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Advancing Ecosystem-Based Management Implementation for Coastal Resilience

A case study research about cross-sectoral interplay in the
 Social-Ecological System of the Mar Menor

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ABSTRACT

Coastal ecosystems provide essential goods and services to societies. Nevertheless, these ecosystems are experiencing rapid degradation worldwide. Increasing coastal uses that exert cumulative pressures on coastal environments jeopardise the provision of ecosystem services such as food, coastal protection and recreation. In the case of the Mar Menor, a coastal lagoon in Spain, sectoral management has been unable to provide solutions to the degradation of the ecosystem from human impacts and recurring anoxia events in the lagoon are threatening human well-being of coastal communities dependent on the lagoon.

Scientists and policymakers recommend implementing Ecosystem-based Management (EBM) to increase the resilience of coastal social-ecological systems. Nevertheless, its implementation in coastal areas remains challenging due to the mismatch with the institutional design of a traditional sectoral management of the coast. Increasing cross-sectoral interplay of actors is promoted for bridging sectoral actors in management and operationalising EBM. Therefore, this study investigates through interviews and document analysis how coordination, cooperation and participation of actors involved in coastal management is organised in the case of the EBM implementation in the Mar Menor and its social-ecological system.

The results of this study show that cross-sectoral structures like commissions or committees can contribute to the integration of the wide spectrum of stakeholders in coastal management to ensure coherent action with EBM objectives and foster sharing of local and scientific knowledge for adaptive management. Meanwhile, this research indicates that power relations and political will are key hindering factors for cross-sectoral interplay and thus need to be addressed for operationalising EBM. Therefore, suggestions are given in order to further advance in EBM implementation, such as changing political priorities, increasing the awareness of the benefits of cooperating with scientific and local actors and designing strong legal basis for stakeholder participation.

Keywords: Coastal, Ecosystem-Based Management, Resilience, Social-Ecological Systems, Multisectoral Coastal Use, Integrated Coastal Zone Management, Cross-sectoral Interplay

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ABBREVIATIONS

CHS - Segura Hydrographic Confederation

DWALFEE - Department of Water, Agriculture, Livestock, Fisheries, Environment & Emergencies

DGMM - Directorate-General of the Mar Menor

EBM - Ecosystem-based Management

IAF - Inter-administrative Forum for the Mar Menor

IDC - Interdepartmental Commission of the Mar Menor

METDC - Ministry of the Ecological Transition and Demographic Challenge

MTPD - Maritime-Terrestrial Public Domain

SES - Social-ecological Systems

SESMM - Social-ecological System of the Mar Menor

SPC - Social Participation Committee of the Mar Menor

SAC - Scientific Advisory Committee of the Mar Menor

1. INTRODUCTION

Coastal ecosystems are within the most valuable and productive ecosystem in the world (Economidou, 1982, Caddy and Bakun, 1994). Due to the dynamics and complex systems in the interface between the sea and land, there is a wide array of coastal ecosystems such as coastal wetlands, mangroves, dunes, sandy and rocky shores, seagrass beds, kelp beds and coral reefs (Nichols et al., 2019). Coastal ecosystems provide benefits to societies, named ecosystem services, many of them being essential for humans and their economy (Barbier et al., 2011, de Andrés et al., 2020) such as food, coastal protection, air and water purification and recreation services (Economidou, 1982, Barbier et al., 2011). However, coastal ecosystems are increasingly degraded due to anthropogenic impacts thus threatening the provision of ecosystem services (Barbier et al., 2011, Refulio-Coronado et al., 2021). The highest rate of coastal ecosystem degradation or loss worldwide account for 50% of salt marshes, 35% of mangrove (Barbier et al., 2011), 29% of seagrass beds (Waycott et al. 2009) and 27% of coral reefs (UNEP, 2006). Human impacts that deteriorate the environment are direct habitat destruction, degraded water quality, introduction of invasive species, overexploitation of natural resources and climate change (Waycott et al. 2009, Nichols et al., 2019). As a consequence, the resilience of coastal areas, including humans and ecosystems, is decreasing threatening human wellbeing and environmental quality.

The largest European coastal lagoon, the Mar Menor, is not an exception. The Mar Menor, located in the Region of Murcia, southeast Spain, and considered “Wetland of International Importance” according to the Ramsar Convention (Ramsar, 1999) is suffering for decades the impacts of human activities such as urbanisation, mining and agriculture to the point that the lagoon has experienced repeated events of anoxia and the consequent death of thousands of fish, eels and other marine species living within it (TAF, 2021) (see figure 1). The main contributor to the anoxia events in the Mar Menor is the input of nutrients (through the aquifer and runoff water) from the industrial agriculture fields located in the adjacent area of “el Campo de Cartagena” (TAF, 2021). However, the different activities taking place in the ecosystem connected to the Mar Menor are also contributing to its collapse (Heezen and Fernández, 2022). As a result, the ecosystem services from which coastal communities benefit are being threatened and so is human wellbeing (TAF, 2021).



Figure 1. Dead fish in the shore of the Mar Menor after an anoxia event in August 2021 (source: UNOISAAC from *Ecologistas en acción*, 2021b)

Coastal and marine areas and its resources have been managed traditionally through fragmented and sectoral approaches (Kelly et al., 2018) which focus is on a policy sector or specific species and often fails achieving policy objectives (Long et al., 2015). Conventional management misses to address the complexity and interconnectedness of humans and ecosystems. The competing use of common property resources in the land and sea generates conflicts between stakeholders often leading to the degradation of the functional integrity of resource systems (Thia-Eng, 1993). As a consequence, sectoral management leads to the depletion of resources and ecosystem degradation (Altvater and Passarello, 2018) weakening the capacity of coastal communities for resilience (Cullen-Unsworth et al., 2014).

Therefore, complex environmental problems such as resource scarcity, biodiversity loss and climate change cannot be addressed with sectoral approaches, but need to apply a holistic, interdisciplinary and integrative approach that acknowledges the complexity and interactions of social and ecological systems and seeks for its resilience and sustainability (Folke, 2006, Binder et al., 2013). In addition, transboundary impacts from human activities across ecosystems requires a more holistic approach that addresses the complex connections between river basins, coastal areas and marine systems (UNEP and GPA, 2006).

Ecosystem-based Management (EBM) (also referred as ecosystem approach) is an alternative to conventional and sectoral approaches which recognises the nature of coastal systems as socio-ecological systems and manages human activities accordingly for conserving ecosystem functions and services for the wellbeing of humans and the increase of the resilience of coastal systems (McLeod et al., 2005). Thus, it can be considered as a guiding concept in modern resource governance as, for instance, in different European Directives such as the Marine Strategy Framework Directive and the Water Framework Directive (Borgström et al., 2015).

1.1 PROBLEM STATEMENT

The implementation of EBM is problematic (Alexander and Haward, 2019), even considered a “wicked problem” (Berkes, 2012). Implementing EBM is often frustrated due to the difficulty to integrate sectors which have traditionally managed the coast sectorally (Alexander and Haward, 2019). Indeed, conflicting and sectoral policies as well as the wide array of authorities with their own policies and rules are one of the main causes hampering EBM operationalisation (van Leeuwen et al., 2014). Österblom et al. (2010) state that “the existing multi-level governance institutions are specifically set up for dealing with individual sectors, but do not adequately support an operational application of the ecosystem approach” (p. 1290). In addition, EBM requires stakeholder involvement in the management (Long et al., 2015) to properly execute integrated management. Consequently, EBM faces a mismatch with the institutional design resulting from the traditional sectoral approach and non-participatory era which hinders EBM operationalisation (Alexander and Haward, 2019; O’Higgins et al., 2020). This problem is generalised in many coastal areas, like the Mar Menor, where EBM policy is unsuccessfully implemented in practice and a sectoral management still prevails, challenging resilience of coastal social-ecological systems.

1.2 RESEARCH AIM AND QUESTIONS

EBM is considered an appropriate approach for increasing sustainability and resilience of coastal areas and it has thus been promoted in policy since the 1990’s (Borgström et al., 2015). However, there is a need for more knowledge on how to effectively implement EBM in coastal areas. This is because EBM requires an integrated management of the coast and it remains difficult to achieve it within a typical sectoral organisation of coastal management. Coordination,

cooperation and participation are promoted for increasing the integration of sectoral actors in management (e.g. Thia-Eng, 1993; Pickaver et al., 2010). These three interaction concepts are integrated in a unique one: cross-sectoral interplay. Thus, incrementing cross-sectoral interplay would contribute to a more integrated management of the coast which is required under EBM (Alexander and Haward, 2019). Accordingly, this study aims to find effective ways to increase cross-sectoral interplay for sector integration in management with the final aim of operationalising EBM for the increase of coastal resilience. Then, the main research question of this study is:

How can cross-sectoral interplay be fostered to increase integrated management and thus, advance EBM implementation for coastal resilience?

Furthermore, in order to help answering the main research question, the following three sub-questions are addressed:

1. How can EBM contribute to coastal resilience from human impacts in the Social-ecological System of the Mar Menor (SESMM)? To answer this question, literature review was conducted to describe the concepts and create the analytical framework. Then, data was collected from the case study through document analysis and semi-structured interviews to learn about the contributions that the EBM Strategy has done and could make in the SESMM regarding resilience to human impacts. The results are presented in the results chapter and discussed in chapter 5.

2. What sectoral actors are there in the SESMM management? For this question, a description of typical actors in coastal management is presented in the theoretical framework. This information is collected from literature review. Finally, the results chapter presents the findings regarding existing actors in the case study that were identified through document analysis and semi-structured interviews and gives a base for the following sub-question.

3. How is cross-sectoral interplay organised in the management of the SESMM and what factors fostered and hindered cross-sectoral interplay? Finally, for answering this question, the theoretical framework describes the role of cross-sectoral interplay in integrated management as well as its main hindering and enabling factors through literature review. Then, the results chapter presents the way cross-sectoral interplay was fostered in the case study and the enablers and hinderers found through document analysis and semi-structured interviews.

1.3 SOCIETAL AND SCIENTIFIC RELEVANCE

EBM is an approach that aims to maintain ecosystems in a healthy and resilient status to ensure their capacity to provide benefits, named ecosystem services, to societies and thus, ensure human wellbeing (McLeod et al., 2005). Ecosystem services are essential to humans not only for their health but also their economy. For example, coastal ecosystems provide food and timber, coastal protection and erosion control thus reducing costs of protection and economic losses from storms. They are also important for tackling climate change due to their function as carbon sinks (Barbier et al., 2011). As such, EBM is an approach that aims for the sustainable use of coastal resources to avoid the collapse of coastal ecosystems which would negatively affect the economy and society. Therefore, advancing the knowledge on how to effectively implement EBM can contribute to tackling current global problems such as climate change and resource scarcity and build healthier coastal ecosystems and more resilient societies. In addition, this study contributes to environmental planning and management science as there is missing

knowledge for the effective implementation of EBM in coastal areas and how EBM translates into practice.

2. THEORETICAL FRAMEWORK

This chapter presents the theoretical framework to answer the research questions with the final aim to find enabling factors for cross-sectoral interplay to advance EBM implementation for coastal resilience. First, the concepts of social-ecological systems and its resilience in the coast are presented. Then, EBM is described as well as its relation to coastal resilience. Finally, the last section introduces the different policy sectors and sectoral actors relevant in coastal management, the forms of interplay that contribute to an integrated management and the hindering and enabling factors that influence cross-sectoral interplay.

2.1 THE COAST AS A SOCIAL-ECOLOGICAL SYSTEM AND ITS RESILIENCE

How can the coast be theoretically conceptualised?

Social-Ecological Systems (SES) are complex adaptive systems (CAS) that recognise society as part of the natural environment, both being interrelated and co-evolving (Berkes and Folke, 1998) (see figure 2). This is an integrated way of understanding the reality of the physical world which conceptualises systems under a “humans-in-nature perspective” (Folke et al., 2010) and highlights the inherent complexity, non-linearity, multi-equilibrium and self-organising nature of CAS (Berkes and Folke, 1998).

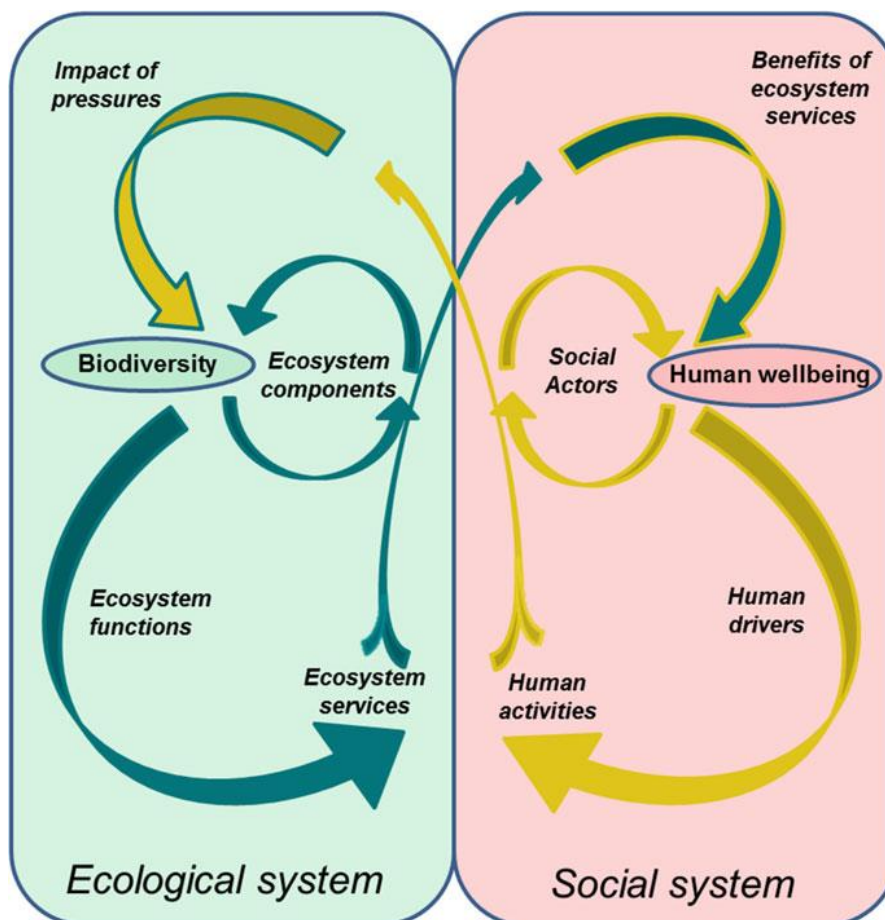


Figure 2. Representation of the social-ecological system and the interrelations between ecological and social system (source: Piet et al., 2020)

Especially, coastal areas are characterised by having complex and dynamic ecosystems (Nichols et al., 2019) which coexist with different human uses and activities that exert cumulative pressures on the environment (de Andrés and Barragán, 2022). In addition, Lloyd et al. (2013) argue that those interactions between social and natural components in coastal areas are dynamic and unpredictable, as SESs are CASs (Pahl-Wostl, 2006). Therefore, coastal planning and management that makes any distinction between natural and human systems of the coast is artificial and arbitrary as both are interconnected (Berkes and Folke, 1998).

Nowadays, the different uses in coastal areas are increasing and so are the actors who interact with the environment leading to increasing impacts of pressures and threatening the capacity of the ecological system to provide ecosystem services for human well-being (Levin and Lubchenco, 2008). Accordingly, de Andrés and Barragán (2022) suggest understanding the coast as a SES for a better delimitation of the scope of management. A SES perspective in coastal management is adequate for addressing not only the human activities that are directly placed in the coast and then, have impacts on the coastal environment, but also those further inland that are interconnected to the coastal ecosystem and have impacts in the coastal ecosystem too (de Andrés and Barragán, 2022). Furthermore, conceptualising the coast as a SES requires a shift from conventional management approaches towards dynamic ones able to operate within changing and self-organizing systems (Piet et al., 2020).

What is resilience of SESs?

Resilience is an ability inherent of complex SESs (Davoudi, 2012; Cosens and Fremier, 2014). Although the meaning of the Latin word resilience, “resiliere”, means “to jump back” and was used to refer to the capacity to return to a previous situation after a crisis (Beatley, 2009), the meaning has evolved across disciplines during the last decades to the most recent conceptualization applied to SESs which describes system’s ability to absorb disruptions, to self-organise but also to learn from and adapt to disruptions (Restemeyer, 2018). Similarly, the fifth IPCC report defines resilience as “the capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation” (IPCC, 2014, p.5).

In this more recent conceptualization of the term, resilience does not mean to go back to the previous state, but to learn and adapt to a less vulnerable one (Davoudi, 2012). Accordingly, SES resilience is determined by three key dimensions and can thus guide resilience analysis: robustness, adaptability and transformability (Restemeyer, 2018; Beatley, 2009). First, robustness is the ability of the system to absorb a shock or crisis without changing its status (Restemeyer, 2018). For example, Levin and Lubchenco (2008) describe the robustness of an ecosystem as its capacity to continue functioning and sustain the provision of ecosystem services over time despite disruptions from human impacts.

Adaptability is the capacity of actors to learn from and respond to disruptive events and trends and evolve to less vulnerable circumstances (Beatley, 2009). Adaptability relates to changes in the system or self-organisation that reduce the system's vulnerability to disturbances (Restemeyer, 2018). In dry coastal regions, adaptability could mean for instance building retaining structures like reservoirs to be resilient to draughts. And finally, transformability is the capacity to make a transition to a new system through innovative solutions (Restemeyer, 2018) under proven untenable or unsustainable conditions of the existing ecological, economic, or social structures (Walker et al., 2004). Transformability involves societal change (Restemeyer, 2018) where experimentation and learning play an important role (Folke et al., 2010). Folke et al. (2010) describe a case of governance transformation in the Great Barrier Reef that resulted

in the shift from protecting specific coral reef areas to the management of the larger marine environment.

