MPA4Change

POLICY BRIEF

FROM TOOLS TO ACTION: SCALING CLIMATE ADAPTATION THROUGH THE MPA4CHANGE TOOLKITS

Recommendations for ***integrating the full suite of validated toolkits into MPA governance frameworks*** *to strengthen climate resilience in the Mediterranean.*

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Executive Summary

This document presents the **MPA4Change Climate Adaptation Toolkits,** developed to support **Mediterranean Marine Protected Areas (MPAs)** in operationalising climate change adaptation and mitigation commitments. The core message is that Marine Protected Areas can function as effective **Nature-based Solutions** for climate adaptation only when these conditions are translated into concrete, supported action at MPA level.

To enable this transition from policy ambition to implementation at scale, the **100 MPA MedAlliance** provides the overarching framework for scaling the uptake of these toolkits across the Mediterranean, combining technical support, policy alignment, and peer learning.

Building on pilot experiences and regional collaboration, the MPA4Change project has **validated a suite of seven/eight complementary, operational toolkits** designed to translate EU and Mediterranean policy objectives into concrete action at MPA level:

#1 Climate Vulnerability Assessment for Mediterranean MPAs

#2 Harmonised Climate Change Monitoring for Mediterranean MPAs

#3 Foundations for Marine Restoration Toolkit for Mediterranean MPAs

#4 Citizen Science for Climate Change Monitoring in Mediterranean MPAs

#5 Participatory Approaches for Co-Creating Climate Adaptation in Mediterranean MPAs

#6 Climate Adaptation & Mitigation Planning Toolkit for Mediterranean MPAs

#7 Geographic Information Systems for MPAs

#8 Communication Tools for Raising Awareness on Climate Change in Mediterranean MPAs

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Together, these toolkits provide **user-friendly guidance, protocols, and training materials** that can be applied and replicated across diverse Mediterranean MPA contexts.

The document calls on **MPA managers, policymakers, and funding institutions** to support the uptake of these validated toolkits through their integration into management plans, policy instruments, and financing mechanisms. Doing so will strengthen MPAs as climate-resilient NbS, enhance coherence with EU and Mediterranean climate and biodiversity targets, and support resilient coastal ecosystems and livelihoods across the Mediterranean basin.

Photo Credit: Rossy Vinchenzo

Introduction

The Mediterranean is widely recognised as one of the world's fastest-warming marine regions and a clear climate-change hotspot. Most of the observed warming is detected at the sea surface, where rising temperatures intensify marine heatwaves, alter seasonal cycles, and increase water-column stratification. These changes have profound implications for the basin's circulation patterns, nutrient availability, and biodiversity distribThe Mediterranean Sea is experiencing accelerating climate change impacts that are compounding long-standing anthropogenic pressures. Recent evidence shows that the increasing frequency and intensity of marine heatwaves are driving recurrent mass mortality events across the Mediterranean, severely affecting habitat-forming benthic communities and challenging ecosystem resilience, including within Marine Protected Areas (Garrabou et al., 2022). While Marine Protected Areas (MPAs) are increasingly recognised in European and Mediterranean policy frameworks as key Nature-based Solutions (NbS for climate change adaptation, their capacity to respond effectively remains uneven and often constrained.

Regular assessments of the Mediterranean MPA network system, facilitated by MedPAN and SPA/RAC, consistently identify structural gaps that limit climate action at MPA level (UNEP/MAP–SPA/RAC & MedPAN, 2020). These include incomplete implementation of management plans, limited enforcement capacity, insufficient coverage of highly protected no-take zones, and the continued lack of systematic integration of climate-change considerations into MPA management frameworks. Addressing these gaps is essential if MPAs are to deliver their full ecological and socio-economic potential under a changing climate.


Photo Credit: Teo Marevic

The **MPA4Change** project responds directly to these challenges by providing operational and tested climate adaptation toolkits that form one of the core pillars of the **100 MPA MedAlliance**. The 100 MPA MedAlliance provides the framework through which these tools are supported, shared, and scaled across the Mediterranean. Together, these toolkits support Marine Protected Areas in translating EU and Mediterranean policy commitments into practical, on-the-ground action.

