

Sensitive biodiversity protection in the land sea continuum: support to decision-making through multiple-user approaches

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LAND-SEA INTERACTIONS

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European Commission Direction General Mare defines LSI “as a complex phenomenon that involves both natural processes across the land-sea interface, as well as the impact of socio-economic human activities that take place in the coastal zone”.

LAND SEA INTERACTIONS AND MARINE AREAS MONITORING AND MANAGEMENT

Based on the methods and tools applied in the following discussed projects, key reflections to take LSI on-board when monitoring and managing marine protected areas and beyond are as follows:

- Due to the sensitivity of coastal environments in the Mediterranean, and as most activities taking place in marine environment also have an onshore component or consequence, alignment between marine and terrestrial planning is important and should be achieved through consistency of policy guidance, plans and decisions.
- In reference to available policy instruments and measures in the Mediterranean, while the ICZM process integrated environmental sensitivity of these LSI areas, the EU Maritime Spatial Planning is developed to plan activities

in the Sea and undermines the environment as an underpinning system where activities should be properly planned (“maritime” versus “marine” spatial planning).

- Ecological knowledge must be the underpinning part of the MSP decision making process. Thus, the ecological cycles and continuity of key habitats and species (such as the *Posidonia oceanica* and sand beaches dunes ecosystems for example), must be the reference point and the main information to be considered when planning coastal and marine sectors development.
- Based on scientific evidence, decision makers should build on the ecological knowledge as a basis for defining priority areas for actions (eg. Monitoring measures, limitation of activities) that are more suitable to welcome the development of those activities accordingly while limiting the effects and the interaction with sensitive biodiversity, even if such decisions restrict uses in these areas.
- The precautionary approach is an essential conditioner to use in planning as a recommendation linked to the cases of unreliability or uncertainty of data.

- The geographical scale influences the LSI analysis in terms availability of needed information, depth of the analysis, type and entity of the socio-economic, administrative and environmental interactions identified.
- Depending on the involved processes and sectors, LSI can be very different in terms of intensity and spatial coverage on land and at sea.
- LSI must be clearly defined and distinguished from conflicts and synergies among uses and between anthropic uses and the environment.
- There is no exhaustive information to assess the effect of land-sea natural processes on coastal and maritime activities. This must be considered and well understood when anticipating positive and/or negative interactions between activities.
- Cooperation, joint production of data and knowledge and sharing of information, needs and priorities between maritime and terrestrial based planning actors are key to pave the way toward effective and efficient planning processes to implement an EBM.

MULTI-USES ON SENSITIVE INTERCONNECTED AREAS (LAND-COAST-SEA)

Most of the activities taking place in the marine environment have a terrestrial component and/or connection affecting to a large scale coastal zones and their sensitive biodiversity. At the same time, some land-based activities and infrastructure extend their activities and impact at sea, this is the case for example of beach tourism, ports and marinas, among others. Coherent mapping and analysis of these interactions would allow to better take into account their cumulative impacts and potential conflicts and synergies¹.

¹ Ramieri, E., Bocci, M., Markovic, M. (2018). *Relationship between LSI and ICZM*.

The development of what is now called the Blue Economy, recognized by a growing number of organizations and actors, can be considered all the way more due to the availability of technological development at sea (beyond 3 and 12 nautical miles). So, land-coast-sea connections and interactions are increasingly impacted. At the same time, it is worth not losing sight of the fact that this new economic 'El Dorado' is adding new pressures, from the sea side, to those already present on the land side. In fact, significant increase in maritime activities have already determined environmental pressures on land and future trends of the sectors are expected to cause additional impacts² on the Mediterranean coastal and marine environment. It is therefore essential to articulate the integrated management of resources with the integrated management of the coastal zone combined with maritime spatial planning.

TERRITORIAL NEEDS

Consistent policies, plans and decisions, as well as the identification of effective governance mechanisms, are key to integrate marine and coastal planning. A number of elements could significantly enhance the sustainable use of coastal and marine areas, such as:

- the definition of the maritime-terrestrial public domain ensuring its integrity and proper conservation.
- the public use of the sea, its shores and the rest of the public sea-land domain.
- the restoration of coastal areas threatened by urbanization, or degraded, in respect of natural balances.
- the water quality monitoring in continuity from source to sea, taking on board the provisions of the EU Water Framework Directive.
- the development of planning schemes to integrate socio-economic growth and environmental management.