Building resilience of SESs requires systems thinking thus increasing understanding of social and ecological system's interconnections and their multiple feedback processes (Folke et al., 2005). As described before, SES interactions are complex and often unpredictable. As a result, there are limitations on the knowledge of SESs and its interconnections (Restemeyer, 2018). Therefore, SES resilience entails fostering adaptive capacity of both the social system and the physical system (Restemeyer, 2018). This is supported by Beatley (2009) who states that "resilience requires thinking holistically, and taking many steps to *grow* a coastal culture and coastal societies that are resilient" (p. 11). Thus, increasing coastal resilience could involve adapting the environment to reduce probability and consequences of the disturbance as well as increasing the adaptive capacity of the social system.

Resilience to what and for whom?

In the process of resilience building of SESs, power and politics need to be considered because "in society there are always rewards and punishments" (Davoudi, 2012, p. 303). As Davoudi (2012) argues, building resilience is a political process which links to issues of justice and fairness and often leads to unequal distribution of benefits. Some individuals or groups gain resilience while others might lose it. Accordingly, assessing resilience in a specific context must first analyse and raise up the following questions: resilience to what and for whom? (Davoudi, 2012; Walker and Leyshon, 2017).

Resilience building processes in coastal areas are often addressed to natural hazards (e.g. Masselink and Lazarus, 2019) such as extreme events, sea-level rise and flooding however, as the EUROSION project highlights, a resilient coast also needs to cope with changes induced by human impacts (Salman et al., 2004) as an increasing disturbance in many coastal systems, for example the case study of the Mar Menor. Since resilience in practice has a different meaning for the distinct stakeholders, resilience building requires a process of negotiation of the problem description, approaches, solutions and potential outcomes (Walker and Leyshon, 2017).

In addition, resilience is not equal in all the spatial and temporal contexts. According to Cutter (2016), systems contain an inherent resilience depending on their characteristics. For example, a low coast might be more susceptible to damage from storm surges than elevated coasts. Moreover, adaptive resilience differs between individuals, stakeholders and governance structures due to their different capacity to learn and change after disturbances and successfully respond, recover and adapt to new conditions. For that reason, governments and agencies need to consider the differences in the physical, social, political and economic context to avoid inequalities in the resilience outcomes (Cutter, 2016). Thus, in order to give the same opportunities to stakeholders to function, learn and transform, the measurement and assessment of resilience must consider them in an integrated way and understand their complexity (Walker and Leyshon, 2017).

2.2 ECOSYSTEM-BASED MANAGEMENT

What is Ecosystem-based Management?

Ecosystem-based Management (EBM) or Ecosystem Approach (hereafter, the concepts are used analogously, but with more emphasis on EBM) is defined as an "integrated, science-based

approach to the management of natural resources that aims to sustain the health, resilience and diversity of ecosystems while allowing for sustainable use by humans of the goods and services they provide” (Kappel et al., 2006, p.1). This definition matches McLeod et al. (2005) definition, agreed upon by a large scientific and policy expert community, which emphasises the holistic perspective of the approach to ecosystems, including humans and thus, the purpose to maintain the health, function and productivity of the ecosystem for protecting human wellbeing. In addition, moving away from a focus on single components (species, sector, activity, etc), EBM considers the cumulative pressures and impacts of different sectors on the ecosystem (McLeod et al., 2005).

Given that “resource management is people management” (Berkes and Folke, 1998, p.2), EBM results in a strategy that manages human activities having pressures and impacts on the ecosystems and, by fostering understanding of their interconnections, considers those effects in the decision-making process (Long et al., 2015). In addition, it has been promoted as an appropriate approach to deal with environmental problems named as wicked problems, such as climate change, biodiversity loss or food insecurity, which are difficult to solve due to its complexity and interrelatedness characteristic from SESs, making the problem persistent and with no clear end. Unlike conventional management that has often designed solutions to wicked problems resulting in winners and losers, EBM seeks to achieve agreed solutions that balance trade-offs (O’Higgins et al., 2020).

Long et al. (2015) identify 15 key principles of EBM in a systematic literature review of recent publications in order to clarify the “essential ingredients” for the successful implementation of EBM. The 15 principles of EBM, from most to less frequently acknowledged in literature, are presented in figure 3.

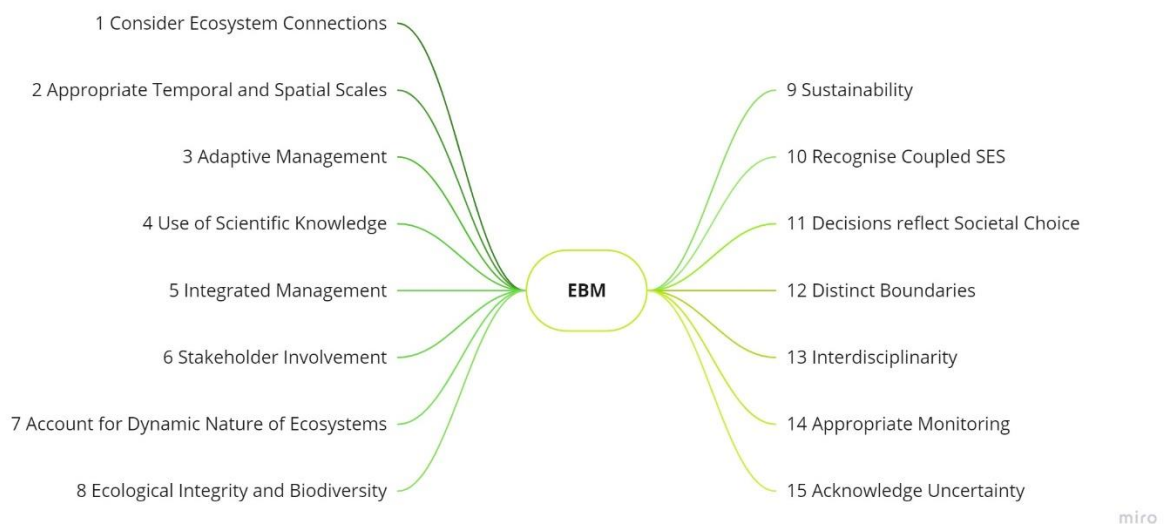


Figure 3. The 15 key principles of EBM identified by Long et al. (2015), from more commonly acknowledged in literature (dark green, n° 1) to less commonly (light green, n° 15) (Author, 2022)

How can EBM increase coastal resilience?

EBM is promoted as an approach for increasing SES resilience in coastal environments (e.g. McLeod et al., 2005; Piet et al., 2020). As described in section 2.1, acknowledging SESs and understanding their interconnections is essential for building resilience (Folke et al., 2005). In

addition, the fact that knowledge on SESs is limited requires fostering the adaptive capacity of the social system and the physical system (Restemeyer, 2018). The implementation of EBM does so through different of its key principles presented in table 3, as described hereunder.

On the one hand, EBM is an approach that requires the recognition of coupled SES and considering ecosystem connections which needs to be addressed at the early stage of an EBM process in coastal planning and management and thus, generate knowledge about the full complexity of the SES (Piet et al., 2020). Indeed, the implementation of EBM should address the complex natural and social interactions that characterise the area to be managed (De Andrés and Barragán, 2022). Cutter (2016) argues that it is necessary to understand the scale at which the coupled SES occurs to foster resilience within a system and thus, implementing EBM can contribute to develop that knowledge. By acknowledging the interconnections in the ecosystem, coastal management can address impacts that are foreseen by the knowledge base of the SES (O’Higgins et al., 2020) and therefore, adapt to a more resilient system.

The knowledge necessary for managing coastal resources cannot be possessed by a single agency or actor but is rather spread and contained among national, regional and local actors and agencies (Berkes, 2009). Accordingly, stakeholder involvement through participatory governance, which is promoted in EBM, can integrate traditional, local and scientific knowledge (McLeod et al., 2005). Indeed, use of scientific knowledge is fundamental for EBM (Long et al., 2015; Piet et al., 2020). Thus, inclusive and collective governance of ecosystems aimed by the ecosystem approach leads to higher SES resilience (Delacámara et al., 2020).

Since EBM strategies must acknowledge uncertainty as a result of SESs being complex and their interconnections often unpredictable (Piet et al., 2020), EBM incorporates “adaptive management into ecosystem plans as an approach to learning from management actions that allows for scientifically based evaluation, testing of alternate management approaches, and readjustment as new information becomes available from carefully designed monitoring programs” (McLeod et al., 2005, p. 5). Indeed, EBM fosters adaptive management therefore enabling an incremental process (Börgstrom et al., 2015) that improves in each adaptive management cycle by including new data from monitoring and learning from experience (Piet et al., 2020). All in all, EBM can be considered to foster a transition to an adaptive and integrated management.

Finally, EBM is an appropriate approach for providing balanced benefits. Delacámara et al. (2020) explain that conventional approaches focus on single benefits while “EBM is characterised by multiple functions and benefits, thus being able to strike the balance, at once, between different policy domains” (p. 48). It aims at maximising, under the limits of the ecosystem, the joint value of the ecosystem services (Delacámara et al., 2020) and thus, the resilience building process can be justly and equitably shared among society.

Operationalising EBM

This study focuses on the implementation phase of EBM, in which the EBM plan is operationalised. EBM can be considered a “wicked problem” (Berkes, 2012) due to the complexity of its implementation (Berkes, 2012; Link and Browman, 2017). This is because often the goals of implementing coastal EBM are the increase of resilience and sustainability of coastal ecosystems which results in dealing with many interests and sectors (Berkes, 2012).

The implementation of EBM is the process in which the measures planned in the planning process are put into practice (Piet et al., 2020). Although public authorities are the ones responsible for implementing such measures within their competences (Cormier et al., 2017), it

is critical to engage and maintain a close communication with stakeholders (Link and Browman, 2017). Thus, Berkes (2012) suggests that new revolutionary practices need to guide the process: “cooperative, multilevel approaches involving partnerships, social learning and knowledge co-production” (Berkes, 2012, p. 473). Making EBM operational in practice would then first entail having a plan which measures and actions are to be implemented by authorities or relevant actors. In addition, those revolutionary practices that Berkes (2012) asks for should be proposed in the plans as actions to build a governance structure that allows the participation of stakeholders in coastal management or the integration of scientists and their knowledge in the decision-making process.

2.3 SECTORAL INTEGRATION FOR EBM OPERATIONALISATION: SECTORS AND CROSS-SECTORAL INTERPLAY

Responsibilities to manage the coast are divided among different sectoral actors. Hereunder, these policy sectors and actors are described. In addition, this section explores the interaction between sectors and how this interaction can be enabled or hindered by different factors to make a more integrated management of the coast and advance towards a resilient and sustainable use of the coast under EBM.

2.3.1 Policy sectors and sectoral actors

What are the principal coastal and marine uses and activities and their relationship?

Nowadays, the coast hosts a wide range of human uses and activities within its land and sea space. Cicin-Sain and Knecht (1998) present a list of the principal groups of consumptive and non-consumptive uses and activities: Navigation and communication, coastal infrastructure development, living marine resources, mineral and energy resources, waste disposal and pollution prevention, ocean and coastal environmental quality protection, tourism and recreation, beach and shoreline management, research, and military activities. Within each of these resource or activity groups there are a larger list of activities, for example, living marine resources includes fishing, aquaculture, biotechnology application of marine resources, and others. In addition, activities that take place far inland from the coast but that affect the coastal environment are also included, for instance, agriculture is considered within waste disposal and pollution prevention as a nonpoint source of coastal and marine pollution (Cicin-Sain and Knecht, 1998). Figure 4 presents the trends of the main activities in the Mediterranean Sea.

Being limited in space and resources, conflicts arise in coastal areas due to competing interests and uses (Thia-Eng, 1993; Alexander and Haward, 2019). The possible interactions among users in the coast are distinguished by Couper (1983) as follows: i) conflicting or harmful interactions, ii) potentially harmful interactions, iii) mutually beneficial interactions, iv) harmful to one activity or use but beneficial to the other. For example, a conflicting interaction could be among fishing and offshore energy, as fishing is often not allowed within offshore wind farms. These different interactions among users are important to be acknowledged by coastal managers in order to understand the complementarity or not of uses and activities in the coast.

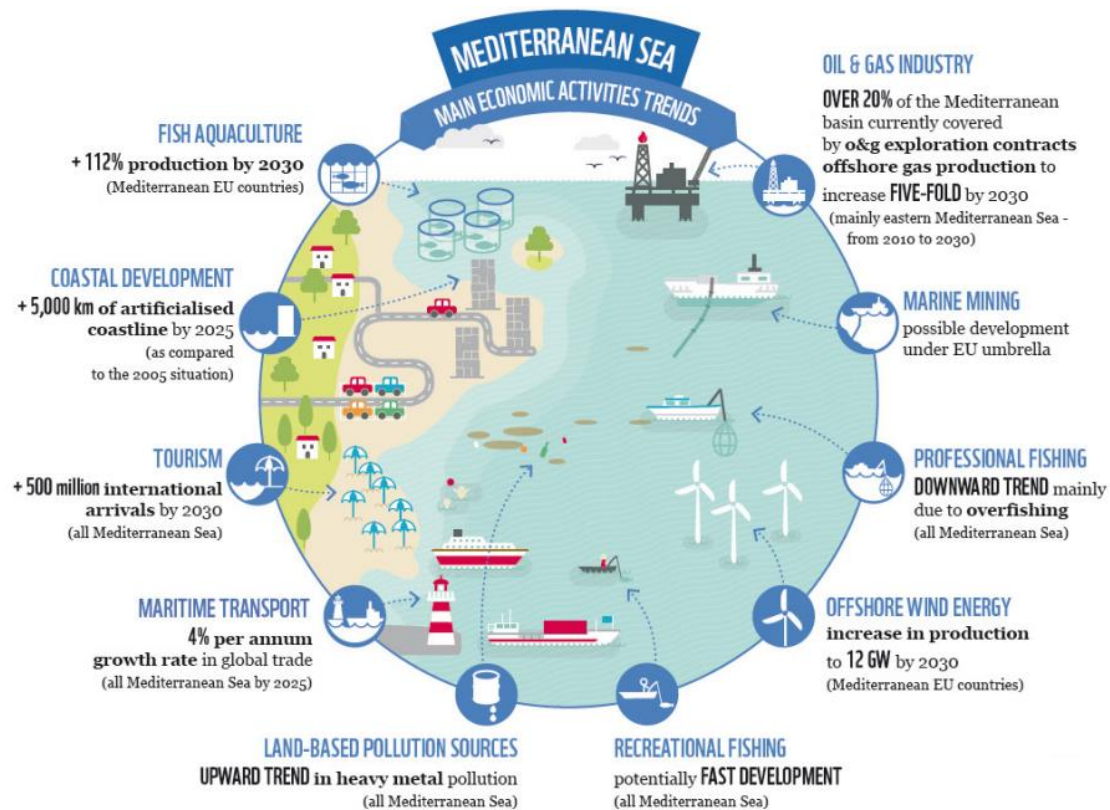


Figure 4. Main Coastal Economic Activities Trends in the Mediterranean Sea (source: Piante and Ody, 2015)

What sectoral actors are there in coastal management?

The previously introduced sectoral activities and their related policy are within the domain of specialised public agencies which are responsible for their regulation and management (Cicin-Sain and Knecht, 1998). Traditionally, such public institutions have been competent for the management of those activities and resources in the coast. However, this study adopts a governance perspective of management in which government is no longer the unique actor in coastal management but needs to cooperate for achieving policy objectives with other category of actors, the private and societal actors, which are those who directly make use of or benefit from coastal resources (Berkes, 2009; Lane, 2008). This represents a shift towards a more democratic and inclusive coastal planning and management which solutions are designed and implemented collectively by government, private sector and civil society (Lane, 2008).

Accordingly, the coastal management system can be thought, as described by Orbach (1995), as a system of relationships between: i) the interested people either because they live, use or are concerned with the coastal environment, ii) public policy and management organisations (government) that affect people's behaviour and, additionally to the ones mentioned before iii) the scientific community that study the coastal environment (natural science) and human behaviour in those zones (social science) and thus, informs management (Orbach, 1995; Cicin-Sain and Knecht, 1998) (see figure 5). It is important to mention that within the government, different authorities or departments are competent for specific resources and activities at the local, regional and national level (Cicin-Sain and Knecht, 1998). In addition, different non-governmental organisations represent groups of stakeholders and their interests (Orbach, 1995). Therefore, when addressing sectoral actors in this thesis, the researcher refers to the public, private and civil actors or organisations that represent different policy sectors and collectively, govern coastal areas.

