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EFFECTIVE

PROTECTION AND RESTORATION MANAGEMENT · MEDITERRANEAN MPAs

Enhancing social well being and economic prosperity by reinforcing the eFFECTIVEness of protection and restoration management in Mediterranean MPAs

D2.2 Policy frame and the EBMS toolbox: Road-map implementation guidance

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EXECUTIVE SUMMARY

The ultimate goal of the United Nations Ecosystem Approach Strategy is the maintenance of ecosystem integrity while enabling the sustainable use of ecosystem goods and services. The EA offers new opportunities for sustainable use of the sea but requires better understanding of how marine social-ecological systems operate, how they generate goods and services, how well these benefits are captured, how human degradation of the systems affect human welfare and generate costs, and the complex social relations and value systems underpinning human governance of terrestrial and marine systems. Using the Convention of Biological Diversity definition "*the EA is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way*". The EA is based on the application of appropriate scientific methodologies focused on levels of biological organization which encompass the essential processes, functions and interactions among organisms and their environment, and it recognizes that humans, with their cultural diversity, are an integral component of ecosystems, emphasizing the integration of all these elements and the need to consider the processes underlying each element and their interconnectivity. To help in the implementation of a correct governance under the EA, the Malawi principles were developed (CBD, 1998). The Malawi principles, a set of 12 guiding principles for managing ecosystems, include both natural and socio-economic aspects and emphasize a holistic, participatory, and adaptive approach to Ecosystem-Based Management, recognizing the interconnectedness of social and ecological systems.

When the EA needs to be raised in practice, the Ecosystem-Based Management (EBM) concept is called. Although it has been some confusion between these two terms, for the purpose of our project and research, and to make it clear, both terms EA and EBM are not synonymous, one (EA) talking about strategy and the other (EBM) bringing the strategy into action. In the marine domain, Katsanevakis et al. (2011,) define EBM as "*an environmental management system approach that recognizes the full array of interactions within a marine ecosystem, including humans, rather than considering single issues, species, or ecosystem services in isolation*". When EBM is applied it is important to illustrate the need to bring EBM within the concept of Adaptive Management (AM). It exists a large array of EBM applications; however, during the course of the European Union FP7 research project EFFECTIVE where the main objective was to develop "*a comprehensive scientific knowledge base and practical guidance for the application of the Ecosystem Approach to the sustainable development of Europe's regional seas*", we decided to define a standardized process and tool for applying the EA principles into management applications. We developed a standard tool, the Ecosystem-Based Management System (EBMS) (Sardá et al., 2014).

The EBMS is a standard operational procedure that works in an adaptive management cycle; it normalizes a common set of instruments and introduces a common language in a quality assurance environment. The EBMS system proposed here is based on three pillars that facilitate the integration of the Malawi principles regardless of the ecosystem or administrative scales. The managerial pillar is the basis of the system and follows a formal classical development of an Environmental Management System (EMS) but using a Risk Management System (RMS) in its decision-making formal tools. The information and the participatory pillars provide the ecological and social inputs in terms of scientific data and social preferences required to support and operate the EBMS to achieve social-ecological targets under an EA. The information pillar ensures that data and scientific advice are based on current knowledge, and the participation pillar brings together communication and consultation requirements as indicated by the principles of the ecosystem approach. Combined, these three pillars can facilitate a wider use of sustainable development principles such as integration, adaptability, transparency or participation inside a quality assurance mechanism.

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At EFFECTIVE one of the main objectives of the project was to apply the use of the EBMS to contribute for a better management and use of marine biodiversity, blue capital, and marine and coastal ecosystems by using the above-mentioned standard tool, the EBMS; and we thought that Marine Protected Areas (MPAs) as one of the most important conservational tools that requires management would be an ideal scenario for its application. The present Deliverable 2.1 is clarifying the conceptual understanding of the EBMS, and its terminology, to its application to marine conservation in Mediterranean MPAs. In the present work, we establish a roadmap to launch the EBMS system into five MPAs, two of them in Catalonia (Spain) and the other three in Sardinia (Italy) with the idea that the EBMS tool is flexible enough for application at any geographical and temporal scale. The aim behind EFFECTIVE is also to raise conditions for scalability and replicability of this proposed standard methodology to facilitate its future use in areas outside the five proposed ones in the project. The case studies proposed in the project will take place in the following MPAs:

- Parc Natural del Cap de Creus (Catalonia, Northwestern Mediterranean)
- Parc natural del Montgrí, les iiles Medes, i el Baix Ter (Catalonia, Northewestern Mediterranean)
- Parco Nazionale dell'Arcipelago di La Maddalena (Sardinia, Italy)
- Area Marina Protetta "·Penisula del Sinis – Isola di Mal di Ventre" (Sardinia, Italy)
- Area Marina Protetta di Tavolara Punta Coda Cavallo (Sardinia, Italy)

Establishing the road-map for implementation, the EBMS application for the MPAs will be carried out following a series of steps:

- a clear delimitation of the social-ecological system under management is needed; in this case, it is an easy task because the delimitation of the area was awarded with the park distinction.
- the EBMS works on a vision-driven process. After delimitation, management of the area should be based on measures and, at that stage, an initial assessment (departure stage) and a final vision desired (desired stage) will need to be established. We will downscale the concept of Good Environmental State (GEnS) to the park areas.
- The clauses of the system, and its procedural rules will be then established under a formal set of them, but applying a case-by-case scenario for the 5 parks selected.
- Develop an operational and transparent environmental accounting system (Information Pillar). The long-term vision for the parks will be related to this information system and the decision-making procedures in the management. A decision-making tool (DEMA tool) will be also created (see Deliverable 2.2). In order to work with all these issues, we will use the well-established social-ecological accounting framework described in previous sections, the Driver(activities)-Pressure-State-Welfare-Response(measures) [D(a)PSWR(m)], to develop a comprehensive scientific knowledge-based information system for the park management-
- Using existing networks in use in the selected parks, we will maintain a participatory and statutory system at the same time through the Participatory Pillar

Effective governance structures and well-known applicable tools are needed for this change and the EBMS has been designed to facilitate this process. The use of the EBMS will allow authorities to manage together, in an integrated way, the different functions of the MPA environment and the ecosystem services they provide.

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SYMBOLS, ABBREVATIONS AND ACRONYMS

CBD	Convention of Biological Diversity
DPSWR	Driver-Pressure-State-Welfare-Response
EA	Ecosystem Approach
EBA	Ecosystem-Based Approach
EBM	Ecosystem-Based Management
EBMS	Ecosystem-Based Management System
EMS	Environmental Management System
EU	European Union
GEnS	Good Environmental Status
GIS	Geographical Information System
HELCOM	Convention on the Protection of the Marine Environment of the Baltic Sea Area
IMP	Integrated Maritime Policy
IUCN	International Union for Conservation of Nature
MEDPAN	Mediterranean Marine Protected Network
MAP	Mediterranean Action Plan
MPA	Marine Protected Area
MSFD	Marine Strategy Framework Directive
MSP	Maritime Spatial Planning
OSPAR	Convention for the Protection of the Marine Environment of the North-East Atlantic
PNCC	Parc Natural del Cap de Creus
PNMMBT	Parc Natural del Montgrí, les Illes Medes I el Baix Ter
RMS	Risk Management System
SDI	Spatial Data Infrastructure
SPA/RAC	Specially Protected Areas Regional Activity Centre
UNEP	United Nations Environmental Program

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INTRODUCTION

Natural Capital is all-natural resources, renewable and non-renewable (geological resources, soils, air, water and all living beings, including ourselves) that provide goods and services fundamental to human existence (pollination, nutrient cycling, water and air purification) and from which we benefit (the water we drink and the food we eat, the fauna that maintains healthy ecosystems, the forests that absorb carbon, protection against natural disasters, energy, physical and mental well-being). Natural Capital has a tremendous value, and sometimes evan can be economically quantified even if some of them are not yet officially recognized by society as an economic asset. However, as humans increase its footprint on the environment, the world Natural Capital degrades.

To deal with this tendency of degradation that can jeopardize our ability to generate welfare into the future, international coastal and marine policies have emphasized the need to develop sustainable strategies for implementing the principles of the Ecosystem Approach (EA) into management with the overarching goal to maintain ecosystem integrity while enabling the sustainable use of ecosystem goods and services in systems under management. The EA strategy emerged as the dominant paradigm for managing coastal and marine ecosystems (Farmer et al., 2012). At the hearth of the EA is the assumption that coupled social and ecological systems can be studied and managed in a holistic manner. This approach offers new opportunities for sustainable use of the sea but requires better understanding of how marine social-ecological systems operate, how they generate goods and services, how well these benefits are captured, how human degradation of the systems affect human welfare and generate costs, and the complex social relations and value systems underpinning human governance of marine systems (Sardá et al., 2014).

Despite the importance of the EA and the growing number of guidance documents describing similar or inter-related concepts, and besides its widely mention in policy documents all over the world, still the concept of the EA is somewhat confused and many different applications can be observed, making that the EA looks nebulous, and rendering it difficult to put into practice. One of the first conflicting issues is the fact that the EA, or its description as Ecosystem-Based Approach (EBA), could be even synonymized with the so-called Ecosystem-Based Management (EBM). **For the purpose of our research, and to make this clear from the very beginning, EA and EBM are not synonymous.** Our EA understanding to be used in the EFFECTIVE project will follow the original description form United Nations, "*the EA is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way*" (CBD, 1998). On the other hand, the EBM would be the way in which, people put the strategy into action, how we can activate such type of strategy. Basically, what it is indicated previously is that you may separate the strategy (EA) with its particular case-by-case targets when applied, from its management application (EBM) and the measures of it when applied. In addition, working with EBM applications can facilitate that instead of addressing isolated problems or sectors, managers recognize their natural areas as interconnected systems, considering their complexity and interdependencies, assuring a more holistic and sustainable approach to coastal and marine management (Kelble et al., 2013).

When move to conservational objectives, Marine Protected Areas (MPAs), including no-take marine reserves, have become key ocean conservation strategies around the world. The Global Biodiversity Framework of the CBD recognize its importance and targeted a necessity to protect 30% of this

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environment for the future (CBD, 2024). Although MPAs are basically designated to protect all or part of particular ecosystems, they can have also many other objectives such as preserving areas of cultural significance, protecting the aesthetic integrity of the system for recreation, tourism, or existence value, or promoting research and education (Halpern et al., 2010). However, the characteristics of such places can attract many different human activities, from recreational and aesthetic experiences into scientific and educational purposes that bring us into the necessity to establish the best management possible for these areas.

It is clear; to protect and conserve the natural ecological characteristics while still providing the services and benefits that society requires from the ocean had become the most important principle for biological conservation. This principle, who has in MPAs its most important tool, is closely aligned with the EA indicating the necessity of both, tool and strategy, to mirror each other when management comes into place, and the introduction of a multidisciplinary perspective, encompassing both natural and social sciences into its application. The integration of these disciplines can ensure effective conservation of marine ecosystems while meeting the needs of society (Elliot, 2011).

Normally, MPAs are established through consultation processes; national planning forums, expert panels or other type of approaches to come up with a list of potential areas for protection that will require governmental approval and its associated goals. Scientific and preparatory work is needed to inspire governments to conserve and restore the richness of marine life and habitat. Once the MPA has been designated, in order to implement a well-structured functional approach for the area, collaborative frameworks are appreciated and effective management would be required. However, in practice, there are different aspects that may change what it should be observed. A reinforcement of the effectiveness of the management put in place by having appropriate resources and tools to ensure its evaluation should be a priority in order to be able to achieve the goals targeted when you establish the MPA.

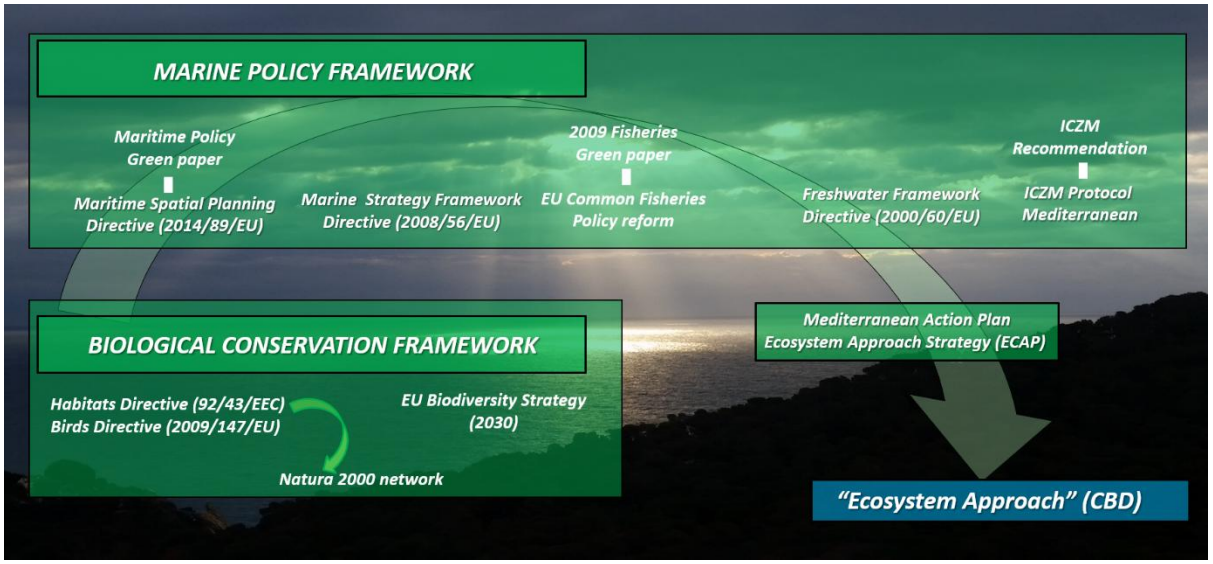

Figure 1.- Marine Policy relevant for the EFFECTIVE project in their pilot sites.

In Europe, the aim of the recent and ambitious European Union's Integrated Maritime Policy (PMI) lies into two big pillars; the Marine Strategy Framework Directive-MSFD (2008/56/EC) and the Maritime Spatial Planning Directive-MSP (2014/89/EU). While the former is aimed to achieve a good

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environmental status of the EU's marine waters and sustainably protect the resource base upon which marine-related economic and social activities depend, the later seeks to enable public authorities to organize human activities in marine areas so as to meet various ecological, economic and social objectives. In any case for both the MSFD and the MSP the application of an EA strategy became a legally binding and operational principle for managing the EU's marine environment. On the other hand, talking about conservation, The EU's biodiversity strategy for 2030, a comprehensive, ambitious and long-term plan to protect nature and reverse the degradation of ecosystems, has been launched recently to put Europe's biodiversity on a path to recovery by 2030. The strategy comes with specific actions and commitments. In order to introduce them, the strategy is working towards the successful adoption of an ambitious global biodiversity framework under the Convention on Biological Diversity. In both cases, Maritime Policy and Biodiversity Conservation goals have the EA at the basis of its development (Figure 1).

Sometimes, it has been said that the EA strategy and its management application, the EBM, work better at a regional level in an attempt to integrate management strategies that explicitly considers the necessary tradeoffs among various activities and services. Although the statement has its logic, we believe that management applications of the strategy can be also applied to small spatial applications and here, its use for MPAs could be widely considered.

To guide a better implementation for both aspects, appropriate tools, governance systems, and implementation networks, are required; to do it, as it has been said, the theory of ecosystem science must be reconciled with practice of ecosystem management (deReynier et al. 2010; Sardá et al 2014). In this research, we hypothesized that, EBM applications can be used at whatever scale, and, if we consider its applications through the development of a type of standard tool, such development could work easily in an imbricated way. In order for the EA to be widely adopted in management, we recently developed a standardized stepwise process for management, the Ecosystem-Based Management System (EBMS) (Sardá et al. 2014). The EBMS has been designed to be a standard methodology that introduces a common set of tools and procedures and a common language that can be useful to facilitate knowledge transfer and capacity building for practicing the EA Strategy.

The purpose of the Deliverable is to clarify the conceptual understanding of the EBM, its terminology, the existing science underpinning it, and its present application to MPAs to construct a road-map implementation of these concepts into the marine protected regions of the pilot areas. We have selected five MPAs of two of the pilot areas of the EFFECTIVE project that will constitute pilot cases of application of the EBMS framework. Initially, a comparative analysis of the management models used in the National/Regional Parks involved in the analyzed areas (pilots) will be analyzed in relation to the EA and its application management. With the support of these management structures, a roadmap will be developed during the development of the project to move the management structures to work within the proposed EBMS model. Implementation of the model will constitute the final 2.3 Deliverable in the project.