² Piante, C., Ody, D. (2015). *Blue Growth in the Mediterranean Sea: the challenge of Good Environmental Status*



FROM LSI CONCEPTS TO POLICY FRAMEWORKS

Maritime Spatial Planning and Land Sea Interactions

The European Union Directive 2014/89/EU on MSP specifies that the planning process should consider LSI and promote the collaboration between Member States³. The correct application of the MSP process could support the integrated management of coastal and marine zones and contribute to achieving GES, being the overall objective of the EU MSFD. At a broader level, MSP is valuable to comply with the recommendations of the UN Environment/MAP system of the Barcelona Convention. In this context LSI analysis is an essential information for a coherent land-marine planning across the land and marine parts of the coastal interface. Holistic planning schemes balancing the protection of vulnerable and most valuable ecosystems with the development of economic activities, provide fertile ground for a more sustainable blue growth.

Maritime Spatial Planning and Integrated Coastal Zone Management

In the context of the Barcelona Convention, although MSP is not explicitly mentioned in the Integrated Coastal Zone Management (ICZM) Protocol, it is considered as an integrative part of its implementation, since the geographical scope of the Protocol covers both the land and sea parts, up to the territorial sea limits, of the coastal zone. The Contracting Parties have progressed towards this direction since 2017 with the adoption of a Conceptual Framework for MSP in the Mediterranean region.

The ESPON MSP-LSI project, drawing on a variety of experiences of marine and coastal planning practitioners at a European, regional and sub-regional levels, reflects on the paths towards an effective management of LSI in territorial planning, highlighting that governance approaches and mechanisms should lead to coordinated, comparable and systematic acquisition and analysis of both marine and terrestrial data and information.

³ <http://msp-platform.eu/>.

ICZM & EBM

As defined by Art. 2 of the ICZM Protocol, “Integrated coastal zone management means a dynamic process for the sustainable management and use of coastal zones, taking into account at the same time the fragility of coastal ecosystems and landscapes, the diversity of activities and uses, their interactions, the maritime orientation of certain activities and uses and their impact on both the marine and land parts”.

EBM is “a strategy for the integrated management of land, water and living resources that provides sustainable delivery of ecosystem services in an equitable way”.

UNEP (2011) *Taking Steps toward Marine and Coastal Ecosystem-Based Management-An Introductory Guide*.



In the framework of both the MSP Directive and the ICZM Protocol, the involvement of stakeholders is of crucial importance. Special attention is required by the authorities on the marine and land parts of the coastal zone, thus addressing the topic of LSI. The integration process is the taking on-board of all the voices in the planning process, “Management must be integrated, just as ecosystems are interconnected”⁴, with the ultimate objective to achieve a GES of the whole Mediterranean Sea. The management of human uses in coastal and marine areas needs to be addressed at a geographical scale that encompasses its impacts on the ecosystem structure and functions, beyond administrative boundaries.

⁴ UNEP (2011). *Taking Steps toward Marine and Coastal Ecosystem-Based Management - An Introductory Guide*





Key international policies relevant to address LSI in the Mediterranean region

- Since 1976, the Barcelona Convention and its protocols, particularly the Specially Protected Areas and Biological Diversity (SPA/BD) (1995), the Pollution from Land-Based Sources and Activities (1999) and the ICZM (2008) Protocols are paving the way for the development of policy frameworks for coastal and marine conservation. Recently, new mechanisms were developed and adopted such as the Common Regional framework for ICZM and the Conceptual Framework for MSP (2018); the IMAP (2016); the Mid-Term Strategy 2016-2021 of UN Environment/MAP and the Mediterranean Strategy for Sustainable Development (2016-2025).
- In 2015, the UN 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs) were adopted, particularly the Goals 14 (Conserve and sustainably use the oceans, seas and marine resources for sustainable development) and 15 (Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss).
- In 2010, the Parties to the Convention on Biological Diversity (CBD) adopted the Aichi targets to be reached by 2020 (e.g. Ecologically or Biologically Significant Marine Areas - EBSAs).
- EU Directives: Maritime Spatial Planning, Marine Strategy Framework, Birds & Habitats, Water Framework; Natura 2000 initiatives; EU Biodiversity Strategy 2020.