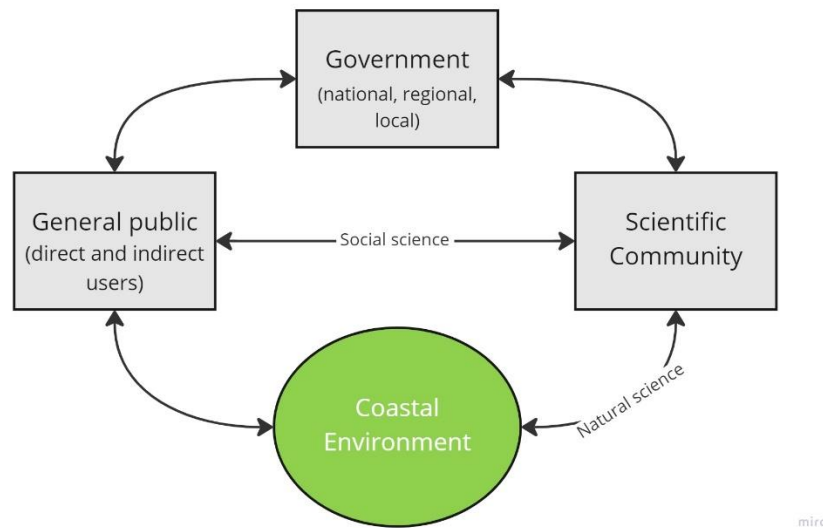


Figure 5. Coastal management system (Author, 2022 adapted from Orbach, 1995)

As noted by Cicin-Sain and Knecht (1998), two major conflicts can arise among agencies and coastal users in relation to coastal and marine resources: 1) conflicts among actors over the right to use distinct coastal and marine areas and 2) conflicts among the government organisations or agencies, at the same level of government (interagency conflicts) and between different levels of government (intergovernmental conflicts), that manage and administer programs related to the coast and sea. Indeed, since responsibilities for the management of the coastal environment is divided among a multitude of agencies, it may lead to overlapping in jurisdictions and mandates resulting in conflicts (Cortner, 1998). Another conflict mentioned in environmental management literature is the conflict between actors and government for the right to participate in the decision-making process which outcomes directly affect or concern them (Lane, 2008).

These conflicts might result in incoherence of policy objectives, inconsistency between policies and actions (Thia-Eng, 1993) and impedes “whole of government”, leading to the prevalence of a more sectoral management (Lane, 2008). Therefore, coastal “policies and management actions need to be adequately coordinated to ensure effectiveness of the management system” (Thia-Eng, 1993, p.85).

2.3.2 Integrated management and the role of cross-sectoral interplay

Considering these multiple claimants and actors in coastal management, a major challenge is to provide coherence in coastal policy and action for the effective implementation of EBM. Accordingly, integration is promoted in literature for tackling the issues of competition, fragmentation and duplication among multiple sectoral actors (Cicin-Sain and Knecht, 1998; Lane, 2008) and for enhancing internal coherence between the policies and actions, projects and programs as well as between planning and implementation processes (Thia-Eng, 1993). Integrated management is an inherent characteristic of EBM and is thus one of the most frequently acknowledged principles in EBM literature (Long et al., 2015). Therefore, EBM cannot be operationalised without a proper integration of management.

Nevertheless, Link and Browman (2017) argue that, although there is plenty of literature on EBM, there are missing insights on its implementation phase and cases of truly multisectoral EBM remain rare. Therefore, literature on integrated management is hereunder drawn from the broad literature on Integrated Coastal Zone Management (ICZM), which is considered a tool for implementing EBM in the coast (2002/413/EC), and from general coastal governance literature (e.g. Lane, 2008).

Integrated management of the coast is a dynamic process that develops and implements a coordinated strategy aimed at allocating the environmental, socioeconomic and institutional resources in order to achieve the conservation and sustainable development of the coast (Price and Khan, 2002). The process “is designed to overcome the fragmentation inherent in both the sectoral management approach and the splits in jurisdiction among levels of government at the land-water interface” (Cicin-Sain and Knecht, 1998, p. 39).

For the purpose of reducing fragmented management and improving integration among agencies and actors in the management of the coast for achieving policy objectives, horizontal and vertical integration gain momentum (Thia-Eng, 1993; Cicin-Sain and Knecht, 1998; Portman et al., 2012). Horizontal integration refers to the integration among coastal and marine sectors such as fisheries, coastal tourism, and biodiversity protection as well as among these sectors and the relevant land-based sectors (e.g. agriculture and mining) that affect coastal environments (Cicin-Sain and Knecht, 1998).

On the other hand, vertical integration takes place among the agencies at the central government, at lower levels of government (regional and local), and business and non-governmental organisations (Vallega, 1999). Integration at the vertical level ensures policy coherence and internal consistency (Thia-Eng, 1993). Moreover, Peters (1998) argues that harmonised implementation of policies requires horizontal integration and vertical integration. In addition, both horizontal and vertical integration are referred to by Delacámara et al. (2020) as a requirement for implementing EBM.

EBM is founded on scientific knowledge and calls for an adaptive approach through monitoring (Delacámara et al., 2020). This results in the need to integrate the research sector as well in the management process. Indeed, Cicin-Sain and Knecht (1998) includes science-management integration as an essential dimension of integrated coastal management which entails the integration of the different science disciplines among them and among those and the management agencies.

Accordingly, these different integration dimensions ensure that the decisions and actions of all sectoral actors (governmental and non-governmental) are harmonised and consistent with the policy objectives for the coast. To achieve vertical and horizontal integration among sectoral actors, Sorensen (1997) suggests increasing coordination and collaboration among actors. In addition, other authors call for the need to increase participation of non-governmental actors in the planning and management process in order to achieve the integration of the different dimensions presented before (Cicin-Sain and Knecht, 1998; Lane, 2008).

First of all, close coordination among agencies is crucial for integrated management (Sorensen, 1997). Peters (1998) refers to **coordination** as “the need to ensure that the various organisations — public and private — charged with delivering public policy work together and do not produce either redundancy or gaps in services” (p.5). Therefore, coordination can be understood here as the organisation of different actors of a complex system like the coast so that they work together effectively. Thia-Eng (1993) states that effective coordination at the planning and implementation levels foster policy and management integration. Since this study focuses on

the implementation phase, it deals with the coordination of administration (Peters, 1998) which refers to coordination of bodies charged with delivering services so as to implement the policy objectives efficiently and effectively (Peters, 1998). In addition, as pointed out before, this study takes a governance perspective of management which entails that those bodies to be coordinated are not only the public ones but also the other actors that “govern” the coast.

In addition, it is important to foster collaboration or, as often addressed in public administration literature, **cooperation**, through regular communication and information and resource sharing between agencies and stakeholders for an integrated management (Sorensen, 1997). Thus, cooperation refers to the collective action from different elements that work or act together for common goals or ends, rather than work in a competing way (Lindenfors, 2017). Thia-Eng (1993) indicates that cooperation and understanding among stakeholders can be stimulated through coordination mechanisms.

Participation is defined as the process of involvement of interested stakeholders and the public in general in the planning and/or implementation of coastal policy (Pickaver et al., 2010). Piet et al. (2020) state that “the participation and involvement of all the resource users is the backbone of a successful EBM process” (p. 28). The participatory process allows building trust which is necessary for collective and cooperative action (Berkes, 2009) and makes users accountable. Bennett and Satterfield (2018) consider that participation can contribute to balanced power relations and democratic decision-making processes from which resulting plans and actions represent stakeholder’s interests, as required by EBM (Long et al., 2015). Accordingly, “policies can only be successfully implemented, therefore, with full stakeholder participation and support” (Pickaver et al., 2010, p.8).

Increasing coordination, cooperation and participation can be effective to address the lack of knowledge and communication, conflicting interests and lack of organisational or legal framework which constitute important barriers to EBM implementation (Marshak et al., 2017). In this study, the three interplay concepts (coordination, cooperation and participation) are integrated into one unique concept, **cross-sectoral interplay**, following Alexander and Haward (2019) explanations. Accordingly, cross-sectoral interplay refers in this study to the action of organisation of different actors for working together effectively, the action of working collaboratively together for the same goals and the action of taking part in a process or being involved that favour an integrated management of the coast (Thia-Eng, 1993; Lane, 2008). In addition, “cross-sectoral” interplay addresses the interaction of sectoral actors both across public, private and social sectors as well as across policy sectors (e.g. agriculture, tourism, environment).

2.3.3 Barriers and Enablers for Cross-Sectoral Interplay

This section presents the main hindering and enabling factors for cross-sectoral interplay identified in literature related to EBM implementation. Alexander and Haward (2019) call for the need to better understand what works well and what affects cross-sectoral interplay. Similarly, Delacámara et al. (2020) consider that it is essential to progress in the knowledge about enabling conditions for cooperative behaviour to further advance in the successful implementation of EBM. Therefore, this section aims to describe the main enabling and hindering factors identified by Alexander and Haward (2019) in a systematic literature review of research articles related to the operationalisation of coastal and marine EBM.

Barriers that hinder cross-sectoral interplay

There are several factors that hinder the effective cross-sectoral interplay and thus, frustrate the operationalisation of EBM. The four more common ones identified by Alexander and Haward (2019) are related to:

- Governance structures and mechanisms
- Communication and sharing
- Participation and exclusion
- Fragmentation

Some governance structures and mechanisms may result in barriers to cross-sectoral interplay, as identified by Alexander and Haward's (2019) systematic review. This refers to the governance structures that are in place and their top-down or bottom-up approaches that constrain the interaction between different sectoral entities and favour a sectoral management rather than an integrated one. For example, transnational policy cooperation in the Baltic Sea was difficult due to the differences in the level of decision-making authority as a result of top-down and bottom-up governance (Hassler et al., 2018). Often, top-down approaches or existing processes from the traditional sectoral management era limit the participation of sectoral actors and leads to an unsuccessful integration of sectors in practice (Alexander and Haward, 2019).

Moreover, lack of communication and information sharing between the involved actors in the EBM process hinders effective cross-sectoral interplay. Lack of communication among agencies, not fostering dialogue between sectors and disruption in the dialogue are within the communication barriers. In addition, lack of data, feedback and information sharing has interfered in the operationalisation of EBM (Alexander and Haward, 2019). For example, lack of information sharing can affect even departments in the same institution generating conflicts as in the Spanish case of beach management (Ariza et al., 2016).

Then, different factors were found to hinder participation of actors in coastal governance. For example, narrow definition or identification of stakeholders may restrain the participation of important groups of actors. Weak participation process designs and power imbalances in the decision-making process may hinder participation. Also, stakeholders themselves sometimes refuse to participate due to past conflicts with other actors (Alexander and Haward, 2019).

Finally, the fourth most common hindering factor to cross-sectoral interplay is fragmentation in coastal governance (Alexander and Haward, 2019). Responsibilities in coastal management are divided among numerous agencies which frequently have overlapping jurisdictions and conflicting mandates leading them to work at cross-purposes (Cortner, 1998, Elsässer et al., 2022). Often, overlapping jurisdictions lead to confusion about who is the responsible actor or in competing cases, generates conflicts between different goals (Cortner et al., 1998; Alexander and Haward, 2019). Consequently, fragmentation may lead to low coordination and cooperation among agencies (Alexander and Haward, 2019) but also among other actors such as industries and private actors that have responsibilities in the coastal management (Cortner, 1998).

These hindering factors are the result from a mismatch in the institutional arrangements as integrated governance and management does not fit with traditional single-sector governance of coastal and marine environments. Therefore, efforts need to be made in order to reduce the barriers to cross-sectoral interplay.

Enabling factors to facilitate cross-sectoral interplay

Alexander and Haward (2019) present several factors and arrangements to improve and enable the interplay between sectors and successfully address the previous hinderers to advance

towards integrated management and the successful implementation of EBM. As a result, the following 3 enabling factors are identified:

- Cross-sectoral structures
- Means of communication and data-sharing
- Participation spaces and processes

Cross-sectoral structures

Coordinating structures which operate across sectors are identified by Alexander and Haward (2019) in several papers as an important factor for enabling cross-sectoral interplay. Such cross-sectoral structures are recommended by a multitude of authors (e.g. Thia-Eng, 1993; Shepherd, 2004; Lane, 2008; Portman et al., 2012). Portman et al. (2012) differentiates between two types of coordinating structures which are promoted as mechanisms for integration: management forums and regulatory commissions. Management forums are forums generally formed by representatives from the general public (direct and indirect users), government agencies and the research community “working together in a collaborative and participatory process for influencing regulatory decision-making” (Portman et al., 2012, p. 197). While management forums are often non-statutory, regulatory commissions are mandated by law and are composed by representatives of the sectoral governmental agencies from the different administrative levels to make decisions about development or the management of coastal activity also through a collaborative and participatory process (Portman et al., 2012). A sectoral coordinating body can be in the form of a committee but also of an authority, an interagency council or a task force (Thia-Eng, 1993). Lane (2008) explain that such structures combine expertise and advice from different governmental agencies and contribute to integration by making “sectoral and departmental boundaries become fluid and permeable enabling further cross-governmental cooperation, and undermining rigid and carefully defended fiefdoms capable of only delivering sectoral decision-making” (p. 860).

For example, the Department for Environment, Food & Rural Affairs (DEFRA) in the UK created an Implementation Group formed by representatives of the different marine stakeholders’ organisations to give advice to policymakers on how to effectively implement a designed approach to be compliant with the European Union Habitats Directive (Clark et al., 2017). A case of marine ecosystems management in Panama has been supported by local fisheries committees consisting of the main stakeholders (including fishermen, women and local community) which propose rules for a more sustainable fishing management and coral reef conservation to the authorities (Shepherd, 2004).

Means of communication and data-sharing across sectors

Fostering means of communication and data-sharing between actors can contribute to cross-sectoral interplay, especially cooperation among sectoral actors (Alexander and Haward, 2019). Clear, transparent and regular communication is considered essential for a successful EBM implementation (Marshak et al., 2017). Maier (2014) explains that the meetings organised by the cross-sectoral structures create a forum or arena that enables communication among sectors, information sharing and gathering common knowledge on different topics that contribute to the understanding of different concerns from stakeholders and develop recommendations based on multiple interests. She emphasises the importance of institutionalising interaction and meetings as it contributes to building trust and maintaining and fostering collaborative action from actors. In addition, governments can promote a protocol for cooperation and communication among governmental agencies that “forces” them to

cooperate through the sharing of information, resources and continuous communication (Lane, 2008).

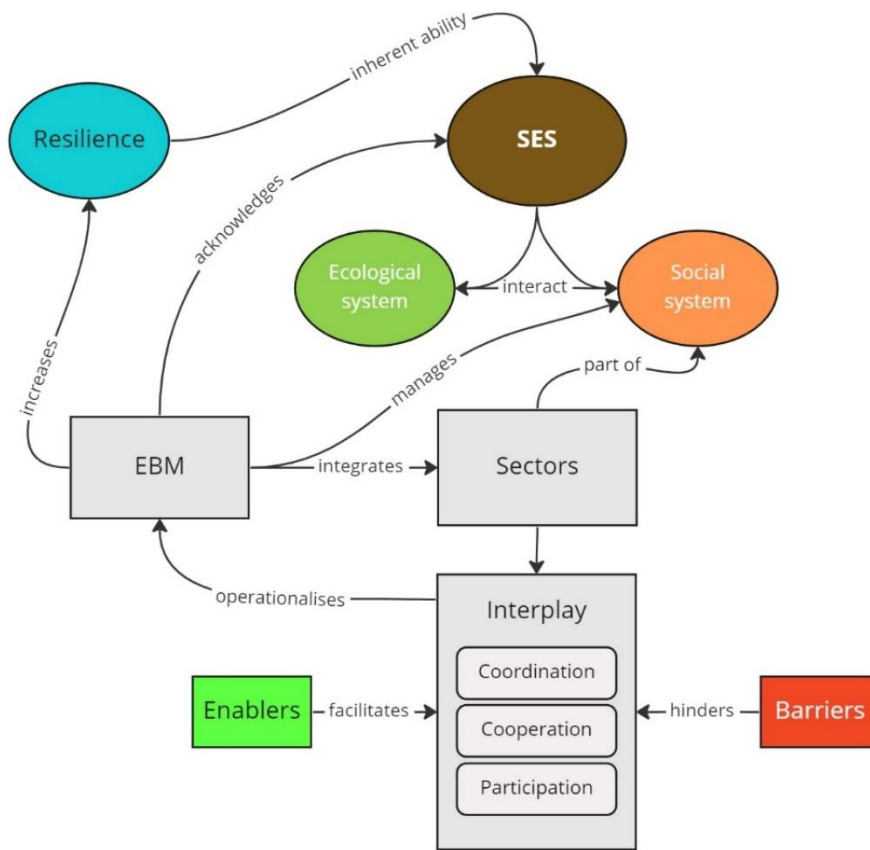
Participation spaces and processes

Alexander and Haward (2019) recommend designing participation processes that enable broad-scale participation. Mechanisms of participation can be, from lower to higher intensity, sharing information to the public, involvement in the process and participation in the decision-making process (Pickaver et al., 2010). Participation and collective choice can be facilitated through spaces and structures which guarantee involvement and representation of stakeholders (Bennett and Satterfield, 2018), such as task forces. Institutionalising such processes and spaces with reliable and recurring involvement of actors is considered by Maier (2014) an important factor for effective participation. Also, their early integration in the process and the perception of power balance between participants is key for success (Maier, 2014).

2.4 CONCEPTUAL MODEL

In this section, the conceptual model is presented (figure 6) for a clear representation of the connections and cause-effect relations between the concepts described in this chapter. This study explores how cross-sectoral interplay is fostered in coastal management to find lessons to advance EBM implementation and thus, increase resilience in coastal SESs. Therefore, cross-sectoral interplay is the central focus of this study which includes coordination, cooperation and participation. Cross-sectoral interplay is fostered by enabling factors but also hampered by barriers. Those enabling factors are the interest of this study as they facilitate coordination, cooperation and participation and thus, increase cross-sectoral interplay which is necessary for the integration of sectors under an EBM approach. Effective cross-sectoral interplay operationalises EBM and this, at the same time, contributes to resilience of SESs.

EBM approach recognises SESs which is essential for resilience building. In addition, the integration of sectoral actors in management enables the operationalisation of EBM and the increase of resilience. Finally, understanding better what institutional arrangements help to bridge sectoral management and consequently, operationalise EBM in coastal SES, will contribute to more resilient coastal ecosystems and societies.