DEVELOPING THE EBMS TOOL

The Ecosystem Approach (EA) and its Malawi principles

The Ecosystem Approach (EA) quickly emerged as a key principle in the implementation of the Convention on Biological Diversity (CBD) by United Nations (UN). From its second meeting (Jakarta, November 1995) the Conference of the Parties adopted the ecosystem approach as the main framework for the activities of the Convention, and subsequently in the development and

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implementation of all its programs. Regarding Europe, all different Seas Conventions (OSPAR, HELCOM, Barcelona Convention) named the EA as the basis of application of their policies and activities. During these 25 years of application the EA has been also named as Ecosystem-Based Approach (EBA), therefore EA and EBA are terms that can be used in a inter-changeable way, both encapsulate the same systems concept into an easily communicable phrase. Although it is not just applicable for the marine domain, internationally today, the EA has emerged as the dominant paradigm for managing marine ecosystems.

It was not easy to find a common definition for the EA rather than being a kind of strategy to deal about the relationship between the social environment and the natural one. Sometimes, it was considered as a resource planning and management approach to deal with land, air, water and all living things included people, however, finally in the year 2000, the CBD adopted the following definition "*a strategy for the integrated management of land, water, and living resources that promotes conservation and sustainable use in an equitable way*" which is the one commonly used today and the one that we will be using. The EA is based on the application of appropriate scientific methodologies focused on levels of biological organization which encompass the essential processes, functions and interactions among organisms and their environment, and it recognizes that humans, with their cultural diversity, are an integral component of ecosystems, emphasizing the integration of all these elements and the need to consider the processes underlying each element and their interconnectivity.

The previous adopted definition defines the EA clearly as a strategy. Although the EA or the EBA has been widely considered synonymous with the Ecosystem-Based Management (EBM), we clearly must distinguish between the strategy and its managerial application. It can be just a question of semantics but to have a clear separation between a strategy, and as we will see below, its principles, and its managerial application opens the possibility for the creation of appropriate tools as the one we are going to develop. Although it is true that the most important lesson for the EA strategy is not to refine definitions or semantic considerations, but rather to facilitate the application of the concept for achieving the objectives of the CBD, we deeply believe it is fundamental to have clear concepts from the very beginning. So, for the purpose of the EFFECTIVE project, and to make this clear from the very beginning, EA and EBM are not synonymous, and we can develop its basic fundamental aspects in a separate way.

Over the past 25 years, coastal and marine managers have been using EA and/or EBM in very different and subjective ways. Many times, the semantics explained above rendered into confusing applications and make the EA seem nebulous, and difficult to put into practice even if it is in the base of all marine policies. In addition, current governance systems and policy outcomes are fragmented and complex, lack transparency and are often reactive rather than proactive (Cormier et al., 2010). As a consequence, a correct application of the EA is rarely applied in practice (Katsanevakis et al., 2011). There are many examples of this gap between theory and practice; in a previous paper (Sardá et al., 2014) we just stated about the problems, its different interpretations of the EA in different countries, and several major obstacles were identified including the lack of common visions and objectives, the lack of proper governance frameworks, the need to establish a systems perspective, and the confusing array of terminology.

In order to implement the EA strategy and its EBM managerial application, the theory of ecosystem science must be reconciled with the practice of ecosystem management (deReynier et al., 2010) and, in order to do that we must define what it can be understand by a correct application of the EA.

We formulate a correct application of the EA, those that takes into considerations the so-called principles of Malawi. In a Workshop on the Ecosystem Approach hosted in Lilongwe, Malawi (26-28 January 1998) (CBD, 1998), whose report was presented at the Fourth Meeting of the Conference of

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the Parties to the Convention on Biological Diversity (Bratislava, Slovakia, 4-15 May 1998, UNEP/CBD/COP/4/Inf.9), twelve principles/characteristics of the EA were identified.

Table 1. Malawi principles for Ecosystem Approach

1	Management objectives are a matter of societal choice.
2	Management should be decentralized to the lowest appropriate level.
3	Ecosystem managers should consider the effects of their activities on adjacent and other ecosystems.
4	Recognizing potential gains from management there is a need to understand the ecosystem in an economic context, considering e.g. mitigating market distortions, aligning incentives to promote sustainable use, and internalizing costs and benefits.
5	To mantain ecosystem services, a key feature of the ecosystem approach includes conservation of its ecosystem structure and functioning.
6	Ecosystems must be managed within the limits to their functioning.
7	The ecosystem approach should be undertaken at the appropriate scale.
8	Recognizing the varying temporal scales and lag effects which characterize ecosystem processes, objectives for ecosystem management should be set for the long term.
9	Management must recognize that change is inevitable.
10	The ecosystem approach should seek the appropriate balance between conservation and use of biodiversity.
11	The ecosystem approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices.
12	The ecosystem approach should involve all relevant sectors of society and scientific disciplines.

The following explanations about the principles of Malawi are directly extracted from CBD (2004). They reflect those important considerations you must need to follow when do you want to applied the EZ in practice.

- Principle 1.- Management objectives are a matter of societal choice. Diverse sectors of society consider ecosystems in terms of their own economic, cultural and social needs. Local communities, indigenous peoples and other people living on these lands are important stakeholders and their rights and interests must be recognized. Both cultural and biological diversity are central components of the ecosystem approach and these must be considered in its management. Society's choices must be expressed as clearly as possible. Ecosystems must be managed, fairly and equitably, for their intrinsic values and for their tangible or intangible benefits to humans.
- Principle 2.- Management should be decentralized to the lowest appropriate level. Decentralized systems can lead to greater efficiency, effectiveness and equity. Management must involve all involved stakeholders and balance local interest with the interest of the general public. The closer management is to the ecosystem, the greater the responsibility, ownership, demands, accountability, participation and use of local knowledge.
- Principle 3.- Ecosystem managers should consider the effects of their activities on adjacent and other ecosystems. Management interventions in ecosystems often have unknown or

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unintended effects on other ecosystems; therefore, potential impacts need to be carefully considered and analyzed. This may require decision-making institutions to institute new arrangements or organizational modalities to adapt, if necessary, to the circumstances given in every case.

- Principle 4.- Recognizing potential gains from management there is a need to understand the ecosystem in an economic context, considering e.g. mitigating market distortions, aligning incentives to promote sustainable use, and internalizing costs and benefits. On of the greatest threat to biodiversity is its replacement by alternative land-use systems. This is often the result of market distortions, which undervalue natural systems and populations and provide incentives and subsidies that encourage conversion of land to less diverse systems. Often those who benefit from conservation do not pay the costs of conservation, and similarly those who generate environmental costs, such as pollution or industrialization, do not assume their responsibilities. Adjusting incentives enables those who control resources to receive their benefits and those who generate environmental costs to be forced to pay them.
- Principle 5.- To mantain ecosystem services, a key feature of the ecosystem approach includes conservation of its ecosystem structure and functioning. The functioning and adaptive capacity of ecosystems depend on a dynamic relationship among species, and between species and their abiotic environment, as well as physical and chemical interactions in the environment. Conservation and, where appropriate, restoration of such interactions and processes is more important for the long-term maintenance of biological diversity than the mere protection of species.
- Principle 6.- Ecosystems must be managed within the limits to their functioning. In considering the likelihood or ease of achieving management objectives, attention should be paid to environmental conditions that limit the natural productivity, structure, functioning and diversity of ecosystems. The limits of ecosystem functioning may be influenced by varying degrees of temporary, unforeseen or artificially maintained conditions, and management should therefore be applied with appropriate caution.
- Principle 7.- The ecosystem approach should be undertaken at the appropriate scale. The approach should be bounded by spatial and temporal scales appropriate to the objectives. Management boundaries at the operational level will be definedby users, managers and scientists. Connections between different areas should be encouraged where necessary. The ecosystem approach is based on the hierarchical nature of biological diversity characterized by the interaction and integration of genes, species and ecosystems.
- Principle 8.- Recognizing the varying temporal scales and lag effects which characterize ecosystem processes, objectives for ecosystem management should be set for the long term..- Ecosystem processes are characterized by diverse time scales and delayed effects. This is inherently in conflict with the tendency of humans to prioritize short-term advantages and immediate benefits rather than future benefits.
- Principle 9.- Management must recognize that change is inevitable.- Ecosystems change may include species composition and population density. Management should therefore adapt to changes. Regardless of their intrinsic dynamics of change, ecosystems are beset by a range of uncertainties and potential "surprises" at the human, biological and environmental levels. Traditional disturbance regimes may be important for ecosystem structure and function and may need to be maintained or restored. Adaptive management in the ecosystem approach must be applied to anticipate and account for such changes and events and should be applied with caution when making decisions that may preclude some options, but at the same time consideration should be given to mitigation measures to address long-term changes such as climate change.

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- Principle 10.- The ecosystem approach should seek the appropriate balance between conservation and use of biodiversity. Biodiversity is critical both for its intrinsic value and for the important role it plays in providing ecosystem and other services on which we all ultimately depend. In the past, there was a tendency to manage components of biodiversity in terms of protected or unprotected. A more flexible approach is needed, where conservation and use are considered in context and the full range of measures is applied holistically from strictly protected ecosystems to man-made ecosystems.
- Principle 11.- The ecosystem approach should consider all forms of relevant information, including scientific and indigenous and local knowledge, innovations and practices. Information from all sources is critical to effective ecosystem management strategies. There is a need to better understand ecosystem functions and the impacts of human activities. All relevant information from an area of interest should be shared with all stakeholders and participants, taking into account, inter alia, any decisions to be taken under Article 8(j) of the Convention on Biological Diversity. Assumptions underlying proposed management decisions should be made explicit and should be compared with existing knowledge and stakeholder views.
- Principle 12.- The ecosystem approach should involve all relevant sectors of society and scientific disciplines. Most biodiversity management problems are complex, with many interactions, side effects and implications, and therefore necessary expertise and stakeholders must be engaged at local, national, regional and international levels, as appropriate.

Another important consideration besides the fact to adapt the 12 principles of Malawi into management applications is that the EA requires adaptive management to deal with the complex and dynamic nature of ecosystems and the lack of complete knowledge or understanding that is related to their functioning. Ecosystem processes are often non-linear and the outcomes of such processes are frequently time-gapped. As a result, there are discontinuities that lead to surprises and uncertainty. Management must be adaptive to respond to such uncertainties and include elements of "learning by doing" or information derived from research. Action may be necessary even when full cause-and-effect relationships have not been scientifically established.

Finally, the relation of the EA with other integrated management approaches need to be discussed noting that there are no conflicts with other approaches. In many cases, however, there is a logical relatedness of the EA to other approaches that have been taken in the past to manage different social-ecological systems (e.g., the sustainable use concept) and this will require some adjustments and further clarification. Obviously, the EA does not preclude other approaches, and can integrate all these approaches and other methodologies to deal with complex situations. Today, there is no single way to implement the EA, as it depends on local, provincial, national, regional or global conditions. This, which in principle can be one of the strengths of the systems can be, at the same time, a weakness because, when utilized, many of the points seen above can be easily forgotten.

As concluding remarks that can serve to have a correct application of the EA into practice and that were advised by UN in its correspondence and reports (CBD,2004) we may have:

- The EA is based on the application of appropriate scientific methodologies, focused on the levels of biological organization, which include the essential structure, processes, functions and interactions between organisms and their environment, as well as the benefits for human societies.
- The EA works under the correct application of the 12 Malawi principles.

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- The EA requires adaptive management to respond to the complex and dynamic nature of ecosystems and the poor understanding and limited knowledge we have about their functioning.
- The EA does not exclude other management and conservation approaches, and, in fact, can be combined and compatible with these approaches.

As we can found the EA in many of the most important environmental policies we have today in the relation with the coastal and marine environment, especially in its relation with both the Marine Strategy Framework Directive and the Maritime Spatial Planning Directive, a correct application of the particular strategy is fundamental if we want to get the main objectives for the future in relation with the state of the environment we want.

The Ecosystem-Based Management System (EBMS)

EBMS description

During the course of the European Union FP7 research project EFFECTIVE where the main objective was to develop "a *comprehensive scientific knowledge base and practical guidance for the application of the Ecosystem Approach to the sustainable development of Europe's regional seas*", we decided to define a standardized process and tool for applying the EA principles into management applications. We developed a standard tool, the Ecosystem-Based Management System (EBMS). The idea behind such a tool was to be sure of the inclusion of all essential components and principles of the EA such as participation, planning and decision-making as well as promoting accountability and quality assurance to achieve management objectives following sustainable development principles and based on ecosystem services. The idea was that this tool could be applied to all possible usages that requires EA, including small-scale applications in MPAs.

Real structured EBM applications, even if the EA is a dominant paradigm in the regulation (see Figure 1) are rare. Different basic explanations can explain it.

- Policy Fragmentation: each driver of a human activity operates under its own regulatory, policy and best management practices, designed to deal with the specifies of their potential environmental impacts.
- It exists a Babel Tower dilemma: It is difficult to reach collaboration and integration if every stakeholder speaks different languages and a confusing array of terminology is finally used, making altogether the EA nebulous.
- Too many concepts: A variety of guidelines and compendiums, and different names for the same concept, offering a broad range of new governance mechanisms and tools for implementation
- Lack of visions: The management of the desired state is not predetermined by a common vision with clear objectives that follows EA principles and can be followed by those principles.

To avoid these problems, it was decided to come up with a standard process tool to facilitate solutions to these above generated problems, and the EBMS tool was created.

In a rapid description, the EBMS is an EA-based adaptive management tool that runs under quality and risk management schemes and includes a quality assurance step on it. It normalizes a common set of instruments a facilitate a standard language. The theoretical construct of the tool was presented in Sardá et al (2014).

The EBMS has a three-pillar structure (Figure 2). The *managerial pillar* is the basis of the system and follows a formal classical development of an Environmental Management System (EMS) but using a

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Risk Management System (RMS) in its decision-making formal tools. The *information* and the *participatory* pillars provide the ecological and social inputs in terms of scientific data and social preferences required to support and operate the EBMS to achieve social/ecological targets under an EA. Combined, these three pillars can facilitate a wider use of sustainable development principles such as integration, adaptability, transparency or participation inside a quality assurance mechanism. For clarity the EBMS employs the Driver-Pressure-State-Welfare-Response (DPSWR} social-ecological accounting framework to organize the information on aspects of social and ecological systems relevant to representing the interactions between them (Cooper, 2013); a small modification of this accounting framework considering Elliott (2020) has been added and will be presented in Deliverable 2.2; to come up with the model D(a)PSWR(m).

The tool works in an adaptive management pattern. In its application, it must be a final objective, a goal that needs to be constructed initially, representing the vision to achieve and maintain. In order to develop the roadmap to reach this vision, an Initial Assessment describing the baseline conditions for the specific social-ecological system should be carried out. The Initial Assessment should contain all available relevant information needed to understand the functioning of the area under management, including an analysis of human activities that lead to exogenic and endogenic pressures and their effects on current environmental state of the social-ecological system to be managed. The results of the Initial Assessment represent the point of departure for the social-ecological system under management. The final desired vision for the managed area represents the targeted “State” of the social-ecological system under management. By reaching and/or maintaining such a vision, an acceptable set of pressures can be allocated under certain ecological, technical, behavioural, administrative and managerial constraints. The actions carried out as part of the EBMS represent a “Response” which is dependent on the presence of an effective governance structure which can uphold the modern principles of environmental management. This requires a committed leadership (a constituent organ or physical person) with a public mandate, as well as the active participation of stakeholders.

The description of the different pieces of the tool follows in the coming sections.

