Interreg Mediterranean

EUROPEAN UNION

MPA-ADAPT

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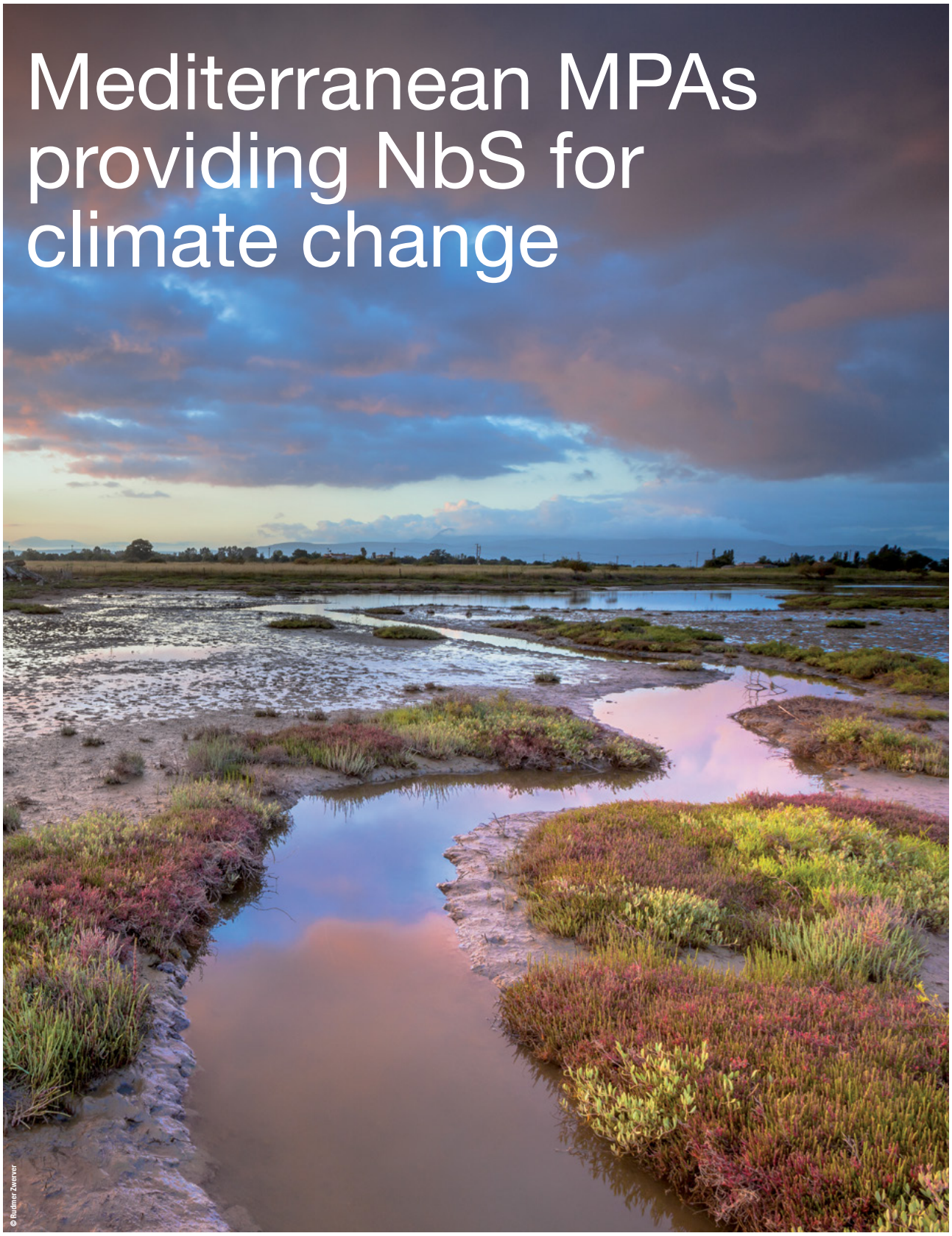
IUCN

# Mediterranean MPAs providing NbS for climate change



# What are Nature-based Solutions (NbS)?

Climate change poses one of the greatest challenges to today's Mediterranean society. According to reports from the Intergovernmental Panel on Climate Change (IPCC), the Mediterranean will be strongly affected by climate change over the course of this century. These changes include increasing periods of drought and water scarcity, extreme phenomena such as storm events that will become more frequent and intense with increasing seawater and air temperatures, salinity increases, sea level rise, acidification and changes marine currents and water circulation. Mediterranean societies and ecosystems will have to prepare to face these changes in the region.