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Figure 6. Conceptual model (author, 2022)

3. METHODOLOGY

This study aims to understand effective ways to increase cross-sectoral interplay for sector integration in management with the final aim of operationalising EBM for the increase of coastal resilience. In order to give responses to the question and sub-questions formulated in section 1.2, the following methods are used to collect data and further on analyse it.

3.1 RESEARCH DESIGN

The methodology selected for conducting this study is qualitative research. The philosophy behind qualitative research connects with the interpretative paradigm. The interpretative approach understands reality as a social construct and studies the subjective meanings of people's experiences and seeks to understand social action within their specific context (Hennink et al. 2020). In contrast, and as the philosophical foundations of quantitative research, the positivist approach assumes that "reality consists of facts and that researchers can observe and measure reality in an objective way with no influence of the researcher on the process of data collection" (Hennink et al. 2020, p.15).

Consequently, quantitative research aims to quantify statistical data and generalise the results to broader population by analysing large sample sizes of population while qualitative research aims to gain "contextualized understanding of phenomena, explain behaviour and beliefs, identify processes and understand the context of people's experiences" (Heinnink et al., 2020, p.17) through in-depth interviews and other methods selecting a small number of participants.

Accordingly, qualitative research is considered to be more appropriate to address the research question because it allows to get a deeper understanding of the influences of different cross-sectoral interplay arrangements on the integration of sectoral actors under a specific context of EBM implementation. Therefore, in this study it's preferred depth over breadth. In addition, as the implementation of EBM involves many sectoral actors, their experiences are important to understand the phenomenon of EBM implementation. Qualitative research is then more suitable to describe how the EBM implementation takes place and how factors influence the interaction of sectoral actors. Quantitative research in contrast wouldn't be suitable to give such a broad understanding of the implementation of EBM.

3.2 LITERATURE REVIEW

Literature review was conducted for understanding the current status of EBM in theory and practice and writing the theoretical framework. It was thus crucial for finding a knowledge gap in science to focus this study on. Spanish and English academic papers related to EBM, SES resilience, integrated coastal management and coastal governance were retrieved via SmartCat and Google Scholar with most intensity from August to October 2022. Academic papers were read and insights related to the research problem and aim were used to build up the theoretical framework which gives the researcher and reader a good understanding of the existing research and sets a structure for the empirical research.

3.3 CASE STUDY RESEARCH

Case study research is the selected qualitative research method for achieving the research aim of understanding effective ways to increase cross-sectoral interplay for operationalising EBM and increasing coastal resilience. Case study research is indicated for studying phenomenon in depth for example, an implementation process (Yin, 2009). Therefore, case study research is appropriate to study EBM implementation in its context. In addition, case study is a good method for describing and giving a deep understanding of the circumstances, events and actor's interactions given within a case (Gagnon, 2010). Considering that the interaction of sectoral actors is the focus of study, conducting case study research is adequate for this study.

3.3.1 Case Selection

The process of case selection is important because the appropriateness of the case study will influence the usefulness of the results. The aim of selecting a case study is to find the most insightful case. Accordingly, the main requirement for choosing a case should be that it has particular or common characteristics that are of interest for the research (Gagnon, 2010).

There are different case study designs: single-case or multiple-case design (Yin, 2009). Gagnon (2010) warns that multiple-case study "may lead the investigator to provide less detailed descriptions and to perform a more superficial data collection, leaving aside information on the underlying social dynamics" (p. 41). Since it is important for this study to obtain a deep understanding of the cross-sectoral interplay in EBM implementation, a single-case design is conducted for allowing a deeper understanding about the case.

Instead of a random selection, an information-oriented selection (Flyvbjerg, 2006) was conducted meaning that the researcher searched for a case under specific criteria in mind. The spatial limits, the theoretical scope and the timescale define the unit of analyses for the study. First, the theoretical focus is based on a review of the key ideas in EBM implementation in the literature. Accordingly, the chosen case must deal with EBM implementation in the coast. In addition, the case selected should have an EBM plan or strategy and be in the implementation phase. Finally, the spatial focus is the Mediterranean coast due to the urgency to increase resilience of the coastal ecosystems and human systems in this region.

Moreover, a typical (also referred as representative) case is selected in this study as it is an adequate design for exemplifying the phenomenon of study (Yin, 2009). Therefore, an exemplary Mediterranean coastal environment which phenomenon of study is the EBM implementation was the selection criteria for finding a suitable case study. After a search of EBM plans and strategies for a typical coastal Mediterranean area, the case of the Mar Menor was selected.

3.3.2 Introduction to the case study

The selected case study is the Mar Menor where a strategy based on EBM is being implemented. Specifically, the strategy is designed not only for the Mar Menor but also for its related Social-ecological System and thus, the area of focus is the Social-ecological System of the Mar Menor (SESMM). Hereunder, the Mar Menor is introduced as well as some considerations on the Strategy.

The Mar Menor, which literally translated means "the smaller sea", is the largest saltwater lagoon in Europe with a surface area of approximately 135 km² (LAGOONS, 2012), a perimeter

of 73 km and a maximum depth of 7 m (Canal Mar Menor, n.d.c). The Mar Menor is located in the west coast of Spain (figure 7) in the Autonomous Community of the Region of Murcia and it is partially separated from the Mediterranean Sea by a sand barrier of 22 km long named La Manga. La Manga has 3 natural channels or gullies that connect the lagoon with the Mediterranean Sea. In addition, there are 5 islands within the lagoon (RegMurcia, n.d.).

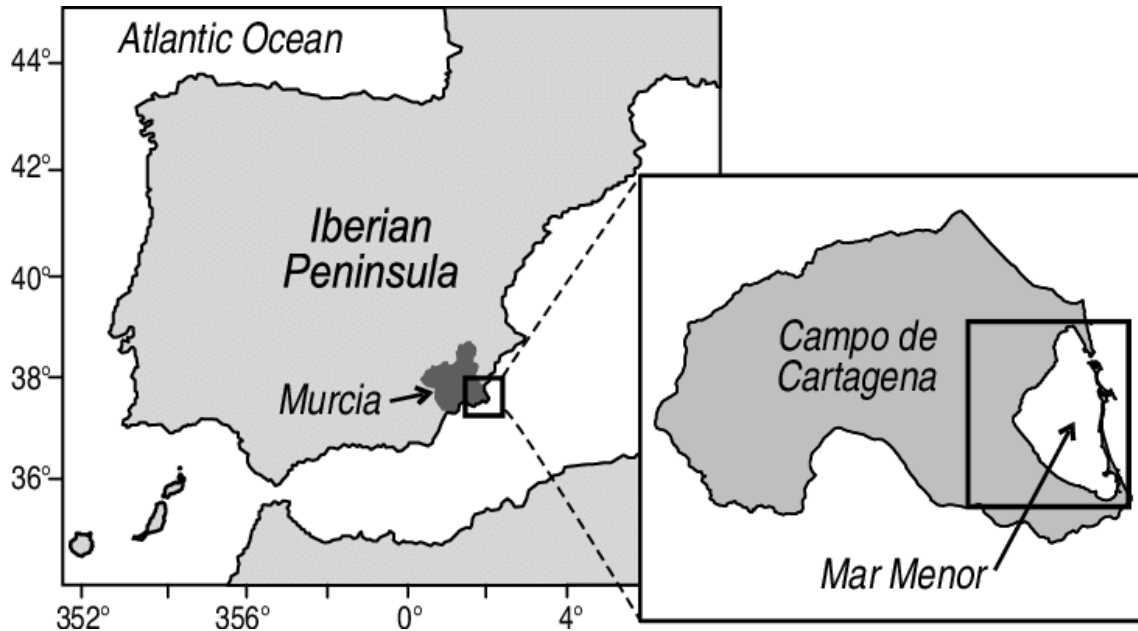


Figure 7. Location of the Mar Menor (source: Perni et al., 2011)

Given these peculiar characteristics, it is an important refuge and breeding place for birds and other species that live within the lagoon waters, islands or shores. El Mar Menor has a rich biodiversity and is an important biological site as there are endemic and endangered species such as the long-snouted seahorse (*Hippocampus guttulatus*). As a result of its importance as a singular habitat, the lagoon and connected environment counts with many national, European and international protection categories. Specifically, at the international level, it is protected by Ramsar (Wetlands of International Importance), and Specially Protected Areas of Mediterranean Importance (SPAMI) based on the Barcelona Convention, and at European level, as part of the Natura 2000 network, the area is assigned as Special Area of Conservation (SAC) and Special Protection Area for birds (SPA). In addition, there are two more protection categories at national level, the Regional Park and Protected Landscape (DGMC, 2021).

A strategy for the integrated coastal zone management of the Mar Menor and its related SES was submitted in July 2016 aimed at tackling the serious state of degradation of the lagoon (DGMC, 2016). Finally, in March 2021 the Strategy was approved and officially, its implementation process started. However, the administration of the Region of Murcia started implementing measures proposed by the draft strategy even before it was approved (DGMM, 2022b), for that reason, both the draft strategy of 2016 and the approved strategy of 2021 are studied. Consequently, this study takes the timeframe from the moment the Strategy was submitted in 2016 and started being implemented until the moment of the analysis, November 2022.

3.4 DATA COLLECTION TECHNIQUES

Gagnon (2010) recommends using as many sources of information as possible not only to gather extensive information but also to make sure that it accurately reflects reality. Thus, this study makes use of triangulation, which can be of help to compare information collected from one source against information collected, at least from one and ideally multiple additional sources (Gagnon, 2010). This allows the researcher to validate or dismiss the findings by comparing information (Yin, 2009).

In addition, different research methods can be conducted within case study research (Swanborn, 2010). The six dominant data collection techniques are interviews, relevant documents, archives, participant observation, direct observation, and physical artifacts (Gagnon, 2010). The two first ones are used in this study as they are considered the most appropriate for studying the EBM implementation in the Mar Menor and for answering the research questions. In addition, in order to meet the recommendation of Gagnon (2010), different sectoral actors are interviewed and a variety of policy documents and reports from different institutions are analysed to increase the sources of information. In addition, press releases were another source of information to conduct triangulation. Hereunder, more details are presented on the research methods used for this research.

3.4.1 Document analysis

Document analysis is the process of examining and evaluating documents from a certain field of study from which a researcher can gain understanding, insights, meanings, and information about a specific subject in a specific context (Bowen, 2009). Then, document analysis can contribute to the collection of data about the case study.

The documents selected for this analysis were case study related documents such as plans, reports and legal documents to obtain information about the planning and implementation of EBM, the progress and the legal and social implications. First, documents were searched through google search and the transparency portal of the regional administration of the Region of Murcia (PTAPRM, 2022) in relation to the coastal management of the Mar Menor. In addition, documents were added along the research process as a result of references in the analysed documents or recommendations from the interviewees. Finally, the documents selected for analysis are present in Table 1.

Table 1. Overview of documents selected for analysis

Document name	Type of document	Acronym	Publisher and year
Law 22/1988, of July 28, on Coasts	Legal framework	Shores Act	Head of State, 1988
Law 2/2013, of May 29, on the Protection and Sustainable use of the Littoral and modification of Law 22/1988, of July 28, on Coasts	Legal framework	Modification of the Shores Act	Head of State, 2013
Law 3/2020, of July 27, of the regeneration and protection of the Mar Menor	Legal framework	Law 3/2020	President of the Autonomous Community of the Region of Murcia, 2020

Integrated coastal zone management Strategy of the Mar Menor and its environment. Draft	Strategy plan	Draft Strategy	Directorate-General of Mobility and Transport, 2016
Integrated coastal zone management Strategy of the Mar Menor and its environment	Strategy plan	Strategy	Directorate-General of Mobility and Transport, 2021
Ordinance of July 29, 2016, of the Department of Water, Agriculture and Environment, by which the Scientific Advisory Committee of the Mar Menor is created	Ordinance	Ordinance of July 29, 2016	Department of Water, Agriculture and Environment, 2016
Ordinance of December 30, 2016 of the Ministry of Water, Agriculture and the Environment, which modifies the Ordinance of July 29, 2016, by which the Scientific Advisory Committee of the Mar Menor is created	Ordinance	Ordinance of December 30, 2016	Department of Water, Agriculture and Environment, 2016
Ordinance of February 28, 2017 of the Ministry of Water, Agriculture and Environment, by which the Committee of Social Participation of the Mar Menor is created	Ordinance	Ordinance of February 28, 2017	Department of Water, Agriculture and Environment, 2017
Annual report to the Governing Council	Report	Annual Report	General-Directorate of the Mar Menor, 2022
Inter-administrative forum of the Mar Menor on May 27, 2022	Report	IAF Report	General-Directorate of the Mar Menor, 2022

3.4.2 Semi-structured interviews

Interviews are considered one of the most important sources of information in case study research (Gagnon, 2010). Within the three different types of interviews, open-ended interview, semi-structured interview and structured interview, it was considered to conduct semi-structured interviews (SSIs). SSI allow the researcher to control the interview by asking the previously prepared questions related to the research topic, but gives the interviewee some freedom in the responses and development of the interview (Yin, 2009).

The interview guide used for the SSIs can be found in Annex A. Questions are related to the resilience of the SESMM, interaction among actors and enabling and hindering factors for cross-sectoral interplay. The questions were adapted depending on the interviewee sector to make it more specific to their case.

SSIs were conducted with actors involved in the strategy-making and implementation processes. To find potential interview partners, an analysis of involved actors in the planning and implementation of the Strategy in the Mar Menor was conducted. The researcher aimed at interviewing actors from different sectors to obtain a broader understanding of the case study. Therefore, different actors from different authorities, organisations and scientific institutions were contacted through publicly available emails or formal contact forms. Additional contacts were facilitated by interviewees, known as snowball sampling (Hennink et al., 2020).

SSIs were carried out through Google meet or phone call. These means allowed a relatively personal interaction and the recording of the audio. Due to the unavailability or unwillingness of policymakers to participate in the SSIs, the interview guide was sent to them for a written format answer of the questions. Two written interviews were obtained from officers, one from the environmental department of the regional administration and the other from the State Coast Demarcation in Murcia. Compared to the SSI, written interviews provided very few information but still, they were an additional source of information. Finally, interview recordings were transcribed through the dictate feature of Microsoft Word and then, this text was reviewed and adapted by the researcher. The transcriptions allowed the further analysis of the written text. Table 2 presents an overview of the three SSIs and the two written interviews conducted.

Table 2. List of semi-structured interviews and written format interviews

Sector	Code	Interviewee position	Note	Mean	Date & extension
Research, University	R1	Expert and researcher in integrated coastal zone management		Google meet	14 th October, 2022. 59 minutes
Civil society and environment	CS1	Retired researcher from the Spanish Oceanographic Institute and representant of the civil organisation "Pacto por el Mar Menor"	Provided an additional document with information related to the Strategy implementation	Google meet	31 st October, 2022. 1h 20 minutes
Agriculture	AG1	Farmer and advisor		Phone call	15 th November, 2022. 31 min
Environment, public regional administration	REG1	Officer in the River Biodiversity, Hunting and Fishing Service of public administration of the Region of Murcia	The interview was answered in a written format	E-mail	15 th November, 351 words
Environment, public national administration	COAS1	Officer from the State Coast Demarcation in Murcia	The interview was answered in a written format	E-mail	7 th December, 535 words

3.5 DATA ANALYSIS

Qualitative data analysis

Data analysis deals with reducing "a huge amount of data in order to obtain an answer to the research question" (Swanborn, 2010, p. 113). Gagnon (2010) argues that already during the data collection process the researcher identifies trends, patterns and potential ways of arranging the data thus, understanding the meaning of the information. In this case, the qualitative data of the collected interview transcripts and documents were the data for analysis. An appropriate method to systematically analyse and interpret the meaning of qualitative data is qualitative content analysis (Schreier, 2012). This can be done through the coding of the data which consists in finding parts of the text from the transcripts or documents that describe or are connected to

concepts or categories related to a topic of interest (Gagnon, 2010) and allows the interpretation of the text. For this, a coding frame was created with the different categories of interests (table 3). Codes define, explain, systematise, and arrange the data and allows a more structured analysis of it. The coding list or frame can be created through an inductive or deductive strategy. The former one, extracts categories from the text along the process of reading while the later one uses subjects that are already established for example from theory (Schreier, 2012). The coding list was created on a deductive basis, using categories already defined from theory. Nevertheless, additional inductive codes were assigned when new categories arise in the text. The coding technique was used through ATLAS.ti software, which is accessible for the RUG students. ATLAS.ti allows a systematic and organised analysis of big amounts of data, and a better interpretation of the data afterwards.

Table 3. Coding list

Category	Deductive code	Inductive code
Resilience	Robustness	
	Adaptability	
	Transformability	
	Fair and equitable distribution	
EBM	Recognise coupled SES	
	Integrated management	
	Adaptive management	
Sectors	Planning development and Infrastructure	
	Environment	
	Agriculture	
	Water Management	
	Fishing	
	Industry, energy and mining	
	Tourism	
	Research	
Cross-sectoral interplay	Coordination	
	Collaboration	
	Participation	
Barriers for cross-sectoral interplay	Governance barriers	Power-related barriers
	Communication & sharing barriers	Lack of political will
	Participation challenges	
	Fragmentation challenges	
Enablers for cross-sectoral interplay	Cross-sectoral structures	Strong legal framework
	Communication and data-sharing means	
	Adequate participation process	

4. RESULTS

4.1 RESILIENCE OF THE COASTAL SES

This section presents the findings to answer the following question: **How can EBM contribute to coastal resilience from human impacts in the Social-ecological System of the Mar Menor (SESMM)?** Accordingly, this section aims to present how coastal resilience in the Mar Menor is influenced by the EBM approach by first introducing the conceptualisation of the Mar Menor as a SES in the Strategy and secondly, describing the resilience of the SESMM and the fairness of benefits distribution.