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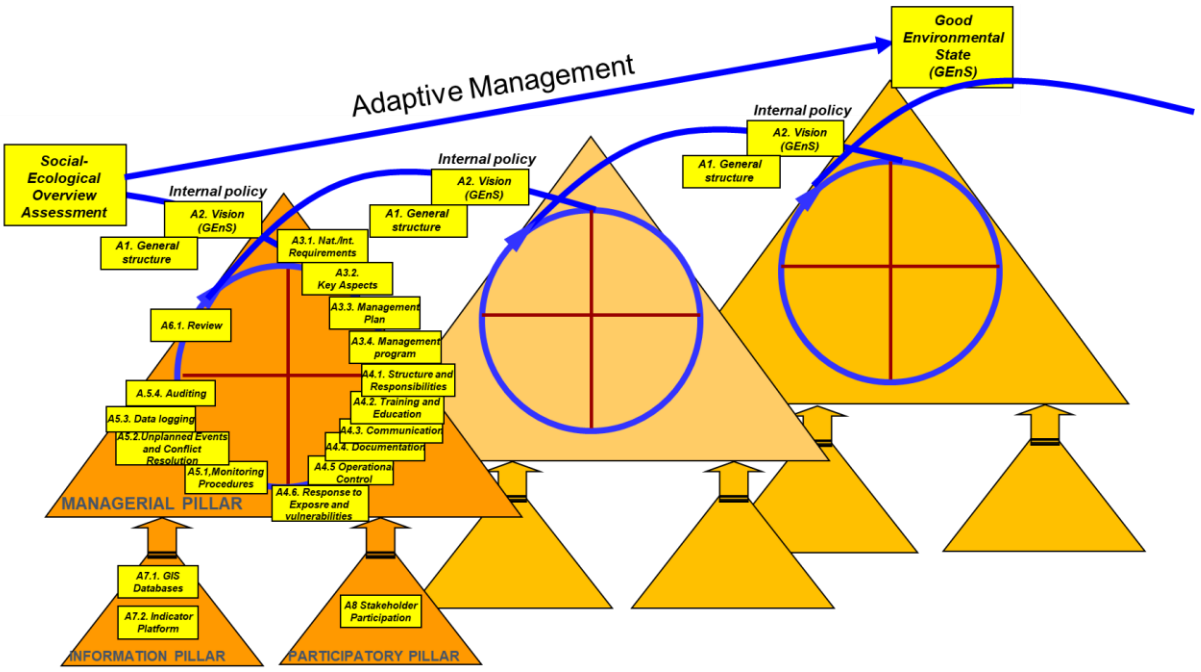

Figure 2.- General structure of the Ecosystem-Based Management System (EBMS), showing in orange one of the cycles in the adaptive management process. In the figure vision is assimilated as the main objective in the MSFD (Good Environmental State). Adapted from Sarda et al. (2014)

Initial requirements

There are several aspects that need to be defined before to start to work with the different clauses that the system will introduce. The first one is to define precisely which is the scope of analysis, the spatial and temporal scale of application. In addition to this scoping evaluation, a couple of initial requirements will constitute the first clauses of the system and are indicated below (for the purpose of the present project; in this initial description of the clauses, we are describing them as use for an MPA).

A1. General Structure

The organization in charge of the park will develop an internal document, which will be adapted over time, on the management process that the EBMS will develop. This document will determine the time period of the management cycles and the meetings to be held in it.

A2. Vision

The organization in charge of the park will develop a document that reflects the park's commitment to adaptive and ongoing management. This document should reflect the conceptual framework and desired vision for the park, defining its conservation elements and the environmental health of its structure and operation.

Managerial pillar

The Managerial pillar is the "engine" of the EBMS. It maps a framework to set up an effective management system to reach and maintain particular targets and is based on a formal Environmental Management System (EMS). The managerial pillar operates on the policy cycle assessment developed inter-alia by the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection

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(GESAMP, 1996) and follows the classical Plan-Do-Check-Act managerial policy scheme (Deming, 1986). It is an iterative continuous quality improvement model consisting of a logical sequence of four repetitive steps, which can adapt to changes in the system under management. In the EBMS, the iterative steps of the system follow the ISO frameworks for environmental and risk management (ISO 14001, ISO 31000). The inclusion of a risk management standard follows modern management best practice for environmental decision-making (Cormier et al., 2013) while the use of EMS is a well-established tool for achieving environmental targets. The structure of the managerial pillar and its relation to EMS/RMS frameworks is shown in Figure 2. The managerial pillar of the EBMS is the piece of management that guides the user toward the desired vision over time through the completion of adaptive management cycles.

The Managerial pillar contains the largest number of clauses in the system. These clauses are following the Deming Cycle (Deming 1986) and they are included below.

Planning phase (PLAN)

Following determination of the "status quo" (in the Initial Assessment) and the "targeted state" through establishing of a vision (i.e. GEnS) and having put in place a general structure to progress towards this vision, the EBMS enters in its planning phase. The aim of the planning phase is the selection of a series of prioritized actions for progress toward the desired vision. The planning phase is structured in four formal clauses (Figure 2) following an RMS framework (the Risk Assessment phase of the new ISO 31000:2009 [IEC/ISO, 2009]). Key risks to different components of ecosystem State are evaluated following the Risk Identification-Risk Analysis-Risk Evaluation scheme (Cormier *et al*., 2013), and a decision support mechanism is used to prioritize and select operational objectives inside the management plan. This decision support mechanism will be explained in the Deliverable 2.2 of EFFECTIVE.

A3.1. National and International Requirements

Park management shall establish and maintain a procedure to identify all National and International requirements and the management context under which the area/region should be carried out.

A3.2. Identification and Prioritization of Key Aspects

Park management shall establish and maintain a procedure to identify events (human-related activities and, natural hazards) that may influence the achievement of the vision of the site under management [The EBMS proposes a DEMA tool to do this work; see Deliverable 2.2 of EFFECTIVE].

A3.3. Management Plan

Park management must establish and maintain a documented Plan, with its objectives and goals. The Plan is the final document based on the risk assessment (identification and prioritization) approach.

A3.4. Management Programs

The park management must implement and maintain a series of management programs and procedures that respond to the activities that are included in the approved management plan with their appropriate timing.

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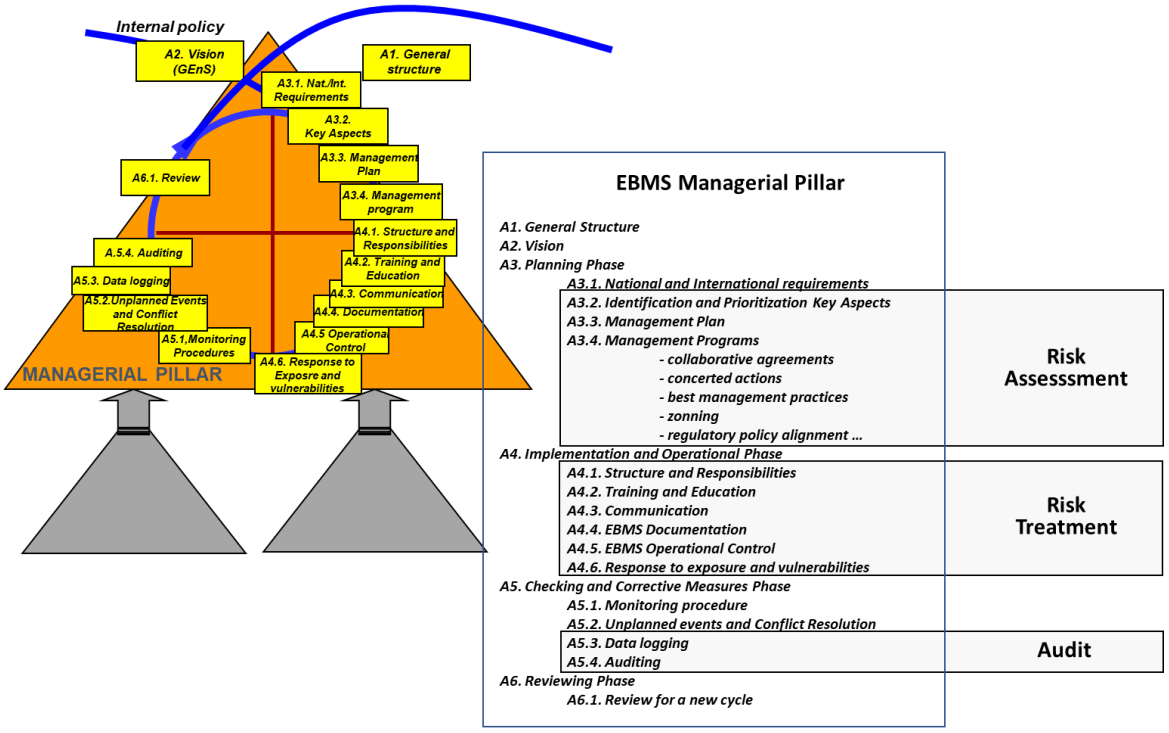

Figure 3.- Managerial pillar of the Ecosystem-Based Management System (EBMS), showing the different phases of management. Those clauses marked with an asterisk differ from the ISO 14001 Environmental Management System. Adapted from Sarda et al. (2014)

Implementation phase (DO)

In the implementation phase, described in six formal clauses, the management plans designed and agreed in the planning phase are put into practice. Two elements are particularly important to ensure the successful application of the implementation and operation stage, the capacity and responsibilities of the personnel in charge, and the operational control of the activities (i.e. monitoring of program effectiveness). As stakeholder participation is a prerequisite in EA frameworks, inclusion of stakeholders in decision making is important here. The competent authority should ensure inclusivity making use of appropriate tools such as those described in the participatory pillar below. At this level, the competent authority should develop the following clauses:

A4.1. Structure and Responsibilities

Park management shall define, document and communicate the roles, responsibilities and empowerment of individuals that facilitate effective management. Resources shall include human resources and specialized skills, technology and financial resources.

A4.2. Training and Education

Park management must identify training and education needs. It is necessary to ensure that all relevant stakeholders and managers understand the EBMS and are aware that a particular site is managed under an EBMS framework.

A4.3. Communication

Park management must implement a communication plan on the selected programs and their origin. Internal communication processes must be established and external communication plans described.

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A4.4. EBMS Documentation
Park management will identify and do the correct warehousing of all documentation required in the process

A4.5. EBMS Operational Control
Park management will identify those operations and activities associated with the key social-ecological aspects identified in line with the previous development to prepare adequate operational control of the activities developed from the management program as a formal requirement.

A4.6. Response to exposure and vulnerabilities
Park management shall establish and maintain procedures to identify and respond to potential accidents and emergencies, as well as to prevent and mitigate any environmental impacts that may be associated with them. A contingency plan would be established.

Checking and corrective measure phase (CHECK)

The checking and corrective action phase is based on the development of compliance monitoring programs, including monitoring of program activities, compliance verification and the audits with verification of the carried work. This phase is also structured in 4 formal clauses. Although the EBMS can be considered a quality assurance tool in itself, the audit clause is an important quality assurance mechanism. The audit should determine the level of conformity in attaining objectives as well as the effectiveness of actions in meeting environmental targets. Monitoring programs in the EBMS framework should also act as regulatory compliance surveillance mechanisms as well as being aligned with any other existing marine conservation agreements or commitments such as collaborative management activities, sectorial plans and their associated monitoring efforts. The clauses fir this phase follow:

A5.1. Monitoring procedure
Park management shall establish and maintain documented procedures to periodically monitor and measure key social-ecological aspects that have a significant impact on the future of the park and its action programs

A5.2 Unplanned events and conflict resolution
Park management will establish an alert system to detect improper system operation and/or unexpected environmental hazards/activities

A5.3. Data logging
Park management shall establish and maintain procedures for the identification, maintenance and disposition of key social-ecological records used in the system, as well as the evaluation of indicators selected for the desired vision.

A5.4. Auditing
Park management shall establish and maintain a program to carry out periodic checking procedures for the system. The audit process or quality assurance mechanism needs to be included in each management cycle of the system in order to determine: a) whether or not the EBMS conforms to planned arrangements for the social-ecological system management including the requirements of this standard system, and b) whether or not the EBMS has been properly implemented and maintained; and provide information on the results of audits to management.

Reviewing phase (ACT)

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The management review is an essential part of the continual improvement of a management system to facilitate the necessary adaptive management formal requirement. To operate within the principles of adaptive management, periodic reviews to develop new plans and new implementation programs are necessary as new developments occur. In this way the EBMS can adapt due to the presence of feedback loops. The vision for the system is re-analysed as part of this review and the distance from the objective (vision raised for the system) is assessed at this time based on program performance during the previous cycle. The review is connected with the planning phase of the next cycle. Making use of the risk management tool (in the planning phase above), the revision needs to establish the external and internal context in which the next identification and prioritization of programs should be conducted. The suitability, adequacy and effectiveness of the entire process are also evaluated at this time. The management review process should ensure that the necessary information is collected to allow management to carry out this evaluation.

While the structure and processes of the managerial pillar described above are relatively simple, they cannot operate in isolation. The information and participation pillars of the EBMS provide the essential scientific data and participatory inputs to run the system being mainly focused on the managing decision for the entire system. A single reviewing clause is included at this stage:

A6.1. Review for a new cycle
Park management must, based on the established periodicity, carry out the necessary steps to initiate, at the appropriate time, a review that leads to another cycle of the program.

Information pillar

The information pillar of the system provides the risk assessment and decision-making components of the managerial pillar with data to inform the decision-making process. Since spatial data are essential for the implementation of the EA, a Spatial Data Infrastructure (SDI) associated to a Geographical information System (GIS) is required (Cinnirella et al., 2015). The relevant properties and processes (and related data) often occur at different spatial scale and may be under different ownership in different jurisdictions, but it becomes necessary for a correct management to work with the best geodata possible. In addition, spatial modelling and mapping of social ecological data using the DPSWR conceptual frame (Cooper, 2013) in a particular location can provide the basis for informed decision making so an indicator platform should be generated to do the appropriate data warehousing. The information system (Geographical Information System and Indicator Platform would be described in Deliverable 2.2

Two different clauses of the process can be identified at that level

A7.1. Geographic Information System (GIS)
Park management will need to maintain a spatial data platform, a very important requirement for being able to carry out Ecosystem-Based Management practices

A7.2. Indicator Platform
Park management will establish a system of indicators as a guide for the management and evaluation of objectives. This platform will be developed following the environmental accounting described previously
D(a) (Drivers and activities) – P (Pressures) – S (States) – W (Welfare) – R(m) (Response and measures).

Participatory pillar

The Malawi principles for EA applications respond to multi-sectorial process and include the participation of stakeholders as one of the more important points for the management (Tallis, 2010).

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Participation requires active involvement of the actors (people influencing and affected by management actions). For the EA to be truly effective it must be supported by and include all levels of society, sectors and stakeholders throughout the implementation of the EBMS. The participatory pillar of the EBMS is included in order to ensure communication with stakeholders and build public capacity to participate. The EBMS can only be effective if it is understood by all concerned stakeholders. In the different MPAs related to the present project, the participation of those stakeholders can be different but, at least, a stakeholder mapping for identification and a procedure for working with them in the process should be raised. The last clause of the process will be related to this particular pillar.

A8. Stakeholder participation
Park management must maintain a structured dialogue with the whole of society with which the park is related, through the use of certain figures of social participation that will be determined in the system.

Conclusive remarks

The EBMS was designed to be a standard methodology to assist management of coastal and marine environments, introducing a common set of tools and procedures and a common language that can be useful to facilitate knowledge transfer and capacity building. The main advantages of the EBMS are:

- Standardization: The EBMS is a standard procedure. It is based on international standards and written in a language understandable by managers and practitioners.
- Commonality: The EBMS introduces a common language, a common set of procedures and identifies essential tools that can be useful to facilitate implementation of the Ecosystem Approach principles.
- Scalability: The EBMS is scalable, can be hierarchically introduced at different spatial scales facilitating nested approaches. Its structures can be adopted for any program of measures from initiatives on the regional sea scale envisaged by legal frameworks (e.g. MSFD) and supported by international cooperative agreements (OSPAR, HELCOM, UNEP-MAP, Black Sea Commission) to the federal, provincial or local programs underway elsewhere.
- Replicability: The EBMS has been developed in its application to MPAs to be used as a referenced standard to improve present park management or to make management happen from the very beginning.
- Quality: The EBMS is a quality assurance tool by itself, the process verifies and determines whether the goals for the system meet expectations and time frames for the social-ecological system under management.
- Vision-driven: The EBMS works in a vision driven It becomes necessary to reach a societal consensus for desired future conditions.

The standard operating practices proposed in this management system have the potential to facilitate the implementation of the EA marine-related policies. The EBMS was designed to provide a structured and inter-comparable process that bridges the theory and concepts of EA to management practices. We believe that the standardization of all the different activities inside a classical PDCA framework but EA oriented can facilitate implementation of the recent policies related to the Global Biodiversity Framework aimed to have better management in protected spaces.