STRENGTHEN BIODIVERSITY PROTECTION COMMUNITY THROUGH THEMATIC PROJECTS

The Biodiversity protection community, co-financed by the Interreg Med programme, aims at improving the conservation of Mediterranean biodiversity and natural ecosystems through strengthening the management and networking of protected areas and to ensure mechanisms for the implementation of EBM approaches.

Some of the community's thematic projects such as AMAre and POSBEMED aim at developing knowledge and methods to foster integrated ecosystem monitoring and management. These projects tested practical solutions to take into account LSI in coastal and marine biodiversity conservation and planning. Both projects have focused their efforts on:

- improving management to enhance conservation effectiveness in protected areas including, Natura 2000 areas.
- the public use of the sea, its shores and the rest of the public sea-land domain.
- supporting joint governance mechanisms amongst key local stakeholders.

These projects are feeding the technical and political recommendations developed by the Biodiversity Protection Community featured by PANACeA and complementarily with the implementation of EU policies, such as Natura 2000, MSP and ICZM processes and EU Biodiversity Strategy to 2020. Both projects are reflecting on strategies and recommendations at transnational level to push for the adoption and implementation of EBM approaches, e.g. through the development and testing of scientific-based geospatial and management decision making tools, cumulative impact assessments, transferable practices to species and/or habitat conservation, pilot actions, stakeholders' workshops, etc.



CONCRETE PILOT ACTIONS AND COORDINATED STRATEGIES TO SOLVE CONFLICTS AFFECTING BIODIVERSITY IN MPA AND THE SERVICES PROVIDED

AMAre project is a concrete example of LSI regarding human uses management in marine protected areas.

Actions for Marine Protected Areas project - AMAre aims at the development of shared methodologies, geospatial and management tools and pilot actions to coordinate strategies amongst MPAs to step towards the Good Environmental Status as set in the EU MSFD. The project is paving the way for a sound Maritime Spatial Planning in these areas, helping MPA managers to address “hotspots” of conflicts that require scientific-based, informed management decisions. Special attention is paid to the scale up of the project’s approach, strategies and recommendations in broader areas, rather seascapes and at transnational level.

More information on AMAre: <https://amare.interreg-med.eu/>

In practice, AMAre developed solutions to improve biodiversity protection and to increase the resilience of networks of MPAs and Fishery Replenishment Areas (FRA), by:

- building on shared methodologies across pilot sites of the project in terms of spatial planning, aiming for better distribution of human activities to reduce conflicts and increase synergies;
- facilitating the homogenization and standardization of data and indicators, as well as data integration, querying and manipulation, to provide MPA managers, decision makers, scientists and citizens with a harmonised database and user-friendly data platform for spatial data and information sharing;
- providing comparable data across MPAs and habitats, and between MPAs and network of MPAs, to allow managers to assess the performance of

protection measures inside and transfer results among the MPAs themselves (pilot areas);

- searching for potential early warning indicators of change e.g. marine water quality;
- facilitating the emergence of common transnational regulations and networks.

Adapting shared methodologies and indicators across MPAs - assessing cumulative pressures:

AMAre developed strategies and recommendations at transnational level, for the adoption of an EBM approach to MSP considering the goals of the MSFD. In 5 pilot sites, the project assessed the effect of the distribution and intensity of human pressures on the environmental status of marine waters, with a focus on vulnerable habitats of EU importance (e.g. coralligenous outcrops, *Posidonia oceanica* meadows). The project allowed the exchange of large, multi-dimensional and harmonised datasets, which integration supports potential ecosystem monitoring and management in broader areas across the Mediterranean. In the context of the Barcelona Convention, the project could support the UN Environment/MAP and its Southern Contracting Parties to implement the EcAp, providing guidance in establishing new Integrated Monitoring and Assessment Programmes (IMAP)⁵ when they don’t exist and/or support countries to update their monitoring programmes in line with IMAP requirements.

⁵ Decision IG 22/7: Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast and Related Assessment Criteria: <https://web.unep.org/unepmap/who-we-are/ecosystem-approach>



TOWARDS A SUSTAINABLE MANAGEMENT OF THE POSIDONIA-BEACH SYSTEMS IN THE MEDITERRANEAN REGION

Complementary to the wider strategic planning reflection carried in AMAre to the seascape, the project POSBEMED, capitalized on existing methods and tools applied in coastal sensitive areas with high conflicts of uses, or high potential of conflicts of uses (e.g. bathing areas/beaches in MPAs).

