SMARTLAGOON

DELIVERABLE 4.2

Description of BMPs, policies and associated scenarios for water pollution control and flood mitigation measures

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No

SMARTLAGOON

Innovative modelling approaches for predicting Socio-environMentAl evolution in highly anthRopized coasTal LAGOONs

Deliverable 4.2

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Description of BMPs, policies and associated scenarios for water pollution control and flood mitigation measures

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Abbreviations

AEMET: National Agency of Meteorology / *Agencia Estatal de Metereología*

ANSE: Naturalist Association of south-east / *Asociación Naturalista del Sudeste*

BMP: Best Management Practices

CARM: Autonomous Community of Region of Murcia / *Comunidad Autónoma de la Región de Murcia*

CHS: Hydrographic Confederation of Segura River / *Confederación Hidrográfica del Segura*

CREM: Regional Center of Statistics of Murcia / *Centro Regional de Estadística de Murcia*

DGCM: General office of Coast and Sea / *Dirección General de la Costa y el Mar*

DPSIR: Drivers-Pressures-State-Impacts-Responses system thinking framework

EDAR: Water Treatment Station / *Estación Depuradora de Aguas Residuales*

EEA: European Environmental Agency

EGD: European Green Deal

EU: European Union

FTHBTM: Federation of Tourism and Hotel Business of the Region of Murcia

GDP: Gross Domestic Product

MITECO: Ministry for the Ecological Transition / *Ministerio para la Transición Ecológica*

MITED: Ministry for the Ecological Transition and Demographic Challenge / *Ministerio para la Transición Ecológica y Reto Demográfico*

MTD: Best Available Techniques / *Mejores Técnicas Disponibles*

NBS: Natural Based Solutions

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PAC: Common Agricultural Policy / *Política Agraria Común*

SCI: Site of Community Importance

SIAM: Agrometeorology Information System of the Region of Murcia / *Sistema de Información Agrometeorológica de la Región de Murcia*

SPA: Special Protected Area

SUDS: Sustainable Urban Drainage Systems

UCAM: Catholic University of Murcia / *Universidad Católica de Murcia*

ZEPIM: Special Protected Areas of Importance for the Mediterranean sea / *Zonas Especialmente Protegidas de Importancia para el Mediterráneo*

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Summary

This document makes a review of some relevant socioeconomic and environmental aspects of the Mar Menor area, as well as an analysis of the responses given by the Public Administration at different levels to the ecological crisis of the lagoon. The analysis has been made based on the DPSIR framework and throughout a *Best Management Practices* (BMPs) identification approach. Bibliographic research and the BMP analysis highlight the relation between the current state of the Mar Menor and agriculture. From the other side, also we have been identified the negative impacts that an unproper ecological status of the Mar Menor lagoon is having in some strategic sectors in the regional economy such as tourism. Bibliography highlights the relation of the ecological state of the lagoon with the agricultural methods employed in Campo de Cartagena. The analysis of BMPs shows that the Public Administration has put the focus on limitation to the agricultural practices that have led the lagoon to its collapse, mainly by reducing the nutrient inputs in the waters and restricting the development of new holdings in the nearest lands to the Mar Menor coastline. There are also efforts to reinforce tourism and change its current vulnerabilities and to promote more sustainable models of ecotourism. Direct actions on the territory such as environmental restoration are also promoted with huge investments in the renaturation of the coastline and the restoration of the functionality of the stream network. The overall analysis will be the base for the further development of the socio-environmental modelling in the upcoming months.

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1. Introduction

The Mar Menor is a coastal saline lagoon in the southeast of the Iberian Peninsula, in the east of Campo de Cartagena (Murcia Region). The lagoon provides an environment where a high biodiversity and valuable ecosystems have been coexisting with human activities for centuries. However, the development of intensive agriculture and mass tourism during the last decades, the proliferation of urban areas, insufficient safeguarding of abandoned mines, modifications of the physical structure of the lagoon and overexploitation of its ecosystem have led to the ecological collapse of this valuable marine space. Moreover, the lagoon not only provides high ecological values, but is also an important touristic destination and of great importance for the culture of local people.

Originally, the Campo de Cartagena region was a rural territory, with a society that depended on subsistence agriculture, fishing, and salt production. The intensification of agriculture in the Campo de Cartagena during the last decades and the spreading of irrigation crops were triggered by additional water availability from the Tagus-Segura transfer. This led to a constant accumulation of nutrients in the soils and groundwater of the Mar Menor catchment area and the growth of nutrient inputs in the lagoon due to runoff and discharges from aquifers. In addition, the impacts of urban development, tourism and mining also have contributed to deteriorating the ecological status of the lagoon. The process culminated in 2016 in an event called “green soup”, in which macro algae communities collapsed and which was followed by a massive mortality of fishes. Since then, several similar episodes took place (2019 and 2021). It is largely acknowledged that the environmental degradation of the Mar Menor is the consequence of socio-economic drivers that led to the unsustainable management of the ecosystem.

Since then, society has put the focus on the Mar Menor, as it could be one of the most critical environmental crises in the European Union. A wide variety of stakeholders and social collectives have participated in the search for solutions to the crisis, everyone defending their own interests or ideas. For instance, ecologists started a social movement advocating for responses from politicians. The tourism sector is affected by the consequences of landscape degradation and demands measures to restore the lagoon, agricultural holdings feel that the majority of societal stakeholders point out the sector as mainly being responsible for the lagoon’s degradation. However, the sector is worried about the impacts that actions could have on their revenues. Local inhabitants have abandoned areas due to unpleasant smells and the response of the public administration is in some cases incoherent and does not respond to all relevant factors.

Even though all stakeholders are involved in the process and affect the state of the socioeconomic and environmental territorial model, administration and public power are the ones which really

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have potential to change the situation by acting on the legal framework of the region. These actions from public powers are what in this document are going to be called *interventions*. Interventions have the potential to modify the ecological and socioeconomic dynamics of the region that lead to the current situation in several ways. These interventions include policies, plans and strategies, laws, regulations, and projects, and could be understood as a tree scheme where more generic instruments are developed by more specific ones (Figure 1). Each of these types of interventions has its own scope and will be described in the next paragraphs.

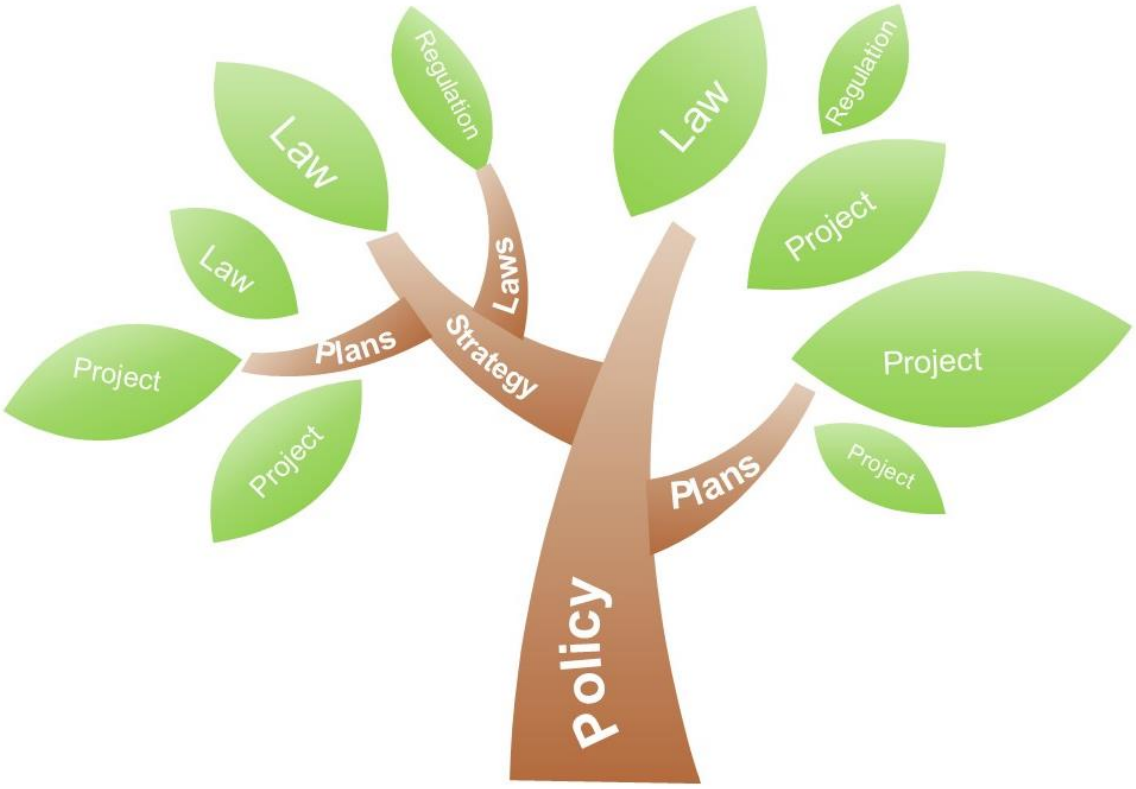

Figure 1: Tree scheme of the different levels of interventions from public administration. Source: own.

Firstly, policies are the whole set of actions taken by the state, at all levels, to respond to specific societal challenges (Bosch et al., 2010). Policies are not a particular response but frameworks that include a wide range of actions and instruments aimed. They can be defined simply as the image that policy makers have of the future regarding a topic and all the efforts that are planned to reach it. Policies are usually medium and long term and are not legally binding. Most of the time, they are not transcribed to official documents, but they can be identified in speeches, actions, meetings, proposals of objectives and the definition of a state that should be achieved in the future. To materialize its aspirations, policies need the application of more concrete instruments such as plans, laws, or projects, which have legal implications that have real-world impact. Bringing this concept to the Mar Menor context, the policy is the "recovery of the environmental status of the lagoon",

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this will lead to a series of restoration projects, laws to regulate the environmental impacts of strategic sectors, plans for diversification of the economy, etc.

On the other hand, plans (and strategies) are instruments that specify the route and the efforts needed to reach, or partially reach the objectives set in the policy (Dasí, et al., 2005). Planning documents need to analyze and quantify the problem, identify the number of resources needed to reach the objectives, define the work plan and the actions required and assess the impacts of its application. Even though plans identify key actions, they do not develop it to the operational scale, that is that projects or laws do. Regarding Mar Menor, an instance of a plan is the "Comprehensive Management Plan of the protected areas of Mar Menor lagoon and coastal strip in the Mediterranean area of Murcia (2019)." This document identifies a problem (the confluence of several protected areas in a relatively small surface that are linked with the Mar Menor lagoon that should be managed coherently), defines objectives, establishes actions that should be developed in a specific temporal frame, and estimates the resources that will be needed for that.

Laws are juridic norms that individuals, groups, or other social constructs such as companies or administrations should adhere to. They are legally binding, and their level of definition can vary depending on the topic. Laws can define administrative processes, develop plans for tackling specific problems, or define technical aspects that specific sectors must adhere to. An example is Law 3/2020 of 27 July, for the recovery and protection of the Mar Menor lagoon. It defines threshold nitrate levels per unit of surface, amongst other aspects that contribute to the recovery of the Mar Menor. From a policy, usually several laws are derived to reach different objectives of the policy.

Regulations are documents that define legally binding norms. Their aim is to regulate specific activities or the application of laws. Executive regulations are those that complement, expand, and define the application of a given law. Administrative regulations are written to specify the internal functioning and procedures of a certain administration. Even though in some cases the practical differences are diffuse between regulations and laws as both can establish norms, the main difference is the origin. Laws are approved by the legislative power and are hard to modify, while regulations depend on the executive power and are more flexible. In hierarchy, regulations are on an inferior scale than laws.

Finally, projects can be defined as the minimum unit of resources assignment to reach one or more specific objectives. Projects should aim to tackle specific problems and define the actions in a way that can be executed (Repetto & Fernández, 2012). An example of a project in the Mar Menor context is the restoration project of stream flows, or the demolition of buildings occupying the maritime-terrestrial public domain.

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All these instruments and tools available to give response to the ecological collapse of the lagoon are what in this document is known as Best Management Practices (BMPs). They are understood as the tools administration and public power uses to redraft the territorial model of the Campo de Cartagena and allow the ecosystems to reach a new balance in where socio-economic activity and a good environmental state is possible.

2. Objectives

The overall objective of this deliverable is to provide an overview of interventions, which can help to improve the environmental status of the Mar Menor Lagoon *directly* by reducing the environmental pressures on the lagoon or *indirectly* by changing stakeholders' way of living and doing business and thus reducing the causes of environmental pressure. With interventions we here mean laws, regulations, best-management practices (BMPs), policies, plans and projects.

To accomplish the general objective, the following specific objectives are proposed:

- To adopt a system thinking approach based on the Driver-Pressure-State-Impact-Response framework (DPSIR) for considering the effects of interventions in the whole system.
- To analyze the key sectors that define the socioeconomic dynamics in the Mar Menor area and its implications in relation with the environmental issue.
- To highlight the main relations between stakeholders and the environmental status of the lagoon.
- To clarify the Spanish framework in relation with administration and legislation that could be derived in actions, interventions, and modification of the reality of the Mar Menor systems.
- To identify the most relevant laws, regulations, guidelines, and plans derived from the public administration to respond to the Mar Menor issue or that could affect it (including relevant stakeholders).
- To extract the Best Management Practices and actions derived from the most relevant responses given by public power to the Mar Menor lagoon crisis.
- To establish and apply a classification system of BMPs and interventions derived from policies, plans, laws, and projects in relation with the Mar Menor systems (environmental and socioeconomic).
- To define possible scenarios for the future based on the current interventions observed and the possible effects of BMPs in the systems (socioeconomic and environmental).
- To provide basis to other SMARTLAGOON project activities such as the system dynamics modeling and the modeling of the hydrological cycle of the Mar Menor's catchment area.

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3. Application of the DPSIR-framework to structure the problem and solution space

The DPSIR-framework - Driving Forces – Pressures – State – Impacts – Responses – is a framework that supports a systems approach. The framework has developed since the 1990s as a basis for many conceptual approaches addressing pressure-state change links and in 1999 the European Environmental Agency presented concepts and definitions for the DPSIR framework (EEA 1999), building on previous frameworks. The DPSIR-framework is a much-used framework to organize and communicate complex environmental issues. It is policy-oriented and a systems-thinking framework that assumes cause-effect relationships between interacting components of social, economic, and environmental systems (Figure 2) and the framework can be used to integrate environmental, social, cultural, and economic aspects into one single framework.

DPSIR has been used for many environmental resource applications, including management of agricultural systems, water resources, land and soil resources. It has also been used in different modified forms since it was first introduced. These interventions include policies, laws, regulations, best management practices (BMPs), guidelines, and plans.

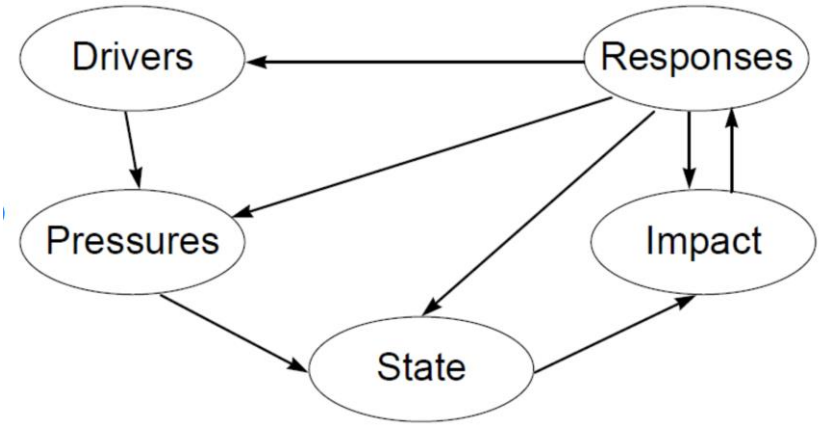

Figure 2: The DPSIR-framework according to EEA Technical report No 25/1999.

The overall definitions of the key components – drivers, pressures, state, impact, responses, are given below. A key benefit of using the DPSIR framework is that it explicitly includes an action or response component that can be taken at any level of the causal network/system.

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Description of BMPs, policies and associated scenarios for water pollution control and flood mitigation measures

Table 1: Components of the DPSIR-framework applied to the Mar Menor Catchment with the "Environmental status of the Mar Menor" as reference point for the State. Source: own elaboration adapted, modified, simplified and supplemented from Dolbeth et al (2016) and García-Ayllón, S. (2018)

	Definition	**Applied to the Mar Menor Lagoon and Catchment Area**
Drivers (driving forces)	Driving forces are the demographic, social, economic and cultural developments in a society which cause pressures on the environment (Gabrielsen & Bosch 2003, UNEP/GRID-Arendal)	- Increase in population and tourism and related activities - Intensified and expanded agriculture and livestock development - Increased maritime activities including harbors and ports - Increase in fish and shellfish catches - Historical mining activities and its env. impact
Pressures (Sorted after drivers)	Pressures are human activities, which can cause a deterioration of the state of the environment. They have their roots in driving forces (EEA 2005).	Population & tourism development - Increased urbanization → increased runoff & stormwater flooding problems - Untreated or insufficiently treated urban wastewater effluents - High population density in summer (from tourism) → increased water sports and boat activities, increased water needs, public water, waste and traffic infrastructure come to their capacity limits - diffuse pollution and point source pollution (from wastewater, stormwater, touristic activities) - Degradation of landscape and protected areas including beaches Agriculture and livestock development - increase in irrigated intensive agriculture including greenhouse cultivation → increased water need → increased water extraction from aquifers - absence of proper brine management - intensive use of fertilizers → diffuse pollution by nutrients runoff from agricultural and livestock; other contaminants of concerns (i.e. pesticides) - soil erosion Harbour, port and maritime activities - dredging activities (enlargement of el Estacio channel) - seabed damages/disturbance due to boat anchoring - boat paint, waste from boats → point source and diffuse pollution Fish and shellfish catch

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		- overfishing - illegal fishing <u>Historic mining</u> - Historic pollution of lagoon sediments - Insufficient safeguarded mine disposals → Point source pollution (heavy metals, acid mining drainage) & soil erosion
State	State refers to the condition of the environment (e.g., the quantity and quality of physical, chemical, and biological components) (Gabrielson & Bosch 2003)	Current environmental status of the Mar Menor lagoon: degradation of water quality (eutrophication, increased concentrations of heavy metals, increase in anoxic periods), waste, loss & fragmentation of natural habitats, noise and light pollution, changes in sediment dynamics, hydrodynamic changes, decreased salinity, change in biological dynamics (jellyfish blooms, algae blooms, replacement of seagrass by macroalgae, decrease in fish stocks, more invasive species, change in trophic structure, loss of natural biodiversity), changes in infiltration & runoff dynamics, groundwater overexploitation, groundwater contamination, high primary production In addition: - insufficient surveillance of responses by the governmental bodies - environmental awareness in the general public is low
Impact	Impacts are the effects of a degraded state of the environment, the changes in the quality and functioning of the ecosystem, on the welfare and well-being of humans, including on the production of ecosystem goods and services (Bratley & Yee (2015),UNEP/GRID-Arendal)	- increased risk of flash floods and stormwater flooding damages - decrease attractiveness of the region for tourists - nuisance for citizens and tourists - loss of area for croplands and fertile soils - increased water stress - increased costs for agricultural activities - reduced catch for fishermen - health risk for animals and humans - decrease in employment and wealth creation
Responses	Responses are actions taken by society to the environmental degradation. This includes actions to ameliorate the state of the environment, prevent or decrease pressures and influence drivers in a positive (UNEP/GRID-Arendal, Bratley & Yee (2015))	Are listed in chapter 5.