The EBMS uses terminology that is closer to policy and management disciplines when compared to terminology used in the natural sciences in general to alleviate the problems of jargon and narrow the gap between the theory and the practice of the EA. One of the things that has to be understood by academia is that any management plan will always have to be implementable by existing legislative and regulatory frameworks. Within a national or international context, agreements can identify

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common or complementary ecosystem objectives for planning to address broader scale issues within the ecosystem boundaries. Ecosystem science or stakeholder engagement contributes valuable knowledge and considerations to the planning process. The implementation, however, will depend on the legislative and regulatory frameworks of the management area. Other regulatory mandate management programs in the fields of health and engineering have operated under such standards and guidelines for some time. Modern marine management needs to be carried out in an integrated way that considers the entire ecosystem including humans. The EBMS proposes a standardized system to facilitate the practice of marine management as well as capacity building.

Finally, by using the EBMS all principles of Malawi can be applied. Table 2 is showing the different characteristics that the EBMS is incorporating and its relation with the Malawi principles (CBD 2004).

Table 2. Relationships between the Malawi principles and several characteristics to be found in the EBMS

Malawi principles	Main characteristics
Principle 6	Setting the scene of management.
Principle 1	Using a system approach to management (enhancing participation, achieving a common view on societal choices.
Principle 8	Need for adaptive management (targeted long-term visions with operational short ones).
Principle 5	Advocacy for the use of the ecosystem services jargon.
Principles 2,4	Working with decision-making procedures in a decentralized way.
Principles 3,11	Developing an environmental accounting framework.
Principles 7,9	Contemplating all scaling effects.
Principles 10,12	Considering humans as part of the global ecosystems (but having clear the site/network vision and involving all sectors of society).

APPLICATION TO MARINE PROTECTED AREAS (MPAs)

MPAs and the Ecosystem Approach (EA)

Effective marine biodiversity conservation is dependent upon a clear scientific rationale for practical interventions (Hiscock, 2014). However, soundless managerial tools should be used for coherent implementation of approved conservational policies as well as during the management of declared MPA. Although Marine Protected Areas are clearly defined as the main tool to protect their Natural Capital, the use of an Ecosystem Approach into its management is still unclear. The main goal of this deliverable as one of the main goals of the EFFECTIVE project is to applied a managerial tool, the EBMS-MPA intended to facilitate its usage. As we saw previously, the EBMS-MPA is a formal standard framework that add new aspects not considered in traditional MPA management by the introduction of the principles of the ecosystem approach to management, between them: a) a clear vision-driven process; b) a holistic approach from a geographical perspective; c) pressure analysis and institutional coordination inside clear participatory planning; d) use of risk management techniques in planning; e) the ecosystem service concept as the central piece of the system; f) use of the D(a)PSWR(m) as the accountable framework for indicators, g) a desired vision based on state indicators and using the good environmental state concept; and h) timely participation by stakeholders. The EBMS-MPA is structured along three pillars working in an adaptive management way. Based on these three pillars, existing

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management practices can be standardized into a viable, systematic means of implementing, in an integrated way, the new international desired protocols for MPA areas. In this section, we promote the idea that by using a standard management tool that allows nested applications, we can improve the protection of the marine environment and improve MPAs functionalities.

The Mediterranean is considered to be one of the world priority ecoregions. Ten years ago (Gabrié et al., 2012), MedPAN in collaboration with the RAC/SPA made an inventory on MPAs in the region and distributed a survey questionnaire between managers. The conclusions of this work, listed in Table 3. One of the highlighted points was the insufficiency of management effectiveness with a general recommendation that management tools should be better implemented. In addition, a second important point detected was the lack of involvement to use the EA Strategy in the management of these MPAs.

Table 3. Main conclusions and recommendations of the recent status of MPAs in the Mediterranean Sea (adapted from Gabrié et al. 2012).

	Main Conclusions
1	The information on Mediterranean MPAs is more accurate. They have been recorded in the MAPAMED database.
2	The target of 10% protection is far from being achieved.
3	There is still a disproportionate geographical distribution and MPAs are still mainly on the coast.
4	Representativity of ecological sub-regions, habitats and species is very variable.
5	The adequacy and viability of sites is very variable.
6	The ecological coherence is better in the western basin but still low on a Mediterranean scale.
7	MPA management is still insufficient.
	Recommendations
1	Reinforce the development of the MPA network in order to achieve the 10% target of the Mediterranean surface area.
2	Reinforce the effectiveness of protection management and evaluation measures in MPAs.
3	Reinforce the resources and tools to ensure an evaluation of the management effectiveness.
4	Promote the development of network's evaluation tools on a regional level.
5	Ensure a better management of threats to MPAs.
6	Enhance the Mediterranean MPAs international recognition.

The above considerations emphasized the need for better management in MPAs. Management can be defined as the function that coordinates the efforts of people to accomplish goals and objectives by using available resources efficiently and effectively. Through years, one of the preferred ways to develop such a mandate is the establishment of management systems and here is when our EBMS we think it can contribute. The EBMS wants to achieve vision management objectives that follow sustainable development principles and that are based on the provision of ecosystem services (CBD, 1998; Balvanera et al., 2001; Cognetti and Maltagliati, 2010). The introduction of a management-type system into MPA management; a) could solve one of the main required recommendations seen in Table 2, the insufficiency of management effectiveness, and b) it could solve also the need to include the principles of the EA into practicing of MPAs as it is recommended elsewhere (see table 2 for an approximation). In addition, it can be an effective way to start management practices where today, even in already MPAs. still we do not have any managerial activity in place.

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We believe that a formal use of the EBMS in MPAs will allow us to move towards a new model of integrated management ideal for the purpose of the new regulatory tools that are been developed recently. In order to apply the EBMS into MPAs, the principles of the EA shall be transferred into the needs for MPA management as seen in Table 2.

The EBMS-MPA application

The EBMS application will be carried out following a series of steps than can be seen in a diagram in Figure 4. Before to start to implement the different clauses for the system, it is important to have a clear delimitation of the social-ecological system under management. In the case of MPAs this is normally an easy task because the delimitation of the area is one of the main tasks carried out before the area was awarded with that distinction. After delimitation, management of the area should be based on measures and, at that stage, an initial assessment (departure stage) and a final vision desired (desired stage) will need to be established. The EBMS works on a vision-driven process; the desired vision will establish the goals and timescales for environmental performance against which the effectiveness of the management system will be judged.

In order to develop the vision for the MPAs, we will use the well-established social-ecological accounting framework described in previous sections, the Driver(activities)-Pressure-State-Welfare-Response(measures) [D(a)PSWR(m)], to develop a comprehensive scientific knowledge-base of Good Environmental State (GES) and use that then, for bringing a practical guidance for the application of the Ecosystem Approach to the park management.

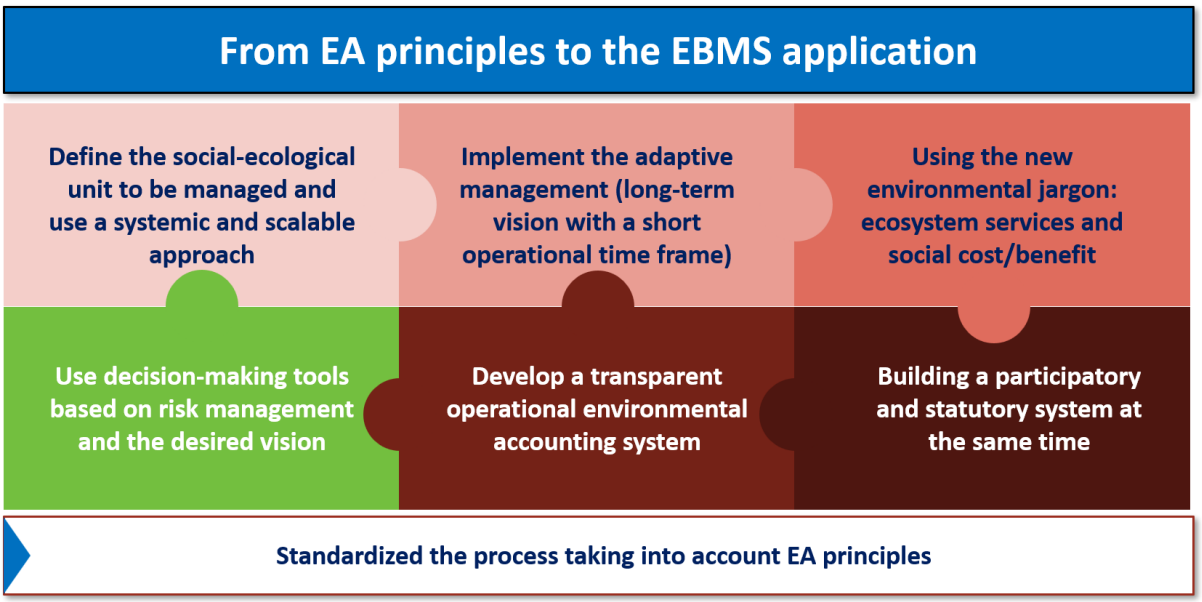

Figure 4. A diagram to explain the EBMS application process.

The Marine Strategy Framework Directive (MSFD) set out a list of 11 descriptors of environmental status for which good status should have been achieved by 2020. These descriptors are further refined in the Commission decision on descriptors (2017/848), A good definition for them can be found in our

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web page https://www.msfd.eu/knowseas/ges.html . Departing from the documents of the countries in which we will base our application, the work to be done will be carried out in three steps:

1) gathering the Marine Strategy data for the two areas that will be studied (Levantino-Balear area in Spain and the Thyrrenian-Northwestern Mediterranean one in Italy)
2) a revision will be made on all documentation on the Marine Protected Areas under assessment and the key factors for the protection to make a downscaling work of GEnS for the identified areas, linking this information with the data that we have on non-protected area, and
3) we will identified existing possible gaps of information and try to obtain them to have all descriptor assessed; if not possible, a not defined data will be included in the analysis mirroring present information status.

This downscaling work will allow managers to have the Good Environmental State for the Park, ultimately, the final vision desired for the MPA that could be contrasted with the present situation based on the measures already taken in these MPAs. Finally, the GEnS desired as a vision will be related to the benefits that the area is given for people; as it has been indicated in the information pillar for the system; ecosystem services will be assessed and valuated when possible.

Mirroring all this previous work, an EBMS requirements and guidance for use will be developed. The requirement/guidance document will contain all the information needed, and clauses and procedures to be developed, in order to follow up the standard that the EFFECTIVE project wants to propose for the management of MPAs. The level of data and the complexity of the EBMS to be carred out, the extent of documentation, and the resources devoted will be, of course, dependent of a large number of factors as the size of the the, the complexity of its link with the territory around the park, and other aspects to be considered.

MPAs selected and work carried out

During the first year of the project, working for the road-map implementation, we have made all necessary contacts to include several MPAs to be pilot sites for the development of the EBMS into practice. Two large MPAs in the Pilot 1 and three of them in Pilot 3 of the EFFECTIVE project have made a committment to participate in this process. The five areas are listed below and are displayed in Figure 5.

- Parc Natural del Cap de Creus (Catalonia, Northwestern Mediterranean)
- Parc natural del Montgrí, les iiles Medes, i el Baix Ter (Catalonia, Northewestern Mediterranean)
- Parco Nazionale dell'Arcipelago di La Maddalena (Sardinia, Italy)
- Area Marina Protetta "·Penisula del Sinis – Isola di Mal di Ventre" (Sardinia, Italy)
- Area Marina Protetta di Tavolara Punta Coda Cavallo (Sardinia, Italy)

Four of these areas are managed by regional goverrntments in Catalonia and Sardinia; only the Parco Nazionale dell'Arcipelago di La Maddalena is managed directly by the Italian Government.

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Figure 5. Pilot sites for the application of the EBMS in the EFFECTIVE project

Catalonian MPAs

Parc Natural del Cap de Creus (Catalonia, Northwestern Mediterranean)

The "*Parc Natural del Cap de Creus*" was created by Law in 1998. The status for protection of the park was given for the Autonomous Government of the Generalitat of Catalonia. In 1992 the Generalitat published a formal decree approving the so-called "*el Pla d'Espais d'Interès Natural-PEIN"* (Decree 328/1992, December 14th) that establsihed a network of 144 spaces. The area of Cap de Creus was then defined with a land surface of 8,769.5 ha plus the bordering marine area; a maritime-terrestrial natural park. In March 1996, the "*Departament d'Agricultura, Ramaderia i Pesca*" and the "Department de Medi Ambient" (today's named "*Departament de Territori, Habitatge i Transició Ecològica*") drafted the law for the protection of the "*Cape de Creus*". This document was transformed into Law 4/1998, of March 12th, on the protection of the Parc Natural del Cap de Creus. The Park was the first marine-terrestrial park established in Catalonia. As other "Parc Naturals" in Catalonia, it is under the general management structure of the "*Direcció General de Polítiques Ambientals i Medi Natural*" where its General Director is Mr. Marc Vilahur.

The "*Parc Natural del Cap de Creus*" is part of the Natura 2000 Network area, in accordance with the Habitats Directive (Directive 92/43/EEC) and the Birds Directive (Directive 79/409/EEC). The park is also part of the Specially Protected Areas of Importance for the Mediterranean Sea (ZEPIM), established by the Barcelona Convention (Convention for the Protection of the Marine Environment and the Mediterranean Coastal Region, 1995) and Monte Carlo (1996), are coastal and marine spaces relevant for the conservation of the biological diversity of the Mediterranean; they are areas of special interest for science, culture, education or aesthetic enjoyment. The park is surrounded by different MPAs which makes the park and the region one of the most protected area of the entire Northwestern Mediterranean (Figure 6).

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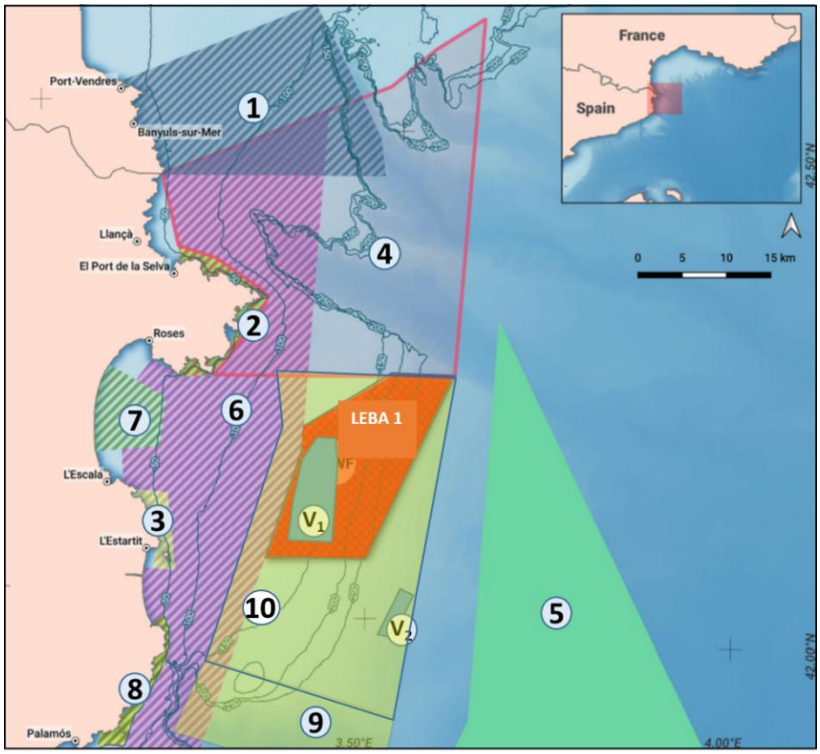

Figure 6. Map of the region showing all the MPAs in relation TO THE TWO Catalonian projects related to the EFFECTIVE project: (1) SPA of Cap Bear-Cap Cerbère, (2) SPAMI, SCI, SAC, and SPA of Cap de Creus, (3) SPAMI, SCI, SAC, and SPA of Montgrí-Medes-Baix Ter, (4) SCI "Western Submarine Canyon System of the Gulf of Lions", (5) "Mediterranean Cetacean Migration Corridor", (6) SPA of the "Espacio Marino del Empordà", and (7) maritime part of the SCI, SAC and SPA of the Aiguamolls de l'Empordà, (8) SPAMI, SCI, SAC, and SPA of the Littoral of Baix Empordà, (9) and (19) areas of high potential for the conservation of the Biodiversity under the Maritime Ordination of Spain, (V1) Hake fishing ban and (V2) Norway Lobster fishing ban. The area in red (LEBA1) has been declared as a high potential area for offshore wind farms installations.
SAC: Natura 2000 Special Areas of Conservation (SAC); SCI: Sites of Community Importance; SPA: Special Protection Areas; SPAMI: Specially Protected Areas of Mediterranean Importance. Adapted from Lloret et al. (2022)

The Cap de Creus peninsula is the easternmost tip of the Iberian Peninsula. Its seabeds are part of the Gulf of Lyon, one of the most productive areas of the Mediterranean. Although the entire peninsula of Cap de Creus and its marine environment was declared a natural park, inside and in the waters that surround it, they have different levels of protection (Figure 7). As for the marine area, the area around the Cap de Creus peninsula has the status of a natural park from the same coastline to a depth of more than 80 meters, from Punta del Bol Nou (municipal term from Port de la Selva) to Punta Falconera (municipal term of Roses), excluding the bay of Cadaqués. Within this same area, and in the marine spaces adjacent to the terrestrial integral nature reserves, two partial nature reserves are established: that of Cap Gros-Cap de Creus, and that of Cap de Norfeu. Finally, the s'Encalladora Marine Integral Natural Reserve is created, in the north of the island. All the islands and small rocky shores located within the marine environment of the Natural Park have the status of a natural site of national interest.