In this regard, Nature-based Solutions (NbS) have the potential to partly counteract some of these pressures. The value of nature and the oceans to help us respond to both the drivers and impacts of climate change is now acknowledged by the Paris Climate Change Agreement which builds upon the UN Framework Convention on Climate Change (UNFCCC). By taking into account the services provided by nature, Nature-based Solutions can foster and simplify the implementation of actions to mitigate and adapt to climate change.

Nature-based Solutions (NbS) is a relatively new term that has been gaining momentum in the last few years, as the conservation community makes an effort to highlight the benefits of nature for people. Indeed, IUCN has defined NbS as **"actions to protect, sustainably manage, and restore natural or modified ecosystems that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits"[1].** This definition emphasizes the need for well-managed or restored ecosystems to be at the heart of Nature-based Solutions.

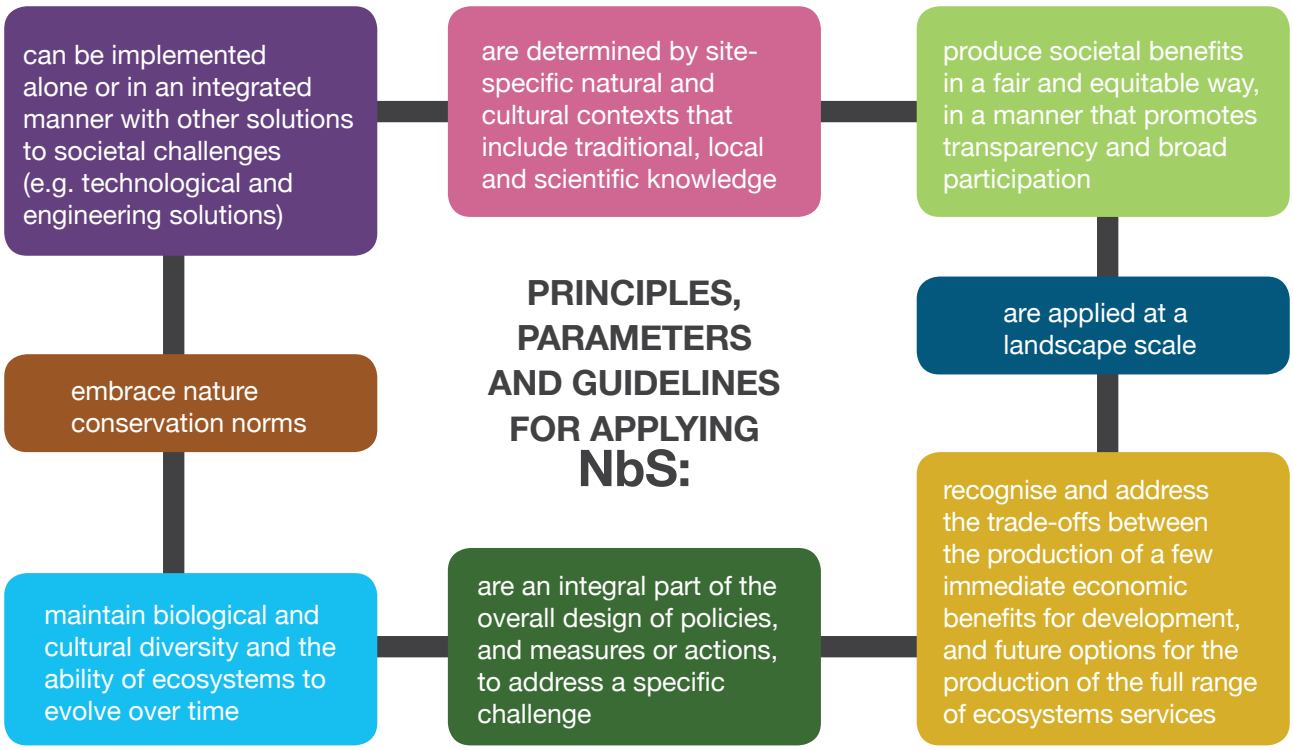
The European Commission has developed its own definition of NbS as "living solutions continually inspired and supported by nature, which use the design based on the same to address various societal challenges in an efficient manner that is adapted to the resources, at the same time providing economic, social and environmental benefits"[2]. Alongside with this definition, it emphasizes that Nature-based solutions are designed to introduce more nature and natural features and processes to cities, landscapes and seascapes. These innovative solutions also support economic growth, create jobs and enhance our well-being[3]. The framing of the European Commission has a larger focus on urban ecosystems, due to the high percentage of the population of Europe that lives in cities.