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4. Legal and socio-economic background

Legal system of the Mar Menor region

In Spain, as it was defined in the Constitution (1978) and the laws that define the public administration, the model of state is de-centralized and without a clear hierarchy. There is no public administration situated above the others, but the distribution of responsibilities is done by competences. So, the authority is drawn as a function of which administration has the competences in which topic as prescribed in the attributive norms.

The public administration of Spain can be classified in three levels, depending on the territory where they have competences:

- The General Administration of the state has its competences over all the Spanish territory.
- The Autonomic or regional Administrations have their competences in the territory within the Region boundaries (*Comunidad autónomas)*.
- The Local Administrations have competences within the municipality boundaries.

In Spain, the General Administration has in practice a short range of action, as the legislative competences depend on autonomies for almost all the relevant domains (environment, public health, education…). Usually, the general administration states the minimums or the direction of policies that should be complied with in every region and from this base, the regional administrations develop the sectors according to their societal needs, their territorial opportunities, and their socio-historical background. In the particular case of environment, each autonomy has the competences to manage their own resources, always meeting the legal requirements at national level.

Furthermore, in contrast with the absence of hierarchy between the public administrations, the legislation, in fact, can be understood as a pyramid (Figure 3), with the Constitution at top level and a base in the local instruments.

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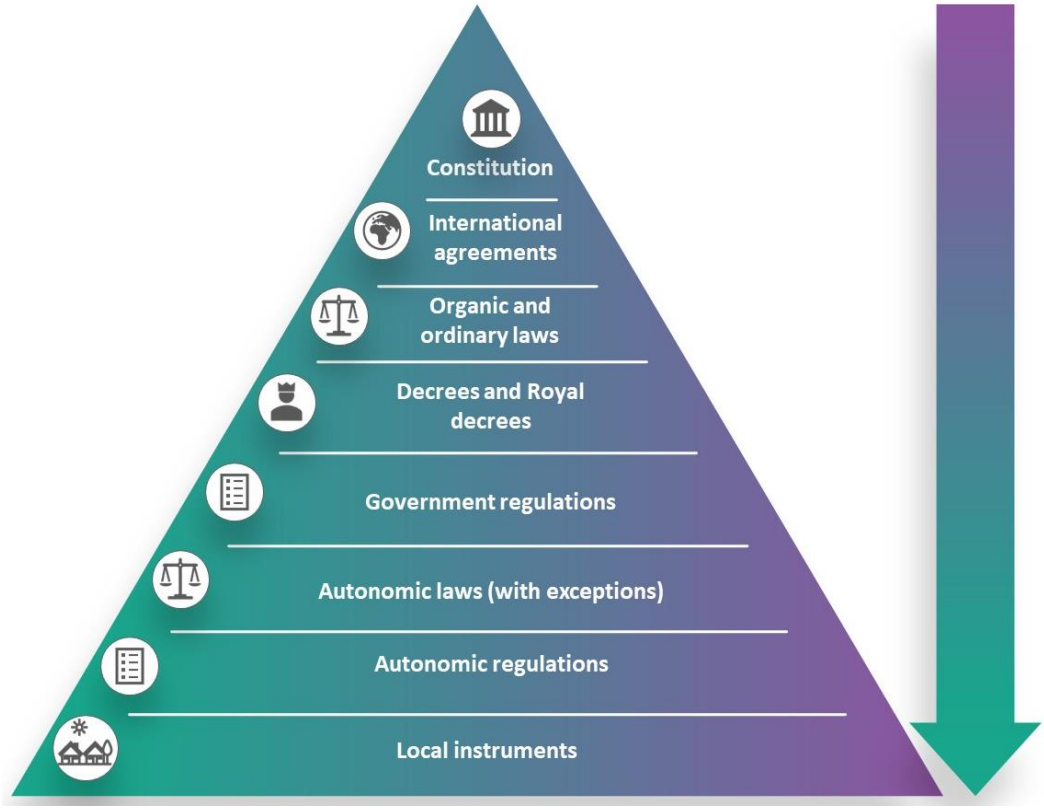

Figure 3: Levels of the legislation of Spain (with some particularities not gathered in the scheme). Source: Own.

It is important to underline that, even though the laws of regions are placed near the bottom of the pyramid, they have priority over national laws in some cases, depending on the competences distribution named above in the text. To provide insights in the differences in the levels, it can be said that:

- The Constitution is the highest juridic instrument in Spain and defines the relations between the norms.
- International agreements are those supported by the government and usually, they are transposed to the juridic instruments of lower hierarchy.
- Organic laws are those approved by the courts and need an absolute majority.
- Ordinary laws are approved by the courts but do not need an absolute majority.
- Decrees and Royal Decrees are promoted by the government. They are the instrument to give a rapid response to critical situations that demand agility.

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- Regulations expand the scope of laws when it is needed to define procedures or individualize situations.

- Finally, the laws of the autonomous communities are approved by the regional parliament, and its relation with the national legislation depends on the competences distribution.

- In the case of local instruments, they are approved in local parliaments or by the administrative office of the town hall. They usually have competences in very specific aspects and in a global problem such as the Mar Menor collapse have little competences.

In the case in question, the Mar Menor lagoon is a physical space with resources of diverse types, and interactions between different sectors of the society, so the three levels of the administration (general, regional, and local) are involved in its management and conservation. In fact, the legal complexity is even greater, as the lagoon is also affected by international agreements (Habitats Directive, Birds Directive…), affected by organic laws (water law, biodiversity protection law…), Decrees and Royal Decrees (Royal Decree 363/2017, Royal Decree 261/1996), autonomic laws (Law 3/2020, Law 12/2013…) and local regulations of use. All of this without forgetting plans of the development of certain sectors or territories, management documents of protected spaces, etc.

The system of administrations, private stakeholders and multiple levels of legislation that coexist in the environment of the Mar Menor implies an additional layer of complexity to a problem complex by itself. But the legislation and administrative actions regarding this cannot be ignored, as they are the main instruments available to reverse the ecological collapse of the lagoon. In this deliverable, we present an in-depth analysis of the responses that are required to restore the environment, including necessary behavioral changes of the relevant stakeholders in the Mar Menor context.

In this deliverable, we analyzed laws and regulations, planning and management documents, public projects and codes of good practices that could affect all the relevant socio-economic sectors with impacts on the lagoon and its system. These interventions could be already applied or expected. Building on the stakeholder analysis and the study of the social and natural environment of the lagoon, we analyzed interventions affecting mainly agriculture, cattle farming, fisheries and aquaculture, agroindustry, tourism, renewable energy, salt-production, military, and mining.

Socio-economic dynamics and important sectors in the Mar Menor

Since the ecological degradation of the Mar Menor lagoon started to be a crucial item in the politics of Spain, there were considerable efforts to identify the origin of the pressures that led to the collapse of the lagoon. Several works such as the Zero Discharges Plan or the Important Topics Scheme in the Segura River Basin from *Confederación Hidrográfica del Segura* (CHS by its initials in

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Spanish) have pointed out the complexity of the socioeconomic dynamics and its relations with the Mar Menor lagoon. This research pointed out agriculture as the main cause of the disaster. Nutrients and water inputs due to irrigation have drastically changed the hydrological dynamics of the Campo de Cartagena water bodies and, therefore, the ecological state of the Mar Menor lagoon. However, even though agriculture has greater impacts, the anthropogenic pressures on the lagoon have taken place over decades, with cumulative impacts coming from tourism, uncontrolled urban growth, diffuse discharges from urban settlements or seafloor degradation and pollutant inputs due to sailing and anchoring.

Despite the previous, tourism and agriculture are strategic for the social development of the region, as they are two of the main economic activities in the region. The population of Campo de Cartagena depends on the incomes generated by the value chain of agriculture, tourism, and its satellite businesses. As a result, solutions that hamper the development of these activities are difficult to apply, as some relevant social groups could feel their interests attacked and do not accept them. Here, we will characterize the main socio-economic sectors in the Mar Menor region to understand how they are affecting the lagoon, how much weight they have in the region and how the degradation of the lagoon is affecting them. Also, it is crucial to attend to the necessity of developing responses that consider the economic needs of a variety of stakeholders in the region as are much more likely to be accepted by these strategic sectors and will therefore be more effective in fostering environmental restoration.

Agriculture

Agriculture is a key sector in the economy of the Murcia Region. The last report of the Agricultural Statistics of Murcia (2019 - 2020) shows that agriculture occupies 10,7% of the labor force of the Region (72.900 people) with an income per capita of 17.270 €. To provide context, the occupation in agriculture in the Region of Murcia is more than twice the national occupation in the sector, which is 4% of the labor force. When comparing the weight of agriculture with industry, differences with the national panorama are also perceptible. In Murcia, agriculture has two thirds the occupation in industry (14,6%) while at the national level, industry gives jobs to triple the number of people compared with agriculture. In addition, some of Murcia's industry is directly related with agroindustry and the processing of agricultural raw products. Data or importance of agriculture in the jobs of the Region compared with Spain are provided in Table 2:

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Table 2: Jobs distribution by sector and genre in the Region of Murcia and Spain. Source: Agricultural Statistics of Murcia (2019 - 2020).

YEAR 2020	MURCIA			SPAIN		
ECONOMIC SECTOR	Total	Men	Women	Total	Men	Women
Agriculture	**10,7%**	14,9%	4,9%	**4,0%**	5,8%	2,0%
Industry	**14,6%**	18,5%	9,3%	**13,9%**	18,6%	8,5%
Construction	**6,3%**	10,4%	0,6%	**6,6%**	11,3%	1,1%
Services	**68,4%**	56,2%	85,2%	**75,4%**	64,3%	88,4%
TOTAL	**100,0%**	**100,0%**	**100,0%**	**100,0%**	**100,0%**	**100,0%**

If agriculture is a key sector in the Murcia Region, its contribution to the economy of Campo de Cartagena is even higher. The region represents 30% of the irrigated herbaceous crops of Murcia, which is the most profitable produce. The vegetable production of Campo the Cartagena reached a total value of 232,4 M€ in the year 2020, being one of the most profitable of Spain (Calatrava & Martínez-Granados, 2019).

Regarding exploitation models, in Campo the Cartagena highly intensive agriculture with irrigated crops and greenhouses are the most common, as are the systems with higher capacity to generate incomes. In reference to irrigated crops in the Mar Menor context, San Pedro del Pinatar, San Javier, Los Alcázares, Torre Pacheco and Cartagena cover 223.100 ha. From that surface, 30.854 ha are dedicated to irrigated crops (82% of total agricultural land) while greenhouses represent 3.000 ha of that surface (CARM, 2020).

As said before, the past was quite different, and the sector evolved drastically with the expansion of watering and the integration of innovative techniques. Until some decades ago, the main production was rainfed crops of cereals and dry fruits, a model that was sustainable and compatible with the conservation of the Mar Menor lagoon. It was not until the 1980s that the agriculture in Murcia (and in Campo de Cartagena) began its transformation from subsistence to intensive farming, high-tech and based on irrigated crops and greenhouses (Caballero et al., 2015), with high levels of fertilization. The crucial factor of this change was the Tagus-Segura transfer, which allowed a hydrologic system with water deficit to use water for irrigation with low restrictions.

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Other relevant factors that shaped the sector into what we know today were the opening of international markets and the access to interchange points (such as trade points or transport infrastructures) the evolution of techniques and organizational systems, the proliferation of petrol-based fertilizers and pesticides and the entrance into force of scale economies that tend to accumulate surface for production. The integration of the agroindustry in the value chain also boosted the sector through its potential for exporting processed products with a higher value (Torres & Gadea, 2012). Finally, in the last years, an increase of 30% of the surface area dedicated to ecological agriculture has been registered, which could be understood as a primary response from the sector to the ecological problems associated with its activity and a willingness to make profit of the opportunities offered by international markets to sell agricultural products with higher prices.

As expected, the development of an economic sector that depends on irrigation, land use changes and nutrient inputs generates environmental impacts over the lagoon. The analysis presented in the following paragraphs of the relations between agriculture and the ecological status of the Mar Menor lagoon is based on the analysis of the Zero Discharge Plan (MTRED) and the Scheme of Important Topics of the Segura Basin from CHS.

First, the dependence of agriculture on fertilizers and pesticides has generated negative effects on water quality due to the pollution of the water bodies of the region. Runoff from agricultural holdings transports nutrients and pollutants from the crops to streams, especially during intense rainfall events, and are canalized to the lagoon, creating an increase in nutrient content in the water. Also, the water inputs from the Tagus-Segura transfer and the continuous watering in the agricultural lands allow fertilizers to infiltrate and reach the Campo de Cartagena aquifer, which relates to the Mar Menor lagoon. As a result, a constant effluent of high nitrate content water is entering from the underground into the lagoon. These nutrient inputs are the causes of the event of *green soup*, and of massive mortality of fish due to eutrophication and anoxia.

Water inputs from outside the system (Tagus-Segura water inputs) are another relevant cause of degradation. More returns of water by infiltration from irrigated crops causes the piezometric level to rise- This in turn increases the flow of water with high nutrient content to the Mar Menor. This problem has been aggravated by the interconnection of different layers of the aquifer due to proliferation of wells to pump water for watering and desalination plants that discharge brines in the streams network.

On the other hand, agriculture provides a wide range of benefits to the local population, being the base of a network of economic connections that are vital for the development of the region. As explained above, the production levels and the level of occupation within the agricultural sector means that a considerable part of the population is closely linked to it, both directly and indirectly.

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Agriculture also provides raw materials that promote the development of the agroindustry, which increases the importance of agriculture and the dependence of the local population on the sector. Also, industries devoted to producing intermediate products for the holdings (fertilizers, plastics, tools, pipes, etc.) have been developed, creating another link between agriculture and the local economy.

Regarding cultural links, agriculture has always been part of the society in Campo de Cartagena, and despite methods and techniques have changed during the centuries, local people and culture are highly influenced by the activity, being seen as something representative of its own culture and an agent of landscape creation (Meseguer, 2006).

Another social relation of agriculture is the antagonism growing between ecologism and agriculture in the Mar Menor region. The degradation of the lagoon has awakened the awareness of activists and several social movements have been formed to demand the restoration of the lagoon. Ecologism demands severe responses and regulations to restore the lagoon. The agricultural sector, on the other hand, feels that their income will be compromised if restrictions are applied and express their disagreement with such measures.

Finally, in 2020 government and public powers approved a specific law to reduce impacts on the salty lagoon (Law 3/2020). In this legal document, the agricultural sector was the focus of restrictions and regulations, but no alternatives to maintain the sector's incomes are proposed beyond organic farming. The Mar Menor crisis could therefore also have negative impacts on the economy of farmers. A considerable number of agricultural products, and processed agro-industrial products from the region Murcia are exported. The bad press of the region and the sector due to the Mar Menor issue could reduce the interest of European markets in local products, reducing incomes of the sector and for the same reason, tourism, and consumption of local products by tourists could decrease.

Cattle farming

Livestock farming, as happened with agriculture, is an economic sector that has had its economical relevance in the CARM boosted during the last decades. Until 30 - 40 years ago, the rentability of cattle farming was almost nonexistent, but the modernization of the farms, a greater intensity in the exploitation, the extermination of livestock disease and the consolidation of a secondary agroindustry with potential to increase the value chain of the products have fostered a solid economic sector with potential to exports. Nowadays, the cattle sector represents 27% of total agricultural production, and a total value of 784,4 M€ (Figure 4Figure 4: Value of cattle farming in CARM during the period 2007 - 2020 in millions of euros. Source: CARM, 2022.). Considering all the modalities of cattle farming in CARM, pig farms are the most common.

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Figure 4: Value of cattle farming in CARM during the period 2007 - 2020 in millions of euros. Source: CARM, 2022.

In Campo de Cartagena, trends have not been different from those of Murcia. The agricultural statistics report of 2020 (CARM, 2022) shows that there are 1.298 cattle farms, which account for 18,6% of the total number of farms in the Murcia Region and an estimated value of 146 M€. Goats, pigs, and sheep are the most relevant models of farms, with 345, 338 and 313 holdings respectively. Even though primary production of cattle is not as relevant as vegetable production or other primary products from the agriculture sector, livestock holdings represent a key element in the regional economy, as the transformation and commercialization of meat-based products is one of the most valuable activities of the agroindustry.

In relation with the environmental state of Mar Menor, the cattle holdings generate impacts due to diffuse pollution caused by deficient storage systems of slurries and manure, that can cause accidents or during rainfall, can generate infiltrations in ground water bodies or discharges in the stream networks of the catchment area of Mar Menor lagoon, producing inputs of pollutants and nutrients into the lagoon.

Regarding socio-economic dynamics of cattle farming in the Mar Menor environment, the main importance of cattle farming is its potential as a provider of raw materials to the industry. Cattle holdings and meat-based industry offer a considerable number of local jobs, have promoted the creation of a secondary industry to provide the necessities of the sector and promote the growth of the economy with its exports. Farms also need to feed animals, and some agricultural holdings are specialized in growing grains and forage. As seen with agriculture, the Mar Menor crisis has put on the table several restrictions to the sector but not as restrictive as those for agriculture.

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Fisheries and aquaculture

About fisheries, the statistics of Centro Regional de Estadística de Murcia (CREM) only offer data for the ports of Cartagena and San Pedro del Pinatar, which are the most relevant trade points.

Statistics show that currently, in the Cartagena fishing fraternity there are 43 boats, which compared with the 67 existing in 2007 implies a reduction of 36% in a period of 15 years. In the San Pedro del Pinatar fraternity, the reduction in the number of boats is 33% from 98 boats in 2007 to 66 in 2020. This reduction in the number of boats that developed the fishing has been reduced globally at the level of CARM, whose reduction was from 285 boats in 2007 to 177 boats in 2020, that is a 38% reduction, even greater than the reduction in the Mar Menor environment.

Figure 5 analyzes fish catches, in the year 2020 CARM computed a total amount of 5.000 tones. From those, Cartagena contributed 550 tones and San Pedro del Pinatar with 1.000 tones to the catches. The development of the volume of the catches for the whole region has varied almost nothing in the analyzed period, but value does, as can be seen in Figure 6 . For 2020, the value of fisheries in CARM was 17,09 M€, a growth of 17% from its value in 2013 (14,64 M€). Something similar happened to the fraternities of the Mar Menor context, where the combined catches of Cartagena and San Pedro del Pinatar experienced a growth of 28% from its value in 2013. Currently, the fishing catches signify a value of 8,83 M€ in the Campo de Cartagena fraternities offering jobs to 218 people.