The total area of the Cap de Creus Natural Park is 13,873 hectares, the protected marine part consists of 3,056 hectares and represents 22.3% of the total area of the Park. This marine part is divided into three different levels or protection zones: natural park area (2,236.77 ha), two partial nature reserves: Cap Gros- Cap de Creus (Farallons: 220.68 ha; Cap de Creus: 310, 76 ha) and Cap Norfeu (267.17 ha) and a comprehensive nature reserve (Encalladora: 20.62 ha).

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The marine area of the natural park has been intensively studied in the past. For specific sites of the park, it exits different bathymetries and bionomic mapping of the seabed (2016 by Ecohydros S.L.; 2014 by Entorn S.A; 2010 by an INTERREG project). However, for the purpose of this work, we will be working with a recent bionomic mapping layer carried out by the company TECNOAMBIENTE S.L.; this layer has been recently released by the Generalitat of Catalunya as the oficial bionomic/bathimetric layer of Catalonia from 0 to 50m depth. To make homogeneous all the information about MPAs at EFFECTIVE, we use the layers of this official map to be used also in the other EFFECTIVE case studied parks. The maps below were carried out following such indications. ALL information about the different layers that will form part of the clause A7.1 at the different MPAs will be seen in Deliverable 2.3.

Since 2017, the marine environment of the Parc of Creus is monitored by researchers of the University of Barcelona (www.seguimentmari.cat). This monitoring program has the following main objectives:

- to evaluate the state of conservation of the populations and marine habitats of these spaces, in relation to the human activities carried out there, as well as to environmental factors,
- to detect risk situations for heritage (invasive species, effects of climate change, etc.),
- to increase knowledge about this space and its species and habitats,
- to develop new descriptors and management tools for the conservation of these spaces, and
- to facilitate a more sustainable management of marine resources

this information will costitute a basis from which we can deliver theindicators to be used in the construction of the good environmental state (GEnS) for the park.

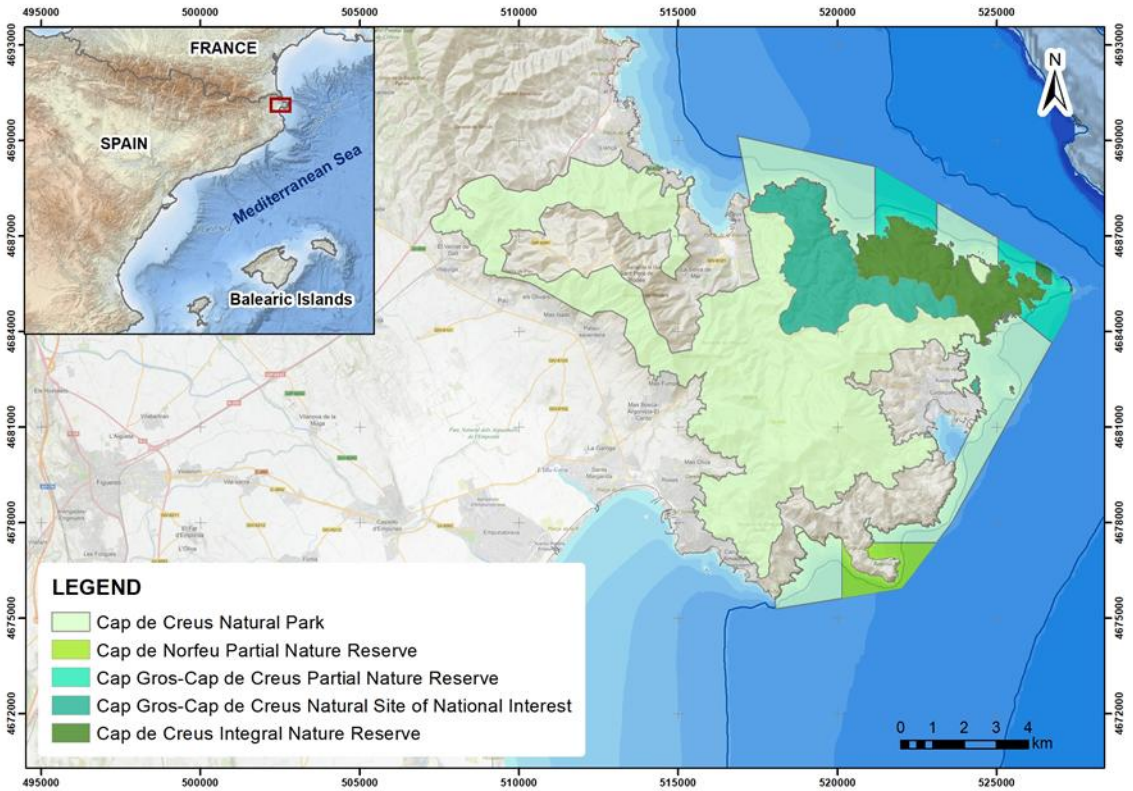

Figure 7. Map of the Parc Natural del Cap de Creus (Catalonia, Northwestern Mediterranean) (https://parcsnaturals.gencat.cat/web/.content/Xarxa-de-parcs/cap_de_creus/el_parc/mapa-parc/planol-guia-Cap-de-Creus-ca-es.pdf)

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Table 4 is showing the most important characteristics of the marine area of the parc including people in charge of its management.

Table 4. Main characteristics of the Parc Natural del Cap de Creus

Parc Natural del Cap de Creus	
Coastal Muncipalities	Roses, Cadaquès, Port de la Selva, Llança (Girona, Catalonia-Spain).
Total area protected	13,873 hectares
Marine extension of the parc	3,056 hectares
Office and contact	Passeig Catalunya, s/n. 17493 Vilajuïga +34 972 193191

The Law 4/1998, of the protection of the Cap of Creus was aimed to establish the legal and management regime for the strict preservation and restoration, when appropriate, of the natural terrestrial and marine systems of the peninsula of Cap of Creus, the geological, botanical, faunal and ecological values and the elements of cultural interest it contains and the integrity of its landscape. The Law determines that to deploy and apply its legal regime, the organization and planning of the use and management of the Park they must be carried out through different planning instruments: (a) a Special Plan for the protection of the natural environment and the landscape, the Master Plan for use and management ("Pla Rector d'Us I Gestió-PRUG) (*Departament de Territori, Habitatge, I Transició Ecològica*, 2024), and, when necessary, specific plans, rules and programs. During last year, the management of the park has been developing the procedures to approve the First PRUG for the parc in its marine domain. The document is already finished and it is right now in the period of allegations. This particular document is going to be an important piece of information for the departure of the information pillar in EFFECTIVE.

Parc Natural del Montgrí, les illes Medes, i el Baix Ter (Catalonia, Northewestern Mediterranean))

Although the Parc Natural Montgrí, les iiles Medes, i el Baix Ter (PNMMBT) was created by Law in 2010, its protection was initiated much before and, regarding its marine area, in December 2001, the meeting of the contracting parties of the Barcelona Convention held in Monaco approved the inclusion of the seabed of the Medes Islands in the initial list of specially protected areas of importance for the Mediterranean (ZEPIM), for the existence of unique species with high ecological value, both animal and plant. Nevertheless, as it was seen in the previous parc, in 1992 the Generalitat published a formal decree approving the so-called "el Pla d'Espais d'Interès Natural-PEIN" (Decree 328/1992, December 14th) that included the PNMMBT. Finally, the PNMMBT was created by the Law 15/2010, of May 28, 2010, with the main objective of unifying the protection regulations for the three spaces that make up the natural park (Montgrí Massis, the Medes Islands, and Baix Ter).

As it was said for the PNCC, the PNMMBT is part of the Natura 2000 Network area, in accordance with the Habitats Directive (Directive 92/43/EEC) and the Birds Directive (Directive 79/409/EEC). The park is also part of the Specially Protected Areas of Importance for the Mediterranean Sea (ZEPIM), established by the Barcelona Convention (Convention for the Protection of the Marine Environment and the Mediterranean Coastal Region, 1995) and Monte Carlo (1996), are coastal and marine spaces relevant for the conservation of the biological diversity of the Mediterranean; they are areas of special

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interest for science, culture, education or aesthetic enjoyment. The park is surrounded by different MPAs which makes the park and the region one of the most protected area of the entire Northwestern Mediterranean (Figure 8).

The PNMMBT is located between two different coastal counties, Alt Empordà and Baix Empordà, in the northeast of Catalonia, in the middle of the Costa Brava. It extends from L'Escala, in the north, to Pals, in the south, and occupies more than 8,188 hectares, 2,039 of which are maritime (Figure 8). The name indicates the variety of landscapes and the unique elements that we will find there: the Montgrí massif, the Medes Islands (the surface part and the submerged part) and the Baix Ter plain. It is made up of eight municipalities with a great wealth of heritage, natural and historical, some of which have a marked tourist character.

The Law 15/2010, establish the legal and management regime for parc. In the case of the PNMMBT, the Decree 222/2008 of the Generalitat of Catalonia, approved the Master Plan for the use and management of the Medes Islands Protected Area (PRUG), being the latest regulation applied to the islands. The Medes Islands is one of the most charismatic places in the Western Mediterranean and one of the most well-known sites for scuba divers all over the Mediterranean. It holds a great diversity of marine habitats largely due to several factors that make the area highly productive. Among the most important factors are the contribution of organic matter from the Ter River, the influence of northern winds and currents that favor the rise of nutrient-rich deep waters, and the diverse composition of the seabed, which causes the existence of different habitats adapted to each of them.

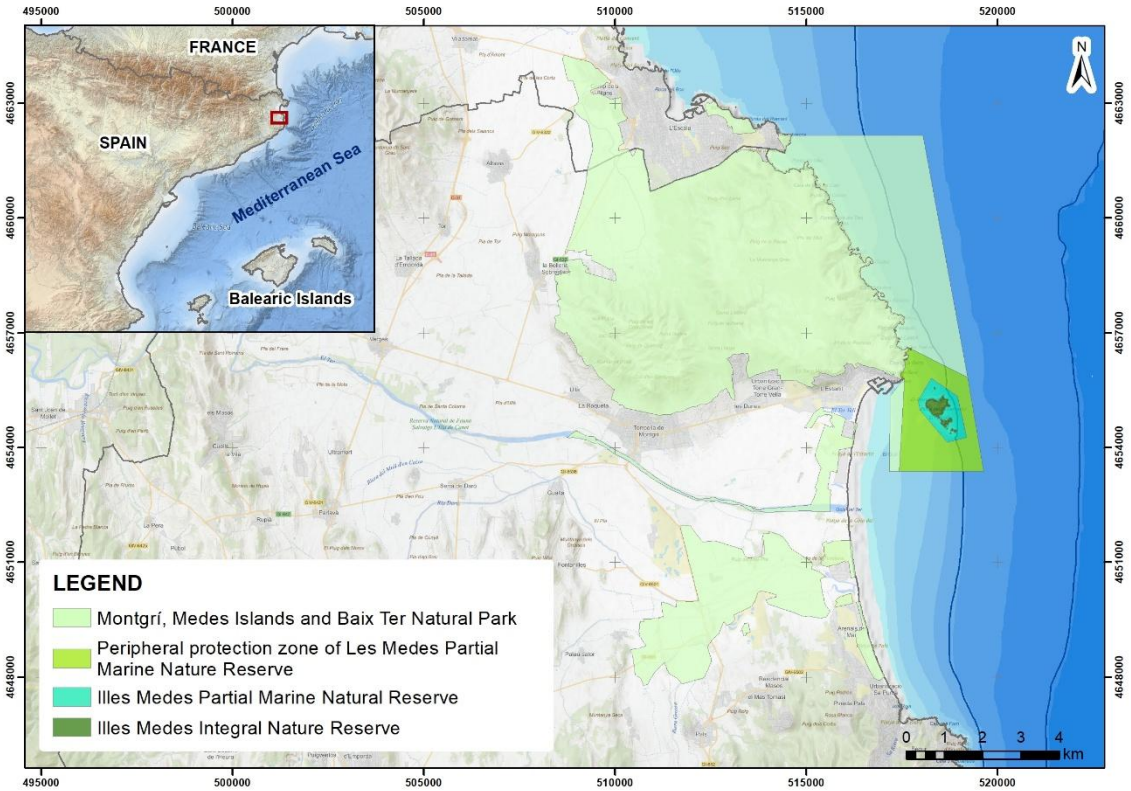

Figure 8. Map of the Parc Natural del Montgrí, les Illes Medes I el Bai Ter (Catalonia, Northwestern Mediterranean)

The main characteristics of the parc can be seen at Table 5.

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Table 5. Main characteristics of the Parc Natural del Montgrí, les iiles Medes, i el Baix Ter

Parc Natural del Montgrí, les iiles Medes, i el Baix Ter	
Coastal Muncipalities	L'Escala, Torruella de Montgrì, and Pals (Girona, Catalonia-Spain).
Total area protected	8,188 hectares
Marine extension of the parc	2,039 hectares
Office and contact	Passeig del Port, s/n, Espigó de Llevant. 17258 L'Estartit Tel.: 972 75 17 01

Road-map implementation: work carried out

In the EFFECTIVE project, and during the period covered by this Deliverable, several meetings and workshops has been carried out in relation with the Catalonian parcs. These meetings had a continuation with other working sessions carried out at the headquarters of the "*Direcció General de Politicas Ambientals de la Generalitat de Catalonia*", which is the administrative office in charge of the managerial structure for these parcs. All these meeting yielded in a training session that was formally arranged at the headquarter office of the Parc Natural del Cap de Creus, in February 8th, 2024. The training session facilitated the initiation of the process of implementation of the EBMS. Table 6 is showing all these meetings and working sessions. The slides shown at the training session can be seen in this Deliverable as Annex 1.

Table 6. The EFFECTIVE project: Road-map meetings for the EBMS in the Catalonian Parcs.