POSBEMED is a concrete example of LSI regarding a natural resource management in a context of beach recreation and tourism pressure.

The project questioned the sustainable use of *Posidonia oceanica* banquettes and associated coastal dune systems, looking to enhance the sharing of good practices to steer joint protection actions of connected ecosystems under different protection regimes (e.g. posidonia meadows management practices, evaluation of ecosystem services, governance models).

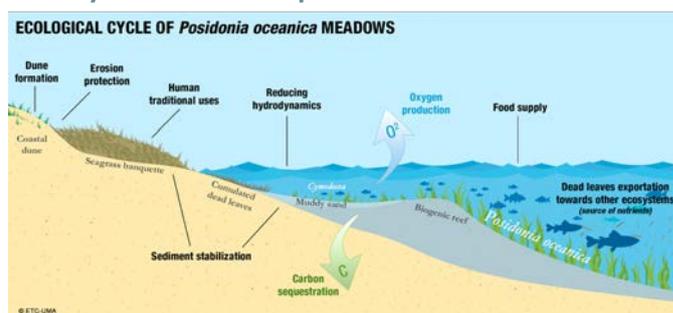
Sustainable management of the systems Posidonia-beaches in the Mediterranean region project - POSBEMED looks at the management of the Mediterranean coast, in protected areas including Natura 2000 areas, focusing on conflicts and opportunities, where interdependence between *Posidonia Oceanica* meadows, coastal dunes and beaches occurs, with a view to provide a joint Mediterranean strategy and governance model for enhancing management effectiveness of these interconnected coastal ecosystems where major pressures from coastal and maritime tourism are on the rise.

More information on POSBEMED: <https://posbemed.interreg-med.eu>

As defined in the EU Water Framework Directive and UN-Environment/MAP system⁶ *Posidonia oceanica* is an indicator of the quality of coastal waters and its meadows are key habitats under EU Habitat Directive, SAP/BIO Protocol and the Natura 2000 network of sites. Together with different types of coastal dunes (EC Habitat 1210, 2110 and 2120) the *Posidonia oceanica* meadows often form a single ecosystem that needs to be managed as such. *Posidonia oceanica* is a Mediterranean endemic marine flowering plant (seagrass) forming extensive underwater meadows which contribute to the bioremediation of coastal waters and shoreline protection. *Posidonia* withered leaves, fibers and rhizomes which are to be found regularly stranded and beached ashore, help reduce swell wave energy and act as seed banks for dune formation, increasing thus the overall resilience of the coast to natural and climate change effects.

POSBEMED developed a strategy for joint management of *Posidonia oceanica*, beaches and coastal dunes in the Mediterranean

Ecosystem services provided by coastal and marine ecosystems – LSI example



⁶ RAC/SPA - UNEP/MAP, 2014. *Monitoring protocol for Posidonia oceanica beds*. By Guala I, Nikolic V, Ivesa L, Di Carlo G, Rajkovic Z, Rodic P, Jelic K. Ed. RAC/SPA - MedMPAnet Project, Tunis. 37 pages + annexes

GUIDING MEDITERRANEAN MPAS THROUGH THE CLIMATE CHANGE ERA: BUILDING RESILIENCE AND ADAPTATION

In the Mediterranean Sea, thanks to the monitoring activities carried out by the Marine Protected Areas (MPAs), some effects of climate change can be observed.

Monitoring and understanding of these changes are essential to increase the resilience of coastal communities and protect marine biodiversity through an adaptive management process. In the past, climate change has not been explicitly addressed by MPA management plans and the information available to support decision-making processes was often limited and fragmented.

The main objective of the MPA-ADAPT project was to develop collaborative and specific adaptation plans for Marine Protected Areas to improve their resilience to the impacts of climate change.

METHODS ON LSI ANALYSIS AND MANAGEMENT

Through the methods developed by the Biodiversity Protection community to support an EBM based MSP, the one-size-fits all approach to address LSI in the context of MSP is not an option. Considering different contexts, interactions between land and sea might involve complex relations among environmental, socio-economic and governance elements. Also, when looking for practical solutions it is crucial to keep in mind that there are often differences between the administrative boundaries and the scale of natural and socio-economic LSI processes and that ensuring that solutions and management options are adapted to the function of ecosystems is a crucial gap that needs to be better addressed in management and policy questions.