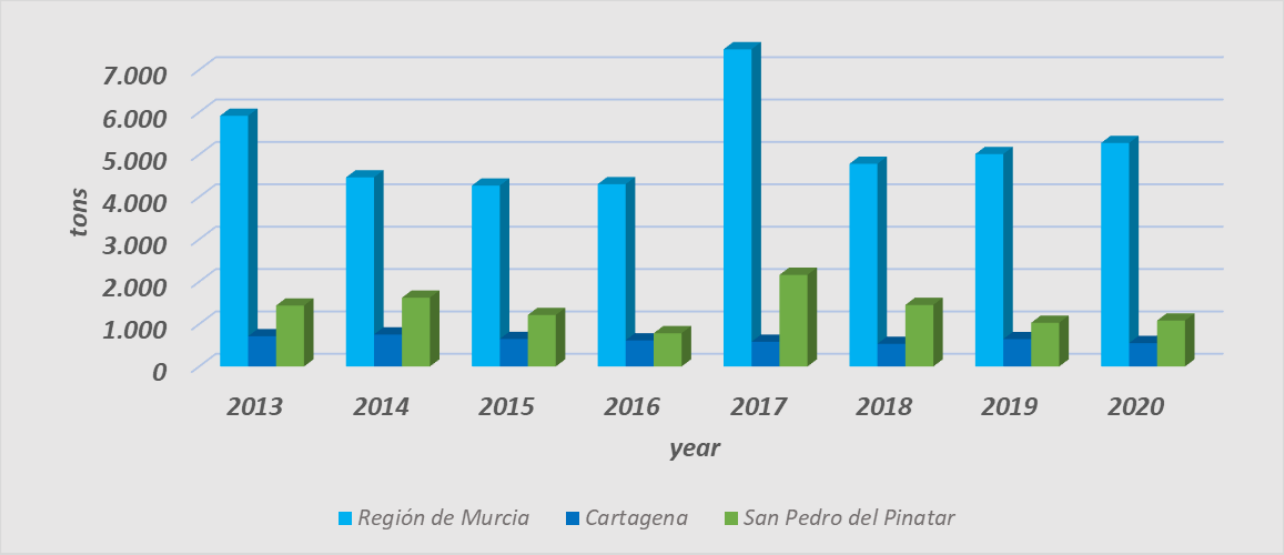

Figure 5: Total catches by fisheries in CARM (blue), Cartagena (deep blue) and San Pedro del Pinatar during the period 2013 - 2020 in tons. Source: CARM, 2022.

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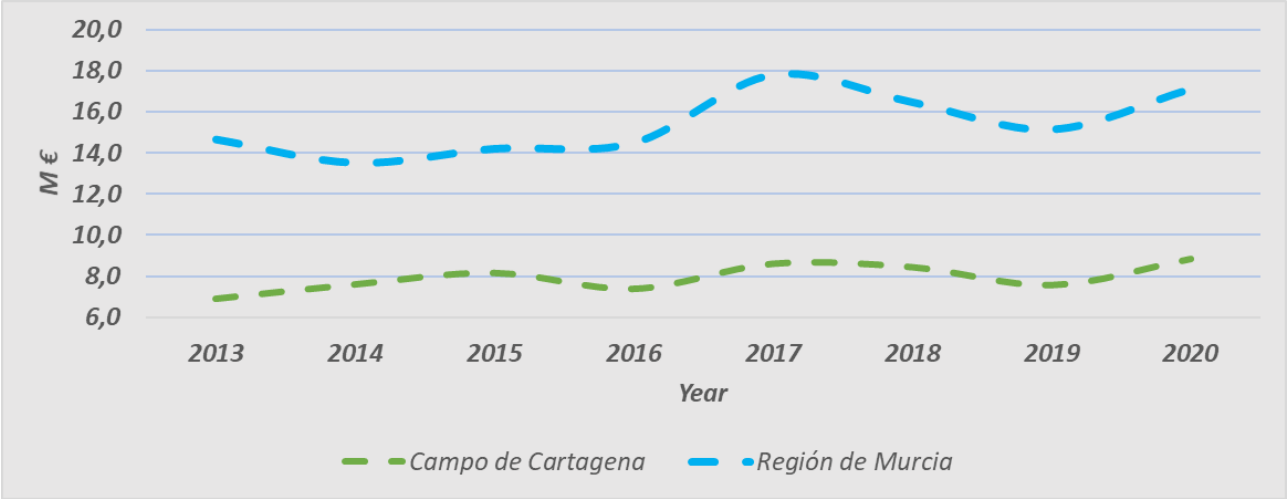

Figure 6: Value of fishing catches over time in CARM (blue) and Campo de Cartagena (green) in the period 2013 - 2020, in millions of euros. Source: CARM, 2022.

Compared with other primary sectors, fisheries are less relevant to the local economy, but it is still a way of life for multiple families and groups in Campo de Cartagena. It is important to clarify that the data shown is not segregated by catches in the Mediterranean Sea and catches from the Mar Menor lagoon, which are expected to be considerably smaller. In fact, the lagoon just sustains a few boats that use traditional methods of fishing, while the most productive ones work in the Mediterranean.

While the economic value of fishing in the Mar Menor lagoon is not particularly relevant, it has high cultural and traditional value. Traditional fishing is a bastion of the culture of the region and has been a base of the local economy for centuries. In fact, the essence of fishing villages keeps its effect over the local architecture in places like Cabo de Palos. The conservation of traditional fishing and the patrimonial elements linked to the activity offers an opportunity to diversify tourism to a more cultural and sustainable model, where the history and traditions of the region could be offered as a product, reducing seasonality and dependance of "sun and beach" tourism, which is more harmful to the local environment.

In respect of aquaculture, CARM is a strategic location at national level, being the fourth most important region of Spain. The main species cultivated are sea bream (*Sparus aurata)*, sea bass (*Dicentrarchus labrax)* and red tuna (*Thumnus thynnus*). The total production value for CARM in that sector is 85 M€ and it offers jobs to 600 people, and to 1.600 if indirectly associated jobs are counted.

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Currently, the most important aquaculture cluster in CARM is in San Pedro del Pinatar, with 7 facilities working and a total production capacity of 9.240 tons. The development of that production has sustained a clear growth since 2007, maintaining employment levels even through the worst years of the financial crisis. There has been reported a decrease in production in the years 2019 and 2020 due to the Covid-19 crisis and a series of extreme weather events that affected the farms, but the production will be recovered as there is a demand for the products.

Regarding environmental issues, there are no expected impacts on the lagoon because of the activity from aquaculture, in fact, reducing the pressures on the natural resources is a positive impact on marine ecosystems.

In socio-economic dynamics, aquaculture has a close relation with tourism, as a considerable portion of the demand of aquaculture products depends on the local catering industry. CARM explains this relation in the Strategic Plan of Aquaculture, in which data show how the value produced by the sector drastically decreased due to the tourism crisis in 2019-2020, as shown in Figure 7.

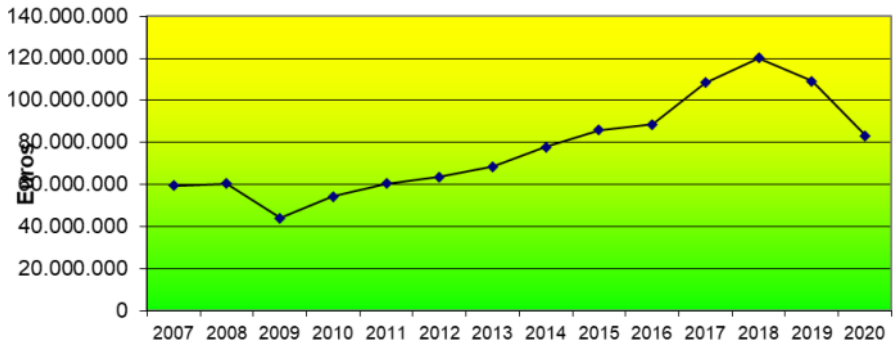

Figure 7: Value of aquaculture in CARM. Source CARM, 2021.

Agroindustry

The development of a productive agriculture in the Murcia Region and, especially in Campo de Cartagena, has incentivized the creation of an industrial cluster of companies with its activity based on the transformation of these agricultural products as raw materials. The region with its one and a half million inhabitants is one of the major highly specialized agro-industrial clusters of Spain, with relevant contributions to national exports. The growth of a secondary industry that provides services and products to the agroindustry, such as pots, packaging, machinery, transport services, fertilizers, laboratories, etc. is also relevant (Martínez-Carrasco & Martínez-Paz, 2012).

Agroindustry is one of the basic pillars of the economy of Murcia, both by its contribution to the additional economic revenue and the number of jobs. The agroindustry represents 5,1% of the GDP and one third of the total industrial activity in the Region of Murcia. According to the Agricultural Statistics, the main sub sectors of agroindustry are the canning industry which represents 34% of

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production value with an amount of 1.873,5 M€, and the meat industry representing 22% of the production value with a total amount of 1.180,9 M€ (UCAM, 2016).

Agroindustry does not represent a threat to the lagoon since it is in industrial areas, with all the facilities and equipment needed to comply with environmental laws and urban planification. The sector could be affected by the ecological crisis of the Mar Menor, as regulations and modifications in the primary sector affect the raw materials that are needed to carry out activities and maintain price levels. Therefore, they are a relevant stakeholder in the socioeconomic dynamics in the Mar Menor environment. In addition, negative portrayal in the media could promote rejection of Murcia products from Murcia, reducing export capacity and the interest of global markets in the products manufactured by the agroindustry of Campo de Cartagena.

Tourism

Tourism is a strategic sector in the Region of Murcia. According to the Strategic Plan of Tourism, until the pandemic crisis, tourism was experiencing annual growth rates of 4,1%, reaching 11,3% of the region's GDP in 2019, representing economic activity of 3.700 M€ and 56.000 jobs. However, in 2020 the touristic activity decreased by 56% compared to 2019 values and 6.000 jobs were affected by it. In this new environment of crisis, domestic tourism has been one of the key factors to maintain the sector, as international tourism has been affected most. This could be a crucial factor in the development of the sector as international tourism is a mainstay of the economy and the sector most sensitive to the Mar Menor degradation.

In contrast with international tourism that is centered around the "sun and beach" model, domestic tourism is more focused on natural areas, rural spaces, sports, and other activities. This offers an opportunity to diversify the tourism sector and to attract international visitors to the region outside of the summer season, reducing the dependency on seasonal tourism, diversifying pressures, and reducing the collapse of the facilities during summer.

The area of Mar Menor has the most important cluster of the hospitality sector in the Murcia Region, containing almost half of the region's hotels and restaurants. The negative effects of Covid have been particularly severe for the area due to its dependence on international arrivals. This impact has been aggravated by the ecological collapse of the lagoon. The president of the Federation of Tourism and Hotel Business of the Region of Murcia (FTHBRM) has announced in several media appearances that the bookings for September and October of 2021 have been reduced drastically due to the mortality of fish, and the predictions for summer 2022 show continued reduced levels of expected arrivals. Society has the collective negative image of the lagoon as polluted, corrupted, and collapsed, which could have serious negative implications for the touristic reputation of the Mar Menor region.

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The reported effects of the ecological crisis of the Mar Menor on tourism affect diverse elements of the chain. Firstly, the degradation of the landscape and the presence of dead fish and unpleasant smells have resulted in a devaluation of properties and houses in the Mar Menor region. In some cases, these effects have led to the abandonment of urban areas in Los Urrutias.

The negative portrayal in social media disincentivizes travelers from key countries such as Scandinavian or the United Kingdom to choose Murcia as their holiday destination, which also accounts for domestic visitors. The image of a polluted area also affects restaurants and catering sub-sectors, as consumer interest in the lagoon's products is low. According to the president of FTHBRM, there is a clear reduction in weekend orders in restaurants. Local people are choosing other areas to spend their weekends.

This outlook affects the occupation in the sector, even though there are not yet official numbers to quantify it, all associations and businesses are demanding solutions to the Mar Menor problem and agree that a response is needed if there is interest in saving the local economy and the tourism sector.

As pointed out earlier, tourism is a sector that depends on healthy ecosystems to attract visitors. Therefore, conflicts between farmers and tourism are expected, as the actions needed to improve the health of the lagoon will negatively affect the economic activity of farmers but will improve the economy for tourism. However, there are several synergies between farmers who redefine their productive model to be more ecological and tourism, as there is an opportunity to include rural areas and traditional farming in the touristic offer of the region. This could enable the creation of new submarkets of eco-tourism and a diversification of products in the wallets of the tourism companies.

As tourism is the key element to introduce new consumers in the region, the reduction of this activity will also impact on local commerce and on the consumption of local products (meat, local rural products, handcraft, etc.), reducing economic activity of other sectors and reducing job opportunities for locals.

But tourism also has been part of the problem of the lagoon. The uncontrolled urban development for hotels and apartments and the seasonal accumulation of people during summer months have exceeded the capacity of water treatment facilities, and discharges of residual waters were made to the lagoon and its hydrological system. Although this issue is currently solved, it contributed to the collapse of the lagoon. Other negative effects of tourism in the ecological dynamics of the area are the construction of marinas for recreational navigation and the opening of canals to give access to navigators and connect the lagoon with the Mediterranean Sea, which permanently altered the ecosystems and coastal dynamics. Recreational and illegal sailing in the lagoon has also contributed to the degradation of seafloor communities by anchoring and discharges of oil.

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It is interesting to highlight the potential that tourism, as the main economic sector in the area, must influence the global environment. New models such as eco-tourism which include non-seasonal, or water sports activities might lessen the economic and ecological crisis of the region. The regional government of Murcia has taken positions regarding the matter, promoting eco–tourism and sustainable activities in the Strategic Plan for Tourism in CARM for the period 2022-2032, but time will be needed to observe and evaluate the effectiveness of those actions.

Renewable energy

This sector is of interest in the Mar Menor issue as it appears as a compelling alternative to make profitable the land of Campo de Cartagena without intensive agricultural land use. Due to the high solar radiation in the region, with almost 365 days of sunlight per year, photovoltaic plants are the most promising method to produce energy in the Mar Menor lagoon region.

Added to the suitability of the terrain for renewable energies, the global situation is pushing the necessity of increasing the energetic independence of the country and reduced fossil fuel use. The EU, with its European Green Deal (EGD) is restructuring the energy generation system and the productive model and foresees a halt to net emissions of greenhouse gasses by 2050. The EGD has also been created as the lifeline against the negative effects of COVID-19 on the economy, with 1,8 trillion Euros invested through the Next Generation EU Recovery Plan. As decarbonization is one of the prime axes of the Green Deal, huge investments are expected in the adoption of renewable energies as the main energy production method in the EU. Due to the potential of generating renewable energies in the region, CARM will be a beneficiary of the growing sector.

Moreover, the current geopolitical situation and the conflict in Ukraine due to Russian invasion, and the economic sanctions applied to Russia have implications for the energy sector of the whole EU. To respond to that situation, the EU has adopted urgent measures to provide energy to society, fostering the adoption of renewable energy and accelerating the transition to a green energy production model. In the case of Spain, the government has taken specific measures to stimulate the development of renewable energies, reducing administrative procedures and exempting solar plants with less than 150 MW from environmental assessment procedures. Additionally, the MITECO has reported a 65% increase of the aggregated value of solar photovoltaic energy in 2020 compared to its value in 2019, making investments in the sector even more interesting. All these factors will have a direct impact on the implementation of new solar plants in Campo de Cartagena.

The global growth of renewable energies has had an impact in the case study area, even though there is no specific plan or policy to promote solar energy in the region. In the Region of Murcia, energy generated by solar photovoltaic plants has been drastically increased in the last years, a fact that is shown graphically in Figure 8. Currently, solar photovoltaic produces 17% of the total energy

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in the region, and in the period 2018 - 2020 production has doubled. This development has placed Murcia as the fourth region in Spain regarding photovoltaic generation, producing 13% of Spain's solar power. Solar plants have been proliferating in the Campo de Cartagena region in the last few years as well.

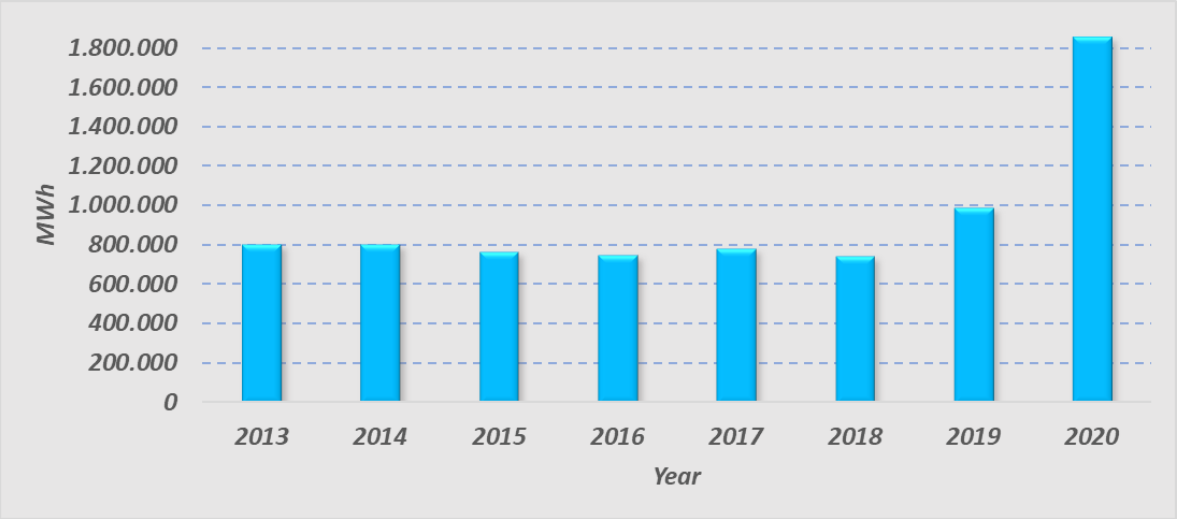

Figure 8: Electric energy generated by solar photovoltaic plants in CARM (MWh) during the period 2013 - 2020. Source: CREM, 2022.

In 2020, the council of Cartagena had nine projects of solar photovoltaic plants, with a total power of 30 MW and a 14 M€ investment. This is quite interesting for landowners, as the energy companies are renting land from them. In crops of low profitability or in crops affected by the legal restrictions of Law 3/2020, this is an opportunity to generate profits from land. This growing trend is expected to be elevated further in the next months and years, when new laws for reducing energy dependence from Russia come into force and start impacting the sector. When the law 3/2020 came into force, the support given by CARM to solar photovoltaic plants was more evident, as article 16 describes that in the exclusion area, authorization of industrial uses will be stopped except those for the implementation of solar photovoltaic plants. This law could be understood as an indirect promotion of solar plants as an alternative to obtain profits from land without using intensive agriculture in the Mar Menor region.

Solar photovoltaic plants have contrasting socio-economic effects on the region. On the one hand, ecologists and urban societies discourage their implementation in the region, as the landscape quality could be affected negatively, with potentially severe local impacts. For instance, the proliferation of solar plants in the region may reduce the attractiveness of the landscape for tourists, which could have repercussions for the tourism sector. An increase in the area dedicated to solar plants could therefore reduce regional visitation levels. On the other hand, renting or selling land to produce solar power could buffer negative economic effects that new conservation laws have on landowners. Land prices have been increasing recently. Industrial activity is also likely to be

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boosted, as solar plants will need maintenance, specific materials and the development of associated products required for their operation could incentivize a new industrial cluster.