2023	
April 23th	First visit to the Director of the "*Parque Natural de las Medes, Montgrí I Baix Ter (PNMMBT)*"
April 27th	First visit to the Director of the "*Parque Natural del Cap de Creus (PNCC)*"
June 25th	First visit to the *Director General de Politiques Ambientals de la Generalitat de Catalonia*
July 25th	Meeting with the Major of Torruella de Montgrí (Girona, Catalonia-Spain)
September 18th	Visit to the managers of INTEMARES ("Fundación Biodiversidad-Ministry of Ecological Transition, Madrid); governance of marine parks; currently structuring a governance for the LIC of the western Mediterranean canyons
October 2nd	Second visit to the Director General de Politiques Ambientals de la Generalitat de Catalonia
November 28th	Second visit to the Director of the "Parque Natural del Cap de Creus (PNCC)"
December 1st	Second visit to the Director and staff of the "Parque Natural de las Medes, Montgrí I Baix Ter (PNMMBT)"
2024	
January 22nd	Online meeting with the Director General and the managers of the parcs and higher staff
January 29th	Work meeting with FOS-Open Standard (consultant for the Generalitat of Catalonia
February 8th	Training Day (NP Cap de Creus and Medes-Montgrí)
2025	

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January 30th	Working session with technicians at the park of Cap de Creus (both Catalan parks)
April 24th	Meeting work with both Directors (PNCC and PNMMBT)
April 28th	Working session with technicians at the park of Cap de Creus (both Catalan parks)

The training day of February 8th at the "Cap de Creus" park headquarters brought together all park workers from the two Catalan parks, excluding two of them needed to cover the necessary on-call duties. The training day was completed with several scientists of the EFFECTIVE project. This meeting could be considered an initial activity for clause A4.2 on training and education. When raising the necessary competencies for the use of the standard, the parks will need to determine the necessary competencies of the personnel and their training needs to understand the systems and their tools based on their appropriate education, past training, or experience. During the session, we introduced park workers to the EBMS system and the aim of the EFFECTIVE project, as well as how these individuals should interact with the three pillars of the system. It was also decided who from the park's key technicians would act as the connection between the project and the EBMS and its practical implementation.

Sardinian MPAs

Parco Nazionale dell'Arcipelago di La Maddalena (Sardinia, Italy)

La Maddalena Archipelago National Park is a large marine protected area made up of a group of islands located in the northeastern part of Sardinia, most of which are either completely uninhabited or have only small human settlements (such as the islands of Caprera and Santa Maria). The only exception is the island of La Maddalena, which is the seat of the homonymous municipality (Figure 9).

The Parco Nazionale dell'Arcipelago di La Maddalena was established in 1994 by the Italian government. The park was created to protect the exceptional biodiversity of the archipelago, including its terrestrial and marine environments. The park's creation was based on the recognition of the area's unique natural features and its role in the conservation of Mediterranean ecosystems.

The national law of January 4, 1994, established the Park, while the Presidential Decree of May 17, 1996, created the Park's managing authority. The same Decree also defines the Park's boundaries, which include "all the islands and islets belonging to the territory of the municipality of La Maddalena, as well as the surrounding marine areas." The Park encompasses a coastline of over 180 kilometres, accounting for approximately one-tenth of the entire Sardinian coastline.

The park is part of the broader Natura 2000 network as well as a Special Protection Area (SPA) under the Birds Directive (Directive 79/409/EEC) and a Site of Community Importance (SCI) under the Habitats Directive (Directive 92/43/EEC).

La Maddalena Archipelago National Park is a protected environment covering a land surface area of 5,134 hectares and a sea surface area of 13,000 hectares. The Park is subdivided into two macrozones - land and sea - subject to different degrees of protection: land part TA (full protection) TB (general protection) TC (partial protection); sea part MA (full protection) MB (general protection), see Figure 10 below. The general management for the park can be seen in Table 7.

In August 2024, the Extraordinary Commissioner, Dr. Rosanna Giudice, introduced additional conservation measures for *Posidonia oceanica* habitats through the "General Provisions for the

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Preservation and Protection of *Posidonia oceanica* Habitats and Seabeds of the National Park and SCI/ZSC Area ITB010008", further strengthening the park's environmental safeguards.

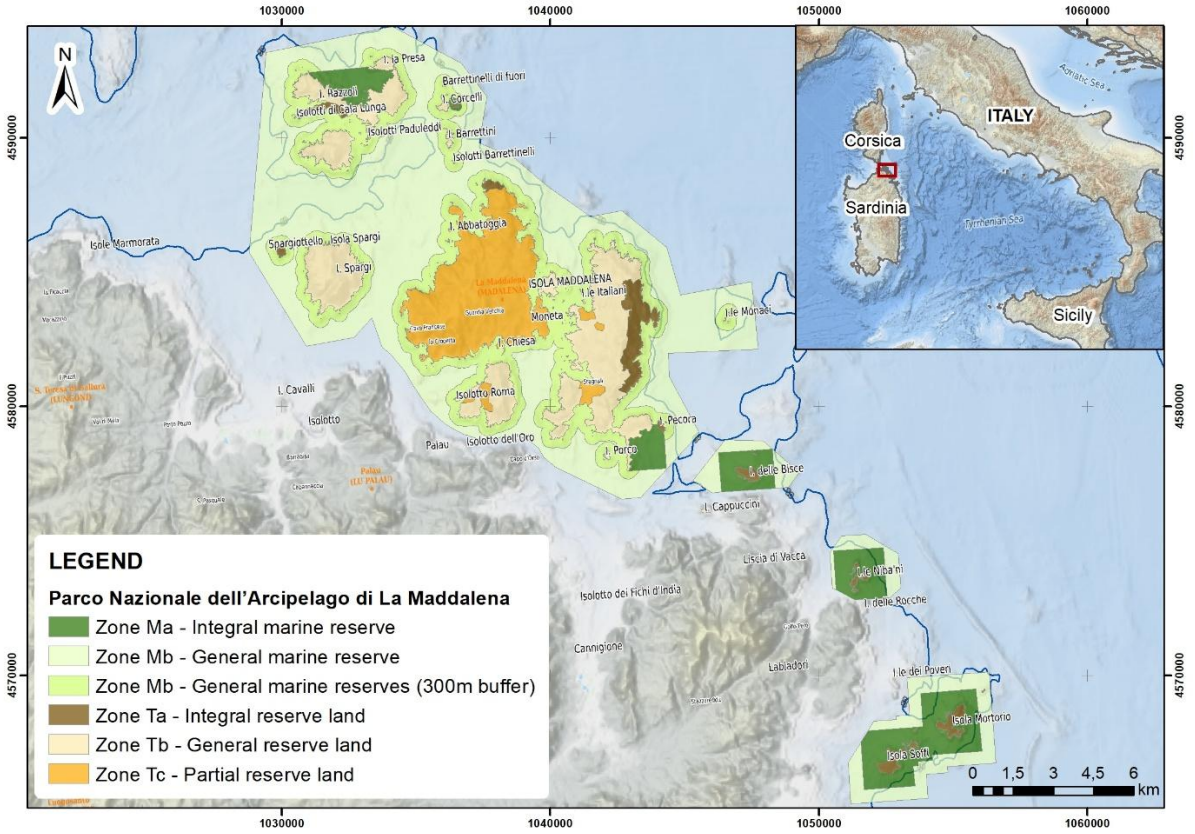

Figure 9. Map of the Parco Nazionale dell'Arcipelago di La Maddalena (Sardinia, Italy) and its zoning parts

As mentioned, the marine area of La Maddalena Archipelago and all the islands and islets belonging to the Municipality of La Maddalena are part of the Park's territory. There are eight main islands: La Maddalena, Caprera, Santo Stefano, Spargi, Spargiotto, Budelli, Razzoli and Santa Maria. Nibani, Soffi, Mortorio and Le Camere are located to the south- east of the Archipelago, opposite the Emerald Coast.

The Archipelago of La Maddalena hosts some of the most popular and appealing beaches in the Mediterranean; in particular, Spiaggia Rosa and Spiaggia del Cavaliere in Budelli, Cala Coticciu, Cala Napoletana and Relitto in Caprera, Cala Corsara and Cala Granara in Spargi. On La Maddalena island there are Bassa Trinita and its white sand dunes, as well as Monti da Rena or Punta Tegge's cliff.

The landscape is unique thanks to its characteristic inlets and coves, which create plenty of extensive, natural landing places. They always ensure safety for people sailing there, under any weather conditions. These inlets are responsible for the unique colour of the seawater and have contributed to the Archipelago's fame all over the world. Despite being inhabited since time immemorial, as shown by the prehistoric sites of Spargi and Santo Stefano, the Archipelago was also frequented during the Roman period. As a matter of fact, the Romans extracted stony material for building columns and other objects.

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The fauna confirms the excellence of the Archipelago's environmental heritage for the presence of both continental and endemic species. Numerous migratory birds, amphibians and reptiles find shelter on the islands. Thanks to the Park's environmental safeguard measures, the Brown Grouper (Epinephelus marginatus) has come back to live on the seabed of the Archipelago.

The vegetation is Mediterranean maquis: lentisk, myrtle, heather, broom and wild olive trees; in some places it is possible to find formations of holm oaks and juniper thickets. La Maddalena Archipelago has a fauna heritage comprising over 900 entities, more than 50 of which are endemic species and numerous others of phytogeographical interest.

La Maddalena National Park, together with the Bonifacio Strait Natural Reserve, has recently become part of the International Marine Park of the Bonifacio Strait (PMIBB). La Maddalena Archipelago and the Bonifacio Strait are located within the Pelagos International Sanctuary for the conservation of marine mammals, the largest Marine Protected Area in the Mediterranean and the first international open-sea MPA in the world. The Pelagos Sanctuary was established in 1999 through an agreement between France, Italy, and the Principality of Monaco, aimed at protecting cetaceans in the Mediterranean.

Table 7. Main characteristics of the Parco Nazionale dell'Arcipelago di La Maddalena

Parco Nazionale dell'Arcipelago di La Maddalena	
Municipalities	Municipality of La Maddalena, Italy
Total area protected	18,134 hectares
Marine extension of the park	13,000 hectares
Office and contact	Via Giulio Cesare, 7 - 07024 La Maddalena (SS)

Area Marina Protetta "Penisula del Sinis–Isola di Mal di Ventre" (Sardinia, Italy)

The Sinis is a peninsula located in western Sardinia, within the municipality of Cabras, forming the northern boundary of the Gulf of Oristano.

The Marine Protected Area (MPA) of Penisola del Sinis – Isola di Mal di Ventre was established on December 12, 1997, by decree of the Italian Ministry of the Environment. In 2011, another ministerial decree redefined the boundaries of the marine protected area and updated the regulation governing activities permitted within the marine protected area. The management of the Marine Protected Area "Penisola del Sinis – Isola di Mal di Ventre" is entrusted by the Ministry of the Environment to the Municipality of Cabras (Oristano).

The objective of the MPA is to protect and enhance the marine and coastal environment within the designated area while managing the sustainable activities allowed within it. The geographical coordinates indicated in the establishing decree refer to the World Geodetic System WGS 84.

The Marine Protected Area is divided into zones subject to different levels of environmental protection, considering the environmental characteristics and the socio-economic context of the area (Figure 11). Its management structure can be seen in Table 8.

- **Zone A - Integral Reserve** includes:
  - Mal di Ventre Island: The northwestern stretch of sea around Mal di Ventre Island, starting from the western point of Cala Maestra.
  - Catalano Rock: The stretch of sea surrounding Catalano Rock.

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- **Zone B - General Reserve** includes:
  - Torre del Sevo: The stretch of sea in front of Torre del Sevo, including the islands of Is Caogheddas and Punta Maimoni, up to about 1,000 meters from the coast.
  - N and SW of Mal di Ventre Island: The northern and southwestern stretch of sea around Mal di Ventre Island, surrounding Zone A, between the line connecting the northernmost point of the island and Catalano Rock and the meridian passing through the southernmost point of Cala dei Pastori.
- **Zone C - Partial Reserve** includes the remaining stretch of sea within the boundaries of the marine protected area.

The Marine Protected Area of Penisola del Sinis-Isola Mal di Ventre has been designated as a Specially Protected Area of Mediterranean Importance (SPAMI) and included in the List of the Regional Activity Centre for Specially Protected Areas (SPA/RAC) of the UN Environment Programme (UNEP).

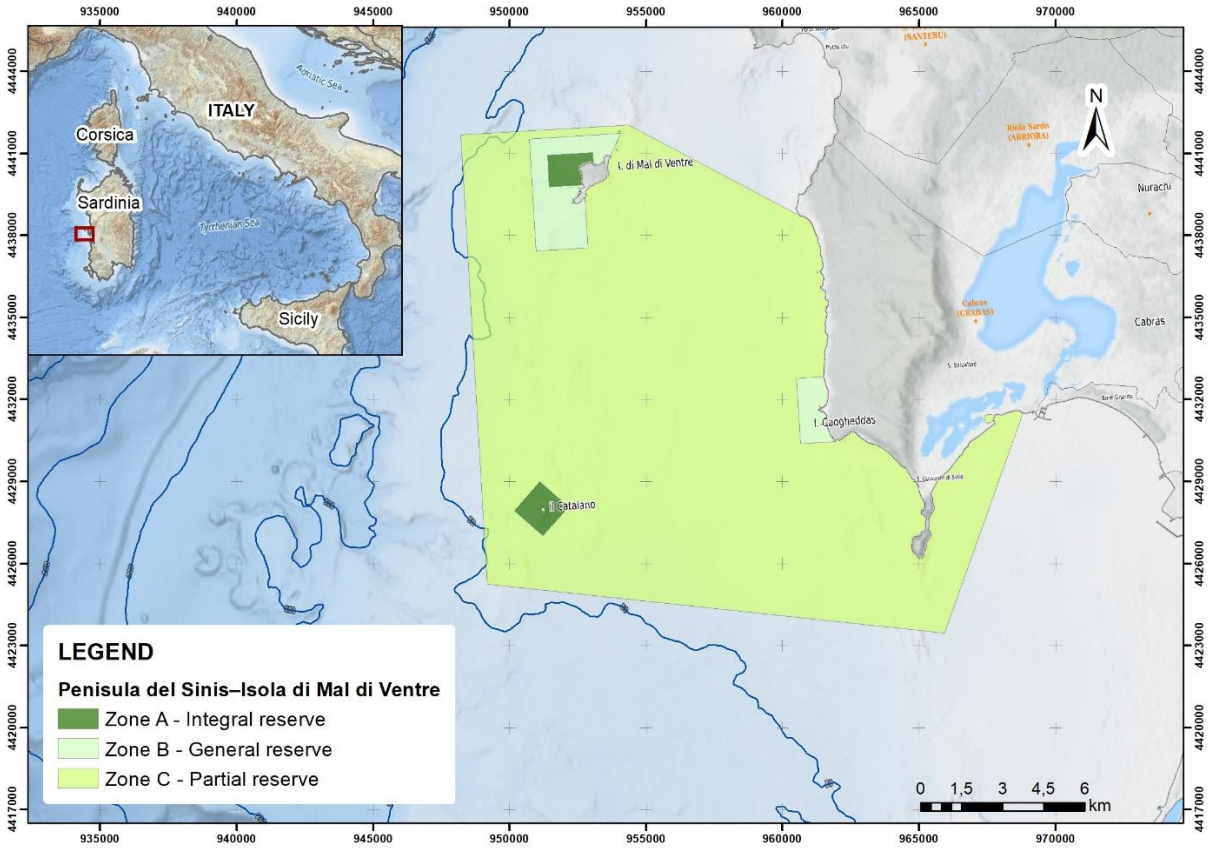

Figure 10. Zoning of Area Marina Protetta "Penisula del Sinis–Isola di Mal di Ventre"

The low stretches of coastline feature sandy beaches and quartz granules, which have greatly contributed to the renowned beauty of the Sinis area in Cabras. The higher sections, characterized by cliffs, rise significantly above the sea, serving as natural viewpoints overlooking Mal di Ventre Island to the north and the Catalano Rock to the south.

The marine environment is characterized by highly varied seabed that support a wide range of species, creating different habitats such as *Posidonia oceanica* meadows and precoralligenous and coralligenous formations. Off the coast of the Sinis Peninsula, a long ridge extends parallel to the

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shore, linking the island of Mal di Ventre, which is characterized by large granite blocks and crevices, to the Scoglio del Catalano, with its steep basalt cliffs and small caves. As you ascend from the deep slope towards the coast, ancient beach lines can be found in the shallow coastal areas, marking past phases of rising sea levels, which began around 18,000 years ago.