4.1.1 Acknowledging social-ecological systems

The Strategy for ICZM of the Mar Menor and its environment has been designed using an ecosystem approach and thus, defines the scope of the area to be managed by using criteria from the SES related to the Mar Menor. This represents a shift considering that the delimitation of the coast for its management, regulated by the Shores Act and its modification in the Protection and Sustainable Use of the Littoral Act, does not fully consider social-ecological criteria. The Shores Act defines three geographical areas comprising 1) the Maritime Terrestrial Public Domain (MTPD), which includes the maritime-terrestrial zone delimited under geographical and ecological criteria, 2) the Protection Easement (PE) that extends 100 m inland from the MTPD except in urban areas where it can be an extension of only 20 m, and 3) the Influence Zone (IZ) which has a delimitation of 500 m inland from the MTPD (see figure 8).

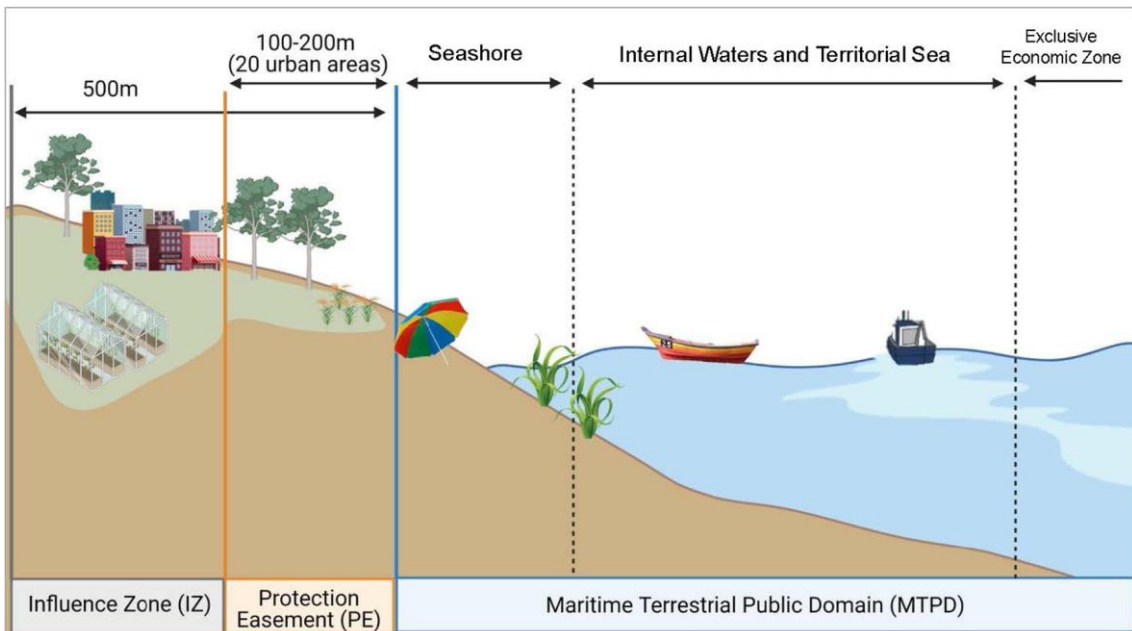


Figure 8. Delimitation of the coast according to Shores Act (source: De Andrés and Barragán, 2022)

As a result, the Shores Act and its modification have been insufficient to integrate in coastal management other human and ecological interactions that, although further inland, affect the coastal environment (R1). Contrastingly, the Strategy does address explicitly the concept of SESs

and uses SES criteria for the delimitation of the Strategy scope. The description of the coastal SES in the Strategy, hereunder explained, integrates scientific and local knowledge because actors participated in the planning process (DGMC, 2021).

In contrast to the delimitation of the coast by the Shores Act, the conceptualisation of the scope of the Strategy does not only focus on the geographical and administrative area where the lagoon is located, but it includes a larger geographical scope considering the Mar Menor ecosystem and the marine and terrestrial ecosystem connected to it, for instance by the watershed (see figure 9). However, for a more effective definition of the area to be addressed, the scope is in the last instance defined under administrative criteria and is addressed as the Social-ecological System of the Mar Menor (SESMM). As presented in figure 9, not only are the coastal municipalities facing the Mar Menor considered in the scope of the Strategy but also, the territory of municipalities further inland such as Fuente Álamo which are within the watershed that directly affects the water quality that arrives to the lagoon. In the case of those municipalities that are not facing the lagoon, only the activities that may have an influence on the Mar Menor such as mining, water management and agriculture are considered by the Strategy for the coastal management.

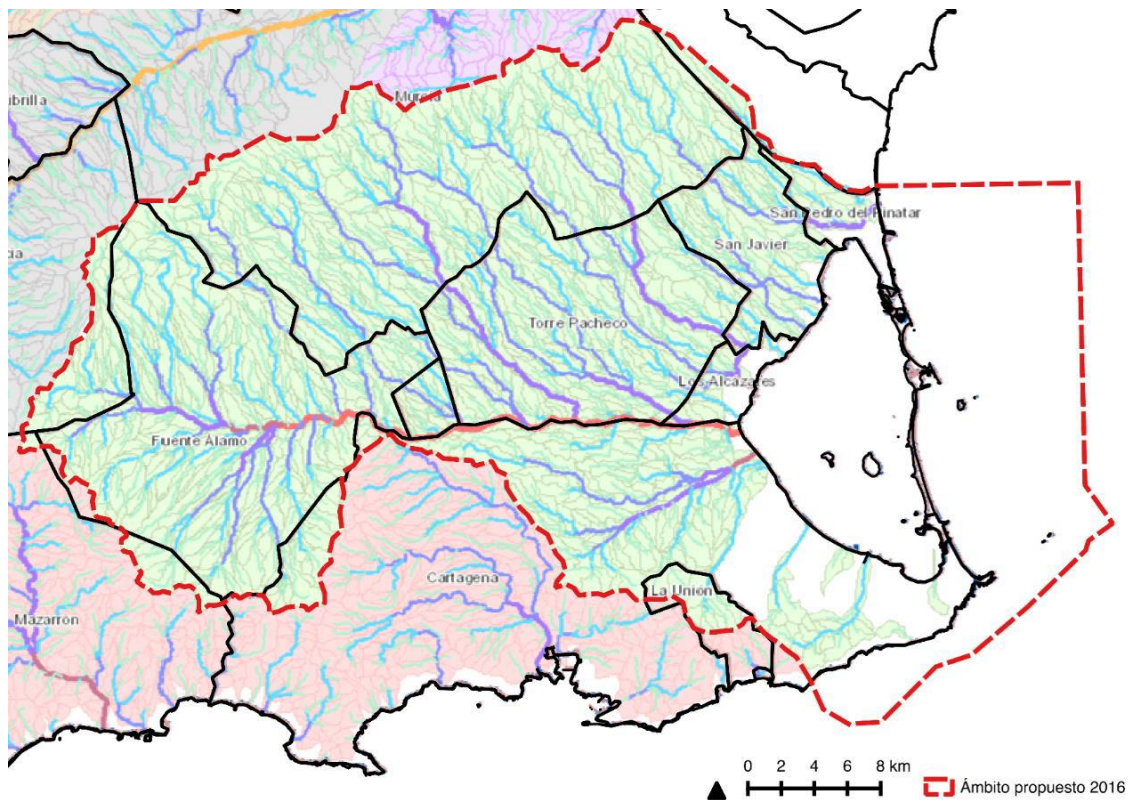


Figure 9. Scope of the Strategy (red line: scope proposed in 2016) (Source: DGMC, 2021)

The scope delimitation based on SES considerations from the Draft Strategy submitted in 2016 was transposed into the Law 3/2020, of July 27, on the recovery and protection of the Mar Menor. Article 2 of Law 3/2020 defines the territorial scope including the 10 municipalities facing the lagoon or having an influence on it as described by the Strategy. Consequently, the Law 3/2020 brings into force the scope in the Strategy, which has a lower rank normative and thus, obliges in a stricter sense to consider this scope for coastal management.

R1 considers that the acknowledgment of SES in the Strategy is crucial to improve the environment of the Mar Menor. “I believe that partial realities only exist in human brains... but no, reality is more complex... and until that reality is understood it is not possible to solve the

problem” (R1). This is because, as the Strategy and R1 explain, although the Mar Menor contained at least six different protection instruments including Ramsar convention and Natura 2000, the ecological quality of the lagoon was decreasing. The problem remained in the exclusion of polluting activities from the coastal management, mainly agriculture and mining, that do not take place directly within or next to the lagoon but that are further inland and are connected to the coastal environment of the Mar Menor through, for example, the watercourses and aquifers.

4.1.2 Building coastal resilience

In this section, it is first emphasised that the “disturbance” for which the Strategy aims to build resilience is to human impacts. Then, resilience of the SESMM is described under the three key dimensions of resilience: robustness, adaptability and transformability.

R1, CS1 and AG1 concur that the actual situation of low resilience of the SESMM is caused by the different human activities that have developed in the region during the last 50 years causing an important degradation of the Mar Menor. In addition, the Strategy mentions human impacts to be the main cause of degradation of the lagoon. Accordingly, the Strategy, designed to improve the situation of the Mar Menor, has the following aim: “Ensure that the Mar Menor reaches and maintains a good environmental status so that the multiple services that this ecosystem offers to human well-being can be used again in an equitable and lasting way” (DGMC, 2021, p.81). This shows that the Strategy applies an EBM approach as it aims to increase the resilience of the ecological system so as to support the resilience of the social system, therefore highlighting the interdependence of the SES.

Although the Strategy does not explicitly address the concept of resilience, some aspects present in the documents and in the interviews show a link to the concept. Resilience provided by the EBM approach of the Strategy is described below under the three key dimensions of resilience: robustness, adaptability and transformability.

Robustness to the impacts of human activities

CS1 defines resilience as the capacity of the ecosystem to integrate disturbance without changing its performance, matching robustness dimension as described by Restemeyer (2018). Thus, CS1 describes resilience of the Mar Menor as high until the past decade, when the anoxia events have occurred in the lagoon. Those events have also increased the vulnerability of activities that depend on the ecosystem health such as fishing. Nevertheless, CS1 confirms that juveniles from some species that were thought to be extinct in the lagoon have reappeared. This shows the resilience capacity of the ecological system of the lagoon to resist a disturbance but as CS1 points out, this capacity is reduced and might not withstand a future disturbance.

Adaptation of the environment to human impacts

In light of the situation of reduced resilience capacity from the system as explained by CS1, the Strategy proposes several operational and sectoral plans to implement four operational objectives that are aimed to contribute to the main aim of the Strategy. For example, the first operational objective states: “Act in the SSEM respecting natural processes with the intention of improving and protecting the structure and functions of coastal marine ecosystems in order to conserve their human welfare services” (DGMC, 2021, p. 95). Thus, these operational and sectoral plans are intended to adapt the watershed and connected human activities and make the system less vulnerable to human impacts. For example, the “plan for the reduction of pollutant inputs to the lagoon” contains a program for the implementation of nature-based

solutions in the watershed and the restoration of wetlands to prevent the input of pollutants from agriculture and old mining sites to the lagoon (DGMC, 2021). Such measures are supported by AG1, who gives advice to farmers for the implementation of natural buffer zones for erosion reduction and nutrient retention. In addition, from May 2022, a program for the environmental restoration of the Sierra Minera Cartagena-la Union has started with the purpose to restore the old mining site and prevent the input of more heavy metals in the lagoon (DGMM, 2022b).

In addition, there are artificial retention ponds planned and implemented by the regional administration to capture and store the runoff waters. They have also improved part of the rainwater collector system and invested in the upgrade of the wastewater treatment plants to improve the quality of the water released to the Mar Menor. Also, there are cleaning campaigns to reduce the biomass that degrades in the lagoon (DGMM, 2022b). Many other plans and measures are planned and implemented and are fostering the adaptation of the SESMM to one that is less vulnerable to the human impacts (DGMC, 2021; DGMM, 2022b).

Transforming human activities

Transformability, the third dimension of resilience, was referred to on several occasions by the interviewees. Specially, for the agriculture sector that is one of the main economic engine of the region but also one of the most polluting activity of the Mar Menor, AG1 proposes making a transformation from the actual industrial agriculture that uses resources unsustainably (e.g. extracts illegally water from the aquifer which is polluted by salt intrusion and therefore, desalinates it with illegal desalination plants (AG1, CS1, Sánchez, 2021) to one that is adapted to the resources of the region and ensures the health of the ecosystem. He proposes cultivating rainfed crops as the region suffers lack of water and climate change is expected to worsen the situation, thus increasing conflicts with other water users.

In addition, R1 criticises that previous coastal management did not consider holistically the ecosystem connected to the Mar Menor neither the human impacts that originated further inland but affected the Mar Menor. Therefore, R1 considers that the Strategy fosters a transition of the conventional coastal management to one that acknowledges SESs connected to the problem of the Mar Menor and can thus create measures to adapt to human impacts because “it is impossible that the Lagoon recovers if we continue to apply the same pressures, if we carry out the same practices, the same conditions as 10, 20, 30, 40 years ago”. Accordingly, R1 suggests that the Strategy is proposing the means for a transition to happen. The means contained in the Strategy, as further explained in section 4.3, are the creation of cross-sectoral structures and other mechanisms that allow the cooperation and participation of the different sectors and actors and create arenas that support the local and scientific knowledge exchange and discuss problems that affect them and the environment.

Are benefits justly and fairly distributed?

As R1 explains, the aim of the Strategy is not intended to benefit one sector more than another, it aims to adapt and transform the activities that take place in the lagoon itself and the related watershed in order to reduce the disturbances to the ecosystem and ensure that the health of the ecosystem is maintained so that it can continue to provide ecosystem services to the society. This is encouraged through the Strategy actions and instruments which are designed to allow the integration of sectors for a balanced share of benefits between the social, economic and ecological interests.

Nevertheless, the regional government is influenced by the strong lobby from the agricultural business (CS1, AG1) which is affecting the effective implementation of the mechanisms and

actions contemplated in the Strategy to achieve the aims that R1 explains. As a result, benefits are not yet well balanced within sectors and the ecosystem and dependent human activities see their resilience diminished.

4.2 SECTORAL ACTORS

In this section, a characterisation of the policy sectors and related actors involved in the management of the SESMM is presented. In addition, the main conflicts between sectors in the case study are briefly introduced. Therefore, in this section the second sub-question is addressed: **What sectoral actors are there in the SESMM management?**

Being a coastal area, the management of the SESMM is shared among different levels of administration, the local, regional and national. At the national level, the Ministry of the Ecological Transition and Demographic Challenge (METDC) is responsible, among others, for direct management of the hydraulic public domain of the intercommunity basins and of the MTPD (Real Decreto 500/2020). Within this Ministry, the Directorate General for the Sustainability of the Coast and the Sea is responsible of the coastal sustainability, implementing integrated coastal zone management according to the EU recommendation (413/2002/EC) and giving grants for activities taking place in the MTPD. Also, within the METDC, the Segura Hydrographic Confederation (CHS) has the competence on the management of the Segura River, its tributaries and watershed, in which basin the SESMM is included. In addition, the sectoral activities such as fishing and transport taking place in the MTPD are managed by the relevant ministry at the national level (DGMC, 2021).

The administration of the Region of Murcia holds most of the competences involved in the management of the SESMM. These are divided between four main departments: 1) the Department of Water, Agriculture, Livestock, Fisheries, Environment and Emergencies (DWALFEE) responsible, as its name suggests, of the relevant sectors of water management, agriculture, livestock, fisheries within inland waters and environment; 2) Department of Promotion and Infrastructure with competences on transport, coasts and ports; 3) Department of Presidency, Tourism, Culture and Sports with competences on the management of the SESMM related to the tourism and recreational activities; 4) Department of Business, Employment and Universities with competences on the management of energy, mining, industry and research activities. It is also important to highlight the existence of the newly created Directorate-General of the Mar Menor, within the DWALFEE, that holds the competences and functions for the implementation of projects and actions related to the restoration and protection of the ecosystem of the Mar Menor (DGMC, 2021).

In addition, the Mar Menor does not fall under the MTPD because it is considered “inland waters” and under the Spanish legislation, they are responsibility of the autonomous community where they are located in. Finally, the local administration has competences on urban planning, wastewater treatment, and maintenance of healthy and clean beaches (DGMC, 2021). In addition, a great variety of private and non-governmental organisations represent the different sectors present in the SESMM management as indicated in table 4.

Table 4. Actors representing policy sectors (Public administration: P.A.; Organisation: Org.)