The concept of NbS is particularly present in the wider discussions on climate change adaptation and mitigation, ecosystem services and green infrastructure. Its framework, as an umbrella-like concept embracing a number of different ecosystem-based approaches, includes a set of general principles for any NbS intervention[4].

**Mitigation means** reducing emissions or increasing the storage of emissions in non-atmospheric sinks negative consequences and take advantage of any opportunities.

**Adaptation measures** is the adjustment of natural or human systems in response to current or expected climate change (or to its effects), to moderate negative consequences and take advantage of any opportunities.


1. WCC-2016-Res-069-EN. Defining Nature-based Solutions. IUCN, World Conservation Congress Hawai.
2. European Commission, 2016. Policy topics: Nature-based Solutions. https://ec.europa.eu/research/environment/index.cfm?pg=nbs.
3. European Commission Webpage on Nature-based Solutions (2018)
4. Cohen-Shacham, E., Walters, G., Janzen, C. and Maginnis, S. (eds.) (2016). Nature-based Solutions to address global societal challenges. Gland, Switzerland: IUCN. xiii + 97pp.
5. IUCN website




## The approaches that nest under NbS can be split into five broad categories:

There is potentially a multitude of solutions that could use NbS, ranging from small scale land management to ecosystem restoration. At present, most NbS including their practical implementation have been developed in urban areas and inland environments. For this reason,examples of case studies in coastal/marine environments are still scarce. In this case, nature-based approaches make it possible to combine climate change mitigation, adaptation, disaster risk reduction, biodiversity conservation, and sustainable resource management. NbS can be applied at a landscape/marine scale and be implemented alone or in an integrated manner with other solutions.

To drive further the NbS concept and the growing of its application, considerable efforts are now underway to develop standards or guidelines for global ecosystem-management initiatives that fall within NbS[5].

Table 1. Types of Nature-based Solutions for the coastal/marine context (after IUCN, 2018)

| NBS FOCUS TYPE | EXAMPLE |
|---|---|
| Ecosystem restoration | EE Ecological Engineering<br>ER Ecological Restoration<br>CLR Coastal Landscape and Seascape Restoration |
| EbMgt Ecosystem-based management | Integrated Coastal Zone Management |
| NI Natural infrastructure | NI Natural Infrastructure |
| Issue-specific ecosystem-improvement | EbA Ecosystem-based Adaptation<br>EbM Ecosystem-based Mitigation<br>Eco-DRR Ecosystem-based Disaster Risk Reduction<br>CAS Climate Adaptation Services |
| AbC Area-based conservation | Area-based Conservation Approaches |