The Marine Protected Area (MPA) promotes various activities, including:

- **Environmental monitoring** involves research programs in ecology, marine biology, and environmental protection to expand knowledge of the MPA. Key activities include monitoring sensitive species and habitats and conducting fisheries-related studies to support biodiversity conservation efforts. The CRES – Sinis Wildlife Recovery Center, in collaboration with the CNR-IAMC of Oristano, rehabilitates and releases distressed turtles and cetaceans as part of Sardinia's Regional Marine Fauna Conservation Network.
- **Environmental education** is a cornerstone of the MPA's mission, fostering understanding and appreciation of natural environments. Activities are conducted through facilities like the Seu Nature Reserve Center and the San Giovanni di Sinis Observatory.
- Diving and snorkeling offer access to the MPA's underwater landscapes, featuring arches, cliffs, and crevices hosting rare marine life. With about 20 dive sites between Catalano Rock and Mal di Ventre Island, local operators provide guided explorations for divers and snorkelers.
- **Recreational boating** is supported along nearly 30 kilometres of coastline, offering sustainable excursions to Mal di Ventre Island and mooring at designated areas such as the Tharros Archaeological Area. Over 70 mooring buoys protect marine habitats while enabling visitors to explore the region.
- Fishing tourism aboard traditional fishing boats provides immersive experiences using age-old techniques, with participants enjoying freshly caught fish prepared with local recipes.
- **Hiking and passenger transportation** are supported by natural trails along the coastline and wetlands, allowing for hiking, trekking, horseback riding, and mountain biking. Passenger transportation to Mal di Ventre Island is available through local operators.

Table 8. Main characteristics of the Marine Protected Areas of Penisola del Sinis–Isola di Mal di Ventre

Area Marina Protetta "Penisula del Sinis–Isola di Mal di Ventre"	
Municipalities	Municipality of Cabras, Italy
Total area protected	26.703 hectares
Marine extension of the park	26.700 hectares
Office and contact	Corso Italia, 108, 09072 Cabras (OR)

Area Marina Protetta di Tavolara Punta Coda Cavallo (Sardinia, Italy)

The Area Marina Protetta di Tavolara Punta Coda Cavallo (Tavolara Punta Coda Cavallo Marine Protected Area, or MPA) was officially established in 1997 by with Ministerial Decree of 12 December, later amended by Ministerial Decree of 28 November 2001 (Figure 12). The area, located in northeastern Sardinia, was designated as a protected marine area due to its exceptional biodiversity and ecological significance, particularly for Mediterranean marine species and habitats.

The MPA is part of the Natura 2000 Network, classified as both a Special Area of Conservation (SAC) under the Habitats Directive (Directive 92/43/EEC) and a Special Protection Area (SPA) under the Birds

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Directive (Directive 79/409/EEC). The management has been entrusted since 01.01.2004 to a Consortium formed by the municipalities of Olbia, Loiri Porto San Paolo and San Teodoro (Table 9).

In the MPA all the allowed and forbidden activities are managed in detail by a definitive regulation (n°299) issued by the Ministero dell'Ambiente e della Tutela del Territorio del Mare, with a decree dated 03/12/2014. The Tavolara Punta Coda Cavallo MPA is divided into three protection zones to regulate human activities and ensure biodiversity conservation:

- Zone A (Full Reserve): Strictly protected areas where no human activity is allowed except for authorized scientific research and guided scuba diving tours in restricted areas and only on approved routes.
- Zone B (General Reserve): Areas permitting limited and regulated activities to ensure environmental protection and sustainable use. These include artisanal fishing, swimming, guided eco-tours, and mooring at designated structures. Navigation is allowed under strict regulations, such as speed limits and maintaining a safe distance from the coastline.
- Zone C (Partial Reserve): Areas with fewer restrictions, allowing controlled recreational and sustainable fishing activities under specific regulations.

The surveillance of the "Marine Zones" is carried out by the Port Authorities - Coast Guard, pursuant to Article 19, paragraph 7, of Law No. 394 of December 6, 1991, as well as by the Corpo Forestale e di Vigilanza Ambientale (CFVA) of the Autonomous Region of Sardinia, according to their respective competencies, and by other law enforcement agencies.

The Marine Protected Area Tavolara Punta Coda Cavallo covers the coast of north-eastern Sardinia, from Capo Ceraso to Cala Finocchio, and includes the islands of Tavolara, Molara and Molarotto. Approximately 15,000 hectares of sea under protection for the naturalistic value of the marine and island environments and for the level of conservation of *Posidonia oceanica* prairies, polychrome sponges and ichthyofauna.

The coastal territory is about 40 km, characterized by the ancient forms of Paleozoic granite, is rich in evocative coves, where the Mediterranean scrub, with imposing specimens of Juniper, Arbutus and phyllirea, reaches the sea. But it is the island system, which is the heart of the biodiversity of this area, that gives a particular charm to the landscape: the contrast between the limestone mass of Tavolara, the dragon island that rises from the sea, with its rugged and vertical shapes and the smaller islands of Molara, Molarotto, Piana and dei Cavalli, rounded and granitic.

The Marine Protected Area (MPA) of Tavolara - Punta Coda Cavallo boasts a rich array of marine and coastal habitats, including notable coralligenous formations, *Posidonia oceanica* meadows, and coastal dunes. Terrestrially, the MPA is home to rare and endangered species like Centaurea horrida, along with abundant species such as Brassica insularis, and the globally threatened Rouya polygama, all contributing to its unique biodiversity. The area also supports vital marine vegetation, including Cystoseira and Lithophyllum byssoides, essential for coastal and underwater ecosystems. Many of these species are endemic or of significant ecological value, further enriching the MPA's biodiversity. Therefore, the MPA) of Tavolara - Punta Coda Cavallo hosts a diverse range of marine and coastal species. Among marine invertebrates, notable species include lobsters, gorgonians, and limpets, which inhabit rocky and coralligenous seabeds. The MPA also supports abundant fish populations, such as groupers and bass, and is frequented by migratory species like basking sharks. Additionally, the area is crucial for seabird populations, including shearwaters, gulls, and cormorants, with significant nesting colonies found on the islands within the reserve.

The regulatory framework for the MPA of Tavolara - Punta Coda Cavallo is defined by its Management Plan, which follows the standardized Isea model used across Italian Marine Protected Areas. This

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framework employs a conceptual map to identify the values requiring protection, conservation objectives, potential threats, and the management actions necessary to address these challenges.

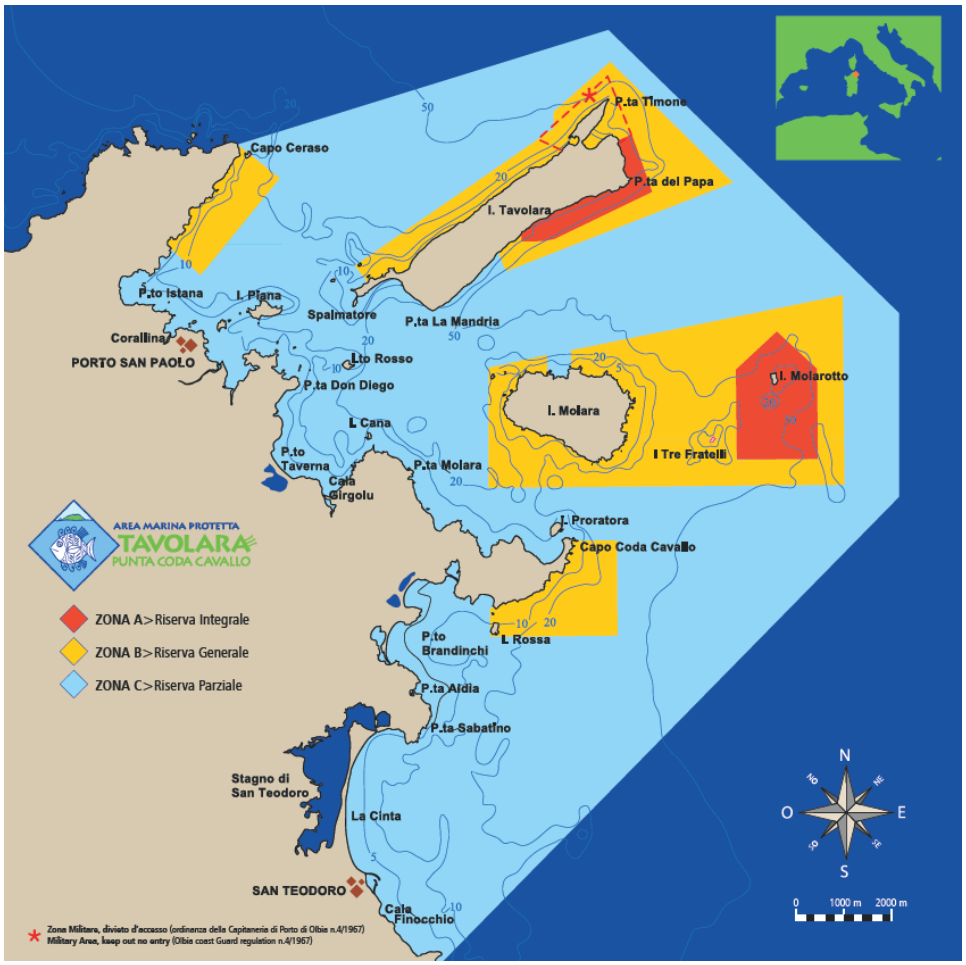

Figure 11. Zoning of the Area Marina Protetta di Tavolara Punta Coda Cavallo (Sardinia, Italy)

The MPA conducts extensive conservation and monitoring initiatives to balance ecological preservation with visitor engagement. Annual assessments of *Posidonia oceanica* meadows, a vital Mediterranean habitat, ensure their health through detailed mapping and ecological analysis. Sustainable small-scale fishing, restricted to resident fishers, supports the local economy while minimizing environmental impact. Monitoring programs for key species, such as sea urchins, regulate harvesting to prevent overexploitation. The "Reserve Effect" study further measures the positive outcomes of protective measures by analysing fish populations, identifying critical habitats, and refining conservation strategies.

Finally, the MPA's adherence to EMAS (Eco-Management and Audit Scheme) is of particular significance to the EFFECTIVE project. EMAS aims to promote voluntary environmental management practices within organizations, focusing not only on legal compliance but also on continuous environmental performance improvement, building trust with institutional partners and the public, and encouraging employee involvement.

To achieve this, the Marine Protected Area underwent a verification and certification process for its environmental management system, validated by an independent, accredited body.

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The managing authority carried out an initial environmental analysis, established its environmental policy, set objectives, and created a three-year environmental program. It then implemented an environmental management system that supports the development, execution, and maintenance of the environmental policy. The managing authority also conducted environmental audits to evaluate its performance and management system, followed by a public environmental statement. After the statement was validated, it requested registration in the European EMAS list (EMAS code I-000324). EMAS certification is an ongoing process, and the AMP is subject to annual checks by the certifying body to ensure continued compliance with environmental management standards.

Table 9. Main characteristics of the Area Marina Protetta di Tavolara Punta Coda Cavallo (Sardinia, Italy)

Area Marina Protetta di Tavolara Punta Coda Cavallo (Sardinia, Italy)	
Municipalities	Municipalities of Olbia, Loiri Porto San Paolo and San Teodoro, Italy
Total area protected	15,357 hectares of sea 76.094 kilometres of coastline
Marine extension of the park	15,357 hectares
Office and contact	Via San Giovanni 14, OLBIA (SS); 07026

Road-map implementation: work carried out

In the EFFECTIVE project, and during the period covered by this Deliverable, initial meetings have been carried out in the Sardinian parcs, to involve the management in the project. Table 10 shows these meetings.

Table 10. The EFFECTIVE project: Road-map meetings for the EBMS in the Sardinian Parcs.

2024	
February 20-22th	Working Sessions in Milano (Italy) with the One Ocean Foundation and FEDERPARCHI
October 23rd	First visit to the Director of the "*Area Marina Protetta "Penisula del Sinis–Isola di Mal di Ventre" (Sardinia, Italy)*"
October 24th	First visit to the Director of the "*Parco Nazionale dell'Arcipelago di La Maddalena (Sardinia, Italy*" (
	First visit to the President of the "*Area Marina Protetta di Tavolara Punta Coda Cavallo (Sardinia, Italy)*"
March 21st	Working session with OOF to select a person to work in Sardinia with the parks
April 3rd	Meeting contacts with park director to work with the information pillar

FINAL CONCLUSIONS

The strategy driven by the Ecosystem Approach (EA) has emerged during the last two decades as the dominant paradigm in formal policy tools to manage coastal and marine ecosystems. The EA ensures

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the adequate provision of ecosystem goods and services while facilitating a sustainable use of its marine resources in a holistic way. However, although the EA is seen at the beginning of numerous policy tools in the western world, and precise principles for its application (the Malawi principle) were developed, the practical uptake of the EA is still slow and the application, when observed, is only seen at large regional development (i.e. as the ones driven for the Maritime Spatial Planning Directive) but much less at different spatial scales.

As included in the COP5 Decision V/6 of the Convention on Biological Diversity, the EA has three main points of interest; (a) is based on the application of appropriate scientific methodologies focused on levels of biological organization, which encompass the essential structure, processes, functions and interactions among organisms and their environment. It recognizes that humans, with their cultural diversity, are an integral component of many ecosystems, (b) The EA requires adaptive management to deal with the complex and dynamic nature of ecosystems and the absence of complete knowledge or understanding of their functioning, and (c) The EA does not preclude other management and conservation approaches, such as biosphere reserves, protected areas, and single-species conservation programmes, as well as other approaches carried out under existing national policy and legislative frameworks, but could, rather, integrate all these approaches and other methodologies to deal with complex situation.

To facilitate the implementation of the EA into real practical applications, we have proposed the development of a standard managerial tool, the Ecosystem-Based Management System (EBMS) that can be systematically used by an effective governance structure (Sardá et al., 2014). The EBMS can help managers to understand space and time scales and find common ground, setting targets and recognising the value of the area involve in the management, and gathering consensus to design the best policy and adapt to change. A standardized stepwise process could help managers to ensure consistency in the development of management measures that address the aspirations of the stakeholders and meet legislative and regulatory requirements for any EA application.

Regarding conservation, Marine Protected Areas (MPAs) are planned and designed to meet long-term nature protection objectives. Although the majority of MPAs combine protection while trying to implement a sustainable development of different human activities by establishing different zoning restrictions, their ultimate vision is always to conserve biodiversity, habitat structure and the functioning of the ecosystem. At the EFFECTIVE project, we believe that the use of the EBMS in Marine Protected Areas (MPAs) can contribute to its better management and we are dealing with this issue in the project.

MAPs require an ultimate long-term vision to be managed effectively. At EFFECTIVE, we link that vision with the concept of Good Environmental State (GEnS). The final vision to be reached and/or maintained would be the operational downscale to the MPA social-ecological system of GEnS. Raise that vision and see the distance to it from what we have now, would be the initial task to deliver. Then, when designing the tactical and operational objectives for managing MPAs to reach their visions, the ecosystem-based management framework can be deployed and the EBMS is thought to help in this process. At EFFECTIVE, we proposed (a) to adopt the strategy of the European Union Marine Strategy Framework Directive in the use of GEnS for every MPA under protection that can be linked to its ecosystem services provision, and (b) to use the EBMS as the standard management tool to reach and/or to maintain this vision (Sardá *et al*. 2014). Five different MPAs have been contacted to start this process.

As it was indicated, the EBMS is aimed to be a standard adaptive management methodology to assist MPA managers by introducing a common set of tools and procedures and a common language that can be useful for facilitating knowledge transfer and capacity building when applied to these defined

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areas. In addition, the EBMS is easily scalable, and can be hierarchically introduced at different spatial scales which could facilitate the institutional coordination needed to solve the problem of policy fragmentation and differentiated responsibilities normally seen in reality. The EBMS is considered a quality assurance tool in itself being used in a vision-driven process of continuous improvement (looking for GES) which makes it necessary to reach a prior consensus for the desired future conditions of the MPA environment under management, something that lies in the basis of these designated areas.

The use of the EBMS will allow authorities to manage together, in an integrated way, the different functions of the MPA environment and the ecosystem services they provide. The EBMS adds new aspects not considered in a classical MPA management structure: a) MPA management is part of a clear long-term vision-driven process; b) MPA management adopts a holistic approach from a geographical perspective; c) it requires pressure analysis and institutional coordination inside clear participatory planning; d) planning is obtained through the use of risk management techniques; e) the concept of ecosystem service is a central piece of the system; f) MPA management uses the D(a)PSWR(m) as its analytical accountability framework of indicators; g) a good final state is based on state indicators using the GEnS concept; and h) it ensures timely participation by the local population. Finally, be being an standard system, the possibility for replicability and scalability of this particular tool increases the possibility to be used in a wider, global way.

