Lebanon), Piero Lionello (Italy), Maria Carmen Llasat (Spain)
- MedECC Coordinators: Wolfgang Cramer (France), Fatima Driouech (Morocco), Joël Guiot (France)
- Objectives:
 - Identify and assess up-to-date scientific information on environmental and climate change hazards in the coastal zone of the Mediterranean Basin, the related risks, adaptation options and solutions
 - Assess and provide information on actions to meet the United Nations Sustainable Development Goals (SDGs)
 - Present adaptation actions that place social and cultural values in context and consider the need to protect communities and biodiversity while minimising impacts on the natural environment and addressing ethical issues

Key points:

1. A third of the Mediterranean region's population lives in close vicinity to the sea and depends on nearby infrastructure and economic activities. The coastal population is expected to grow faster than the inland population, thus leading to increased exposure of people and assets to coastal hazards resulting from climate change and environmental degradation. Although the population could decline under certain scenarios in the North, high population increases are expected in the South and the East, meaning that **up to 20 million people could be affected by permanent displacement due to sea-level rise by 2100**. Infrastructure such as transport networks or cultural

heritage sites will also be at high risk, and as it stands, the region is already home to three of the world's 20 airports most at risk of coastal flooding.

2. The current rate of annual sea level rise in the Mediterranean is about 2.8 mm per year, twice as high as the 20th century average, while by the end of the 21st century the mean sea level could go up by a metre. **The Mediterranean coast is among the world's regions with the highest probability of compound flooding, the impacts of which will be aggravated as a result of climate change and population growth on the coast.** The frequency of extreme sea level events that occur once in 100 years is likely to rise by at least 10% by 2050 and 22% by 2100 under an intermediate emissions scenario. Precipitation will decrease over most of the Mediterranean, but heavy rainfall will increase in some areas of the northern Mediterranean. Both protection against coastal flooding and management of coastal erosion typically rely on high-cost engineering solutions and generally fail to fully consider the values of future sea level rise, risking limited long-term effectiveness.
3. **Marine heatwaves, which over the last two decades have increased in frequency and duration by 40% and 15% respectively,** increase carbon emissions and favour the emergence of non-indigenous tropical species, which in turn have a variety of ecological and socioeconomic impacts on the Mediterranean. Heatwaves have also led to mass mortality events affecting corals, sponges, molluscs, bryozoans and echinoderms and are expected to become even more common in the future.
4. As the impacts of climate change intensify in the Mediterranean, a climate change hotspot where temperatures are expected to rise at a faster rate than the global average, the efficiency of conservation measures depends greatly on the success of climate change mitigation efforts. **A growing number of hard limits will be reached for every increment in global warming.** Adaptation limits of coastal, terrestrial, freshwater and brackish water ecosystems will be reached at a 3°C warming scenario in the North and possibly sooner in the South and East, which are expected to be particularly impacted by the future degradation and reduction of conventional freshwater resources. Such evolution will increase overall risks and hamper their management.
5. The Mediterranean Sea is one of the most heavily plastic polluted areas in the world. Plastics account for up to 82% of observed litter, 95–100% of total floating marine litter and more than 50% of seabed marine litter. **By 2040, the leakage of plastics into the sea is likely to double if annual plastic production continues to grow at a rate of 4% and waste management is not radically improved.** Mediterranean ecosystems and human health face severe threats from high levels of pollutants along the coast, originating mainly from land-based human activities such as industry, agriculture, urbanisation, and tourism. Although European legislation in particular has successfully reduced toxic metal concentrations, the northern Mediterranean is increasingly affected by emerging pollutants. A significant lack of data, understanding, and treatment technology for these pollutants hampers effective monitoring and risk assessment. Risks to coastal ecosystems and human health from pollution are expected to increase as anthropogenic pressures continue to grow, with no current consistent strategy to reduce pollution on a

Mediterranean scale. Actions controlling pollution at its sources are generally more efficient than those treating it at endpoints, especially given its cross-border nature.

6. **The Mediterranean is the world's leading tourism destination**, both internationally, attracting about a third of the world's tourism, and domestically, with over a half of the EU's tourist accommodation establishments. As is the case with irrigated agriculture, tourism produces peaks in water demand in the summer, a phenomenon that is expected to intensify due to climate change, agricultural practices, and the increase in population and tourism in the coastal areas, particularly in the South. Tourism, like other socioeconomically crucial sectors such as ports and maritime transport or construction and real estate, is largely based on extractive models of development, but could foster sustainability by shifting to more circular and greener practices, including the use of renewable energy, that promote local communities and conserve natural resources.
7. **Efforts to adopt effective mitigation and adaptation measures are still insufficient to promote desirable and liveable futures. The Sustainable Development Goals will not be met unless there is transformative action across all sectors, systems, and scales.** A mix of legal, policy and economic instruments, are available to promote the sustainable blue economy, that is to say, climate-resilient sustainable development pathways that decouple energy consumption from economic growth. Engaging scientists, policymakers, stakeholders, and citizens, while including cross-sectoral adaptation strategies into a regional Mediterranean framework would enable cooperation and allow for more effective cross-border measures to be taken.