This policy brief introduces the MPA4Change toolkits and demonstrates how, when implemented within the 100 MPA MedAlliance framework, they can strengthen MPA governance, planning, and implementation, thereby enhancing the role of MPAs as effective Nature-based Solutions for climate change adaptation in the Mediterranean.

The Climate Emergency in the Mediterranean

The Mediterranean is widely recognised as one of the world's fastest-warming marine regions and a global climate-change hotspot (Pastor et al., 2020). Most observed warming occurs at the sea surface, intensifying marine heatwaves, disrupting seasonal cycles, and increasing water-column stratification, with cascading effects on circulation, nutrient dynamics, and biodiversity distribution.

Marine heatwaves are becoming longer, more frequent, and more severe, triggering large-scale mass-mortality events and accelerating shifts in species distribution. Combined with sea-level rise, ocean acidification, and chronic pressures such as overfishing, pollution, and habitat degradation, these impacts are pushing Mediterranean marine ecosystems beyond their resilience limits and increasing risks for coastal communities and livelihoods.

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What the MPA4Change Toolkits Provide

Evidence for Action:

The MPA4Change Toolkits provide harmonised methods and guidance that enable Mediterranean MPAs to detect climate trends, assess ecological and socio-economic vulnerabilities, design restoration actions, engage communities, and translate evidence into management responses. Standardised monitoring protocols, vulnerability and risk assessment tools, participatory approaches, and restoration guidelines together create a coherent knowledge base that supports adaptive management across the region.

Policy Integration:

The MPA4Change Toolkits provide harmonised methods and guidance that enable Mediterranean MPAs to detect climate trends, assess ecological and socio-economic vulnerabilities, design restoration actions, engage communities, and translate evidence into management responses. Standardised monitoring protocols, vulnerability and risk assessment tools, participatory approaches, and restoration guidelines together create a coherent knowledge base that supports adaptive management across the region.

Capacity Building:

Each toolkit includes ready-to-use manuals, templates, workflows, and digital resources that guide MPA managers from data collection and stakeholder engagement to planning, implementation, and policy reporting. Training materials, factsheets, and e-learning modules support long-term capacity development, ensuring that skills and knowledge can be transferred across the Mediterranean MPA network.

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Community Engagement:

The Citizen Science and Participatory Approach Toolkits promote inclusive monitoring, local ownership, and the integration of traditional and Local Ecological Knowledge (LEK). By involving local users, communities, and stakeholders, MPAs strengthen trust, improve compliance, and ensure that conservation and climate actions reflect local priorities. This participatory foundation helps MPAs function as effective Nature-based Solutions for climate change adaptation and mitigation, delivering ecological and societal benefits.

Photo Credit: Josep Clotas

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Why Implement the Climate Adaptation Toolkits?

Marine Protected Areas are widely recognised as effective Nature-based Solutions for climate change adaptation and mitigation, yet many Mediterranean MPAs still face persistent challenges in translating this potential into practice (IUCN, 2020). Limited access to standardised data, insufficient integration of climate considerations into management plans, and capacity constraints continue to hinder effective climate action (Hopkins et al., 2016).

The Climate Adaptation Toolkits respond directly to these challenges by providing tested, transferable, and policy-aligned tools that support evidence-based decision-making and adaptive management. Their implementation enables MPAs to move from fragmented monitoring and planning efforts towards coherent, climate-smart management frameworks, strengthening their contribution to biodiversity conservation, climate resilience, and sustainable coastal livelihoods.

Strategic Alignment

The adoption of the MPA4Change Toolkits helps to **operationalise existing international and regional commitments**, complementing the policy frameworks already referenced in the "Policy Integration" section. In particular, the toolkits support the implementation of:

Barcelona Convention – Integrated Monitoring and Assessment Programme (IMAP) and Post-2020 SAPBIO

IMAP defines core ecological indicators for assessing the state of the Mediterranean marine environment, while the Post-2020 SAPBIO provides a strategic roadmap for biodiversity conservation and restoration. The MPA4Change Toolkits contribute to these processes by offering harmonised, science-based methods for climate change monitoring, vulnerability assessment, restoration planning, and reporting in MPAs.