AMAre, POSBEMED and MPA-ADAPT have been looking at operative elements relevant in the discussion on how to deal with LSI in the Mediterranean providing tools, methods and strategies.

Guiding Mediterranean MPAs through the climate change era: building resilience and adaptation project - MPA-ADAPT

supports and promotes the role of Mediterranean MPAs as central tools for the adaptation and mitigation to climate change and the implementation of EcAp roadmap.

This initiative has multiple objectives in line with the focus of this factsheet:

- improve knowledge about the inter-linkages of marine ecosystems with human activities confronted with the impacts of climate change;
- foster the implementation and development of standardized monitoring tools to build vulnerability assessment (e.g. characterize temperature regime and anomalies, monitor warming rates and mass mortality events, shifts in fish distribution and abundance) and define adaptation plans to Climate Change in Mediterranean MPAs for the small-scale and recreational fishery sectors;
- promote stakeholder engagement through participatory approaches;
- strengthen and mainstream policies for Climate Change adaptation in the Mediterranean Sea.

More information on MPA-Adapt: <https://mpa-adapt.interreg-med.eu/>

AMAre is developing and implementing tools using a participatory approach in different case studies to test the robustness of its conceptual approach for the formulation of strategic policy making and spatial planning in MPAs. To this end the following considerations have been taken on-board:

- The guideline shall be adopted in a flexible manner to reflect the state of MSP development in a specific area (for ex. roadmap for scenario analysis of management alternatives).
- The application of the methodological approach requires data availability and specific analysis as well as time and resources (for e.g. multiple stressors assessment model, spatial analysis and Geographic Information System (GIS) system, model of marine litter dynamics, etc.).



POSBEMED is more specifically looking into the interaction of land-based activities, particularly coastal tourism, with the *Posidonia oceanica* meadows localized along the coastline. Through a comparative study of legal frameworks, practices, tools and approaches in five EU Mediterranean countries (Spain, France, Italy, Greece, Cyprus), it established a Toolkit on existing methods and tools, providing practical examples to illustrate how conservation effectiveness can be enhanced regarding these key habitats in protected areas (for example, addressing the issue of *Posidonia* removal from the beach if it must occur, providing alternative solutions to the use of mechanical approaches.) International networking and synergies on sustainable beach management are fostered with the realisation of a shared [GIS database](#) and capacity building events and workshops for local decision makers and protected area managers (e.g. natural beach nourishment, erosion mitigation techniques).

MPA-ADAPT focuses on climate change, providing a real tool to manage the analysis and adaptation plan in MPAs and their communities.

The implementation of the MPA-ADAPT project involved 5 marine protected areas from 3 different Mediterranean countries and allowed to:

- monitor the effects of climate change with a series of improved protocols,
- carry out assessments of vulnerability to climate change from a socio-economic and biodiversity perspective,
- improve common capacity and knowledge through a programme of training and data sharing.

Effective and transferable methods and tools developed within thematic projects' frame was presented to support decision-making in multiple-user approaches. These effective and transferable methods and tools allow fostering biodiversity protection in a context of increasing Land-Sea interactions. The use and development of these tools are encouraged on territories facing similar issues.

Acronyms

CAMP: Coastal Area Management Programme
 CBD: Convention on Biological Diversity
 EBM: Ecosystem-Based Management
 EC: European Commission
 EcAp: Ecosystem Approach
 ESPON: European Spatial Planning Observation Network
 EU: European Union
 FRA: Fishery Replenishment Areas
 GES: Good Environmental Status
 GIS: Geographic Information System
 ICZM: Integrated Coastal Zone Management
 IMAP: Integrated Monitoring and Assessment Programme
 LSI: Land-Sea Interaction
 MAP: Mediterranean Action Plan
 MPA: Marine Protected Area
 MSFD: Marine Strategy Framework Directive
 MSP: Maritime Spatial Planning
 SAP/BIO: Strategic Action Programme for the Conservation of Biological Diversity in the Mediterranean
 SDG: Sustainable Development Goal
 UN: United Nations

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