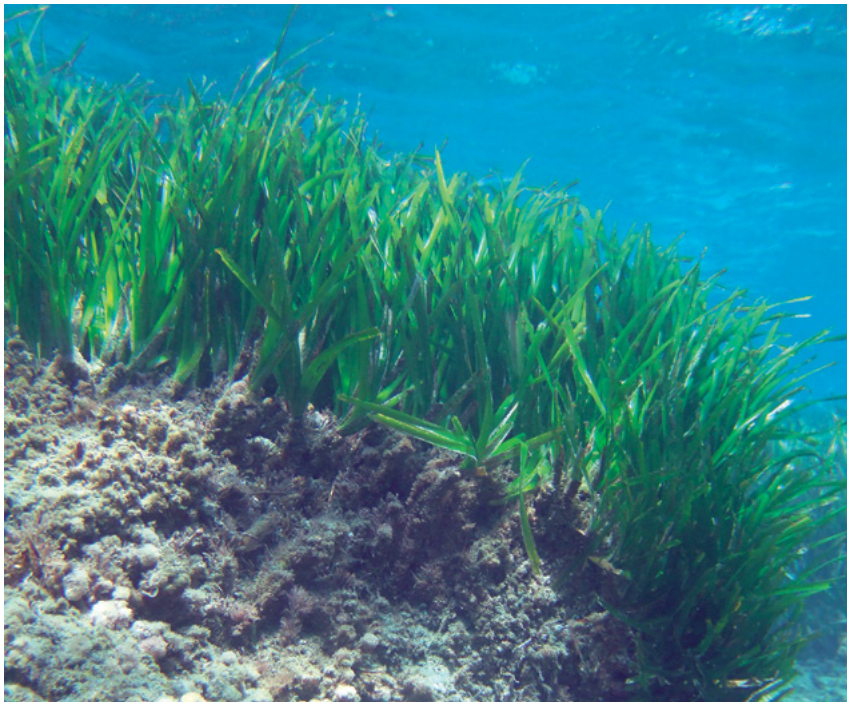
# The role of MPAs to reinforce NbS for climate change

Along the Mediterranean coast, ecosystems play a critical role in protecting and maintaining coastlines. Coastal ecosystems can dampen waves, attenuate water flow and flooding, reduce stormwater runoff, and build up coasts by contributing to the processes that generate, trap, and distribute sediment across shorelines.

MPAs (Marine Protected Areas) support global efforts in the face of climate change because of their important role in providing these ecosystem services, mitigating impacts and increasing the ecological, social, and economic resilience of coastal communities.

Moreover, actions in MPAs can enhance this role as NbS through different ways:

## 1. RETAIN, MAINTAIN AND RESTORE NATURAL COASTAL CARBON SINKS



In Nature-based climate change mitigation, the ecosystem services are used to reduce greenhouse gas emissions and to conserve and expand carbon sinks.

Mediterranean coastal blue carbon ecosystems (saltmarshes and seagrasses) represent important climate mitigation opportunities. These ecosystems found in Mediterranean MPAs have high rates of carbon sequestration and act as long-term carbon sinks. MPAs can help to fight climate change by offering an increased $CO_2$ storage capacity and creating, maintaining or restoring these ecosystems, particularly *Posidonia oceanica* meadows and saltmarshes.

Table 2. Average capacity of sequestration and carbon sink of blue carbon ecosystems in the Mediterranean

| | **SEQUESTRATION ($tCO_2$/ha per year)** | **STOCKS ($tCO_2$/ha)** |
|---|---|---|
| Saltmarshes | 5.5 | 550 |
| Seagrass meadows | 3.7 | 2,500 |

Source: Mateo et al 1997; Nelleman et al 2009; Mateo et al 2006; Mateo & Serrano 2012; Pendleton et al 2012; LIFE Blue Natura 2018


## 2. CONDUCT VULNERABILITY ASSESSMENTS AND DEVELOP ADAPTATION OPTIONS

In nature-based climate adaptation, the goal is to preserve ecosystem services that are necessary for human life in the face of climate change and to reduce the impact of anticipated negative climate change effects (eg. more intense rainfall, more frequent floods as well as heat waves and droughts). Additionally, they are aimed at buffering the negative impacts of climate change.

Typical measures following this approach are the development of vulnerability assessments and thereafter adaptation actions that for example involve: the renaturation of deltas and other water bodies, the relocation of dikes to recreate natural floodplains to react to increased flood risks and the conservation and use of *Posidonia oceanica* banquettes in beaches for coastal resilience and dune formation.

These approaches enhance coastal stabilisation and strengthen the functional relationships within the marine/land ecosystem and between species to increase their resilience to recover from intense weather events and adapt to climate change.