Salt flats

The exploitation of Salt flats has been historically a characteristic activity of the Mar Menor area, and nowadays it can be found in three main salt flat areas: San Pedro del Pinatar, Marchamalo and El Rasall. The high salt content of the lagoon water, the flat lands, and the high level of sunlight in the region promoted the sector in the past, and human activity generated a semi-natural environment with high ecological values and a certain weight in the local economy.

Salt flats are a representative element of the local culture, as they were thousands of years ago, when Carthaginians were living in the zone. After that, the salt flats have maintained their activity until today and a specific local culture and traditions have grown around them.

The Salt Flats of San Pedro del Pinatar are in the outermost northern area of the Mar Menor lagoon, and the salt exploitation covers an area of 496 ha, as shown in Figure 9. The salt flats have been included in the list of Wetlands of International Importance (RAMSAR), have been cataloged as Special Protected Area from Birds Directive and Special Areas of Conservation from Habitats Directive and, the area is included in a regional park. The estimated salt production of Spain for 2018 is 4,3 Mt (Statista) while the salt production of San Pedro del Pinatar is estimated at 100.000 tons (Ballesteros & Fernández, 2013). Regarding employability, the salt flats of San Pedro del Pinatar offer jobs to a variable number of people that fluctuate from 50 to 70 people depending on seasonality.

The salt flats of Marchamalo are in the southern lands of the Mar Menor coast, in Cartagena. The wetlands have an extension of 200 ha and currently, there is no economic exploitation of the area. In fact, ANSE is promoting a project to restore and put into value and production 7 ha of these salt flats. The project aims to promote the local economy, safeguard the traditions and cultural values associated with this activity and promote the ecosystems that are established through human activity in the salt flats with traditional techniques. As San Pedro Salt Flats, Marchamalo Salt Flats are included in several environmental protection catalogs: SPA, ZEPIM, SCI and Ramsar site.

The salt flats environmentally depend on the Mar Menor lagoon. Salt flats require water inputs from Mar Menor, and, if the water quality is low and it contains high concentrations of nutrients and pollutants, the highly valuable ecosystems of the salt flats can be negatively affected or even disappear.

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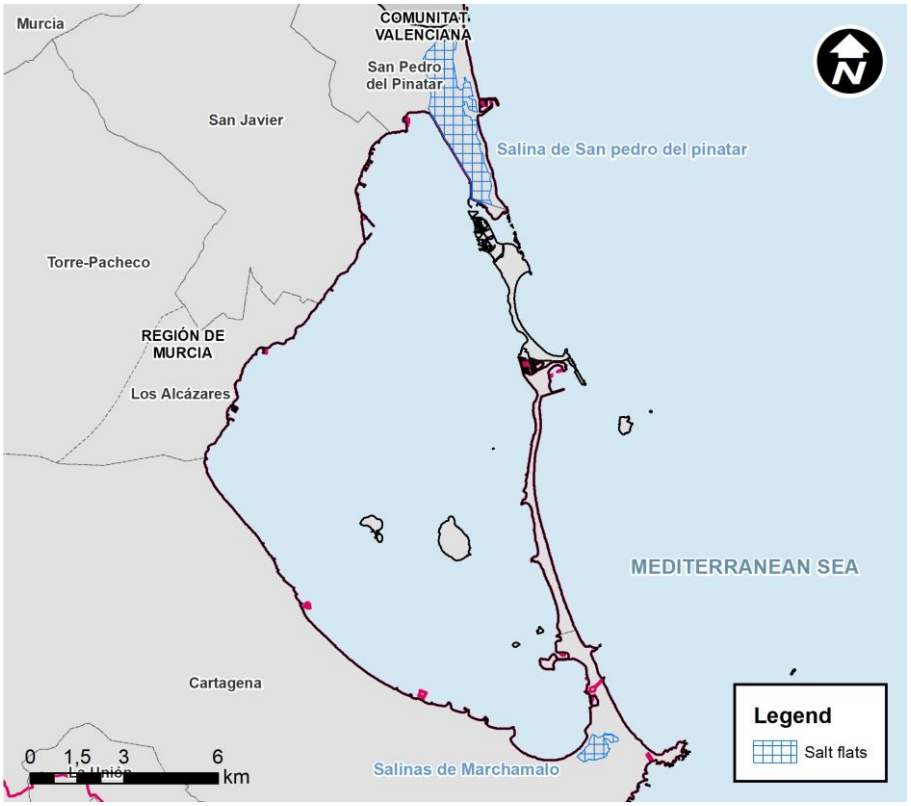

Figure 9: Salt flats associated with the Mar Menor lagoon. Source: own.

On the side of social relations, tourism is the socio-economic activity most related with the salt flats, except for the salt industry workers. The San Pedro del Pinatar salt flats are a desired destination for local visitors and people interested in ornithology, ecotourism, and nature sports activities. The salt flats also are advertised as a destination to self-care tourism due to the possibility of taking mud baths. Such activities could be rejected by tourists if the water quality is low, and the area is perceived as being polluted. On the other hand, if the ANSE project develops as expected, it will generate a space with higher ecological and aesthetic values for visitors than it currently has, improving the interest of tourists in the area.

Military

In the coastal area of the Mar Menor the Air Force of Spain has available for its use several facilities and infrastructures, highlighting the Murcia-San Javier Airport. In the area, there are also formation centers and military academies. The airport of San Javier traditionally was operating with commercial flights until 2019, when all the activity not related with military activities was diverted to the international airport of Murcia. Until 2019, the airport experienced a notorious increase of visitors, with 0,5 M of travelers in 2005 to 1,2 M of travelers in 2018.

The military facilities are located on the very coast of the lagoon, so they imply a great impermeable surface near the lagoon that breaks the ecological continuity between the lagoon and the

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agricultural lands further inland. Also, aviation has an important impact on bird species that depend on the lagoon and the wetlands surrounding the airport.

In the first instance, the relocation of commercial flights from San Javier airport to the International Airport of Murcia could lead to think that arrivals to the Mar Menor lagoon touristic area will be less important and tourism could suffer from it. However, the tourism numbers have been growing independently of that fact, so there is not a clear impact on the sector.

In contrast, the local economy of the coastal villages of the Mar Menor has been affected by the closure of the airport for commercial flights. The airport and the services it provided created a whole economic system that sustained a high number of employees. This effect on the local economy in the municipalities located at the western coast of the salty lagoon has been reinforced with the negative effect the environmental status of the lagoon has on tourism. These villages are especially vulnerable as they do not have a Mediterranean coast and their tourism depends exclusively on the Mar Menor waters.

Mining

The main area of mining with influence in the ecological and socio-economic system Mar Menor is Sierra Minera. The area has been exploited for centuries by different cultures, but it was in the period 1850-1990 when open mines were created, changing the landscape to what we know nowadays. The materials extracted were mainly silver, zinc, plumber, and chromium. The first mining activity is dated in Carthaginian times, but the Romans were the first to extract all the potential of the mining resources with the available technologies at the time (Antolinos & Soler, 2007). It was not until 1840 when the advances in technology allowed overcoming the separation costs and in turn made the mining in Sierra Minera profitable again (Belmonte et al., 2010). After That, the mining activity remained active until 1990.

Even though mining ceased almost three decades ago, its impacts are still affecting Mar Menor. The open mines are in contact with precipitation that causes runoff and conduces heavy metals and pollutants from the abandoned mines to the hydrological system of the Mar Menor lagoon. Also, deposits and storage facilities are constantly inputting diffuse pollutants to the streamflow network that end in the Mar Menor. In Sierra Minera 2.351 deposits have been counted. From those, 89 floating mud reservoirs are discharging directly in the streams.

Currently, there is no economic activity in Sierra Minera, so the existence of abandoned mines and deposits only implies severe environmental impacts. Sierra Minera also offers an opportunity to restore and reconfigure the landscape of the region, preventing discharges and pollution to the environment and offering attractive landscapes that could be exploited by tourism.

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5. BMPs and policies based on existing laws and regulations

Working definitions

The ecological crisis of the Mar Menor lagoon is the consequence of decades of anthropogenic pressures stemming from multiple sectors. The system is complex and there are interests in different aspects of the matter coming from multiple stakeholders.

The current state of the lagoon has impulse the adoption of measures coming from administrations on all its levels. The interventions have been materialized in the form of policies, plans and strategies, projects, and legislations. The main administrations involved in that process have been:

- General administration by the MITERD and the CHS.
- Autonomic administration of CARM by different offices, depending on the targets of the interventions.
- Local governments related with the lagoon.

The analysis of the responses and interventions to the crisis reveals two main groups or typologies of interventions depending on their focus and aims:

a) Direct interventions to the physical environment to restore or modify ecosystems and biotic and abiotic states, generally to promote the recovery of the Mar Menor or to restore it.

b) Interventions that modify the socio-economic characteristics of the region to reduce pressures and modify human behavior that led to the actual state. These actions could be general or specific to some pressure or economic sector.

To characterize and identify the scope of the interventions and which elements of the subsystems (natural or socio-economic) are targeted or could be affected, the *Best Management Practices* (BMP) approach has been employed. BMP can be understood as interventions or actions determined to prevent or reduce harms or undesirable effects in a system (in this case, the environmental system of Mar Menor lagoon). These BMPs will have direct environmental effects but will also influence the development and behavior of other economic and social sectors. But because they are implemented in the legislation, they can have actual effects.

The methodology employed in this work to identify BMPs has been structured in two phases:

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- **Phase 1.** The first steps have been done by analyzing and studying the history of actions taken by the different levels of the administration in relation to the Mar Menor. This analysis not only has been done for specific environmental aspects but for all actions that can affect the strategic stakeholders of the system. This phase was a pre-filter of which documents should be studied.

- **Phase 2.** Phase 2 consisted in the detailed analysis of all the interventions coming from phase 1. From the analysis of the documentation, all the specific actions have been extracted and classified attending two main criteria: which topic of the system are interventions trying to modify and which stakeholder of the system is affected.

Organization of the subsequent tables.

The following sections of this document gather the information about BMPs in the context of the Mar Menor lagoon. As the Mar Menor issue is mainly derived from the socio-economic sphere, and the competences in environmental protection are in the hands of Autonomous Community administrations, responses to the problem have mainly been laws, regulations, and plans. These actions come mainly from the government, on different scales (local, regional, or national), but with predominance of the regional level. So, BMPs have been prospected in legally binding documents as they are those which could modify the behavior of the socio-economic stakeholders in the short/medium term. The results are described in the two tables below.

General description of the selection of legal documents

The first table is an inventory of legal documents that have been analyzed to extract BMPs. These legal documents should have certain characteristics to be considered as a source of BMPs. First, they should be still in force. Second, they should make clear reference to the problems of the lagoon and/or should have the intention of reshaping some aspect of the socio-economic and environmental states. Some documents are specific actions or responses to the ecological collapse of the Mar Menor, while other documents are sectoral plans, laws or regulations that make only reference in some of its content to the lagoon. Also considered have been legal documents with potential to change aspects of the socio-economic sectors that are in close relation with the socioeconomics and the ecology of the lagoon. The information of this table is composed by the following columns.

Legal document number

This column is a unique code consisting in a consecutive integer that allows linking the BMPs with its document or origin.

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Description of BMPs, policies and associated scenarios for water pollution control and flood mitigation measures

Name

The official and legal name of the document that has been analyzed. The name is presented in English as the first option, followed by its official name in Spanish and exactly how it's named in the legally binding documents.

Short description of the legal document and its expected impacts

Is a descriptive column where a brief description of the document, its motivation and its main goals and aspirations are defined. It also explains why it has been considered in the analysis and which are its expected effects on the lagoon system.

Source

Refers to the administration or organ that has promoted the publication of the document and that is responsible for it.

BMPs Table

This table is a crucial part of the deliverable, as it will provide the main inputs to the subsequent selection of dynamics to consider in the modeling of the socio-economic environment of the lagoon. Identification of the main BMPs derived from the responses given by governments to the crisis will allow the project to mark the main aspects that will lead to changes in the stakeholder's behavior and therefore, changes in the ecological state of the lagoon.

The table has seven columns, which are: law number, response to DPSIR element, item, or BMP, affected area, topic, target (stakeholders) and temporal frame. This column configuration aims to provide basic information about the BMP, to assess if there are temporal or territorial restrictions, which element of the socio-economic and environmental dynamics are affected by them, what sectors of society are the most affected, and which is the time frame of each BMP. A specific definition of each column will be provided in the following paragraphs.

Legal document number - BMP number

This column acts as an identifier of the BMPs. It is composed of two digits. The first refers to the *Legal document number* column of the *General Description of the Documents Table*. Its utility is to provide a code that allows the reader to identify from which document the BMP was extracted. The second number is for the unique identification of each BMP.

Response to DPSI element

In this column, the BMPs have been classified depending on which element of the DPSIR framework are targeting. Categories used are:

- D: drivers
- P: pressures

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- S: state
- I: impacts

Item or BMP

This column is an operational description of the BMP. It describes the actions of the BMP, defines sizes, amounts and units. It also covers what is going to change and in which amount, and who must implement the BMP.

Affected area

Some BMPs are restricted only to a specific area or surface, sometimes due to the definition of the BMP itself or the legal document is focused completely on a specific territory. Other BMPs present different grades of application or amount of change depending on territorial areas, when this happens, it has been also pointed out in that field of the table.

Topic

The topic refers to the problem or sector that is intended to be modified by the BMP. If the *item or BMP* column responds to *how* BMPs affect change, then the *Topic* column responds to *what* affects change. To facilitate the analysis of the table and to extract statistical information, the field has been normalized by the generation and homogenization of a dynamic list that has been modified during the data acquisition process until its last version, which is presented below.

Topic	Brief description
Administrative procedures	This topic refers to BMPs that redefine the functions of administration, create new offices or departments for specific topics for the management of the Mar Menor or modify some internal procedures that could imply changes that affect the development of some economic or social sectors.
Environmental protection	This includes specific actions for the protection of flora, fauna, and ecosystems, such as protected lands, recovery plans of species, etc.
Discharges and spills	This is defined for all the BMPs that aim to reduce direct or diffuse discharges that could reach the Mar Menor lagoon, through direct discharge into the lagoon or by being

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Topic	Brief description
	discharged in the streams of the catchment area of the lagoon.
Education	Education encompasses the BMPs that aim to improve the knowledge of the population in several topics. It could be technical education programs to farmers (i.e.) or the creation of platforms for the general education of people regarding the Mar Menor crisis.
Environmental restoration	This group of BMPs are those that intend to restore or improve the state of the environment in the Mar Menor catchment area with the aim of improving the ecological state of the entire system. Some of them are restoration of streams, recovery of polluted areas or forestry plantations.
Recommended good practices	Include a series of recommendations that some sectors are encouraged to adopt in their procedures to improve overall sustainability. They are voluntary recommendations and do not have to be applied. .
Grants	Grants are relevant for all BMPs which aim to stimulate and modify the behavior of stakeholders through economic incentives.
Information access	Refers to actions dedicated to increase or facilitate data to the general public in order to increase societal awareness and increase participation of the general public in the process of management of the crisis of the Mar Menor lagoon.
Land use and land management	The BMPs marked within this topic are those that apply rules for land use or apply restrictions to the development of activities in certain terrains of the catchment area of the Mar Menor.
Mobility	Mobility refers to improvement of public transport and connectivity in the influence area of the lagoon. These measures are mainly intended to increase the connectivity of la Manga and touristic areas with the main urban

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Topic	Brief description
	centers to promote tourism and facilitate communication.
Monitoring	The BMPs inventory has plenty of restrictions and thresholds to the application of certain techniques like watering or fertilization in certain areas. All these restrictions need monitoring and control. As this monitoring is also proposed as a measure to reduce pressures on the lagoon and greater monitoring efforts could lead to a reduction of certain activities or practices, a specific topic has been created.
Discharges and spills	This is defined for all the BMPs that aim to reduce direct or diffuse discharges that could reach the Mar Menor lagoon, through direct discharge into the lagoon or by being discharged in the streams of the catchment area of the lagoon.
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Target

If the topic column is based on the kind of aspect it is intended to modify or act on, target refers to the main stakeholder or economical sector that will be affected by the BMP. The identification of the target is considered crucial information when setting up the model of the socio-economic interactions in the Mar Menor region and how these socioeconomic changes could also influence the environmental status of the system. Identifying the target also allows understanding which

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sectors receive much interest from the public administration, and which sectors' importance for responding to the environmental issues of the lagoon might be underestimated.
Due to the complexity of socio-economic systems, for an appropriate classification and to facilitate data analysis, a close list of the targets has been made following the classification in table below.

Target (or stakeholder/sector)	Brief description
Agriculture	Agriculture refers to the primary sector of production of vegetables, fruits, and other products. It includes both irrigated and rain fed crops.
Aquaculture	The economic sector of aquaculture is quite relevant in the coastal areas of Murcia. Specifically, the polygons located in front of San Pedro del Pinatar coast, by its production volumes and its proximity to the Mar Menor lagoon.
Desalination plants	All the BMPs that target the management of the desalination plants are classified under this target.
Diving	This economic sector is based on recreational diving. Nowadays it offers incomes to a modest number of companies, but it is expected to promote water sports and ecotourism in the region, so the sector has a great potential to grow in the coming years.
Fishing	This sector includes professional and recreational fishing.
Forestry	Forestry refers to the sector which manages and exploits the natural resources that are associated with forest ecosystems. They could be timber products or non-timber products. The reforestations of forest lands are also classified as forestry.
General	General is a category created to include general restrictions or general legal conditions that affect society.
Hunting	Hunting refers to the recreational activity, as in the area of study there is not a professional hunting sector.
Industry	Industry refers to the sector dedicated to the secondary sector. In the Campo de Cartagena, industrial clusters are quite relevant, especially those linked to the transformation of raw materials from agriculture and cattle farming.
Livestock farming	This category refers to the productive sector of cattle

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	farming that is developed in the Campo de Cartagena region. In the studied area it is mainly intensive cattle farming, but some extensive holdings exist as well.
Mining	Mining is not active nowadays in the Mar Menor region, but the activities and the mines that have not been restored keep generating impacts on water quality. So, mining refers to BMPs dedicated to reducing impacts from abandoned mining areas in Sierra Minera.
Port infrastructures	Mar Menor has several port infrastructures on its coast. The classification refers to BMPs that aim to change procedures of existing ports or implement restrictions to the new ports.
Public administration	Some interventions are defined to modify or expand competences and responsibilities of public administrations. This category has been proposed to identify BMPs that are intended to demand changes in public administration.
Renewable energy	This category includes actions referring to the implementation of facilities to generate renewable energy. In Campo de Cartagena, that is mainly solar photovoltaic. This category has been considered by its potential to offer alternatives to intensive agriculture to generate incomes to landowners.
Sailing	Group of BMPs dedicated to modify or alleviate the impacts of sailing or recreational navigation in the ecosystems of the lagoon.
Salt flats	As said before, salt flats are part of the environment of Mar Menor and local culture. Some actions are proposed to recover and manage the salt production.
Tourism	As the main economic sector in the area of the Mar Menor, tourism is heavily affected by the current state of the ecosystems of the lagoon. Some BMPs are proposed to reduce impacts on the sector and promote its diversification.
Urban planning	Urban planning is the sector related with the promotion and expansion of urban settlements and areas.
Water treatment	Water treatment is a key element to guarantee a good state of aquatic ecosystems. The tag gathers the facilities dedicated to treat residual waters. In the past, diffuse discharges coming from deficiencies in the residual water treatment system reinforced the degradation of the lagoon. Currently, this is supposed to be overcome, but some actions

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	have been proposed to improve the environmental performance and reduce risk in water treatment plants.