Sector	Organisation	Level and Nature
Agriculture and livestock	Department of Water, Agriculture, Livestock, Fisheries, Environment and Emergencies	Regional

	5 agriculture and livestock business org.	Regional, Org.
	2 irrigation associations	Regional, org.
Coastal infrastructure development	Department of Promotion and Infrastructure	Regional
	Municipal department of spatial planning	Local, P.A.
Culture	Department of Presidency, Tourism, Culture and Sports	Regional
Environment	Ministry of Ecological Transition and Demographical Challenge	National, P.A.
	Directorate-General for the Sustainability of the Coast and the Sea	National, P.A.
	Department of Water, Agriculture, Livestock, Fisheries, Environment and Emergencies	Regional, P.A.
	Directorate-General of the Mar Menor	Regional, P.A.
	9 environmental NGO's	Regional, Org.
	1 environmental business org.	Regional, Org.
Fishing and aquaculture	Ministry of Agriculture, Fishing and Food	National, P.A.
	Department of Water, Agriculture, Livestock, Fisheries, Environment and Emergencies	Regional, P.A.
	5 fishermen organisations	Regional-local, Org.
	7 fishing and aquaculture business org.	Regional-local, Org.
Industry, Energy and Mining	Department of Business, Employment and Universities	Regional, P.A.
Navigation and communication	Department of Promotion and Infrastructure	Regional, P.A.
	6 water sports organisations	Regional-local, Org.
	1 nautical business org.	Regional, Org.
Research	Department of Business, Employment and Universities	Regional, P.A.
	3 Universities	Regional, University
	Water Resources Research Platform	Regional, Platform
	Spanish Institute of Oceanography-Oceanographic Centre of Murcia	National-Regional, Institute
	Murcian Institute of Agricultural Research and Development	Regional, Institute
	Euro-Mediterranean Water Institute Foundation	National, Institute
Tourism planning	Department of Presidency, Tourism, Culture and Sports	Regional, P.A.
	7 tourism organisations (includes water sports organisations)	Regional-local, Org.
	8 tourism business organisations	Regional-local, Org.
Water management	Segura Hydrographic Confederation (CHS)	National, P.A.
	Department of Water, Agriculture, Livestock, Fisheries, Environment and Emergencies	Regional, P.A.

	Department of Wastewater treatment	Local, P.A.
	2 irrigation associations	Regional, org.
Civil Society	3 neighbourhood organisations	Regional- Local, Org.

Among these sectors, the main conflicts of interests arise between the agriculture and livestock with the rest of sectors (CS1). This is due to the fact that agriculture is considered the main cause of eutrophication of the Mar Menor negatively affecting the other sectors such as fishing, tourism and environment (AG1). With less intensity but also important to mention are conflicts related to the pollution from tourism and coastal infrastructure to the other sectors (R1).

4.3 CROSS-SECTORAL INTERPLAY AND ITS ENABLERS AND BARRIERS

This section aims to present how cross-sectoral interplay was organised in the case study and the factors that enabled and hindered it in the implementation of EBM. It does so by first describing the actions, mechanisms and instruments for improving coordination, cooperation and participation in the SESMM that have been implemented as a result of the Strategy from the moment of submittal of the Draft Strategy in 2016. Then, a compilation of hindering and enabling factors for cross-sectoral interplay found in the management of the SESMM are described. Accordingly, this section aims to answer the third sub-question: **how is cross-sectoral interplay organised in the management of the SESMM and what factors fostered and hindered cross-sectoral interplay?**

4.3.1 Cross-sectoral interplay

The Strategy proposes a number of instruments to be implemented by the different institutions which are designed for the improvement of the coordination, cooperation and participation in the management of the SESMM and thus, operationalise EBM. It is important to mention that, since the instruments started to be implemented from the moment of the submission of the Draft Strategy in 2016 thus making use of this document rather than the final Strategy that was accepted in 2021, references are done to both documents. Nevertheless, the information contained in both documents is identical, except for specific points which are informed in the description below.

Table 5 presents the instruments proposed by the Strategy (both the draft from 2016 and the final from 2021), the articles in which those arrangements are enforced in Law 3/2020, of July 27, of the restoration and protection of the Mar Menor (from now on referred as “Law 3/2020”) and their implementation status at the time of data collection of this study, November 2022. The implementation of these instruments are hereunder described.

Table 5. Instruments proposed by the Strategy and the implementation status in 2022

Instruments to increase cross-sectoral interplay		
Proposed by Strategy	Enforced by Law 3/2020	In place by 2022
Unit of coordination of the Mar Menor , aimed at the coordination and cooperation among the 3 public administrations	Article 5 enforces the creation of an Inter-Administrative Commission for the Mar Menor through an	Inter-Administrative Forum of the Mar Menor (IAF) . Not properly institutionalised as the 3 administrations did not sign an agreement yet

	agreement among the 3 administrations	
Interdepartmental Commission of the Mar Menor , aimed at the coordination and cooperation among departments from the regional public administration	Enforced by Article 9	Interdepartmental Commission of the Mar Menor (IDC) created in 2017
Social Participation Committee of the Mar Menor , for the participation of civil society and stakeholders	Enforced by Article 7	Social Participation Committee of the Mar Menor (SPC) created in 2017
Scientific Advisory Committee of the Mar Menor for the participation and cooperation with the scientific community	Enforced by Article 8	Scientific Advisory Committee of the Mar Menor (SAC) created in 2016
Directory for the integrated management of the Mar Menor	Enforced by Article 10.4	The Directory is published in the Mar Menor webpage “Canal Mar Menor”
Communication and Information System for the Mar Menor	Enforced by Article 10	Creation of webpage for specific information of the Mar Menor named “Canal Mar Menor” and information campaigns

4.3.1.1 Coordination and cooperation

The Strategy proposes two instruments for the operationalisation of the strategic objective of improving the institutional coordination and cooperation processes. This strategic objective is at the same time intended to operationalise the Strategy aim. As both coordination and cooperation are addressed for the same instruments, they are put together in this section.

Implementation of the Unit of coordination of the Mar Menor

Proposed by the Strategy, the Unit of Coordination of the Mar Menor is aimed to be the main public institutional body for the coordination, cooperation and implementation of the Strategy. Its aim is the coordination and cooperation of policies and actions in the Mar Menor among the 3 administrations involved in the SESMM (DGMC, 2021). Currently, there exists a body taking over these responsibilities which has been named the **Inter-Administrative Forum for the Mar Menor (IAF)** (R1; REG1; COAS1). The IAF is formed by representants of the national, regional and local administration with competences in the Mar Menor: at the national level, representants from the SHC, the MITERD and its State Coast Demarcation in Murcia; at the regional level, representant from the DWALFEE and the other relevant departments; and at the local level, representants from the four coastal municipalities (DGMM, 2022a).

The creation of this body proposed in the Strategy has come into force by the Law 3/2020, which describes in its article 5 the need to promote, by initiative of the Government of the Murcia Region, an agreement for the creation of an inter-administrative institutionalised body “for the institutional coordination and cooperation of public policies and actions that affect the Mar Menor” (Law 3/2020, art. 5, p. 709000). In addition, article 6 (Law 3/2020) urges the creation of

collaboration agreements between the different public administrations. Although at the moment they have implemented a provisional IAF, the different 3 administrations have not signed any agreement that institutionalises this body and their commitment to cooperate (DGMM, 2022b; R1; COAS1). Though the Region of Murcia has requested the MITERD and the different municipalities the signature of the collaboration protocol for the formal institutionalisation of the IAF and their cooperation in May 2020, and reiterated it in December 2020, they have only received the response of one of the municipalities, San Javier, in May 2021 (DGMM, 2022a). R1 considers that “they don’t want to institutionalise a body [the Unit of coordination of the Mar Menor] that leads them to sign an agreement and that agreement obliges them to work cooperatively”.

Nevertheless, the IAF is already operational and organises meetings to which the representatives from the three levels of administration come together. There are planned meetings every first Monday of every month in the municipal headquarters of the 4 coastal municipalities, in a rotating basis, where they discuss any topic related to the Mar Menor, review the status of the actions planned in the Strategy and analyse the progress within each administration's competences (Europa Press, 2019). The results of these meetings (e.g. DGMM, 2022a) are presented in the newly created webpage for the information related to the Mar Menor that is introduced later on. However, according to R1, although there is coordination between the 3 administrations as a result of the IAF, there is lack of cooperation due to low political will. COAST1 supports this argument and blames political tensions as the reason for low coordination and cooperation.

Implementation of the interdepartmental commission of the Mar Menor

The **Interdepartmental Commission for the Mar Menor (IDC)** was created in 2017 and is the governing body proposed by the Strategy for the improvement of the processes for coordination and cooperation of public sectoral institutions among the regional level. As its name indicates, it is an interdepartmental body that coordinates and cooperates internally the regional departments and agencies involved in the management of the SESMM (DGMM, 2022b). As suggested by the Strategy, it takes over the leading role for the implementation of the Strategy because the regional administration contains most of the competences on the Mar Menor and the SESMM, as indicated in section 4.2.

The IDC is formed by the representants from the Directorates-General from the regional administration involved in the management of the SESMM, among others, the Director-General of the Mar Menor, Director-General of environment, Director-General of mobility and the coastline, Director-General of agricultural, livestock and fishing production, and Director-General of Energy and Industrial and Mining Activity.

The creation of this body has been enforced by the Law 3/2020. Although the Strategy draft submitted in 2016 recommended creating this body under the Presidency department due to its higher capacity of leadership within the regional administration, it has been assigned under the DWALFEE thus, falling shorter of leadership. Nevertheless, R1 indicates that this body is working more successfully in a coordinated and cooperative way than the IAF.

4.3.1.2 Participation of non-governmental actors

Implementation of the Scientific Advisory Committee of the Mar Menor

The **Scientific Advisory Committee of the Mar Menor (SAC)** is proposed by the Strategy for the involvement of the scientific community and their knowledge in the management of the SESMM. This Committee, which creation, functions and composition are contained in the Strategy and the Law 3/2020, is aimed to give advice to the strategies, programs and actions for the management and restoration of the Mar Menor as well as carry on analysis of the lagoon and thus, bridge policy and action from sectoral public institutions and research. Five different working groups constitute the SAC divided according to different disciplines (e.g. Bathymetry and Sediments Working Group, Catchment Basin Working Group and Lagoon Ecology Working Group). Meetings are organised for the specific working groups and then, for the whole SAC to share information about the monitoring and discuss problems and solutions all together (REG1; DGMM, 2022b).

The SAC is contemplated in both the Draft Strategy and final Strategy documents as a committee of independent nature formed by researchers from the different public and private institutes and universities as well as by researchers in topics of interest for the Strategy. As a difference, the final Strategy includes in this definition the possibility of the SAC to be integrated by “expert technical staff from the different administrations involved in the management of the Mar Menor” (DGMC, 2021, p. 89).

This change in definition results in the actual modification of the members of the SAC. On July 26, 2016, the SAC was created by Ordinance of the Department of Water, Agriculture and Environment (Ordinance of July 26, 2016). This document first articulated, under article 3, the composition of the SAC as described in the Draft Strategy. Nevertheless, it was soon modified by the Ordinance of December 30, 2016 in order to include government officials from the different Directorate-Generals of then Department of Water, Agriculture and Environment within its members. As a result, the SAC loses its independent nature from the government and is arranged in a way so that decision-making processes in the SAC are under control of the Regional Government interests (CS1; COAS1). Consequently, several researchers resigned from being part of the SAC (CS1; AG1), for example four do so in June 2018, fifteen in September 2019 and four other researchers in October 2019 (Ruiz, 2019).

Surprisingly, this is supported by the Law 3/2020 in which section 3 of article 8 described that one third of the SAC must be formed by government officials from the different administrations involved in the SESMM management, and the other two thirds by researchers from public and private research institutions. Currently, a Decree that regulates the functions and composition of the SAC is waiting for approval. As a result, a legal instrument with higher legal status than the current Ordinance (Ordinance of July 26, 2016 and its modification by the Ordinance of December 30, 2016) will support this Committee, its composition and functions (DGMM, 2022b). The difference is that the Decree has a regulatory normative content while the Ordinance is a type of legal rule that is part of the regulation and is not subordinated to the law, putting the Decree in a higher legal status than the Ordinance (Salasar, n.d.).

Implementation of the Social Participation Committee of the Mar Menor

Before the submission of the Strategy in 2016, there were no specific instruments, administrative body or other arrangements in relation to public participation in the management of the lagoon (DGMC, 2016). The creation of arrangements for the participation of the civil society in the integrated management of the SESMM is complex and controversial as explained hereunder.

First, the Strategy draft of 2016 proposes the creation of the Forum of the Mar Menor as a body for public participation that is open to all citizens and constitutes an arena for discussion of

problems and solutions related to the Mar Menor. The decisions taken in this forum are to be transmitted to the Unit of coordination of the Mar Menor (actual IAF) and the IDC and thus, integrate citizens' interests into the public decision-making process. In February 2017, the regional department with competences on the environment (at that moment the Department of Water, Agriculture and Environment) created the **Social Participation Committee of the Mar Menor (SPC)** which takes over the competences described by the Draft Strategy on the Forum of the Mar Menor (Ordinance of February 28, 2017).

The Ordinance of February 28, 2017 suggests the SPC to inform through requests and proposals about the social, economic and local interests that arise from the SPC meetings so as to be considered in the decision-making process of the IDC and IAC. It also mandates the IDC and IAF to communicate them the policies, strategies, programs and actions relevant for the Mar Menor so that the SPC can discuss the implications and possible conflicts and give feedback.

In addition, the Ordinance of February 28, 2017 regulates the members of the SPC as follows: the President which is assigned to the regional minister of the Department of Water, Agriculture, Livestock, Fisheries, Environment and Emergencies, a representant from each Directorate-General of the Murcia region, and an specifically assigned number of representatives from the different sectors in the Mar Menor including harbour authority, environmental organisations, agriculture organisations, fishing organisations, tourism, nautical and recreational organisations, business organization, trade, shipping and industry organizations, a representant from each city council facing the Mar Menor, and the Spokesperson of the Scientific Advisory Committee of the Mar Menor (Ordinance of February 28). As a result, the ordinance is controlling the representation of this body. In addition, although it states the need to integrate only one representative of each regional department in the meetings, the participation list of one of the meetings shows that there is more than one representative from each department (DGMM, 2022c). Finally, the Ordinance of February 28, 2017 requires the SPC to meet at least 2 times per year under the call of the president or when a minimum of 19 representatives of the SPC request a meeting. Since the SPC was established in February 2017, there have been 14 meetings (GDMM, 2022b), resulting in an average of less than three meetings per year.

After two meetings of the SPC, in 2018, SOS Mar Menor, one of the most important civil society organisation that integrates different sectors such as citizens of the whole affected area, fisherman and environmental NGOs, left the SPC (Ecologistas en acción, 2021a) as they felt that their opinion was not taken into account, that too few meetings were organised and that this body has become a facade "so that the Regional Government hides its inaction in urgent matters and validates inappropriate actions, promoted by private interests, and that have the broad rejection of the scientific community" (CS1). COAS1 also argues that the SPC is a body which does not fulfil its purpose and that the regional administration makes use of it to support their interests. SOS Mar Menor ratified its withdrawal from the SAC in September 2021 as the organisation considers that the situation hasn't changed since 2018 and that the SPC does not fulfil its functions (CS1; Ecologistas en acción, 2021a).

However, the SPC is regarded as a provisional body (DGMM, 2022b). Article 7 of the Law 3/2020 sets out the creation of the Board of the Mar Menor as the main institutional body for consultation and participation. Although the final Strategy approved in 2021 now refers to the previous Forum of the Mar Menor contemplated in the Draft Strategy as Board of the Mar Menor, following the Law 3/2020 denomination, it does still refer to it as a body for public participation of citizens. Nevertheless, the description of the Board of the Mar Menor present in the Law 3/2020 does not expressly refer to it as a participation board of citizens. Accordingly, its composition, set in section 4 of article 7, is of one third formed by the representatives from the three public administrations, one third by the representatives from the SAC and one third

by the representatives from civil society organisations. It is important to bear in mind that, as explained before, the SAC is already constituted in part by governmental officials, resulting in an important portion of the SPC under the influence of governmental sectoral interests. In this regard, COAST1 states that the SPC should be “an independent committee without the participation of any political or institutional agent”.

At the moment, the creation of the Board of the Mar Menor as urged by the Law 3/2020 has been set out through the Decree draft that regulates the composition of the Board and its functions and, after having received allegations and modifying the draft, is awaiting its approval. Accordingly, if the approval proceeds as expected, the actual SPC will be substituted by the Board of the Mar Menor and its characteristics (DGMM, 2022b).

Implementation of the Directory for the integrated management of the Mar Menor

As contemplated in the Strategy, a directory of the most involved, influential and/or interested social, private and public agents in the SESMM need to be created and publicly published. The aim of this instrument is to officially inform about the different stakeholders and foster relationships, exchange of information and opinions, collaboration and participation, as described in the Strategy and article 10.4 of Law 3/2020. Currently, the directory is published in the official webpage of the Mar Menor, “Canal Mar Menor”, and clearly includes all the public institutions involved in the management of the SESMM. However, concerning non-governmental actors, there are only four workers’ organisations published and no single civil society nor environmental organisations within the list (Canal Mar Menor, n.d. b). CS1 considers that the regional administration, responsible for updating the directory, does not have an interest to publish all the relevant stakeholders.

The directory should be, according to the Strategy, easily adaptable, include stakeholders that requests to be listed, and have supportive processes to analyse the relevant actors to be included in this list. However, these conditions are missing. For example, regional policymakers clearly know about the existence and the importance of the SOS Mar Menor platform, as they have participated in some meetings of the SPC and have presented several claims during the past years (CS1). Nevertheless, they remain excluded from the directory.

Implementation of the Communication and information system of the Mar Menor

As contemplated in the Strategy and in article 10 of Law 3/2020, the regional administration must ensure a public system of communication and information about matters related to the Mar Menor. The requirements included in the Strategy are taken into force by Law 3/2020 and, starting with article 10.2, it states the need to elaborate a dissemination plan through appropriate platforms such as social networks, press, television and web pages. From 2017, the regional administration has started a dissemination campaign. As a result, information is being shared in the social networks of twitter, facebook, instagram and youtube, and other means like the newly created webpage “Canal Mar Menor” (DGMM, 2022b).

According to this dissemination campaign and in order to comply with article 10.3, the DWALFEE created the webpage “Canal Mar Menor” in which information relevant to the Mar Menor (e.g. reports, plans, public actions aimed at the regeneration and protection of the Mar Menor, the Directory of the Mar Menor and scientific studies carried out in the lagoon) is published for the open access of all stakeholders and the general public. This page exists since March 25, 2021 and is actively sharing information (DGMM, 2022b).