EU Marine Strategy Framework Directive (MSFD)

As the EU's main instrument for achieving Good Environmental Status in marine waters, the MSFD requires Member States to monitor, assess, and reduce pressures on marine ecosystems. The MPA4Change Toolkits provide practical approaches that can be used within MSFD monitoring programmes and management measures, particularly in relation to climate-sensitive habitats and species.

EU Nature Restoration Regulation (NRR)

The NRR calls for the restoration, monitoring and long-term maintenance of key marine and coastal habitats and species. MPA4Change protocols and assessment tools offer concrete methods that can underpin restoration targets, timelines and indicators in Mediterranean MPAs.

EU Biodiversity Strategy to 2030 and EU Strategy on Adaptation to Climate Change

Both strategies promote ecosystem-based and Nature-based Solutions as core instruments for biodiversity conservation and climate resilience. By structuring climate monitoring, vulnerability assessment, restoration and participatory planning, the MPA4Change Toolkits help embed these approaches into marine and coastal governance.

2030 GreenerMed Agenda (UfM)

The Union for the Mediterranean (UfM) 2030 GreenerMed Agenda and the Sustainable Blue Economy Roadmap: Endorsed by 43 UfM countries in 2021 under the North-South Med CoPresidency, these regional frameworks implement the respective UfM Ministerial Declarations on environment, climate change, green and blue economy. They facilitate strategic, technical and financial convergence across countries through interconnected multi-stakeholders and multi-level governance processes and projects, aspiring to reinforce the wider path towards sustainable development across the region. MPAs are specifically tackled under the Biodiversity and Ecosystem Restoration Axis 3 of the 2030 GreenerMed Agenda and duly taken into account within the SBE Roadmap to ensure sustainability, adaptation and resilience of maritime activities.

Kunming–Montreal Global Biodiversity Framework (Targets 3 and 8)

The Global Biodiversity Framework calls for at least 30 % of marine and coastal areas to be effectively conserved and managed, with climate-resilient and well-connected MPA networks by 2030. MPA4Change, together with the 100 MPA MedAlliance initiative, directly supports this ambition by promoting climate-ready, effectively managed MPAs in the Mediterranean.

European Ocean Pact

The European Ocean Pact is a high-level political framework designed to strengthen coordination, coherence, and investment in ocean and marine governance across the European Union and its sea basins, including the Mediterranean. It promotes a multilevel and cross-border governance framework to effectively coordinate maritime policies across all sea basins. In this context, the European Commission plans to propose an Ocean Law in 2027, with the aim of strengthening maritime spatial planning as a strategic tool, improving cross-sectoral coordination, and ensuring consistent implementation of ocean objectives. The Pact also reinforces the protection and restoration of marine biodiversity, highlighting the key role of an effective and well-managed network of Marine Protected Areas. Although the EU has achieved 12.3% protection of its waters, Member States are urged to move towards the target of protecting 30% of the seas by 2030, with management plans grounded in science and supported by the participation of local communities (COM(2025) 281 final, p. 7).

Pact for the Mediterranean

The Pact for the Mediterranean addresses the combined impacts of climate change, pollution, and biodiversity loss by strengthening environmental and climate resilience across the region. It promotes effective planning and the coordinated mobilisation of public and private funding at both national and international levels, with a strong emphasis on regional cooperation and local partnerships. Anchored in the framework of the Barcelona Convention, the Pact supports a clean transition and climate-resilient economic development in the Mediterranean, with particular attention to the implementation of the Global Biodiversity Framework and the strengthening of protected areas, especially Marine Protected Areas (JOIN(2025) 26 final, p. 14).

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Lighthouses of Change: Case Examples

This section presents selected "Lighthouses of Change" Mediterranean Marine Protected Areas that illustrate how climate adaptation can be operationalised in practice when adaptive management and ecosystem-based approaches are applied.

These examples demonstrate how MPAs can move beyond policy commitments and pilot concrete actions using climate monitoring, stakeholder engagement, and evidence-based decision-making.