## 3. RESTORE FRAGMENTED OR DEGRADED ECOSYSTEMS

Coastal ecosystems like sea-grass meadows, coralligenous habitats and other biogenic reefs can dampen wave damage caused by the increasing storm events. Coastal wetlands on the other hand can also adapt and compensate for sea-level rise, increase the water storage capacity and restrict inland storm surges, attenuate waves and protect against erosion.

Typical NbS measures in this approach will aim to strengthen the role of these coastal ecosystems by restoring fragmented or degraded habitats in MPAs and their surroundings. These measures will help to reduce wave intensity and protect coasts from erosion, thereby stabilising shorelines. They can also include among others, restoring or building wetlands or salt marshes, beach nourishment, reef creation and seagrass re-establishment and protection.

## 4. RE-ESTABLISH CRITICAL PROCESSES

Some NbS have worked for decades at providing both infrastructure protection and habitat value. Protected areas supporting restoration efforts in a nearby watershed that are undertaken to address flooding due to deforestation and degradation of coastal wetland, may be considered part of this type of NbS. Other implementing measures could be 'hybrid solutions', which combine natural features and structural engineering.

Examples of complementary measures to re-establish sediment connectivity include rehabilitation of coastal dunes, beach nourishment with break waters and/or relocation of coastal-road infrastructure for responding to sea level rise and coastal hazards.


## 5. NATURAL INFRASTRUCTURE IN COASTAL TOWNS

Currently, one-third of the Mediterranean population is concentrated along its coastal regions and the number is increasing. Because of this, there is a growing need for sustainable urbanization, including the coastal towns where MPAs are located.

Promoting Nature-based Solutions in this urban context will help to fight warming in these areas and assist coastal communities reduce erosion and flood reduction risk while providing recreation benefits. Typical measures in this approach are the placement of green roofs and walls that help to reduce temperatures in coastal towns and increase related energy savings as well as to open storm water management systems to manage flooding. The combination of these NbS with the use of grey infrastructures (i.e. hard or engineering approaches such as dikes, levees, embankments, sea-walls and breakwaters) might still be needed for adapting to biophysical challenges including hazards and climate driven extreme events.

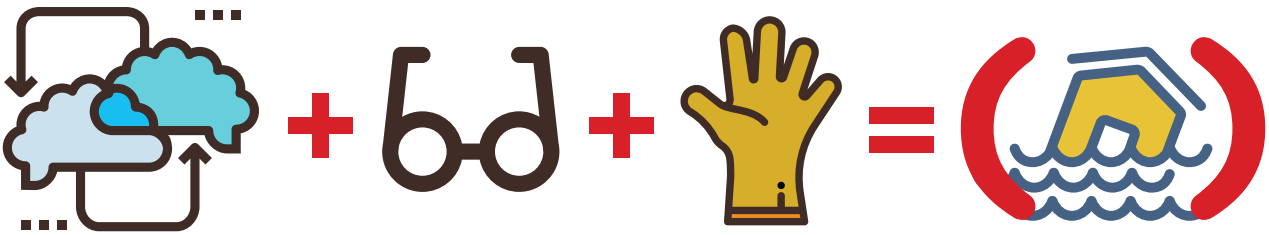
# The multifaceted scheme and considerations in NbS

Nature-based solution projects also create a greater level of awareness about the negative consequences of climate change and the appropriate courses of action, if well communicated to the public. In most cases, the critical decisions about NbS design, costs, location and scale as well as levels of management intensity should involve a wide range of stakeholders who may have different ideas and pre-existing ways of managing their problems. It is important to encourage the early involvement of a wide range of stakeholders and funding sources from the initial phase of NbS design to implementation.

Lessons learnt from implementation of NbS emphasize the importance of structured design, addressing ecological needs, evaluating how to accommodate coastal processes and monitoring so as to plan for adaptive management.

Monitoring allows the project performance to be assessed over time. If and when a problem is identified, it can be addressed through adaptive management which usually takes the form of some type of project modification or repair.

Promoting the development of NbS through the existence of MPAs and implementation of specific ecosystem improvements will reinforce the value of Mediterranean MPAs to mitigate some of the impacts of storm surge, flooding, wave-related damage, erosion, shoreline retreat, and the potential impacts of sea level rise as well as having multiple co-benefits to the coastal communities.



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