Documents related to legislation, agreements and actions taken by the regional administration in relation to the Mar Menor and other related information are shared in the Transparency Portal of the Murcia Region. Environmental information is in possession of the regional administration and can be requested in this Transparency portal (PTAPRM, 2022). Therefore, environmental information is not easily and publicly available.

Finally, since 2017, there have been 600 dissemination actions (e.g. brochures, books, maps, etc), 59 external publications (e.g. in the Murcian Institute of Agricultural and Environmental Research and Development), and 9 public activities with a total forum of 13,774 attendees. In addition, the regional government has created two APPs, “CONNECTAmbiental” and “Rumbo Mar Menor”, the former one to report environmental impacts by citizens and the later one, to assist navigation in the Mar Menor and inform of environmental aspects.

4.3.2 Hindering and enabling factors

This section aims to describe the factors and arrangements that enabled and hindered cross-sectoral interplay in the management of the SESMM thus answering the last part of the third sub-question.

Hindering factors

Governance structures and mechanisms related barriers

The top-down approach of the governance and management of the SESMM constituted a barrier to cross-sectoral interplay in the case study. The actions and instruments proposed in the Strategy, explained before, are more bottom-up directed as they are aimed to create a governance model where citizens and actors are given a voice. Nevertheless, they cannot be considered to fully enable a bottom-up approach as the power of social and private actors in decision-making processes is reduced to sending proposals and requests on actions or other matters to the principal decision-making bodies in the SESMM, the IAC and the IDC. Consequently, it lays in hands of the two governing bodies whether to consider the proposals and requests on their final decision (CS1). Considering that, as explained below, there is missing power balance between the sectoral interests in the regional government, the top-down approach frustrates the implementation of a truly multi-sectoral EBM.

Power-related barriers

Power imbalance has resulted in an important barrier in the case study which hindered cross-sectoral interplay. The political party that governs the Region of Murcia strongly supports industry, especially the agricultural sector (CS1, AG1). This is because the agricultural sector strongly lobbies the regional government since decades (CS1). Within the regional administration, representatives have been assigned to support the agricultural interests among the different sectoral departments, for example, the president of the DWALFEE who is an agriculture entrepreneur himself (CS1; AG1; CARM, n.d.). Consequently, being the regional administration one of the most important players in the decision-making of coastal management, they protect the agricultural sector in the decisions that are taken within the IDC (SC1).

Flyvbjerg (2003) states that “power is knowledge” (p. 319) and indeed, this has materialised in the case study. The great majority of the scientific community expose the lack of independence

and transparency of the SAC and accuse the regional government from modifying its composition described in the Ordinance of July 26, 2016 in support of their interests (CS1; WWF, 2022). Consequently, the regional government has imposed its power through the modification of the Committee's composition and by handpicking its representatives, thus influencing what information counts and goes public (AG1). COAS1 also states that "conclusions are drawn and disseminated without previously being agreed upon and, in many cases, they are not true". As a result, there is no correct participation and cooperation of sectors, instead, sectoral interests prevail from others thus hindering EBM implementation.

Similarly, the SPC has a lack of power in the decision-making process and also, the regional government is not fulfilling the purpose that the Strategy initially gave to the body (COAS1) thus reducing the participation of stakeholders (CS1). Therefore, the interests are not balanced because the regional administration does not integrate the requests from the public.

Lack of political will

Lack of political will is one of the main barriers in the case study of the Mar Menor. Being competences and responsibilities for the management of the SESMM distributed among the 3 levels of administrations, it has led to tensions and lack of cooperation and agreement due to the different political representation of the administrations. Although competences of the different institutions are well defined by the legislation, conflicts often arise because "there is an electoral opportunity or there is a political opportunity or there is a clear confrontation between administrations" (R1). As a result, rather than finding common goals and action to solve societal problems, administrations are more interested in exposing the opposition party's issues than cooperating to find solutions (e.g. Gómez, 2022; La Opinión de Murcia, 2022).

Lack of communication and sharing

There is not a lack of communication and sharing per se found in the case study. Rather, there is lack of transparent information and lack of relevant and proactive communication to foster the real integration of sectors through cross-sectoral interplay.

Lack of participation and exclusion

Some information has already been given in this section in relation to the lack of participation. Indeed, lack of participation was a barrier for sectoral interplay in the case study. In the case of SOS Mar Menor platform, their exclusion from the SPC was voluntary as they considered that the Committee does not comply with the intended function in the Strategy (CS1). Also, scientists that exclude themselves from the SAC due to the lack of independence from the authorities leads to a lack of cooperation among the research disciplines and authority and low integration of science in management.

Enabling factors

Create cross-sectoral structures

The creation of structures which function across sectors is one of the main enablers for cross-sectoral interplay in the management of the SESMM. Specifically, the IAF is fostering the coordination and cooperation of the 3 different public administrations, each within its own competences, and thus, fosters the interplay among different sectors represented at different administrative levels (national, regional and local). As a result of this body, coordination is

improved in comparison to the situation before its creation. Cooperation is also being fostered within the meetings of this body but the lack of political will from the national and regional administrations is hindering their effective cooperation (R1).

In addition, the IDC facilitates the coordination and cooperation among the different sectoral departments of the regional administration (DGMM, 2022b). R1 confirms that this Commission is successfully enhancing cross-sectoral interplay for the management of the SESMM as they organise periodic meetings, in which they coordinate their actions and share relevant information that helps conduct an integrated management. Nevertheless, here again, the behavioural barriers of the regional government related to the agricultural lobby hinder a fair balance of the social, ecological and economic interests.

In addition, the creation of the SAC allows coordination between different scientific disciplines and the coordination of their work with the needs from the regional administration. This allows scientific research to be coordinated with actions conducted by the public administrations as these last ones can request advice on their proposed programs and actions and thus, foster the integration of science-management. If this structure would have independence from the regional administration, therefore being composed only by scientists, this Committee could favour the integration of these key actors into management.

Finally, the SPC, creates an arena for the coordination and cooperation among non-governmental actors and among them and the public administrations. This is an appropriate arena to inform about management instruments approved by the authorities and coordinate their actions accordingly with the users. Also, the other way around, stakeholders can agree upon matters and propose them to the authorities. This body has existed since 2016 but is far from achieving the integration of actors in the SESMM (CS1) as it needs mechanisms of power balance between participants but also, a proper share of power from the public administration to the stakeholders.

Foster means of cross-sectoral communication and data-sharing

The periodic and in presence meetings that are organised for the previous cross-sectoral structures are important means for communication and sharing of information. Indeed, the different administrations forming the IAF bring documents to the meetings which explain their advances on the implementation of the Strategy within their own competences (e.g. DGMM, 2022a). In addition, the regional administration is conducting a dissemination plan that allows non-governmental sectoral actors to be informed about updates (advances on the Strategy implementation, actions, problems, etc) related to the Mar Menor through common and diverse social networks. Moreover, the creation of the webpage Canal Mar Menor and APPs offers information and data to the stakeholders and citizens anytime (DGMM, 2022b).

Create participation processes to foster broad-scale participation

The participation of stakeholders has been enabled in different ways. The communication and information system is allowing the broad public to be informed about the problems, actions and advances carried out in the Mar Menor and its SES. In addition, a correctly made directory would enable more partnership among actors and foster their participation. The SPC is a good mean to create an arena for the civil society, business organisations and NGO's to come together and discuss about their concerns and come to agreements. Their participation in the management process is thus allowed by sending requests to the IAF and the IDC about their concerns and proposed solutions.

Create a strong legal framework

The instruments and mechanisms proposed in the Strategy to foster cross-sectoral interplay (see table 5) have been enforced by law 3/2020 which has provided a strong legal framework for those actions to be implemented. Transposing into law those arrangements proposed by the Strategy means that what the Strategy proposes in a voluntary way is enforced and gains a higher legal rank therefore making mandatory the implementation of such arrangements (R1). “Then, even if they [the administration] don’t like it, it has to be complied with” (R1). Accordingly, creating a strong legal framework can address the barrier of low political will as it makes mandatory the implementation of those arrangements.

5. DISCUSSION

This chapter evaluates the results from the case study and shows how it relates to the literature review, conceptual model and the research questions. The research problem of this study is that institutional arrangements designed under a conventional sectoral management of the coast result in a mismatch with EBM implementation requirements and thus, hinders EBM operationalisation. Accordingly, this study aims to find effective ways to foster cross-sectoral interplay to increase the integration of sectors and EBM operationalisation.

The results indicate that creating new institutional arrangements that enable cross-sectoral interplay, especially cross-sectoral structures, facilitate the integration of sectors in the management of the SESMM and contribute to the effective operationalisation of EBM in the coast as previous research indicates. Nevertheless, the results clearly illustrate that political will and power relations are important hindering factors for the implementation of cross-sectoral structures and thus, hinder EBM implementation.

5.1 EBM, SES AND COASTAL RESILIENCE

The case study results indicate that EBM is more appropriate for building resilience than a conventional and sectoral management of the Mar Menor as expressed in EBM literature (e.g. McLeod et al. 2005; Delacámara et al., 2020; Piet et al., 2020). For building resilience, systems thinking was crucial in the case study, meeting Folke et al., (2005) arguments. First, the Strategy and Law 3/2020 enforce the application of SES criteria in the scope for coastal management. As a result, SES interrelations (see figure 2) and ecosystem connections are recognised in coastal management, following two of the EBM key principles (figure 3), and broadening the area of coastal management to the SES of the Mar Menor. It also recognises the human activities and related actors that produce impacts and have interests in the SESMM. Accordingly, the Strategy proposed operational and sectoral plans to make the system less vulnerable to the identified human impacts in the SESMM, some of them presented in section 4.1.2. The physical adaptation measures that were implemented contribute to the adaptability dimension of resilience explained by Restemeyer (2018).

In addition, the Strategy proposes instruments to make a transition from a sectoral and command-and-control management to a more adaptive and integrated coastal management, these being key principles of EBM (see figure 3). The effective implementation of the instruments has the potential to increase the capacity of the system to make a transition thus meeting the transformability dimension of resilience described by Restemeyer (2018). However, the transition is not close to be completed as integrated and adaptive management in practice differs from theory due to lack of stakeholder participation, low coordination and cooperation among authorities and low integration of scientific and local knowledge in management.

Therefore, one of the main contributors of EBM to resilience was to define the scope of management of the Strategy under SES criteria, as suggested by de Andrés and Barragán (2022), and thus bring into practice the 10th more commonly acknowledged principle in EBM (Long et al., 2015), which at the same time, fosters a transition to more adaptive and integrated management.

Regarding fairness of the resilience building process, the results indicate that the Strategy considerations are not intended to benefit one sector more than the others, instead it aims to sustain ecosystem structure and functions for the benefit of society and the different sectors in a balanced way. This matches the description of EBM by several authors (McLeod et al., 2005; Kappel et al., 2006; Cosens and Fremier, 2014). The lack of specificity of the Strategy aim, presented in section 4.1.2, may seem to lead to inaction, however, more concrete operational and strategic objectives are being operationalised through plans and instruments, some of them presented in the results chapter. Nevertheless, lack of power balance among interests in the Mar Menor resulted in the unsuccessful implementation of the functions of such instruments leading to winners and losers in resilience building (Davoudi, 2012), specially benefiting the agricultural sector and economic sector in general.

Therefore, these results suggest that EBM is more appropriate to increase resilience of coastal SES, as indicated in the conceptual model (figure 6), but the implementation of the proposed actions, plans and instruments need to become effective in order to operationalise EBM.

5.2 ADVANCING TOWARDS INTEGRATED MANAGEMENT THROUGH CROSS-SECTORAL INTERPLAY ARRANGEMENTS

The findings show that, as Cicin-Sain and Knecht (1998) indicate, there are many sectors involved in coastal management and many different actors represent them: authorities, business sector, NGO's and the civil society in general. In order to foster the integration of sectors in the implementation of EBM, the Strategy proposes several instruments for improving the coordination and cooperation among sectoral public institutions as well as participation of stakeholders (table 5).

The results indicate that creating cross-sectoral structures have the potential to foster coordination, cooperation, and participation of actors which operationalises EBM principles such as integrated management, stakeholder involvement, use of scientific knowledge and adaptive management, identified by Long et al. (2015).

Coordination arrangements

The principal contributors to institutional coordination among sectors were the creation of two cross-sectoral bodies dictated in the Strategy. On the one hand, the IDC was intended to integrate the sectoral departments of the administration of the Region of Murcia, thus fostering horizontal integration as required for integrated management by Cicin-Sain and Knecht (1998). On the other hand, the IAF integrated representatives from the three different administrations, known as vertical integration which is a critical dimension for integrated management as argued in several papers (e.g. Thia-Eng, 1993; Cicin-Sain and Knecht, 1998). This finding supports the recommendations by several authors (Thia-Eng, 1993; Lane, 2008; Portman et al., 2012; Alexander and Haward, 2019) to create such structures for the coordination and integration of sectors in coastal management. Accordingly, and meeting Lane's (2008) explanation, these structures have bridged the different authorities that represent sectors at the same and different administration levels and fostered the coordination of their actions through periodic meetings.

Two other bodies enabled the coordination of different scientific knowledge disciplines and the different non-governmental organisations. First, the SAC integrated five working groups which enabled coordination of different scientific disciplines and thus advanced the understanding of

the complex dynamics and interconnections of the SESMM. Then, the SPC enabled an arena for different non-governmental actors to come together and coordinate their actions through the discussion of problems, measures, actions, etc.

Cooperation arrangements

Cooperation among sectors was enhanced through different arrangements promoted in the Strategy. Firstly, the different cross-sectoral bodies (IAF, IDC, SAC and SPC) enabled the cooperation among the representatives involved in the respective bodies. The meetings organised for the different bodies facilitated face-to-face communication among sectoral actors and/or authority representatives and sharing of information through different means such as presentation of reports or budget allocation. Such communication and data-sharing arenas foster cross-sectoral interplay and thus, advance EBM implementation (Alexander and Haward, 2019). Nevertheless, the consequences of not institutionalising a body for the interaction among the three administrations, as required by the Strategy, as well as the meetings of the SPC resulted, in conformity with Maier (2014) explanations, in low cooperation among administrations and lack of trust from part of the SPC actors.

Secondly, arrangements to connect these bodies among them can contribute to increase cross-sectoral cooperation. On the one hand, the researchers that form the SAC cooperate with the administration involved in the IAF and IDC by giving them advice on the strategies, programs and actions that they propose, recommend programs and actions, suggest necessary research studies and conduct monitoring, as contained in the Ordinance of July 26, 2016. By doing so, management-science integration is enabled, one of the integration dimensions presented by Cicin-Sain and Knecht (1998), and thus operationalises the principles of use of scientific knowledge and integrated management in EBM presented by Long et al. (2015) (figure 3). On the other hand, the SPC also cooperates, in compliance with Ordinance of February 28, 2017, with the IAF and IDC by sending them requests and proposals on matters agreed upon in their meetings, thus enhancing more global perspectives in the resulting decisions of the IAF and IDC. Similarly, Shepherd (2004) presented the possibility of this interaction “local committee-authority” in a case of marine ecosystems management in Panama.

Thirdly, both the directory of the Mar Menor and the system of communication with the general public are good initiatives to foster cooperation among stakeholders. The directory is intended to inform stakeholders of the existence of other actors and favour partnership and cooperation while the communication system may raise awareness of the general public and foster their willingness to participate and cooperate for improving the environment of the Mar Menor. These arrangements were not considered in the theoretical framework chapter but might be of help for enhancing cooperation among sectoral actors, especially non-governmental ones, when clearly and transparently used.

Participation arrangements

The results present several arrangements that enhanced the participation of sectoral actors in the management of the SESMM. On the one hand, the general public is called to participate in the SPC through representatives of their sectoral organisation, including civil society, NGOs and business organisations. Regarding the SPC functions, its participation level can be considered as medium, according to Pickaver et al. (2010) classification, because the general public has the opportunity to participate in the design of solutions and share their conclusions with those who make decisions (IAF and IDC), but they are not given the power to directly influence the final decisions. Still, their participation in the SPC could favour a more integrated management of those who are affected by the management decisions, following Lane (2008) considerations, if

the functions of the SPC would follow the descriptions given by the Strategy, free from political influences.

The SAC functions can also be described as a way of participation of researchers in the management of the SESMM. The scientific insights resulting from the SAC are integrated indirectly in management decisions through the cooperation arrangements presented before with the IAC and IDC. Their level of participation is also considered medium as they are neither given the opportunity to participate in the decision-making process. The contributions of the SAC to a more integrated management are nevertheless frustrated as its composition as well as the resulting conclusions are adapted and distorted in benefit of political interests.

In addition, the regional administration created and shared publicly the directory of the Mar Menor and implemented a communication system which openly shares information related to the Mar Menor and the implementation of the Strategy and related actions. Considering Pickaver et al. (2010) classification, these participation arrangements match the function of informing the general public and can be considered of low involvement. Nevertheless, it is still important to keep actors informed and foster their awareness for more coherent action with policy objectives (Pickaver et al., 2010).

In conclusion, the cross-sectoral interplay arrangements presented in this section are a way of pursuing integration within an existing institutional design without making a fundamental change as Alexander and Haward (2019) suggest. In other words, coastal management still maintains the sectoral public institutions which conduct their sectoral functions as well as the division of competences between administrations but creates “mechanisms of connection” that enables a more integrated management. The contribution of cross-sectoral structures on EBM implementation meets the expectation from the researcher, as cross-sectoral structures have been promoted for decades to increase cross-sectoral interplay (e.g. Thia-Eng, 1993).