Recent research and assessments confirm that the resilience of MPAs to climate change is significantly strengthened when systematic monitoring and adaptive management are embedded in management frameworks, and when climate considerations are recognised in legislation and planning processes (Hoppit et al., 2022). The case examples below translate these principles into real-world applications, showing how MPAs can function as sentinel sites and learning hubs for climate adaptation across the Mediterranean.

- **Portofino MPA (Italy).** The combined use of the Climate Change Monitoring Toolkit and the Citizen Science Toolkit has strengthened the MPA's role as a climate-change sentinel site. Continuous temperature logging and citizen-science observations of mass-mortality events and fish assemblages provide complementary data streams that support near-real-time alerts on marine heatwaves. While early detection cannot prevent extreme events, it allows managers to rapidly communicate risks, temporarily adapt tourism and diving activities in the most affected sites, and prioritise emergency monitoring and restoration in vulnerable habitats.

- **Brijuni National Park (Croatia).** Application of the MPA4Change monitoring protocols to Posidonia oceanica meadows and Pinna nobilis populations, combined with citizen-science observations and participatory planning processes, has helped integrate climate risks into zoning and tourism management. Monitoring data and Local Ecological Knowledge (LEK) are used to identify the most sensitive sites, adjust visitor use, and support nature-based restoration actions.


Photo Credit: Nick Kane

These examples show that, although MPAs cannot avoid marine heatwaves or fully prevent mass-mortality events, combining scientific monitoring with citizen engagement improves spatial and temporal coverage of data, supports more targeted biodiversity management (e.g. focusing protection and restoration on the most impacted or most resilient sites), and generates evidence that can be shared across the wider Mediterranean MPA network.

Recommendations

The following recommendations translate the findings of this document into targeted actions for key stakeholder groups involved in Mediterranean MPA governance and financing. They aim to support the effective uptake of the validated climate adaptation toolkits, strengthen policy coherence across scales, and ensure that MPAs can deliver their full potential as Nature-based Solutions for climate change adaptation and mitigation.

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For Policy Makers

- **Integrate the validated MPA4Change Toolkits** and monitoring protocols into national MPA frameworks and climate adaptation strategies.
- **Harmonise monitoring standards** regionally through the Barcelona Convention's Integrated Monitoring and Assessment Programme (IMAP).
- Ensure that **climate and biodiversity data inform marine spatial planning, fisheries management, restoration policies,** and the implementation of the EU Nature Restoration Regulation (NRR).
- Promote **cross-border cooperation** and knowledge exchange to accelerate the uptake of harmonised methods across the Mediterranean MPA network.

For MPA Managers

- **Adopt the MPA4Change Toolkits to** detect climate impacts, guide adaptation and mitigation actions, and fulfil national, EU, and Barcelona Convention reporting obligations.
- **Benefit from integrated regional platforms** that enhance data quality, interoperability, and visibility:
  - **T-MEDNet** for temperature and mass-mortality monitoring
  - **ORMEF** for observations of exotic and thermophilic species
  - **AMARE** Geoportal for spatial data visualisation
  - **Observadores del Mar** for citizen-science reporting
- Use these platforms to strengthen harmonised monitoring, improve data sharing, and increase the visibility of climate impacts and biodiversity change across the Mediterranean MPA network.

- Showcase **best practices,** share results, and contribute to regional learning processes to support replication and collective resilience across Mediterranean MPAs.

For Donors & Institutions

- **Provide multi-year funding** to scale the full suite of MPA4Change Toolkits, including climate-change monitoring, citizen science, vulnerability and risk assessment, restoration planning, participatory approaches, and communication.
- **Invest in regional digital** platforms that underpin harmonised data collection and interoperability, such as T-MEDNet, ORMEF, the AMARE Geoportal, and citizen-science infrastructures like Observadores del Mar.
- **Support capacity building** through training, mentoring, and expert deployment to accelerate toolkit adoption within MPAs across EU and non-EU Mediterranean countries.
- **Align financial support** with key EU and regional policy frameworks, including the EU Nature Restoration Regulation, EU Biodiversity Strategy 2030, the EU Climate Adaptation Strategy, and Barcelona Convention mandates.
- **Contribute to and utilise the MPA4Change Roster of Experts,** a key pillar of the 100 MPA MedAlliance, to provide specialised technical support on monitoring, vulnerability assessment, restoration, stakeholder engagement, and communication.
- **Prioritise investments** that strengthen long-term data management, reporting systems, and cross-MPA learning processes to ensure continuity, comparability, and sustained regional impact.