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Legal documents

Table 3: General description of the legal documents studied for the compilation of BMPs. Source: Own.

Legal document number	Name (including year when it came into force)	Short description of the legal document and its expected impact	Source
1	Law 3/2020 27th July, for the recovery and protection of the Mar Menor lagoon - "*Ley 3/2020 de 27 de julio, de recuperación y protección del Mar Menor.*"	This is the most recent law covering environmental aspects specifically for addressing the Mar Menor lagoon issue, with implications for several sectors. The document includes a zoning of the study area where the restrictions are applied depending on the zone and the socioeconomic sector. This document also sets up the basis and the commitment to develop and apply the Land Management Plan for Mar Menor Catchment, in a period of 3 years since the approval of the Law 3/2020. This regulation is expected to have implications on BMPs in the future. Law 3/2020 was addressed by the Decree-law 5/2021. This regulation reforms the Law 3/2020 by reducing times for crop restitution in case agricultural land is irrigated without irrigation rights. It also emphasizes the urgency to implement the measures proposed in Analysis of solutions for Zero Discharges into de Mar Menor from Campo de Cartagena. The main objective of the reform is	CARM

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Legal document number	Name (including year when it came into force)	Short description of the legal document and its expected impact	Source
		to accelerate the reduction of nitrate and pollutant discharges in the lagoon. The consolidated text of the Law 3/2020, which includes the dispositions of the Decree-law 5/2021 has been analyzed. This is the basic document in the BMP analysis as the main tool that public power has used to restore the environmental situation of the salty lagoon.	
2	Law 1/2018 7th February, on urgent measures to guarantee environmental sustainability in the Mar Menor Area - "*Ley 1/2018 de 7 de febrero, de medidas urgentes para garantizar la sostenibilidad ambiental en el entorno del Mar Menor.*"	This law is no longer valid as it was abolished due to the derogatory provision 1 of the Law 3/2020. Only the annex V Code of Good Farming Practices, a voluntary to implement code, the additional disposition 1 (that makes the application of the Code of Good Practices compulsory in some areas) and the second final disposition (referring to taxes) are still active.	CARM

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Legal document number	Name (including year when it came into force)	Short description of the legal document and its expected impact	Source
		Law 3/2020 makes compulsory the application of the Good Farming Practices in some areas.	
3	Law 13/2015, 30th March, on land management and urban planning of Murcia Region - *"Ley 13/2015, de 30 de marzo, de ordenación territorial y urbanística de la Región de Murcia"*	The object of the Law 13/2015 is to regulate land management, coast management and urban planning in the Murcia Region under the principles of sustainability, the right to enjoy an environment in a good ecological status, nature protection, right to housing, and the protection of culture and landscape. Urban planning and land management are essential elements in defining the relations between the natural environment and humans. The restrictions and strategies derived from this law will have both direct and indirect impacts on the socio-economic system in the Mar Menor lagoon context, and on the physical state of the region. So, the law is studied from the BMP point of view.	CARM
4	Regulatory provisions of hydrological planning of Segura Basin (Annex X of the Royal Decree 1/2016 8th January - "*Disposiciones normativas del Plan*	This hydrological plan is the basic framework for the management of water resources. The plan covers a six-year period, from 2015-2021.	CHS

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Legal document number	Name (including year when it came into force)	Short description of the legal document and its expected impact	Source
	Hidrológico de la Demarcación Hidrográfica del Segura. Anexo X del Real Decreto 1/2016, de 8 de enero"	Currently, the document of the period 2022 - 2028 is under the procedures for being approved, but until this happens, the 2015 - 2021 plan remains legally active. As it is defined in the Water Law of Spain, every action that implies the hydraulic public domain should be included in the hydrologic planning. The general object of the water planning is to assure the good ecological state of the water bodies, to cover human needs, to achieve balance in the regional and sectoral development and to increase water availability while protecting its quality and optimizing its use. In the context of the Mar Menor lagoon, as an element of the public domain, it is managed by hydrological planning. Also, the Tagus-Segura transfer is managed through this document, as well as water concessions for agriculture and urban use are managed by CHS. It is obvious that all these elements will have an impact on the ecological status of the Mar Menor lagoon and the activities that	

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Legal document number	Name (including year when it came into force)	Short description of the legal document and its expected impact	Source
		socio-economic stakeholders will develop in the Mar Menor context.	
5	Initial Version of the Management Plan of Mineral Resources of the Murcia Region - "*Versión inicial del Plan de Ordenación Territorial de los Recursos Minerales de la Región de Murcia*"	This Plan is intended to establish a framework to foster the mining sector in the Murcia Region and simultaneously go forward into a more modernized and connected territorial system where the environmental perspective and the objectives of other territorial plans are considered. As it is known from the environmental analysis of the Mar Menor lagoon, mining historically has affected the environmental status of the Mar Menor lagoon due to the diffuse discharges and the pollution through erosion and sediment transport. Thus, a strategy to develop mining in Murcia could have implications for the future of the lagoon and its socio-economic environment.	CARM
6	Review and Update of the Management Plan for Flood Risk in the Segura River Basin (2nd cycle) - *"Revisión y actualización del Plan de Gestión del Riesgo de Inundación de la*	The European Parliament approved Directive 2007/60/CE regarding evaluation and management of floods in the EU. The Directive was transposed to the national legislation in the Royal Decree 903/2010, of 9th July, on evaluation and management of flood risks.	CHS

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Legal document number	Name (including year when it came into force)	Short description of the legal document and its expected impact	Source
	Demarcación Hidrográfica del Segura (2º ciclo)"	This legislation implies the evaluation of the areas affected by flood risks, the development of risk maps and the implementation of these risks in the Management Plans for Flood Risk, at the level of the hydrological basin. This law should be completed before 2013, updated before 2019 and then, every 6 years. The Management Plan for the Flood Risks in the Segura Basin aims to analyze flood risks at basin level and to implement measures for both improving the ecological status of the water bodies and reducing the risk of inundation based on a land management approach and Nature Based Solutions (NBS). As Campo de Cartagena has been identified as a large area affected by floods, one of the problems of the Mar Menor lagoon is the great amount of runoff that transports sediments and nutrients into the lagoon. The measures and actions implemented or planned to manage flood risks will have a strong impact on its ecological status and	

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Legal document number	Name (including year when it came into force)	Short description of the legal document and its expected impact	Source
		could also imply restrictions to the socio-economic stakeholders of the Mar Menor environment.	
7	Comprehensive Management Plan of the protected areas of Mar Menor lagoon and coastal strip in the mediterranean Region of Murcia (2019) - *"Plan de Gestión Integral de los Espacios Protegidos del Mar Menor y la Franja Litoral Mediterránea de la Región de Murcia"*	As a result of the implementation of the Habitats Directive into the national and regional legislation, the regional administration is responsible for developing the management of the natural spaces included in the Natura 2000 Network. The Mar Menor lagoon is a rich natural space with rich ecosystems and surrounded by strategic spaces for the flora and wildlife. Several Natura 2000 network spaces exist in a reduced territory, creating connections and interchanges between habitats of interest. Those ecosystems are closely related and should not be managed isolated and inconsistently. As a response, the regional government of Murcia has developed a comprehensive management plan for the protected coastal spaces in the territorial context of the Mar Menor Lagoon. The document defines regulations and actions needed to guarantee the protection of the ecosystems, including	CARM

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Legal document number	Name (including year when it came into force)	Short description of the legal document and its expected impact	Source
		restrictions that affect the development of the local (and regional) economy and the environmental status of the lagoon.	
8	Plan for the Protection of the Coastal Rim of the Mar Menor lagoon - *"Plan para la Protección del Borde Litoral del Mar Menor"*.	This Plan is a document created by petition of the General Direction of Coast and Sea (DGCM, by its Spanish initials). The main objective of this plan is to set up a series of actions to restore the coastal rim of the Mar Menor lagoon and its closer coastal areas of the Mediterranean Sea to promote the ecological recovery of the Mar Menor. The actions were initially defined in the first planning document (2020). Nevertheless, after the publication of the initial document the DGCM considered the allegations coming from involved stakeholders and finally, the actions proposed were modified, adapted, and published in the document called Specific Report about the Plan for the Protection of the Coastal Rim of the Mar Menor lagoon.	Ministry for Transport, Mobility and Urban Agenda

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Legal document number	Name (including year when it came into force)	Short description of the legal document and its expected impact	Source
9	Priority Actions Framework for the Recovery of the Mar Menor lagoon - "*Marco de Acciones Prioritarias para la Recuperación del Mar Menor*"	This document was developed by MITERD as a route of priority actions to stabilize and recover the ecosystems of the lagoon. To achieve those objectives, this program looks for a balance between the good environmental state of the lagoon and the development of the socio-economic sectors of the region. The main focus of the actions is on the elements causing the current problems.	MITERD
10	Strategic Plan of Sustainable Tourism of Cartagena 2022 - 2025 - "*Plan Estratégico de Turismo Sostenible de Cartagena 2022 - 2025*"	Despite the richness of cultural and environmental resources, tourism in Cartagena is based on the "sun and beach" model. This model is highly dependent on domestic Spain tourism and shows a high degree of seasonality, spatial concentration and low profitability compared with other tourism models. In addition, the Covid-19 crisis has drastically reduced visitor numbers. This strategy aims to diversify and transform tourism in Cartagena to a more diverse and sustainable tourism model, where the rural destinations and l the potential of	City Council of Cartagena

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Legal document number	Name (including year when it came into force)	Short description of the legal document and its expected impact	Source
		the region is used sustainably as the base for local development. As Cartagena has within its boundaries a great surface of Campo de Cartagena region, La Manga and Mar Menor coastal areas, the redefinition of the tourism model could be a crucial factor for changing the socio-economic environment of the Mar Menor lagoon.	
11	Strategic Plan of Tourism of Murcia Region - *"Plan Estratégico de Turismo de la Región de Murcia 2022 - 2032"*	Tourism is a key economic sector of the Murcia Region and, until the Covid-19 crisis it was experiencing a considerable growth in both the number of tourists and the economic activity. Nevertheless, the sector has some vulnerabilities that have been compounded by Covid-19 and the ecological crisis of the Mar Menor lagoon. The Plan aims to plan the touristic activity in CARM until 2032, promoting a less dependent sector on the "beach and sun model" to be able to generate a new framework of sustainable coastal	CARM

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Legal document number	Name (including year when it came into force)	Short description of the legal document and its expected impact	Source
		development and the promotion of the rural areas through ecotourism.	
12	Royal Decree 6/2022, 29th March, on adoption of urgent actions in the framework of the National Plan in response to the economic and social implications of the War in Ukraine - "*Real Decreto-ley 6/2022, de 29 de marzo, por el que se adoptan medidas urgentes en el marco del Plan Nacional de respuesta a las consecuencias económicas y sociales de la guerra de Ucrania"*	As a response to the crisis created by the war in Ukraine, the national government has approved a package of measures to reduce the impact of the energy prices on the Spanish economy. Some of the measures aim for a higher degree of energetic independence, promoting the installation of renewable energy plants. This could have considerable effects in Campo de Cartagena and in the Mar Menor territorial context due to the suitability of these landscapes for photovoltaic plants. Photovoltaic plants have been proliferating in the Murcia Region in the previous years.	Council of Ministers of Spain
13	Royal Decree 1057/2020, 1st December, on regulation of the direct concession of a grant to the Autonomous Community of the Region of Murcia for executing mining security and closure works in the abandoned facilities of mining wastes of El Lirio - "*Real*	The main purpose of this Royal Decree is the regulation of a grant aimed to restore the abandoned facilities for storing mining wastes called El Lirio. These facilities are in Barranco del Ponce, in Cartagena municipality.	MITERD

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Legal document number	Name (including year when it came into force)	Short description of the legal document and its expected impact	Source
	Decreto 1057/2020, de 1 de diciembre, por el que se regula la concesión directa de una subvención a la Comunidad Autónoma de la Región de Murcia para la ejecución de obras de seguridad minera y clausura en la instalación de residuos mineros abandonados denominada El Lirio."	El Lirio has the potential to generate severe environmental impacts, affecting humans and ecosystems. The facility currently affects a stream that discharges directly in the Mar Menor lagoon, producing discharges of heavy metals when rainfall generates runoffs into the stream and transports pollutants to Mar Menor.	
14	Decree nº 327/2021, 29th December, on establishment of the regulations of a grant for the municipality of Cartagena for the development of a project for removing mud presence in the bathing areas in the Cartagena coast in the Mar Menor - "*Decreto nº327/2021, de 29 de diciembre, por el que se establecen las normas especiales reguladoras de una subvención a otorgar por concesión directa al Excmo. Ayuntamiento de Cartagena para la redacción del proyecto*	Some beaches on the Mar Menor coast in the municipality of Cartagena cannot be used for swimming because they are polluted with mud. It reduces the attractiveness of beaches and therefore has negative effects on tourism and the local economy. The local government of Cartagena has the competences in maintaining its municipal lands. To promote the restoration of these coastal lands, CARM offered a grant to the city council.	CARM

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Legal document number	Name (including year when it came into force)	Short description of the legal document and its expected impact	Source
	de ejecución y estudios complementarios de las obras para la realización del proyecto de ejecución y estudios complementarios de las obras para la realización de las actuaciones que sean necesarias para eliminar la presencia de fangos y lodos en las zonas de baño del municipio de Cartagena en el Mar Menor.		
15	Species bank of endangered or threatened species of the Mar Menor lagoon - "*Banco de especies protegidas y singulares del Mar Menor*"	In 2016, the first eutrophication of the Mar Menor occured, an event that affected especially the vegetation cover of the seafloor and the species directly associated with it. It was devastating for the noble pen shell (*Pinna nobilis*), a species of Mediterranean clam, whose population decreased by 99%. Similarly, the continuous degradation of the lagoon, boosted by the extreme weather events of 2019 that triggered the massive fish mortality and similar events in the years after having stimulated the public administration to take action.	Council of the Government of CARM

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Legal document number	Name (including year when it came into force)	Short description of the legal document and its expected impact	Source
		In response to the danger for sensitive flora and fauna, the Murcia Region government approved the creation of an endangered and singular species bank of the Mar Menor lagoon for its conservation. For that, captive breeding programs and reintroductions will be done.	
16	Order 16th March 2022, from the Office of Water, Agriculture, Cattle farming, Fishing and Environment, on approval of the Inspection Plan of cattle farms for the period 2022 - 2023, for the monitoring of the measures planned in Law 3/2020 - "*Orden de 16 de marzo de 2022, de la Consejería de Agua, Agricultura, Ganadería, Pesca y Medio Ambiente, de aprobación del Plan de Inspección de Explotaciones Ganaderas para el bienio 2022-2023, para el control de las medidas previstas en la Ley 3/2020, de 27 de julio, de recuperación y protección del Mar Menor*"	The objective of the inspection plan is to design and plan the inspections to livestock farms during 2022-2023 in the legal framework of law 3/2020. It is expected that increasing the pressure on infringers will improve the overall environmental performance of the sector because the diffuse discharges of slurries in permeable soils and streams are likely to be considerably reduced by the application of stricter monitoring.	Office of Water, Agriculture, Cattle Farming, Fishing and Environment of CARM

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Legal document number	Name (including year when it came into force)	Short description of the legal document and its expected impact	Source
17	Order 6th September 2021, from the Office of Water, Agriculture, Cattle farming, Fishing and Environment, on approval of the Inspection Plan of agricultural holdings for the period 2022 - 2024, for the monitoring of the measures planned in law 3/2020 - "*Orden de 6 de Septiembre de 2021, de la Consejería de Agua, Agricultura, Ganadería, Pesca y Medio Ambiente, de aprobación del Plan de Inspección de Explotaciones Agrícolas para el trienio 2022 - 2024, para el control de las medidas previstas en el capítulo V y artículo 57 de la Ley 3/2020, de 27 de julio, de recuperación y protección del Mar Menor*"	This plan was developed with the aim of planning the inspections in agricultural holdings to evaluate the implementation of the restrictions established in Chapter V of Law 3/2020.	Office of Water, Agriculture, Cattle Farming, Fishing and Environment of CARM
18	Law 2/2020, 27th July, on mitigation of the socioeconomic impact of COVID-19 in housing and infrastructures - "*Ley 2/2020, de 27 de Julio, de mitigación del impacto socioeconómico del COVID-19 en el área de vivienda e infraestructuras*".	This law is a response to the socioeconomic impacts of the restrictions needed to control COVID-19. Tourism has been affected with severity in CARM and this law proposes measures and actions to reduce its impact.	CARM

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Legal document number	Name (including year when it came into force)	Short description of the legal document and its expected impact	Source
19	Resolution of the General Secretary of Water, Agriculture, Cattle, Fisheries and Environment for the collective agreement of the General Administration of the Autonomous Community of Region of Murcia with Comarcal Confederation of Companies of Cartagena (CEOC) for the development of actions for divulgation, education, formation and environmental advisory for companies in the context of the Mar Menor lagoon - "*Resolución de la Secretaría General de la Consejería de Agua, Agricultura, Ganadería, Pesca y Medio Ambiente, por la que se publica el convenio entre la Administración General de la Comunidad Autónoma de la Región de Murcia, a través de la Consejería de Agua, Agricultura, Pesca y Medioambiente y la Confederación Comarcal de Organizaciones Empresariales de Cartagena (COEC) para la realización de actuaciones de divulgación,*	This agreement aims to develop the knowledge of the companies in the territorial context of the Mar Menor lagoon regarding the natural values and of the lagoon and its environment. This will be achieved through educational actions directed to company owners and workers to improve its sustainability, reduce impacts and promote awareness.	CARM

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Legal document number	Name (including year when it came into force)	Short description of the legal document and its expected impact	Source
	formación y asesoramiento ambiental en el ámbito del Mar Menor a los empresarios de la comarca del campo de Cartagena"		
20	Decree 292/2021, 23rd December, on the establishment of special regulatory norms of direct concession of a grant for the elaboration of a Plan for the reactivation of nautic sector in the environment of the Mar Menor by a program of enhancement of its touristic model, equipments, touristic resources and relaunching of the Mar Menor as a tourism destination - *"Decreto n.º 292/2021, de 23 de diciembre, por el que se establecen las normas especiales reguladoras de la concesión directa de una subvención a la Asociación Consorcio Estación Náutica Mar Menor-Cabo de Palos para la elaboración de un Plan de Reactivación del Sector Náutico en el entorno del Mar Menor mediante un programa de mejora del modelo turístico, equipamientos, recursos turísticos y*	The ecological crisis of the Mar Menor has changed the paradigm of nautical activities in the lagoon and its environment. The Nautic Station of the Mar Menor is trying to transform the region's tourism sector to make it less dependent on seasonality. For that, they want to promote nautic activities as alternatives that could be carried out the whole year instead of the "sun and beach" tourism that only happens in a certain period of the year. To reach this goal, the Nautic Station is making efforts to create a Reactivation Plan for the Sector. To collaborate and facilitate that task, CARM has prepared a bundle of economic aids, with a total amount of 130,000 €.	CARM

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Legal document number	Name (including year when it came into force)	Short description of the legal document and its expected impact	Source
	relanzamiento sostenible del destino del Mar Menor."		