Accordingly, this approves the interconnection in the conceptual model which indicates that enablers, such as cross-sectoral structures, facilitate interplay of different sectors through coordination, cooperation and participation and thus, operationalise EBM (see figure 6), as integrated management is one of its key principles. Thus, the findings confirm, following Berkes (2012) demand, that implementing EBM needs of “revolutionary” practices that involve creating collective structures for cooperation, social learning and knowledge co-production; however, achieving that is more complicated than just through the creation of cross-sectoral structures alone. The next two sections present key factors that hindered the effective cross-sectoral interplay in the Mar Menor and frustrated the implementation of integrated management and thus, operationalisation of EBM.

5.3 TOP-DOWN IMPLEMENTATION AND POWER-RELATED BARRIERS HINDER CROSS-SECTORAL INTERPLAY

The results show that the imbalance of power among sectoral interests in the regional administration and the prevalence of a top-down approach have frustrated an effective cross-sectoral interplay and thus, the implementation of EBM.

The results prove that power-related barriers are potentially the main barrier to cross-sectoral interplay in the SESMM confronting the results by Alexander and Haward (2019). This barrier does not appear within the four most prevalent ones in their study but is present in some papers they analysed which proves not to be a rare barrier. The findings identified that the regional

administration is influenced by the lobby from the agricultural sector and that even the representative of the department with competences on environment (DWALFEE) cannot be considered impartial in the SESMM management as he is an agricultural entrepreneur himself. This leads to power imbalance between the policy sectors, as information is carefully managed by the representatives of the administration of Murcia to prevent restrictions on the development of agricultural activity, as different sources mentioned. Considering that agriculture is one of the main contributors to the anoxia events in the Mar Menor, actions need to be taken to fairly balance the benefits and trade-offs with the other policy sectors affected by the anoxia events and the degradation of the ecosystem.

In addition, the regional administration is reluctant to transfer power to non-governmental actors, resulting in the described irregularities of the SPC and SAC's functions and composition. In such committees, "power is knowledge" (Flyvbjerg, 2003) because only the information and decisions that interests the representatives of the Region of Murcia is made public and influences decisions, often in favour of sectoral interests.

In addition, the results indicate that the implementation of EBM in the SESMM is a more top-down approach albeit the different instruments proposed in the Strategy for involvement of scientists and the general public in the management. This is because ultimately, the decision-making process is exclusive for the governmental actors. The top-down approach does not necessarily translate into the prevalence of a sectoral management as Sander (2018) claims in his article, in which he describes that the top-down approach for implementing EBM in the Barents Sea was successful to avoid sectoral conflicts and enable an integrated management. However, in this case study, the top-down approach keeps the power within the governmental bodies and the fact that the regional administration, one of the main actors in the decision-making process which gathers most of the competences in the management of the SESMM, has a stronger interest in maintaining and developing the agricultural sector, results in the prevalence of agricultural interests above other sectoral interests in the management of the SESMM. This confirms that governance related barriers, the most commonly found bottleneck in the literature review of EBM implementation by Alexander and Haward (2019), is also an important barrier in this case.

Consequently, these power-related barriers and the predominance of a top-down implementation of EBM has restrained the original functions of the cross-sectoral interplay instruments proposed by the Strategy. Thus, the prevalence of sectoral interests over the balance and integration of social, economic and environmental interests hinders an effective operationalisation of EBM. This also confirms that barriers, like power imbalance, hinder the interplay of sectors and thus affects the operationalisation of EBM (figure 6).

5.4 NEED FOR POLITICAL WILL TO COOPERATE

Lack of political will does also negatively influence the effective implementation of cross-sectoral interplay instruments, such as the IAF, in the SESMM. Not considered as one of the main barriers though (Alexander and Haward, 2019), it is an important one in the case of the SESMM management and it is also present for example, in the practical implementation of EBM in Sweden (Österblom et al., 2017). Mainly, lack of political will constrain cooperation between the regional and national administrations in the IAF as there is more political interest to be in disagreement due to their different political ideologies. Therefore, it is important to engage strong political will and commitment from the beginning of the planning process (Thia-Eng, 1993). Not only it hampers the functions of the IAF, but more political will from the regional

administration for implementing EBM rather than supporting agricultural and economic interests could enable the effective implementation of the instruments, the SAC and SPC, considered in the Strategy for the balance of interests in the coastal management and thus increase the participation of non-governmental actors and the cooperation among them. Consequently, coastal environment does not seem to be a principal and long-term priority for the different administrations in the case of the Mar Menor.

5.5 LIMITATIONS

In this section, the researcher aims to reflect on her research process considering the research design, methodology and the unexpected obstacles encountered along the thesis process.

First, the main research question contains three concepts that resulted complex and extensive to analyse. On the one hand, resilience is a complex concept which was difficult to analyse in the Mar Menor context because it was not directly addressed in the policy documents. In addition, interviewees struggled to make connections between resilience and EBM in the case study due to the unfamiliarity with the concepts and the early stage of implementation of the Strategy.

On the other hand, studying cross-sectoral interplay involves a multitude of elements, including the analysis of a great variety of sectoral actors, both at the different domains of society (public, civil and private) and policy sector, and their interaction and connectivity in three different ways: coordination, cooperation and participation. Studying each interaction in depth could easily constitute a thesis itself and consequently, it resulted complex to stay within the word count while providing depth about cross-sectoral interplay. In addition, such interactions are better studied through oral interviews with actors themselves. However, the researcher could not conduct any oral interview, but written ones, with policymaking actors. Maybe officers wanted to avoid talking about controversial topics related to the Strategy implementation. Nevertheless, it was possible to interview non-governmental actors who were willing to explain their experiences in the case study and share their critical perspectives, perhaps even more than the policy makers themselves who are deeply involved in the implementation practices and might be harder for them to reflect on those matters. Interviewee's experience and data extracted from documents allowed a good understanding of the process of implementation of the Strategy and cross-sectoral interplay in the management of the Mar Menor, thus allowing the researcher to come to insightful results and conclusions.

All in all, this is a representative case meaning that although some lessons can be valid for other contexts, it is a unique and illustrative case with its own characteristics on the Mediterranean coast, specifically a large coastal lagoon within a given planning and management system and might not be valid in other contexts with different planning systems and environmental characteristics.

6. CONCLUSION

The last anoxia events of 2016, 2019 and 2021 in the Mar Menor demonstrated the urgency to transform the coastal management approach to one that makes the coastal system more resilient to human impacts. EBM has proven to be an appropriate approach for increasing coastal resilience and addressing the anoxia problem by adapting and transforming the social-ecological system to one that is more resilient. However, there is missing knowledge in theory and practice on how to effectively implement EBM in the coast which has traditionally been managed sectorally. The institutional design of a sectoral management of the coast is not suitable for implementing EBM which requires integrated management among policy sectors. To address this problem, cross-sectoral interplay, as the coordination, cooperation and participation of actors, arises as an opportunity to bridge sectoral institutions and actors and advance EBM implementation.

Therefore, the main research question addressed in this study is: **How can cross-sectoral interplay be fostered to increase integrated management and thus, advance EBM implementation for coastal resilience?**

Accordingly, this research aimed to find effective ways to foster cross-sectoral interplay to increase an integrated management of the coast and enable the implementation of EBM which contributes to coastal resilience. Based on a qualitative research through a case study of the implementation of EBM in the Social-ecological System of the Mar Menor (SESMM), cross-sectoral structures proved to be effective to foster cross-sectoral interplay and thus advanced in the implementation of EBM. Nevertheless, the findings indicate that power relations and political will are important hindering factors for cross-sectoral interplay and the operationalisation of EBM.

Cross-sectoral structures

The results indicate that cross-sectoral structures such as committees, commissions or forums that create arenas for the gathering of sectoral actors foster their coordination and cooperation and enable actors to participate in coastal management, thus increasing integrated management, as the literature review suggested. In the case study of the Mar Menor, a forum, a commission and two committees were created for the cross-sectoral interplay of different groups of actors with the aim of fostering the transition to an integrated management of the coast and operationalise EBM.

In order to foster institutional coordination and cooperation, the creation of a cross-sectoral body that involves the different authorities that have competences in the same coastal region to be managed can be beneficial, thus increasing vertical integration. For example, the Inter-administrative Forum of the Mar Menor (IAF) was designed for the vertical integration of the institutions at different administrative levels. However, government agencies should be integrated in a forum that is mandated by law or regulation to ensure their coordination and cooperation.

In addition, coordination and cooperation of authorities that operate at the same level within different policy sectors can be enhanced by the creation of an interdepartmental commission for the horizontal integration. In the case of the Mar Menor, the Interdepartmental Commission of the Mar Menor (IDC) fostered the horizontal integration by coordinating actions taken by the

sectoral regional departments and created a fora for the communication and share of information which contributes to cooperative behaviour among them.

Moreover, as the theory suggests, EBM cannot be successfully operationalised without the use of scientific knowledge in management. Thus, the results show that creating a committee for the participation of the scientific community in coastal management can contribute to science-management integration. In addition, scientific committees allow the coordination and cooperation among the different scientific disciplines. Integration of science in management may also contribute to the identification of ecosystem connections and the characterisation of SES (figure 2), required in an EBM strategy.

Finally, stakeholder participation can be enabled by the creation of a committee for social participation. This fosters dialogue, balances sectoral interests and connects the interests of the general public in the decisions for coastal management. Drawing on the finding of the case study, such committees should be given the power to influence decision-making and balance power within the actors. Participation of stakeholders in the management system is also required for vertical integration (Vallega, 1999).

Accordingly, these different cross-sectoral structures contribute to bridge the different sectoral actors among them and among different societal domains through their coordination, cooperation and participation in the management system and advances the operationalisation of integrated management through the coordination of the management activities undertaken by the different actors but also, other EBM key principles like stakeholder involvement, integration of societal choice in decisions, use of scientific knowledge and interdisciplinarity (figure 3). Therefore, a conclusion from this study is that EBM implementation in coastal regions can be supported by a set of structures that enable the coordination and cooperation across sectors and institutions.

Hindering factors: power relations and political will

While this research demonstrates that creating cross-sectoral structures contributes to operationalising EBM, it also indicates the need to consider and address power relations and political will in decision-making processes. In contrast to literature, the findings show that power relations are a key factor for cross-sectoral interplay. For example, power imbalance between the different policy sectors in the regional administration of Murcia affects the decisions taken by the IDC which has also representation in the IAF, favouring sectoral economic interests thus hindering the operationalisation of EBM objectives. Power relations also affect the participation of non-governmental actors in coastal management as the regional administration does not integrate in a balanced way their different sectoral interests and concerns in the final decisions. Considering that EBM requires decisions to reflect societal interests (Long et al., 2015), power relations hinder the operationalisation of this principle.

In addition, the results indicate that political will is also a key factor for cross-sectoral interplay. The differences in political ideologies among administrative levels have frustrated the cooperation among them. Also, lack of political will leads to the lack of institutionalisation of the actual IAF which misses regulation of its functions and composition and thus their obligation to cooperate lacks of enforcement mechanisms. These factors are a barrier to the operationalisation of EBM because they make sectoral interests predominate over others when designing solutions and impedes balancing trade-offs in decision-making in contrast to what O'Higgins et al. (2020) suggest under EBM.

Further recommendations for practice

The findings show that the current institutional arrangements in the case study are not yet fully operationalising the principles that EBM theory suggests. Again in 2021, an anoxia event occurred in the Mar Menor showing that measures have not been enough to reduce the vulnerability of the coastal system. In addition, coastal management cannot be considered truly integrated and adaptive yet, as political will and power relations hinder stakeholder participation. Hereunder, some suggestions are proposed in order to advance to EBM in practice in cases like the Mar Menor.

Adapt and transform human practices

EBM literature emphasises the need to preserve the health of the ecosystem for ensuring the provisions of ecosystem services to societies (e.g. McLeod et al., 2005). For cases like the Mar Menor, some transformations or adaptations of human activities based on the capabilities and limits of the ecosystem could improve the health of the coastal environment and maintain the ecosystem services it provides thus increasing resilience of coastal systems. For example:

- Transforming back to more ecological agricultural practices and drought resistant crops for local consumption.
- Adapt tourism to the capabilities of the ecosystem by avoiding massification in summer and promoting sustainable practices in the coast and its related ecosystem.
- Scale-up nature-based solutions for a more natural water cycle in the watershed connected to the coastal ecosystem, and increased ecosystem services such as the reduction of floods and purification of runoff water.

Strong legal foundations and management processes

In the implementation of EBM policy in coastal regions, many actors with competing interests may oppose to change. For example, although the Strategy was designed in a participative and collaborative way with stakeholders, its implementation was not welcomed by all the actors in the Mar Menor. In that sense, a strong legal basis that enforces the implementation of the instruments, actions and other considerations from the strategies or plans can contribute to their effective application in practice.

Nevertheless, for cases like the Mar Menor, it is necessary to revise laws, ordinances and other legal instruments that bring into effect the instruments considered by the Strategy, for instance the Scientific Advisory Committee of the Mar Menor, in order to ensure that those instruments are functionally operating under the designed requirements of transparency and independence and that it allows knowledge to be effectively integrated into final decisions for coastal management.

In addition, it is important to ensure transparent institutionalised participation processes of stakeholders for the integration of scientific and local knowledge and the balance of sectoral interests in the decision-making along the EBM cycle, from planning to implementation and evaluation. Also, cooperation among different administrations, especially with conflicting political ideologies, needs to be institutionalised through, for example, the signature of a collaborative protocol by the different administration representatives which enables cooperative behaviour to achieve EBM goals.

Change of political priorities

The case study of the Mar Menor shows the need to balance the power of sectoral interests to support EBM implementation in the coast. A strong long-term political interest to maintain and improve the health of the coastal environment and reduce the negative impacts of economic activities is crucial to advance in EBM implementation. Thus, it can be beneficial to educate policymakers about SES, ecosystem services, the increasing risks and pressures to coastal environments, the importance of maintaining a healthy ecosystem to ensure their provision for the resilience of the social and economic systems and the need to take seriously the limits of ecosystems for resilience of coastal SES. Increased awareness on the importance of considering the interconnections of SES (figure 2) and ecosystem limits and capabilities in coastal management could increase their urgency to integrate scientific knowledge in policy and management for more science-based decision-making, thus enabling participation of the scientific community.

In addition, authorities should raise awareness of policymakers about the importance of stakeholder engagement for increased local knowledge that contributes to adaptive management, a key principle of EBM (figure 3; Long et al., 2015), and coherent action of stakeholders with policy objectives. Increase systems thinking of coastal managers to better understand social and ecological interconnections in coastal resource management.

Effective learning and balanced negotiations of stakeholder interests

Social participation committees or forums may lead to unfair share of trade-offs and unsuccessful social learning, like in the case of the Mar Menor, when interests are not properly balanced. Accordingly, coastal managers should enable arenas for stakeholder participation that stand out for its transparent share of information and balanced power of actors. This can increase stakeholder understanding of different actor needs and behaviours and of the limits of the coastal ecosystem they share in order to develop consensus. Moreover, it can increase stakeholder understanding of their impacts on the environment and other users and increase their feeling of responsibility. Coastal managers should also promote coastal environment as a priority for stakeholders for the resilience and sustainability of coastal regions and enable social learning that foster adaptive management, by adapting to changing conditions of the coastal SES through local knowledge and experimentation.

Recommendations for future research

In comparison to literature, the findings from this research indicate that power relations were a key factor for cross-sectoral interplay which hindered the implementation of EBM in the coastal management of the Mar Menor. For future research, it would be valuable to study more in depth power relations in the interplay among sectoral actors and how to balance power among them in decision-making processes to enable the participation of stakeholders, the fair balance of trade-offs and the integration of scientific knowledge in management for conserving the health of ecosystems.

In addition, coordination and cooperation among administrations was difficult in the case of the Mar Menor due to lack of political will. Accordingly, future studies could investigate how to promote cooperative behaviour among different administrations with different political sign in the process of EBM implementation.

Finally, considering that resilience is growing interest in policy discourses (Restemeyer, 2018) and that this study focused on human impact disturbances, future studies could explore the contributions of EBM to increase resilience in the coast for diverse type of disturbances such as sea level rise to further boost the implementation of EBM in coastal areas.

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ANNEX A: Interview guide

The Interview guide was originally written in Spanish. This is its English translation.

Introduction

1. Introduction from researcher: personal background, topic of the thesis, concepts and aim of the interview.
2. Ask for consent to record the interview and to use the information in the thesis. Briefly explain ethical considerations.
3. Could you please briefly introduce yourself and your role?

Case Study

Resilience in the coast

4. What do you think about the delimitation done in the Strategy under SES criteria? Is it more appropriate to solve the problems in the Mar Menor and why?
5. How is the ecosystem approach of the Strategy of the SESMM contributing to coastal resilience?
6. In your opinion, does the implementation of the Strategy build resilience in a justly and fairly way among stakeholders?

Cross-sectoral interplay

7. What are the sectors and actors relevant in the management of the SESMM? Are they all involved in the implementation of the Strategy?
8. How is coordination among sectors organised? (ask specifically for interviewee's case)
9. How is the cooperation among actors from different sectors organised? (follow-up question: How is information and knowledge exchanged between actors?)
10. How is participation of stakeholders arranged?

Hindering and enabling factors

11. What aspects made difficult the coordination, cooperation and participation between different sectoral actors? Which were the most relevant in the case?
12. What factors or arrangements facilitated interaction between sectors?
13. What would you recommend for increasing the interaction and thus, the integration among sectors?

Conclusion

14. Is there anyone involved in the coastal management that you would recommend me interviewing? (Can you recommend me a contact from X sector?)
15. Possible extra document sharing.
16. Is there anything else that you would like to share?
17. Thank the interviewee.