2) MedECC Special Report: Interlinking climate change with Water-Energy-Food-Ecosystems (WEFE)

- Written by 60 volunteer authors from 15 countries
- Report Coordinators: Philippe Drobinski (France), Marta Rivera Ferre (Spain), Mohamed Abdel Monem (Egypt)
- MedECC Coordinators: Wolfgang Cramer (France), Fatima Driouech (Morocco), Joël Guiot (France)
- Objectives:
 - Assess up-to-date scientific information on the interlinked water, energy, and food systems in the Mediterranean in the context of climate change and their connections with the surrounding ecosystems
 - Provide scientific information relevant for informed decision-making and comprehensive and intersectoral policies

Key points:

1. The Mediterranean is a climate change hotspot where both human societies and ecosystems face high exposure and vulnerability. Interconnected challenges related to water, energy, food,

and ecosystems threaten livelihoods, economies, and natural systems, with significant disparities between countries and between rural and urban areas. The Water-Energy-Food-Ecosystems (WEFE) nexus approach provides a comprehensive framework to address these challenges in developing sustainable solutions and preventing cascading effects that could further harm the region's communities and ecosystems. The integration of the WEFE nexus into policies and development plans supports the implementation of the Sustainable Development Goals given its relevance to the majority of them.

2. Insecurity for all elements of the nexus is the rule rather than the exception in many countries of the Mediterranean Basin, which has far-reaching implications in terms of sustainability. The region faces pressing challenges of water insecurity (e.g., water stress), energy insecurity (with large dependence on fossil fuels mostly imported), food insecurity (comprising the triple burden of malnutrition) as well as ecosystem insecurity (e.g., fast rate of biodiversity loss, on land and in the ocean).
3. The unsustainability in all WEFE elements is not only characterised by insecurity but also by the existence of large disparities between countries, as well as by the multiple interlinkages between the four nexus elements. Mediterranean countries are facing numerous and interrelated challenges in terms of access to and availability of water, energy, food and fertile land, as well as in how these elements depend on and potentially impact ecosystems. Mediterranean countries face several challenges in their implementation of the 2030 Agenda for Sustainable Development.
4. Climatic and non-climatic drivers of change in one WEFE element can have cascading effects in the other WEFE elements, generating multiple loops and feedback paths. Similarly, adaptation measures focusing on a single societal goal and one WEFE element can result in negative trade-offs, leading to maladaptation. Sustaining healthy ecosystems needs to be at the heart of interventions given the relevance of adaptation and mitigation measures at various temporal and spatial scales. The complex web of interactions among WEFE elements can first result in degraded ecosystems which cannot provide the associated ecosystem services and hamper water, food and energy security.
5. The main pathways for action within the WEFE nexus approach are threefold:
 - Innovative technological solutions, including renewable energy, which has a significant potential to mitigate climate change, especially in the South and East, and enhanced efficiency.
 - Ecosystem-based solutions, including agroecology and nature-based Solutions (NbS) such as green infrastructure or wetland restoration
 - Social innovation approaches aiming to reduce or modify consumption patterns, such as the re-adoption of the Mediterranean diet, which is less energy intensive.
6. There is a large variety of implemented solutions at various spatial scales, with an uneven distribution over the whole Mediterranean basin. Social options based on behavioural change

show the highest positive effect on all the four pillars of the nexus. In general, green options, such as nature-based solutions (NbS) and agroecological management practices, have positive impacts on the four pillars and are the most transformative. More evidence is required to assess specific NbS and the effect of adaptation options related to governance and institutions, in particular on water pricing policies and those limiting and reducing water use. Options related to water use and management are the most complex and controversial because they can have a negative impact on other pillars.

7. The adoption of the WEFE approach in the Mediterranean region falls short due to limited data quality and accessibility; insufficient awareness of nexus synergies and trade-offs; insufficient incentives and investments; the higher short-term costs of the nexus approach; and a lack of adequate governance with inter-sectoral and multi-level coordination. Enhancing institutional capacities requires a science-policy interface, efficient finance mechanisms, intra-regional dialogue, deliberative approaches, and pilot nexus approaches for more coordinated WEFE actions. These can include new irrigation techniques or the enhancement of traditional ones; reusing treated wastewater or desalinated water using renewable energy; agrivoltaics without land competition; or agroecological practices that reduce freshwater consumption, increase water conservation, improve soil fertility and reduce energy footprint while maximising local food production and protecting ecosystems.
8. Background information established in [MedECC's First Mediterranean Assessment Report](#):
 - Water: 180 million people already suffer from water scarcity. The region also faces flood-induced risks on infrastructure, degradation of water quality, as well as unequal access.
 - Food: Water scarcity, heat stress, agricultural land loss due to coastal flooding, abandonment, soil salinisation, and desertification impact agricultural production. A shift away from the traditional Mediterranean diet contributes to increased malnutrition, degradation of ecosystems, and a rise in greenhouse gas emissions.
 - Energy: Mediterranean countries are still overwhelmingly dependent on fossil fuels to produce electricity, and despite their high potential, renewables only accounted for 11% of total consumption in 2020. Projected declines in streamflow could lead to a decrease in hydropower and thermoelectric power by up to 7% and 15%, respectively, by the 2050s.
 - Ecosystems: Biodiversity loss, deforestation, wildfires, land use changes, and pollution are severely undermining Mediterranean terrestrial and marine ecosystems, reducing the ecosystem services they provide.