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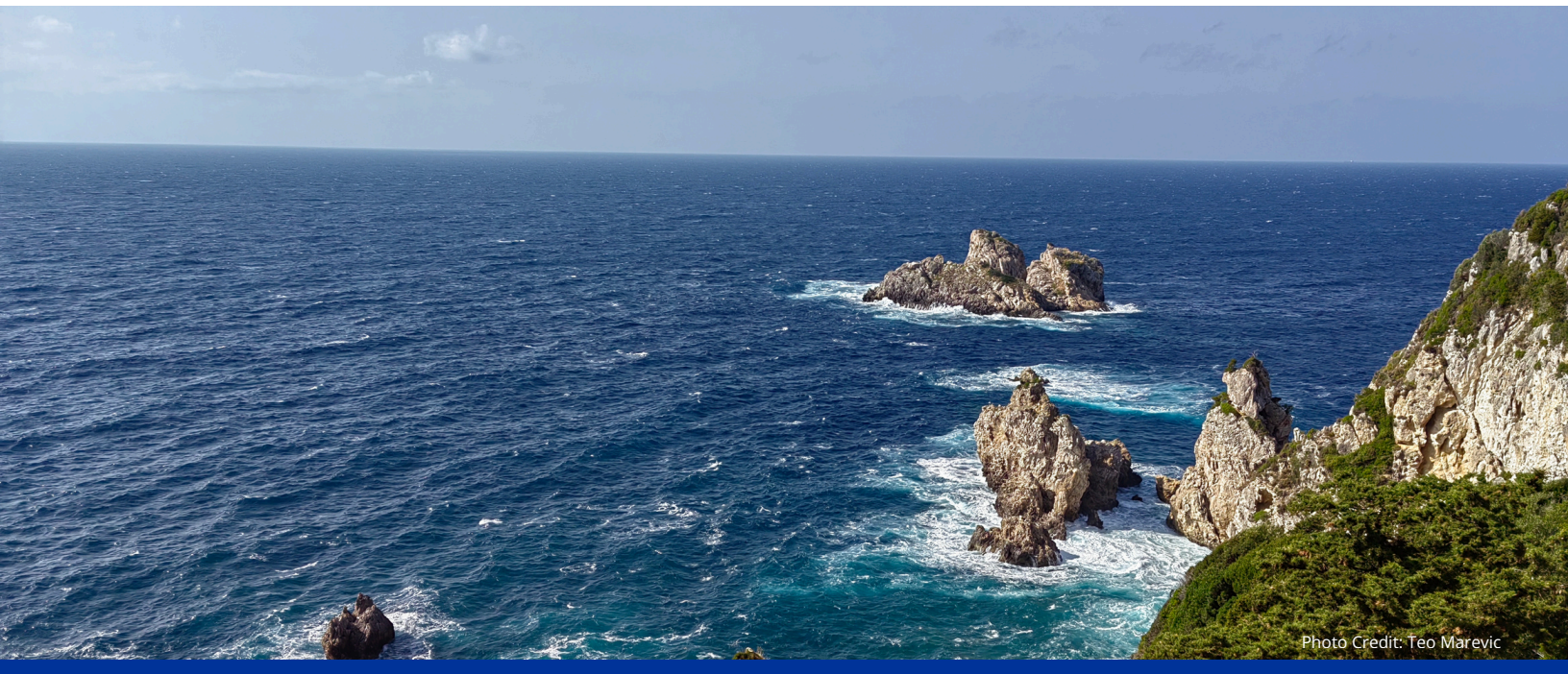

Photo Credit: Teo Marevic

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