BMPs analysis/measures

The following table lists BMPs, which are described in the legal documents identified as relevant for having an impact on the development of the environmental conditions of the Mar Menor as well as on causes leading to its deterioration.

Table 4: BMPs compilation from the legal documents identified as responses to the Mar Menor crisis or to address problems in economic sectors due to the degradation of the lagoon. Source: own.

Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
1 - 1	S	Open access and diffusion of information on the environmental status of the lagoon.	-	Information access	Broad public	From 02/08/2020

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
1 - 2	D	Temporary exclusion area for new urban development that has not been adopted before that law came into force	Temporary exclusion area (as defined graphically in the law)	Land use and land management	Urban planning	3 years from 02/08/2020 or until the entry into force of the Land Management Plan of the Mar Menor basin. Whatever occurs first.
1 - 3	P/S	Introduction of permeable paving in new urban development	Areas in the zones 1 and 2 not affected by the temporary exclusion area	Water management	Urban planning	From 02/08/2020
1 - 4	P/S/I	Introduction of systems to separate pluvial and residual waters and mechanism for re-using pluvial water in new urban development	Areas in the zones 1 and 2 not affected by the temporary exclusion area	Water management	Urban planning	From 02/08/2020
1 - 5	P/S/I	Adoption of Nature Based Solutions (NBS) and Sustainable Urban Drainage Systems (SUDS) in areas affected by runoff	Areas in the zones 1 and 2 not affected by the temporary	Runoff & erosion	Urban planning	From 02/08/2020

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
			exclusion area			
1 - 6	P/S/I	Renaturation of cities and urban areas	Municipalities affected by the law	Environmental restoration	Urban planning	From 02/08/2020
1 - 7	P/S/I	Adoption of Nature Based Solutions (NBS) and Sustainable Urban Drainage Systems (SUDS) to increase the permeability of urban areas	Municipalities affected by the law	Water management	Urban planning	From 02/08/2020
1 - 8	S/I	Implementation of water retention actions on the roof of buildings (green roofs, NBS, etc.)	Municipalities affected by the law	Water management	Urban planning	From 02/08/2020
1 - 9	D	Prohibition to change the classification of forest lands unless it is declared of general interest	Zones 1 and 2	Land use and land management	Forestry	From 02/08/2020

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
1 - 10	S/I	Development and execution of hydrological woodland restoration	Mar Menor basin, outside the hydraulic domain	Environmental restoration	Forestry	From 02/08/2020
1 - 11	P	Prohibition of dumping in the lagoon excluding pluvial water and groundwater (always after processes of denitrification)	Municipalities affected by the law	Discharges and spills	Water treatment	From 02/08/2020
1 - 12	P	Prohibition of solid spills into the lagoon	Municipalities affected by the law	Discharges and spills	General public	From 02/08/2020
1 - 13	P	New urban development should have separation and catchment systems for pluvial water, and they should not be discharged in the Mar Menor lagoon. SUDS systems will be prioritized.	Zones 1 and 2	Discharges and spills	Urban planning	From 02/08/2020
1 - 14	P	Adoption of the water sanitation planning and water treatment of the Murcia Region in existing urban settlements	Zones 1 and 2	Discharges and spills	Water treatment	From 02/08/2020
1 - 15	D	Prohibition of changing land use from rainfed crops to irrigated crops if there are no water use rights.	Zones 1 and 2	Land use and land management	Agriculture	From 02/08/2020

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
1 - 16	D	Requirement of approval for expanding crops over non-forest lands.	Zones 1 and 2	Land use and land management	Agriculture	From 02/08/2020
1 - 17	P	It is forbidden to apply any kind of fertilizers for the crops located from the coastline to 1,500 meters. Ecological and precision agriculture could use fertilizers under some restrictions if they are located further than 500 from the coastline.	In the 1,500 meters strip from Mar Menor coastline	Nutrient inputs	Agriculture	In the strip between 100 meters and 500 meters from the coastline, from 02/08/2020. In the strip between 500 meters and 1,500 meters, 3 months of 02/08/2020
1 - 18	P	20% of the area under irrigation agriculture must be converted into green barriers/buffer strips.	In the 1,500 meters strip from Mar Menor coastline	Nutrient inputs	Agriculture	From 02/08/2020

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
1 - 19	P	Total restriction in the use of chemical fertilizers, non-composted manure, or green manure.	In the 1,500 meters strip from Mar Menor coastline	Nutrient inputs	Agriculture	From 02/08/2020
1 - 20	P	Fertilizing more than 170 kg/N/ha/year is forbidden.	Zones 1 and 2	Nutrient inputs	Agriculture	From 02/08/2020
1 - 21	P	Restriction to water crops without consolidated water rights, or that its physical disposition increases the risk of nutrient discharges in the lagoon.	In the 1,500 meters strip from Mar Menor coastline	Watering	Agriculture	From 02/08/2020
1 - 22	D	Restrictions to the extension of existing greenhouses and the development of new greenhouses. Cases in progress are excluded from this restriction.	In the 1,500 meters strip from Mar Menor coastline	Land use and land management	Agriculture	From 02/08/2020 to a maximum period of 3 years or when the catchment basin of the Mar Menor lagoon plan is approved.
1 - 23	S	All the agricultural holdings should be inscribed in the register of Agricultural Holdings of the Region of Murcia.	Zones 1 and 2	Monitoring	Agriculture	From 02/08/2020

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
1 - 24	S	Owners of agricultural holdings should communicate the volume of water used during the year to the regional government.	Zones 1 and 2	Watering	Agriculture	From 02/08/2020
1 - 25	S	Agricultural lands should have monitoring systems of water and fertilizers used.	Zones 1 and 2	Monitoring	Agriculture	From 02/08/2020
1 - 26	D	Cultivated areas without water rights or where crops were planted without authorization (illegal agriculture) should be restored to its natural state. If the crop originally was a rainfed crop, the original crop could be reimplanted.	Zones 1 and 2	Land use and land management	Agriculture	From 02/08/2020
1 - 27	P	Agricultural holdings of irrigated crops should have green barriers to prevent runoffs and soil erosion protection.	Zones 1 and 2	Runoff & erosion	Agriculture	From 02/08/2020

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
1 - 28	P	5% of the land should be dedicated to nutrient capture systems (green strips, green filters, vegetations…). In the 1,500 meters strip, 20% of the holdings surface.	Zones 1 and 2.	Nutrient inputs	Agriculture	From 02/08/2020
1 - 29	P	All cultivation operations should follow the contour lines. In zone 2 it can be not compulsory under certain considerations.	Zones 1 and 2	Runoff & erosion	Agriculture	From 02/08/2020
1 - 30	P	Within 2 years of coming into force of this law, the development of an action program to maintain and preserve soils should be carried out.	Zones 1 and 2	Runoff & erosion	Public administration	within 2 years of 02/08/2020
1 - 31	D/P	Promotion of crop rotation techniques.	Zones 1 and 2	Good practices	Agriculture	From 02/08/2020
1 - 32	D/P	Restriction to two crop cycles per year or three crop cycles in case of leaf crops with a cycle shorter than 45 days. Seeding and harvesting dates should be written in the field notebook of the holding.	Zones 1 and 2	Regulation of activities	Agriculture	From 02/08/2020
1 - 33	P	Nitrogenated fertilizers should be prescribed by technicians.	Zones 1 and 2	Nutrient inputs	Agriculture	From 02/08/2020

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
1 - 34	P	It is forbidden to use urea or uric nitrogen as fertilizers.	Zones 1 and 2	Nutrient inputs	Agriculture	From 02/08/2020
1 - 35	P	It is forbidden to use mineral fertilizers with nitrogen as basic fertilization.	Zones 1 and 2	Nutrient inputs	Agriculture	From 02/08/2020
1 - 36	P	It is compulsory to calculate the nitrogen balance according to the action program and Code of Good Farming Practice.	Zones 1 and 2	Nutrient inputs	Agriculture	From 02/08/2020
1 - 37	P	Registration of all the nutrient inputs performed in the crops is compulsory.	Zones 1 and 2	Nutrient inputs	Agriculture	From 02/08/2020
1 - 38	D/P	Actions to improve the soil microbiome (organic fertilization, microorganisms' fertilization, green fertilization…)	Zones 1 and 2	Nutrient inputs	Agriculture	From 02/08/2020
1 - 39	P	If soil nitrate is > 100 mg/kg of soil, the depletion factor should be > 40%	Zones 1 and 2	Nutrient inputs	Agriculture	From 02/08/2020

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
1 - 40	P	Prohibition of mineral fertilization with phosphorus if the P Olsen in the soil is > 120 mg/kg soil.	Zones 1 and 2	Nutrient inputs	Agriculture	From 02/08/2020
1 - 41	P	Plastic greenhouses should have structures to capture rainwater that is falling on the surface of the greenhouse.	Zones 1 and 2	Runoff & erosion	Agriculture	From 02/08/2020. Greenhouses smaller than 0,5 ha 1 year after 02/08/2020,
1 - 42	P	Water catchment tanks of the greenhouses should be prepared to store at least the runoff equivalent to a precipitation of 100 liters/m^2.	Zones 1 and 2	Water management	Agriculture	From 02/08/2020
1 - 43	P	It is forbidden to use sewage sludge as fertilizers.	Zones 1 and 2	Nutrient inputs	Agriculture	From 02/08/2020
1 - 44	P	Manure, slurry and other organic inputs should be treated properly before its application in agricultural lands.	Zones 1 and 2	Nutrient inputs	Agriculture	From 02/08/2020
1 - 45	P	Only registered manure and slurries should be employed.	Zones 1 and 2	Nutrient inputs	Agriculture	From 02/08/2020

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
1 - 46	P	Slurry and manure can only be applied under technical prescription.	Zones 1 and 2	Nutrient inputs	Agriculture	From 02/08/2020
1 - 47	P	Non-treated slurry can only be applied with the hanging tube system or injection.	Zones 1 and 2	Nutrient inputs	Agriculture	From 02/08/2020
1 - 48	D/P	If the number of crops is one per year, the slurry and manure should be applied at least biannually with exception of lands with very low nutrients content (organic matter < 1%, starting - NO3 < 25 mg/kg y P Olsen < 25 mg/kg) or nutrients extractions very high (> 170 kg N/ha), where fertilization can be done annually.	Zones 1 and 2	Nutrient inputs	Agriculture	From 02/08/2020
1 - 49	P	The owners of the agricultural standings should provide reports about several parameters to the administration.	Zones 1 and 2	Monitoring	Agriculture	From 02/08/2020
1 - 50	P	Slurry and organic fertilizers should not be applied under rain alarm form AEMET or in the periods from 15th September to 31st October and 1st to 30th April.	Zones 1 and 2	Nutrient inputs	Agriculture	From 02/08/2020

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
1 - 51	P	It is forbidden to stack manure or other fertilizers in agricultural lands for a period longer than 72 hours.	Zones 1 and 2	Nutrient inputs	Agriculture	From 02/08/2020
1 - 52	P	Fertilizers and manure should not be distributed if wind speed is faster than 3 m/s.	Zones 1 and 2	Nutrient inputs	Agriculture	From 02/08/2020
1 - 53	P	If agricultural activity has been stopped for a period longer than one year, bare soil should be avoided with natural or planted vegetation.	Zones 1 and 2	Runoff & erosion	Agriculture	From 02/08/2020
1 - 54	D/P	If an agricultural activity is abandoned, its natural state should be restored.	Zones 1 and 2	Land use and land management	Agriculture	From 02/08/2020
1 - 55	P	Every crop holding should have an annual plan to manage plastic debris. Plastics should be delivered to the appropriate manager.	Zones 1 and 2	Regulation of activities	Agriculture	From 02/08/2020
1 - 56	S	Crop holdings should have an environmental operator as advisor.	Zones 1 and 2	Regulation of activities	Agriculture	From 02/08/2020

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
1 - 57	P	Desalination plants must have a nitrate reduction system.	Zones 1 and 2	Nutrient inputs	Desalination plants	From 02/08/2020
1 - 58	P	Mandatory implementation of the action program for areas vulnerable to nitrate pollution from agriculture.	Zones 1 and 2	Nutrient inputs	Agriculture	From 02/08/2020
1 - 59	P	Creation of a label for sustainable agriculture in the Mar Menor context.	Zones 1 and 2	Good practices	Agriculture	From 02/08/2020
1 - 60	P	Only sustainable precision farming is allowed.	Zone 1	Regulation of activities	Agriculture	From 02/08/2020
1 - 61	P	Only two crops per year. Crops are classified in group 1 and group 2. Only one crop per year of group 1 is allowed and it is not allowed to concatenate two crops of group 1 species. Group 1 species with a cycle shorter than 45 days could be planted two times consecutively (Groups are specified in article 51 of the Law 3/2020).	Zone 1	Regulation of activities	Agriculture	From 02/08/2020

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
1 - 62	S	Seeding, plantation and harvesting dates should be registered in the field notebook.	Zone 1	Monitoring	Agriculture	From 02/08/2020
1 - 63	P	In watering crops, if during autumn and winter there are no crops being used, a green cover should be planted to protect the soil.	Zone 1	Runoff & erosion	Agriculture	During autumn and winter months. From 02/08/2020
1 - 64	P	Direct application of slurry is forbidden if they are not properly treated.	Zone 1	Nutrient inputs	Agriculture	From 02/08/2020
1 - 65	P	It is forbidden to apply basic fertilization with nitrogenous products.	Zone 1	Nutrient inputs	Agriculture	From 02/08/2020
1 - 66	P	Crop holdings larger than 0,5 ha should install hygrometers and other devices to register soil moisture and plan the watering precisely.	Zone 1	Watering	Agriculture	Within 6 months of 02/08/2020
1 - 67	P	Drip irrigation could not have any unitary water waste larger than 2,2 l/h.	Zone 1	Watering	Agriculture	From 02/08/2020

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
1 - 68	D	It is forbidden to install new livestock farms and the expansion of already existing ones.	Zone 1	Land use and land management	Livestock farming	From 02/08/2020
1 - 69	P	The Best Practices Available "Mejores Técnicas Disponibles" (MTDs) are compulsory.	Zone 1 and 2	Good practices	Livestock farming	From 02/08/2020
1 - 70	P	Obligation to impermeabilize the storage systems of manures in farms.	Zone 1 and 2	Discharges and spills	Livestock farming	From 02/08/2020
1 - 71	P	Slurry and manure must be delivered to an approved manager.	Zone 1 and 2	Regulation of activities	Livestock farming	From 02/08/2020
1 - 72	P	Prior notification and validation of livestock manure movements through the electronic register for that purpose.	Zone 1 and 2	Monitoring	Livestock farming	From 02/08/2020
1 - 73	P	Development of a specific regulation for fisheries.	Mar Menor	Policies and regulations	Fishing	

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
1 - 74	P	Development of a census of professional boats for fishing allowed to operate in the lagoon.	Mar Menor	Monitoring	Fishing	From 02/08/2020
1 - 75	P	Development and submission of an environmental adaptation program for the boats operating in the Mar Menor lagoon.	Mar Menor	Sustainability	Fishing	Within 18 months of 02/08/2020
1 - 76	D	Prohibited to develop a new sports marina.	General area of the law 3/2020	Port infrastructures restrictions	Port infrastructures	From 02/08/2020
1 - 77	D	Marina expansions must be carried out in the frame of an environmental conversion according to the Integrated Management Plan of protected spaces of Mar Menor Lagoon and coastal strip of Murcia Region without breakwater structures.	General area of the law 3/2020	Port infrastructures restrictions	Port infrastructures	From 02/08/2020
1 - 78	P/S	Public administration should carry out a hydro-dynamic study of each port and if negative impacts are detected, compensatory or corrective measures should be taken.	Mar Menor	Sustainability	Port infrastructures	Within 12 months of 02/08/2020
1 - 79	P	Port Concessions must present a zero-discharge plan.	General area of the law 3/2020	Discharges and spills	Port infrastructures	From 02/08/2020

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1 - 80	P	Implementation of daily access ramps for navigation.	General area of the law 3/2020	Regulation of activities	Sailing	From 02/08/2020
1 - 81	P/S	Installation of informative panels about good practices and sustainable navigation.	General area of the law 3/2020	Education	Sailing	From 02/08/2020
1 - 82	P	Implementation of the Tourism Sustainability Recognition System in Natura 2000 Network.	General area of the law 3/2020	Sustainability	Tourism	From 02/08/2020
1 - 83	D	Tourism Promotion Plan for diversifying the “sun and beach” tourism model.	General area of the law 3/2020	Sustainability	Tourism	From 02/08/2020
1 - 84	P	Publication of Good Environmental Practices for tourism companies considering aspects such as environmental impacts of tourism, ecosystems, and opportunities for sustainable activities.	General area of the law 3/2020	Good practices	Tourism	From 02/08/2020
1 - 85	P	Sustainability training program for tourism agents, impacts expected and responsible behavior.	General area of the law 3/2020	Education	Tourism	From 02/08/2020

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
1 - 86	S	Study for selection, prioritization, and execution of restoring actions in areas affected by mining that compromise the environmental state of the Mar Menor lagoon.	Mar Menor basin system	Environmental restoration	Mining	Six months from 02/08/2020
1 - 87	S	Prioritization of administrative procedures related to Lay 3/2020.	General area of the law 3/2020	Administrative procedures	Public administration	From 02/08/2020
1 - 88	S	Implementation of action programs in areas vulnerable to nitrate pollution with actions to prevent, reverse and protect these areas.	Campo de Cartagena	Nutrient inputs	Agriculture	From 02/08/2020
1 - 89	P/S	Establishment of sanctioning procedures to guarantee the enforcement of the legislation.	General area of the law 3/2020	Regulation of activities	General public	From 02/08/2020
1 - 90	D	Agricultural lands that have not been used within 20 years will be considered as forest lands.	General area of the law 3/2020	Land use and land management	Agriculture	From 02/08/2020
1 - 91	D	Agricultural lands that have not been used within 10 years will be considered as forest lands.	Zones 1 and 2	Land use and land management	Agriculture	From 02/08/2020

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
1 - 92	S	Implementation of the register of livestock manure movements.	General area of the law 3/2020	Monitoring	Livestock farming	Within 12 months of 02/08/2020
1 - 93	S	Reinforcement of the inspection bodies to assure the accomplishment of legal restrictions.	General area of the law 3/2020	Monitoring	Public administration	From 02/08/2020
1 - 94	P	Rural lands owned by Comunidad Autónoma de la Región de Murcia will be used as nutrient retention areas. Other public administrations will be invited to do the same.	Zone 1	Nutrient inputs	Broad public	From 02/08/2020
1 - 95	S	Specific plan for recovering traditional livestock trails and wetlands.	General area of the law 3/2020	Land use and land management	Livestock farming	From 02/08/2020
1 - 96	S	Livestock and agricultural holdings should contract collaborative entities of the Agricultural Administration of Murcia Region to assure that all the environmental aspects are covered in their holdings.	Zones 1 and 2	Regulation of activities	Agriculture / Livestock farming	From 02/08/2020

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
1 - 97	S	Reinforcement of inspection to monitor the compliance of the environmental laws.	General area of the law 3/2020	Monitoring	Public administration	From 02/08/2020
1 - 98	P	Total restriction to the use of inorganic or synthetic nitrogenous fertilizers. Organic fertilizers suitable for organic agriculture are allowed with restrictions in its amounts.	Zone 1, with the exception of the strip included between the Mar Menor coastline and 1,500 meters from it, is an area that has greater restrictions.	Nutrient inputs	Agriculture	Temporal restriction of two years from 02/08/2020 or when proper nutrients catchment infrastructures are in place.
1 - 99	P/S	Monitoring by the city councils of the pluvial water quality that is discharged in the Mar Menor Lagoon.	General area of the law 3/2020	Monitoring	Public administration	From 02/08/2020 until the Program of monitoring and improvement of sanitary, pluvial and EDAR networks is approved.