When checking different MPA networks worldwide, a large number of already established MPAs work with a management structure and associated permanent staff. The management of these areas, however, is normally carried out using informal systems and tools. EFFECTIVE is aimed to make MPA management through EBMS application much more objective and formal, and consequently, more scalable and replicable worldwide. In the past we have been working closely with two already established MPA networks (MEDPAN-“Mediterranean network of Marine Protected Areas” and NEAMPAN-“North-East Asian Marine Protected Areas Network”); using these previous contacts, we will formulate several meetings with them after EBMS implementation would be completed in our parks. In addition, we applied this year to be present in the IUCN World Conservation Congress 2025 of the International Union for Conservation of Nature (IUCN) in Dubai to carry out an interactive session in the format of a toolbox session with the idea ro introduce the EBMS to the IUCN world and all its associated partners.

An easy final conclusion of this global pattern is that every MPA constitute a particular case, it takes time to understand in which way they are working and accomplishing its desired objectives. The use of a standard system for such management would help a dialogue between different stakeholders involved. In addition, there are many other MPAs that are just drawings in a paper; for these cases to have a standard system would facilitate the departure of its managerial work. A correct management cycle of these areas should be focus on measures (monitoring programs) that allow managers to alleviate negative pressures for the correct functioning of the area, disclosing all the information following sustainable transparent principles. Effective governance structures and well-known applicable tools are needed for this change and the Ecosystem-Based Management System (EBMS) has been designed to facilitate this process.

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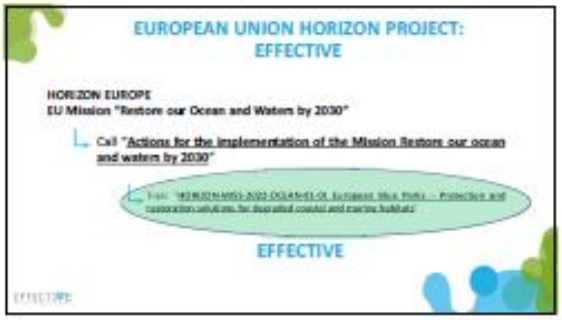
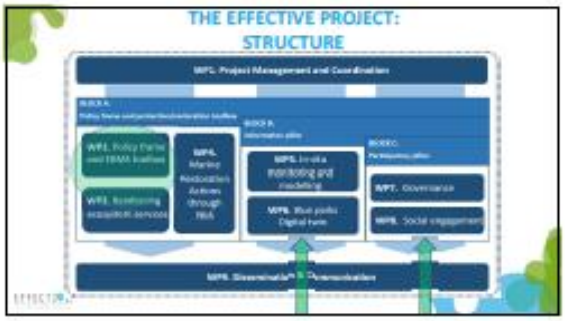
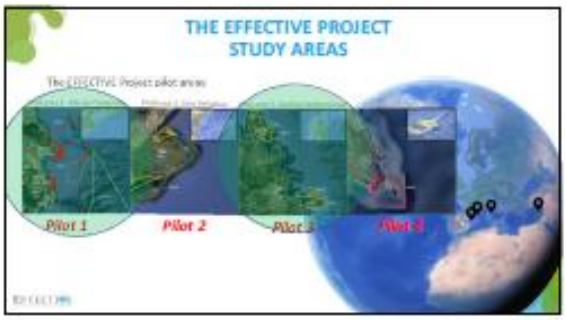
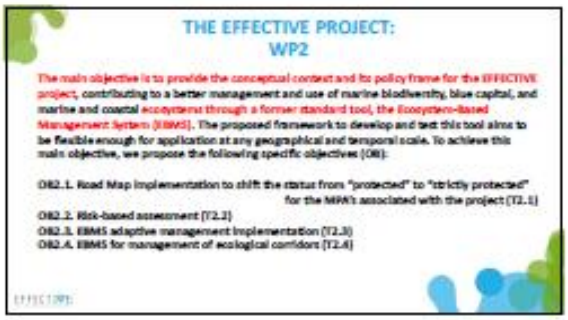
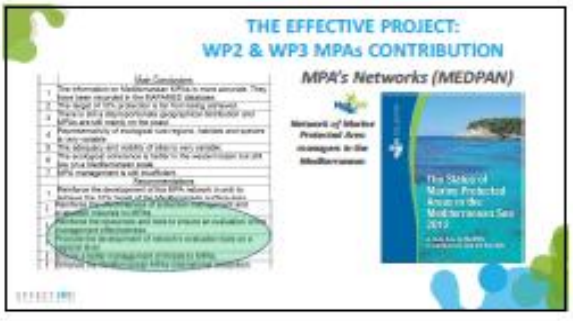
ANNEX 1.- Training Session Road-map EBMS











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THE EFFECTIVE PROJECT: WP2
Task 2.1: ROAD MAP FOR THE EBMS
(PILOT 1)

- 24 de Abril. Primera visita al Director del Parque Natural de las Medes, Montgrí i Baix Ter (PNMMBT) (Ramón Alturo)
- 27 de Abril. Primera visita al Director del Parque Natural del Cap de Creus (PNCC) (Pere Pella)
- 7 de Junio. Primera visita a Marc Vilahur, Director General de Políticas Ambientales de la Generalitat de Catalunya
- 29 de Julio. Visita al alcalde de Torroella de Montgrí
- 16 de Septiembre. Visita a los gestores de INTEMARES (Fundación Biodiversidad): gobernanza de parques marinos; en la actualidad están valorando una gobernanza para el LIC de los cañones del Mediterráneo occidental.
- 2 de Octubre. reunion con Marc Vilahur
- 28 de Noviembre. Segunda visita al PNCC (Pere Pella y Arántxa Purroy)
- 1 de Diciembre. Segunda visita al PNMMBT (Ramón Alturo y Arántxa Purroy)
- 22 de Enero. reunion con Perl Canals (El Timel-MEDPAN)
- 24 de Enero. conversación "online" con Marc Vilahur (Ramón, Pere, Arántxa, Anna)
- 29 de Enero. Reunión de trabajo con Xavi Escoté (PCN – Open Mandarin)
- 8 de Febrero. Training Day (NP Cap de Creus and Medes Montgrí)

THE EFFECTIVE PROJECT: WP2
Task 2.1: ROAD MAP FOR THE EBMS
(PILOT 3)

- 20-22 de Febrero. Visita en Milán a DDP y FEDERPARCHI para decidir que dos parques italianos se asociarán con este proyecto en el Piloto II.
- 28 de Octubre. Primera visita al Director del Parque Natural de Sinis (Sardinia, Italy) (.....)
- 24 de Octubre. Primera visita al Director del Parque Nacional de La Maddalena (Sardinia, Italy) (Giulio Placitu)
- 24 de Octubre. Primera visita al Director del Parque Natural de Tavolara (Sardinia, Italy) (.....)

EFFECTIVE
PROTECTION AND RESTORATION MANAGEMENT - MEDITERRANEAN MPAS

Enhancing social well-being and economic prosperity by reinforcing the EFFECTIVEness of protection and restoration management in Mediterranean MPAs

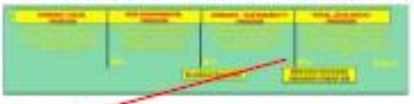
THE PROCESS

EUROPEAN UNION:
BIODIVERSITY STRATEGY 2030

The EU's biodiversity strategy for 2030 is a comprehensive, ambitious and long-term plan to protect nature and reverse the degradation of ecosystems. The strategy aims to put Europe's biodiversity on a path to recovery by 2030, and contains specific actions and commitments. The strategy contains specific commitments and actions to be delivered by 2030.:

- ✓ Establishing a larger EU-wide network of protected areas on land and at sea.
- ✓ Launching an EU nature restoration plan.
- ✓ Introducing measures to enable the necessary transformative change
- ✓ Introducing measures to tackle the global biodiversity challenge and working towards the successful adoption of an ambitious global biodiversity framework under the Convention on Biological Diversity.

THE ECOSYSTEM APPROACH Strategy (CBD, 1998)



The Ecosystem Approach-EA" (CBD, 1998) is a strategy advocated by the United Nations for the integrated Management of land, water and living resources that promotes the conservation and sustainable use of Natural Capital in an equitable manner.

- ✓ Develops new management approaches (e.g. "Ecosystem-Based Management-EBM")
- ✓ It groups together the human, biological and physical part of the system for which management actions are needed

THE ECOSYSTEM APPROACH
THE MALAWI PRINCIPLES

THE ECOSYSTEM APPROACH
ROAD MAP FOR IMPLEMENTATION

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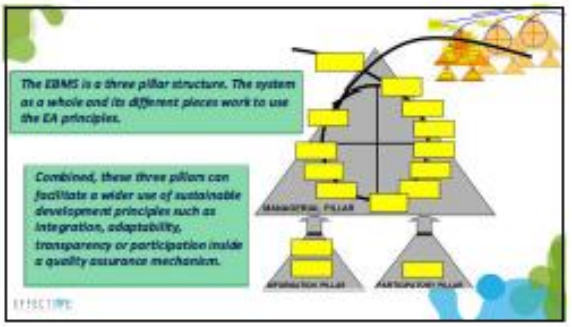

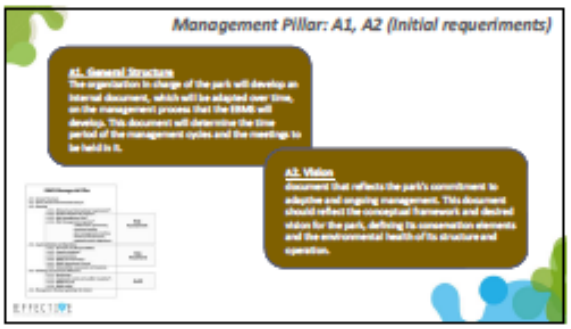

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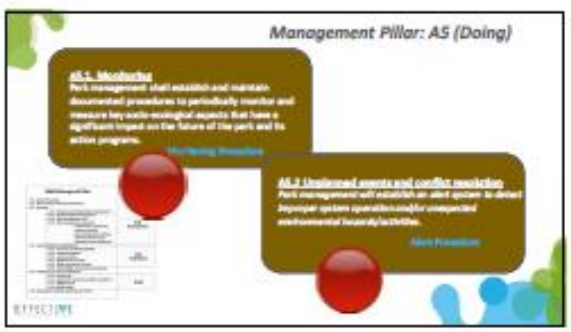

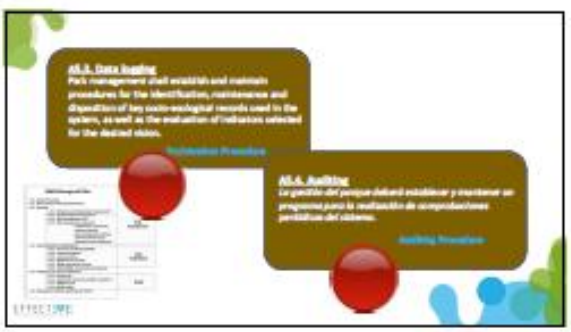

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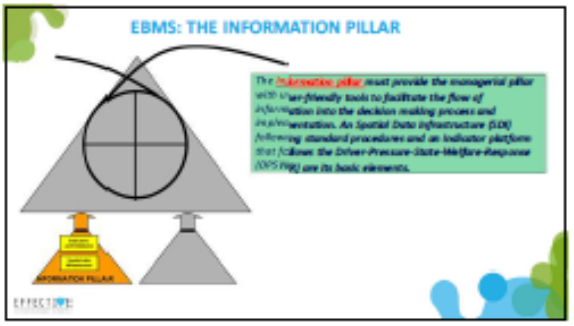

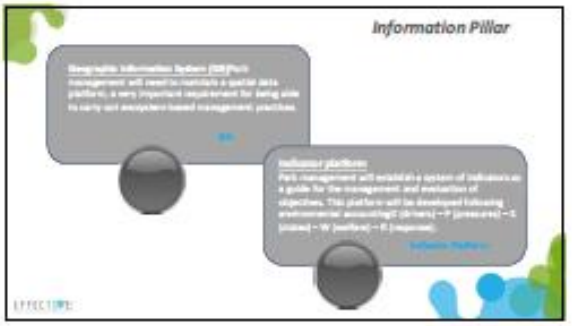

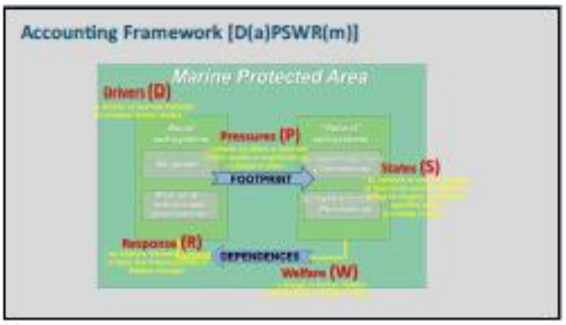

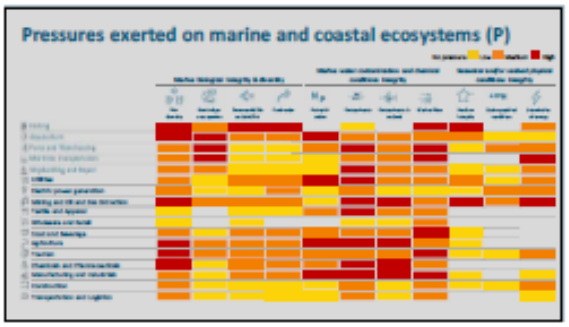

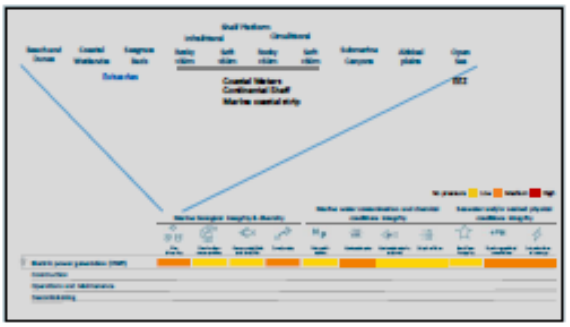

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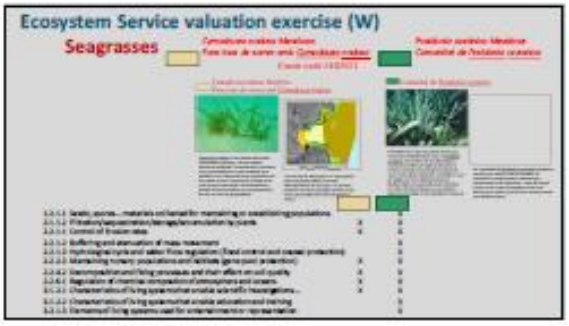

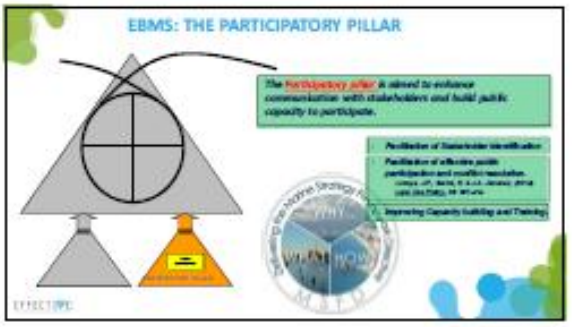

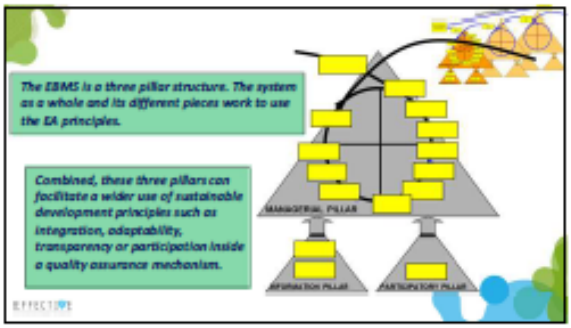

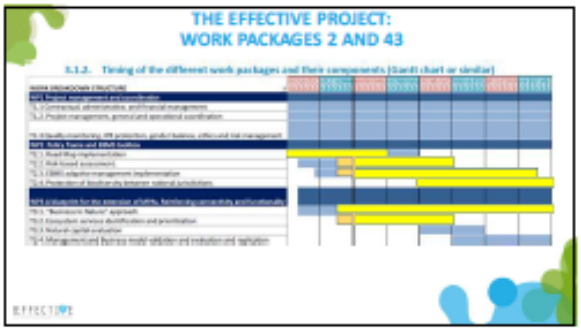

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