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
1 - 100	P	Compulsory application of the Code of Good Farming Practices.	Zones 1 and 2	Regulation of activities	Agriculture	From 02/08/2020
2 - 1	P	Fertilizers should be applied outside of rain periods, with adjusted dose and with appropriate techniques to assure its integration in the soil.	Compulsory for Zones 1 and 2.	Nutrient inputs	Agriculture	Compulsory from 02/08/2020
2 - 2	P	When applying slurry and sewage sludge, runoff or filtrations into public streams should be avoided.	Compulsory for Zones 1 and 2.	Nutrient inputs	Agriculture	Compulsory from 02/08/2020
2 - 3	P	It is prohibited to fertilize with slurry and sewage sludge in terrains with risk of remaining waterlogged for a period longer than 24 hours. When applying them, systems for delivery and distribution should be employed.	Compulsory for Zones 1 and 2.	Nutrient inputs	Agriculture	Compulsory from 02/08/2020

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
2 - 4	P	In rainfed holdings, fertilizers should be applied with a soil tillage after rainfall to prevent the runoff of nutrients.	Compulsory for Zones 1 and 2.	Nutrient inputs	Agriculture	Compulsory from 02/08/2020
2 - 5	P	It is not allowed to use fertilizers in fallow lands or between crops (understood as the period of time between the harvest and the terrain preparation for the next crop).	Compulsory for Zones 1 and 2.	Nutrient inputs	Agriculture	Compulsory from 02/08/2020
2 - 6	P	Nitrogenous fertilizers or manure should only be used in agricultural lands, gardens, grasslands or with the aim of restoring soils. They are not allowed to be used in the periphery of agricultural lands or near separation walls.	Compulsory for Zones 1 and 2.	Nutrient inputs	Agriculture	Compulsory from 02/08/2020
2 - 7	P	Nitrogenous fertilization will be applied as distant in time as possible to prevent soil damages.	Compulsory for Zones 1 and 2.	Nutrient inputs	Agriculture	Compulsory from 02/08/2020

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
2 - 8	P	Base fertilization should not exceed 40% of the total amount of fertilization for the crop. This amount is defined in table 2 of the Annex V of the Law 1/2018 of February 7th.	Compulsory for Zones 1 and 2.	Nutrient inputs	Agriculture	Compulsory from 02/08/2020
2 - 9	P	Land steeper than 15% can't be fertilized with mineral or organic liquid fertilizers. Only fertirrigation techniques are allowed.	Compulsory for Zones 1 and 2.	Nutrient inputs	Agriculture	Compulsory from 02/08/2020
2 - 10	P	Mineral and organic fertilization is allowed only if it is buried within 24 hours of its application.	Compulsory for Zones 1 and 2.	Nutrient inputs	Agriculture	Compulsory from 02/08/2020
2 - 11	P	Establishment of inadequate periods for fertilization depending on the type of crop (table 1 of Annex V of law 1/2018).	Compulsory for Zones 1 and 2.	Nutrient inputs	Agriculture	Compulsory from 02/08/2020

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
2 - 12	P	Prevention of fertilization in lands with the phreatic level higher than 0,5 meters or with risk of nutrient percolation to groundwater.	Compulsory for Zones 1 and 2.	Nutrient inputs	Agriculture	Compulsory from 02/08/2020
2 - 13	P	Strip of at least 3 meters from the hydric domain without fertilization.	Compulsory for Zones 1 and 2.	Nutrient inputs	Agriculture	Compulsory from 02/08/2020
2 - 14	P	Terrains within 50 meters to fountains, wells or other water infrastructures of human use should not be fertilized.	Compulsory for Zones 1 and 2.	Nutrient inputs	Agriculture	Compulsory from 02/08/2020
2 - 15	P	Prohibition to add more than 170 kg/ha year of fertilizers with its origin in sludges or manure and slurry.	Compulsory for Zones 1 and 2.	Nutrient inputs	Agriculture	Compulsory from 02/08/2020

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
2 - 16	P	Fertilization programs should follow the quantities defined in table 2 of Annex V of Law 1/2018. Higher doses can be applied under some circumstances as specific studies for the holding or application of traditional watering techniques.	Compulsory for Zones 1 and 2.	Nutrient inputs	Agriculture	Compulsory from 02/08/2020
2 - 17	P	Nitrogen balance should be calculated for every holding at the beginning of the crop cycle. The calculation should be done as defined at section 1.7 of the Annex V of law 1/2018.	Compulsory for Zones 1 and 2.	Nutrient inputs	Agriculture	Compulsory from 02/08/2020
2 - 18	S	Execution of regular water analysis of the pH, conductivity, and ionic composition. Thresholds and technical aspects of the analysis are defined at section 1.8 of the Annex V of the Law 1/2018.	Compulsory for Zones 1 and 2.	Monitoring	Agriculture	Compulsory from 02/08/2020

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
2 - 19	P	The use of water with electric conductivity over 3 dS/m should be restricted.	Compulsory for Zones 1 and 2.	Watering	Agriculture	Compulsory from 02/08/2020
2 - 20	P	Greenhouses, when possible, should have water retention structures to prevent runoff.	Compulsory for Zones 1 and 2.	Runoff & erosion	Agriculture	Compulsory from 02/08/2020
2 - 21	P	Watering should be based on accepted methodologies and calculated specifically for each crop. Data is available by SIAM. Also, the humidity retention capacity of the terrain should be considered.	Compulsory for Zones 1 and 2.	Watering	Agriculture	Compulsory from 02/08/2020
2 - 22	P	Flood irrigation should be done in border strips shorter than 120 m lengths in argillaceous terrains and 75 m in sandy soils. Argillaceous terrains slope should be less than 0,5 per thousand and sandy terrains less than 2 per thousand.	Compulsory for Zones 1 and 2.	Watering	Agriculture	Compulsory from 02/08/2020
2 - 23	P	Drip irrigation should last less than 5 hours.	Compulsory for Zones 1 and 2.	Watering	Agriculture	Compulsory from 02/08/2020

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
2 - 24	P	Greenhouses with "biosolarization" should be irrigated with sprinkler systems.	Compulsory for Zones 1 and 2.	Watering	Agriculture	Compulsory from 02/08/2020
2 - 25	P/S	Fertilization and watering should be adjusted when precipitation exceeds 15 mm/day, and a register should be done with the rainfall data.	Compulsory for Zones 1 and 2.	Watering	Agriculture	Compulsory from 02/08/2020
2 - 26	S	Register of water and nutrients inputs in the agricultural holding.	Compulsory for Zones 1 and 2.	Monitoring	Agriculture	Compulsory from 02/08/2020
2 - 27	S	Features of the watering network should be maintained and reviewed regularly.	Compulsory for Zones 1 and 2.	Watering	Agriculture	Compulsory from 02/08/2020
2 - 28	P/S	Crop rotations with species of deep roots should be done to improve the recirculation of nutrients among the layers of soils.	Compulsory for Zones 1 and 2.	Nutrient inputs	Agriculture	Compulsory from 02/08/2020

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
2 - 29	P/S	In lands steeper than 5%, soil tillage and terrain preparation should be done following the contour lines. Crops following slopes are forbidden.	Compulsory for Zones 1 and 2.	Runoff & erosion	Agriculture	Compulsory from 02/08/2020
2 - 30	P/S	Agricultural holdings should keep record of the management of plant residues, avoiding burnings except when plants are affected by pests or plant diseases.	Compulsory for Zones 1 and 2.	Monitoring	Agriculture	Compulsory from 02/08/2020
2 - 31	P	Recommended techniques for plant residues management when there are no risks: - Crushing and adding to the soil - Crushing and mulching - Livestock feeding - Biomass	Compulsory for Zones 1 and 2.	Regulation of activities	Agriculture	Compulsory from 02/08/2020

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
2 - 32	P	Some basic recommendations about soil management should be considered: - Avoiding solid pilings when the terrain has high moisture content. - Selecting crop species considering soil and water properties and quality. - Reduce the increasing accumulation of salt ions in the soil. - Appropriate management of organic matter.	Compulsory for Zones 1 and 2.	Regulation of activities	Agriculture	Compulsory from 02/08/2020
2 - 33	P	Organic nitrogen should be applied to assure its integration in the soil, avoiding rainy periods. In the case of slurry, waterlogging should be avoided.	Compulsory for Zones 1 and 2.	Nutrient inputs	Agriculture	Compulsory from 02/08/2020
2 - 34	P	At least a distance of 10 meters to the Hydric Domain should be free of fertilizers.	Compulsory for Zones 1 and 2.	Nutrient inputs	Agriculture	Compulsory from 02/08/2020

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
2 - 35	P	It is forbidden to stack manure and other organic fertilizers in the field.	Compulsory for Zones 1 and 2.	Nutrient inputs	Agriculture	Compulsory from 02/08/2020
2 - 36	P	Temporary stacks of manure and organic fertilizers should only be done for a period no longer than 15 days and if the terrain characteristics do not pose a risk for the hydric domain.	Compulsory for Zones 1 and 2.	Nutrient inputs	Agriculture	Compulsory from 02/08/2020
2 - 37	P	Temporary stacks of manure and organic fertilizers should not exceed 100 tones.	Compulsory for Zones 1 and 2.	Nutrient inputs	Agriculture	Compulsory from 02/08/2020
2 - 38	P	Dry matter content in stacked manure should be at least 30%	Compulsory for Zones 1 and 2.	Nutrient inputs	Agriculture	Compulsory from 02/08/2020
2 - 39	P	Minimum distances should be guaranteed from stacked manure to other farms (300 meters), water catchment points for human use (100 meters downstream, 400 meters upstream), rivers, water reservoirs and seasonal water courses (100 if slope > 5%, 200 if slope >= 5%).	Compulsory for Zones 1 and 2.	Nutrient inputs	Agriculture	Compulsory from 02/08/2020

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
2 - 40	P	Livestock farms should have impermeable storage systems for slurry and manure and at least a distance of 25 meters to the hydric domain.	Compulsory for Zones 1 and 2.	Nutrient inputs	Livestock farming	Compulsory from 02/08/2020
2 - 41	P	Pluvial water gathered in the roofs of the structures for manure and slurry storage should be conducted appropriately to ensure that contact between water and organic residuals does not take place.	Compulsory for Zones 1 and 2.	Nutrient inputs	Livestock farming	Compulsory from 02/08/2020
2 - 42	P	Storage systems of slurry and manure should keep the following distances: Water streams: 100 meters. Water canalizations and watering sewers: 15 meters. Water captions for settlements: 250 meters.	Compulsory for Zones 1 and 2.	Nutrient inputs	Livestock farming	Compulsory from 02/08/2020

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
2 - 43	S	Livestock farmers should keep record of the management of the manure and slurry.	Compulsory for Zones 1 and 2.	Monitoring	Livestock farming	Compulsory from 02/08/2020
2 - 44	P	Water use should be optimized in livestock farms with appropriate equipment.	Compulsory for Zones 1 and 2.	Water management	Livestock farming	Compulsory from 02/08/2020
2 - 45	P	Promotion of animal diets that reduce the emission of high nitrogenous manure.	Compulsory for Zones 1 and 2.	Nutrient inputs	Livestock farming	Compulsory from 02/08/2020
2 - 46	S	Public administration should develop a monitoring program by sampling watering water and point samples of superficial waters. The monitoring aspects are included in the Annex V of the Law 1/2018.	Compulsory for Zones 1 and 2.	Monitoring	Public administration	Compulsory from 02/08/2020
2 - 47	P	Dissemination and promotion of the Code of Good Farming Practices.	Mar Menor basin context	Education	Agriculture	Compulsory from 02/08/2020

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
3 - 1	S	Establish a system of sanctions if coastline planning regulations are violated.	Region of Murcia, especially in coastal areas.	Regulation of activities	Urban planning	From 06/05/2015
3 - 2	S	The integrated management strategy for coastal areas should be developed.	Region of Murcia, especially in coastal areas.	Policies and regulations	Public administration	From 06/05/2015
3 - 3	S	Instruments for environmental management of protected natural spaces prevail over urban planning instruments.	Region of Murcia	Land use and land management	Urban planning	From 06/05/2015

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
4 - 1	P/S	Priority of water is defined as follows: 1. Water supply for the population. 2. Livestock and agricultural farming, industry (not energy production). 3. Energy production. 4. Aquaculture. 5. Other activities that need administrative concession not included in the previous activities.	Segura Basin	Water management	General public	From 19/01/2016 until the publication of the next planning document.
4 - 2	P/S	Water concession priorities for watering are as follows: 1. Traditional agriculture. 2. Legalized by its existence in 1953. 3. Legalized after 1953. 4. Remaining holdings or new concessions.	Segura Basin	Water management	Agriculture	From 19/01/2016 until the publication of the next planning document.

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
4 - 3	P	Water for all use should have as maximum Boro concentration 0,3 mg/l.	Segura Basin	Water management	Broad public	From 19/01/2016 until the publication of the next planning document.
4 - 4	S	Ecological flow is a restriction that should be respected by all the users.	Segura Basin	Water management	Broad public	From 19/01/2016 until the publication of the next planning document.
4 - 5	S	In case of severe droughts, less restrictive ecological flows could be considered, with the exception that it would be unwise for the conservation of Natura 2000 networks or Ramsar spaces.	Segura Basin	Water management	Broad public	From 19/01/2016 until the publication of the next planning document.
4 - 6	S	Ecological stream monitoring should be performed by the CHS. Measurements should be done weekly and monthly.	Segura Basin	Monitoring	Public administration	From 19/01/2016 until the publication of the next planning document.

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
4 - 7	S	Owners of water use rights, if CHS asks for it, should install devices for monitoring the ecological flows in the catchment point.	Segura Basin	Monitoring	Broad public	From 19/01/2016 until the publication of the next planning document.
4 - 8	D/P	Establishment of water use for each socio-economic sector defined in article 14. Watering for agriculture in Campo de Cartagena has a water concession of 122 hm^3 /year from streams.	Segura Basin	Water management	Broad public	From 19/01/2016 until the publication of the next planning document.
4 - 9	D	It is stipulated as a water assignment of 32 hm^3 /year to satisfy the necessities of wetlands in the basin.	Segura Basin	Water management	Public administration	From 19/01/2016 until the publication of the next planning document.
4 - 10	D/P	If an aquifer is under risk of being affected by salt intrusion, its use will be restricted.	Segura Basin	Water management	Broad public	From 19/01/2016 until the publication of the next planning document.
4 - 11	D/P	If a waterbody is protected under instruments of the Law 42/2007, restrictions derived from it will be included in the Hydrologic Management Plan.	Segura Basin	Water management	Broad public	From 19/01/2016 until the publication of the next planning

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						document.
4 - 12	S	The plan establishes the year 2027 as the deadline to establish a Good State of the Water in the Mar Menor Lagoon	Mar Menor	Water management	Broad public	From 19/01/2016 until the publication of the next planning document.
4 - 13	D/P/S	Water bodies of the Segura Basin should be managed under the principle of "No Deterioration".	Segura Basin	Water management	Public administration	From 19/01/2016 until the publication of the next planning document.
4 - 14	S	Objective of recovering riverbank woodlands in the Segura streams and waterbodies for 2027.	Segura Basin water bodies	Environmental restoration	Public administration	From 19/01/2016 until the publication of the next planning document.

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
4 - 15	D	No new water concessions will be given to increase water volumes to meet the increased water needs of holdings, nor for replacing crops from rainfed to watering crops.	Segura Basin	Water management	Agriculture	From 19/01/2016 until the publication of the next planning document.
4 - 16	D/P/S	In groundwater bodies at risk of not accomplishing a good ecological state or in risk of being overexploited, no new water concessions will be given.	Segura Basin	Water management	General public	From 19/01/2016 until the publication of the next planning document.
4 - 17	S	The direct reusability of treated waters will be promoted during the planning period.	Segura Basin	Water management	General public	From 19/01/2016 until the publication of the next planning document.
4 - 18	D/P/S	Reach zero non-treated discharges in the Mar Menor Lagoon.	Mar Menor catchment area	Discharges and spills	General public	From 19/01/2016 until the publication of the next planning document.
4 - 19	P	EDAR treating more than 250.000 m^3/year should have a denitrification-nitrification treatment with ammonium under 1 mg/l and nitrates under 25 mg/l.	Segura Basin	Discharges and spills	Water treatment	From 19/01/2016, deadline 31/12/2027.

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
4 - 20	P	EDAR treating more than 250.000 m^3/year should have a water treatment to decrease phosphorus levels to 0,13 mg/l in the EDARs discharging at: - Segura River downstream Contraparada. - Guadalentón river downstream Punetes. - Rambla de Albuón. - Mulas river, downstream La Cierva dam. - Arroyo Tobarra. - Alhárabe, Benamor and Moratalla rivers.	Segura Basin	Discharges and spills	Water treatment	From 19/01/2016, deadline 31/12/2027.
4 - 21	P/S	Irrigation returns will be promoted as a measure to increase efficiency in water use and to improve the ecological status of rivers.	Segura Basin	Water management	Agriculture	From 19/01/2016 until the publication of the next planning document.
4 - 22	P	Water returns should follow the Code of Good Farming Practices and the Royal-Decree 47/2022.	Segura Basin	Water management	Agriculture	From 19/01/2016 until the publication of the next planning document.

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
4 - 23	P	Exploitation of coastal groundwater bodies should, if they need desalination, conduct brines to sea under the terms pointed out by administration.	Segura Basin	Nutrient inputs	Desalination plants	From 19/01/2016 until the publication of the next planning document.
4 - 24	S	Mar Menor lagoon should have a good water quality in 2027.	Mar Menor lagoon	Water management	Public administration	From 19/01/2016 until 2027.
5 - 1	D/P/S	Promotion of a program for improving the environmental control and reducing the effects of mining on the natural areas.	Murcia Region	Sustainability	Mining	From December 2021
5 - 2	D/P	Program to promote the restoration of abandoned mines.	Murcia Region	Environmental restoration	Mining	From December 2021
5 - 3	D/P	Identification of the lands in the south of La Unión, traditionally affected by mining as Lands Affected by Mining Risks which implies restrictions to the mining.	Mining area south of La Union	Land use and land management	Mining	From December 2021
5 - 4	D	Classification of mining areas South of La Union as exploitable lands priority III (less prioritized areas to use).	Mining area south of La Union	Land use and land management	Mining	From December 2021

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
6 - 1	D	Land management restrictions to land use and activities.	Segura Basin	Land use and land management	Urban planning	From 2022 (in process of approval)
6 - 2	P	Implementation of SUDS for managing risk of floods.	Urban areas of: - San Pedro del Pinatar. - Ciudad del Aire de San Javier.	Water management	Urban planning	From 2022 (in process of approval)
6 - 3	P/S	Conservation and improvement of river courses to increase its water transport capacity in episodes of torrential rains.	Segura Basin	Water management	Public administration	6 years from 2022 (in process of approval)

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
6 - 4	S	Execution of projects to maintain and improve the ecological status of dry beach, dune revegetation, recovery of coastal wetlands and repairs in coastal infrastructures.	Segura Basin maritime-terrestrial public domain	Environmental restoration	Public administration	6 years from 2022 (in process of approval)
6 - 5	S	Hydrological-woodland restoration of "La Rambla de las Matildes", that brings the debris from Sierra de la Mineria to the Mar Menor lagoon.	Rambla de las Matildes, Sierra Minera de Cartagena	Environmental restoration	Public administration	Within 2 years from the approval of the project. First, it is compulsory for the approval of the plan.
6 - 6	S	Hydrological-woodland restoration of "La Rambla del Beal".	Rambla del Beal, Sierra Minera de Cartagena	Environmental restoration	Public administration	Within 2 years from the approval of the project. First, it is compulsory for the approval of the plan.

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
6 - 7	S	Hydrological-woodland restoration of "El Barranco de Ponce".	Barranco de Ponce, Sierra Minera de Cartagena	Environmental restoration	Public administration	Within 2 years from the approval of the project. First, it is compulsory for the approval of the plan.
6 - 8	S	Hydrological-woodland restoration of "Rambla de Carrasquilla".	Rambla de Carrasquilla, Sierra Minera de Cartagena	Environmental restoration	Public administration	Within 2 years from the approval of the project. First, it is compulsory for the approval of the plan.
6 - 9	S	Restoration and improvement of forest stands owned by CHS to improve and regulate the hydrological cycle and reduce runoff.	Forests affected as ARPSI in the Murcia Region.	Environmental restoration	Forestry	Within 5 years from the approval of the project. First, it is compulsory for the approval of the plan.

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
6 - 10	S	Restoration of the coastline of the maritime-terrestrial Public Domain in the Segura Basin to increase the stability and to defend the coast against erosion.	coastline of the maritime-terrestrial Public Domain in the Segura Basin	Environmental restoration	Public administration	Within 5 years from the approval of the project. First, it is compulsory for the approval of the plan.
6 - 11	S	Environmental restoration of Ramble de El Albujón and its environment.	Rambla Albujón flows from Torre Pachecho to its mouth.	Environmental restoration	Public administration	From 2022 until the end of the 2nd cycle of the plan
6 - 12	P/S	Green corridor to channel runoff under flood scenarios and SUDS in the north area of Los Alcazares.	From Corredor Los Camachos to the mouth of the Mar Menor lagoon at the south of the Airport,	Runoff & erosion	Public administration	From 2022 until the end of the 2nd cycle of the plan
6 - 13	P	Flood control infrastructures in Rambla de Cobatillas.	Northwest of San Javier	Water management	Public administration	From 2022 until the end of the 2nd cycle of the plan

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6 - 14	P/S	Green corridor to channel runoff at the west of Torre Pacheco.	West of Torre Pacheco	Runoff & erosion	Public administration	
6 - 15	S	Hydrological restoration of Rambla de La Señora.	Rambla de la Señora	Environmental restoration	Public administration	From 2022 until the end of the 2nd cycle of the plan
6 - 16	P/S	SUDS and runoff control infrastructures in the basin of Rambla de la Maraña.	Basin of Rambla de la Maraña	Runoff & erosion	Public administration	From 2022 until the end of the 2nd cycle of the plan
6 - 17	P/S	Green corridor and runoff control infrastructures in the basin of Rambla La Peraleja.	Basin of Rambla La Peraleja	Runoff & erosion	Public administration	From 2022 until the end of the 2nd cycle of the plan
6 - 18	P/S	Green corridor and runoff control infrastructures and SUDS for protecting the center and south areas of Los Alcázares.	Environment of the urban area of Los Alcázares.	Runoff & erosion	Urban planning	From 2022 until the end of the 2nd cycle of the plan
7 - 1	S	Environmental education should have a fundamental role in the management of the natural spaces, promoting knowledge about the environmental services provided by the natural spaces.	Area of application of the Integrated Management Plan.	Education	Broad public	From 20/10/2019

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
7 - 2	S	Public administration in environmental issues should facilitate and improve the participation of local stakeholders (economic, social and nature conservation associations) in the management of the natural spaces	Area of application of the Integrated Management Plan.	Public participation	Broad public	From 20/10/2019
7 - 3	P	Activities that can affect transport and dynamics of sediments should be avoided.	Area of application of the Integrated Management Plan.	Runoff & erosion	Broad public	From 20/10/2019
7 - 4	P/S	Public administration will promote landscape architecture measures to reduce agricultural effluents in the Mar Menor lagoon catchment area such as green barriers.	Mar Menor catchment area	Discharges and spills	Agriculture	From 20/10/2019
7 - 5	S	Construction of structures affecting marine phanerogams should not affect its ecological state.	Marine areas of the Integrated Management Plan.	Biota protection	Infrastructures	From 20/10/2019

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
7 - 6	D	New artificial beaches are forbidden.	Coastal areas of the Integrated Management Plan boundaries.	Land use and land management	Urban planning	From 20/10/2019
7 - 7	P	Public Administration of the Murcia Region will promote through financial aid agricultural, forest and livestock practices that support the ecological restoration of the Mar Menor and its surrounding ecosystems.	Environment of the Integrated Management Plan boundaries.	Grants	Agriculture / Forestry / Livestock farming	From 20/10/2019
7 - 8	P	New facilities for livestock farming should be placed in the Agricultural Use Zone.	Environment of the Integrated Management Plan boundaries.	Land use and land management	Livestock farming	From 20/10/2019

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
7 - 9	P	Small-scale fishing is compatible with the conservation objectives.	Marine areas of the Integrated Management Plan boundaries.	Sustainability	Fishing	From 20/10/2019
7 - 10	P	Fishing is prohibited in the Reserve Area.	Marine areas of the Integrated Management Plan boundaries are classified as Reserve Areas.	Biota protection	Fishing	From 20/10/2019
7 - 11	D	New aquaculture facilities should not be installed in protected areas with presence of phanerogams and maërl bottoms, and should keep a minimum distance to Mediterranean tapewead (*Posidonia oceanica*).	Marine areas of the Integrated Management Plan boundaries.	Land use and land management	Aquaculture	From 20/10/2019

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
7 - 12	D	Ban on hunting.	Reserve Area, "Humedales periféricos", "Islas del Mar Menor", "Islas occidentales", "Cabezo del Carmolí".	Biota protection	Hunting	From 20/10/2019
7 - 13	D	It is forbidden to open new intensive hunting grounds.	Within the Integrated Management Plan boundaries.	Land use and land management	Hunting	From 20/10/2019
7 - 14	P/S	Public administration should try to engage tourism companies in projects for protection, conservation and restoration of the natural environment that will also promote good practices.	Mar Menor territorial context.	Tourism dynamization	Tourism	From 20/10/2019
7 - 15	D	Eco-tourism will be promoted by the public administration.	Within the Integrated Management Plan	Promotion of ecotourism	Tourism	From 20/10/2019

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
			boundaries.			
7 - 16	D/P	Access restricted to areas of interest for conservation. Some areas have temporary restrictions and others all year.	Within the Integrated Management Plan boundaries.	Biota protection	Tourism	From 20/10/2019
7 - 17	D	Prohibition of tourism activities.	Islas Hormigas y Franja Sumergida Punta de Cabo Tiñoso.	Biota protection	Tourism	From 20/10/2019
7 - 18	D/P	Establishment of limited quotas for diving.	“Franja Litoral Isla Grosa”, “Franja litoral del Farallón” and Priority Conservation Zone.	Regulation of activities	Diving	From 20/10/2019

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
7 - 19	D/P	Prohibition of professional and sports fishing from ground, boat or diving.	Reserve Zone. Priority Conservation Zone: Franja sumergida de las islas. Franja Litoral de Isla Grosa. Franja Litoral Farallón. Fondos de las Palomas. Fondos de Cueva de Lobos.	Biota protection	Fishing	From 20/10/2019

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
7 - 20	P	Prohibition of presence of boats during the night.	Reserve Zone. Islas Hormigas Franja Sumergida Punta de Cabo Tiñoso. Priority Conservation Zone: Franja sumergida de las islas. Fondos de las Palomas. Fondos Cueva de Lobos. Franja Litoral de Isla Grosa. Franja Litoral	Regulation of activities	Sailing	From 20/10/2019

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			del Farallón.			

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
7 - 21	D/P	Public administration with competences in port infrastructures, in collaboration with the environmental office of the regional government will promote the environmental adaptation of port infrastructures to prevent discharges from the port and boats and the introduction of alien species.	Within the Integrated Management Plan boundaries.	Sustainability	Port infrastructures	From 20/10/2019
7 - 22	D/P	Public administration will foster the installation of temporary anchoring areas and dry marinas to reduce impacts of sailing in the natural spaces.	Marine areas within the Integrated Management Plan boundaries.	Seafloor protection	Sailing	From 20/10/2019
7 - 23	P	Public administration will foster a less polluting navigation, with sailboats and electric boats.	Marine areas within the Integrated Management Plan boundaries.	Discharges and spills	Sailing	From 20/10/2019
7 - 24	P	Regulation of the maximum sailing speed to less than 20 knots to boats larger than 10 meters length.	Marine areas within the Integrated Management Plan boundaries.	Regulation of activities	Sailing	From 20/10/2019

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
7 - 25	D/P	Prohibition of construction of new port infrastructures in the Mar Menor lagoon. Port extensions are only possible if they are done under principles of environmental integration.	Mar Menor lagoon.	Port infrastructures restrictions	Port infrastructures	From 20/10/2019
7 - 26	D	It is not allowed to open new roads or vials in the protected areas.	Within the Integrated Management Plan boundaries.	Land use and land management	Infrastructures	From 20/10/2019
7 - 27	D	New industrial activities should have an evaluation of its compatibility with the objectives of the Integrated Management Plan.	Within the Integrated Management Plan boundaries.	Sustainability	Industry	From 20/10/2019
7 - 28	D/P	Any project to expand salt flats or to change the use of salt lagoons should be approved by the Environmental office or Murcia Region.	Within the Integrated Management Plan boundaries.	Land use and land management	Salt flats	From 20/10/2019

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
7 - 29	D	The creation of new mines or extractive activities, and the expansion of existing mines is forbidden.	Within the Integrated Management Plan boundaries.	Land use and land management	Mining	From 20/10/2019
7 - 30	P	In the Mar Menor lagoon, seafloor dredging or any other activity that can affect the sea bottom is not allowed.	Mar Menor lagoon.	Seafloor protection	Mining	From 20/10/2019
7 - 31	P	Land will be considered as Non-developable Land (cannot be urbanized).	Protected areas within the Integrated Management Plan boundaries.	Land use and land management	Urban planning	From 20/10/2019
7 - 32	S	Study and control of flora alien species.	Within the Integrated Management Plan boundaries.	Biota protection	Public administration	From 20/10/2019
7 - 33	S	Acquisition and restoration of land.	Within the Integrated Management Plan	Environmental restoration	Public administration	From 20/10/2019

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
			boundaries.			
7 - 34	S	Recovery and restoration of sandy habitats and lagoons.	Within the Integrated Management Plan boundaries.	Environmental restoration	Public administration	From 20/10/2019
7 - 35	S	Environmental restoration of the Mar Menor lagoon habitats.	Mar Menor lagoon.	Environmental restoration	Public administration	From 20/10/2019
7 - 36	S/I	Development and execution of a program for the protection and adaptation of the Mar Menor lagoon to climate change.	Mar Menor lagoon.	Policies and regulations	Public administration	From 20/10/2019
7 - 37	S	Development and execution of a hydrological-woodland restoration program.	Catchment area of the Mar Menor lagoon.	Environmental restoration	Forestry	From 20/10/2019

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7 - 38	S	Corrective measures to reduce impacts on the fauna.	Cabezos del Mar Menor	Biota protection	Public administration	From 20/10/2019
7 - 39	P	Adaptation of anchoring and establishment of mooring buoys.	Mar Menor lagoon	Seafloor protection	Sailing	From 20/10/2019
7 - 40	P/S	Improvement of the quality of water discharged in the Mar Menor lagoon through green infrastructures and restoration of watercourses.	Mar Menor water catchment areas and watercourses that discharge in the lagoon	Discharges and spills	Public administration	From 20/10/2019
7 - 41	S	Monitoring system of the water quality.	Mar Menor lagoon	Monitoring	Public administration	From 20/10/2019
7 - 42	S	Port infrastructures Management System with actions for environmental adaptation and the development of a Code of Good Practices.	Mar Menor lagoon	Sustainability	Port infrastructures	From 20/10/2019
7 - 43	S	Environmental training program for professional and recreational fishing.	Mar Menor lagoon	Education	Fishing	From 20/10/2019

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7 - 44	S	Development of Code of Good Practices for tourism companies.	Murcia Region	Good practices	Tourism	From 20/10/2019
7 - 45	S	Environmental training program for tourist agents.	Murcia Region	Education	Tourism	From 20/10/2019
7 - 46	S	Environmental training program for farmers.	Murcia Region	Education	Agriculture	From 20/10/2019
7 - 47	S	Development of programs of environmental education.	Murcia Region	Education	Broad public	From 20/10/2019
7 - 48	S	Development and dissemination of environmental information.	Murcia Region	Education	Broad public	From 20/10/2019
7 - 49	S	Creation of a public online repository with information about sustainability in agricultural holdings.	Murcia Region	Education	Broad public	From 20/10/2019
7 - 50	S	Development of a website regularly updated with information about the environmental state of the protected areas.	Murcia Region	Information access	Broad public	From 20/10/2019

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
8 - 1	P/S	Modification of the Pilar de la Horadada port infrastructure, recovery of beaches occupied by the urban development (Playa de las Villas and Playa del Mojón) and redistribution of sand to the beaches most affected by erosion (south of the port).	Zone 1A of the Plan for the Protection of the Coastal Rim of the Mar Menor lagoon	Environmental restoration	Urban planning	Unknown
8 - 2	S	Restoration of the Playa de la Llana by building a breakwater near the San Pedro del Pinatar Port and in the rocky area in the north of the Gola de la Caleta. Sand transfer from Playa de Torre to Playa de la Llana and dunar restoration in Playa de Torre Derribada.	Zone 1A and 1 B of the Plan for the Protection of the Coastal Rim of the Mar Menor lagoon	Environmental restoration	Infrastructures	Unknown
8 - 3	P/S	Recovery of occupied spaces of the Maritimum-terrestrial Public Domain by removing existing buildings and equipment.	Zone 1B of the Plan for the Protection of the Coastal Rim of the Mar Menor lagoon	Environmental restoration	Urban planning	Unknown

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
8 - 4	P/S	Protection of Playa del Estacio from marine erosion and recovery of the Maritimum-terrestrial Public Domain by removing existing buildings and equipment.	Zone 1C of the Plan for the Protection of the Coastal Rim of the Mar Menor lagoon	Environmental restoration	Urban planning	Unknown
8 - 5	P/S	Restoration of sand beaches and recovery of the occupied surface of the Maritimum-terrestrial Public Domain by buildings in the Mediterranean coast of La Manga and Cartagena.	Zone 1C of the Plan for the Protection of the Coastal Rim of the Mar Menor lagoon	Environmental restoration	Urban planning	Unknown
8 - 6	P/S	Removal of buildings and constructions occupying the Maritimum-terrestrial Public Domain occupied in the northern beaches of the Mar Menor lagoon	Zones 2A and 2B of the Plan for the Protection of the Coastal Rim of the Mar Menor lagoon	Environmental restoration	Urban planning	Unknown

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
8 - 7	P/S	Removal of buildings and constructions occupying the Maritimum-terrestrial Public Domain in the southern beaches of the Mar Menor lagoon	Zones 3A and 3B of the Plan for the Protection of the Coastal Rim of the Mar Menor lagoon	Environmental restoration	Urban planning	Unknown
8 - 8	P/S	Removal of buildings and constructions occupying the Maritimum-terrestrial Public Domain occupied in the southern beaches of the Mar Menor lagoon	Zone 4A of the Plan for the Protection of the Coastal Rim of the Mar Menor lagoon	Environmental restoration	Urban planning	Unknown
9 - 1	S	Campaign to improve the monitoring of water use in agriculture according to the restrictions established in the Law 3/2020 by reinforcing the civil service and giving support to CARM.	Catchment area of the Mar Menor lagoon. Campo de Cartagena, environment of the water body of Campo de Cartagena,	Monitoring	Agriculture	From 2019 to 2022

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
			illegal irrigated crops outside boundaries for water use			
9 - 2	P	Sealing and disconnecting illegally irrigated crops from the water supply infrastructure.	Catchment area of the Mar Menor lagoon. Campo de Cartagena, illegal irrigated crops outside boundaries for water use	Water management	Agriculture	From 2021 to 2022
9 - 3	P/S	Development of an action program for the groundwater body of Campo de Cartagena and precautionary measures of water use.	Catchment area of the Mar Menor lagoon, Campo de Cartagena, environment	Water management	Broad public	From 2022 to 2027

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
			of the Campo de Cartagena water body			
9 - 4	S	Identification and characterization of the drainage network of Mar Menor catchment area to identify priority streams and promote its recovery.	Catchment area of the Mar Menor lagoon, Campo de Cartagena	Environmental restoration	Public administration	From 2021 to 2026
9 - 5	S	Intensification of the discharges monitoring in the Hydraulic Public Domain from livestock farming and intensive agriculture.	Catchment area of the Mar Menor lagoon, Campo de Cartagena	Monitoring	Agriculture	From 2022 to 2026
9 - 6	S	Restoration of natural areas in the perimetral strip of the Mar Menor lagoon.	In the 1,500 meters strip from Mar Menor coastline defined in the Law 3/2020	Environmental restoration	Public administration	From 2022 to 2026

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9 - 7	S	Renaturalization and restoration of streams. Projects to restore ecological connectivity to Mar Menor catchment area and restoration of streams affected by mining, especially Rambla de Albujón and drainage systems of mining areas.	Catchment area of the Mar Menor lagoon	Environmental restoration	Public administration	From 2022 to 2026
9 - 8	S	Restoration of abandoned mining areas and restoration of lands affected by mining in the Mar Menor surroundings.	Catchment area of the Mar Menor lagoon	Environmental restoration	Mining	From 2023 to 2026
9 - 9	S	Protection and recovery of the Maritimum-terrestrial Public Domain in the Mar Menor coast.	Mar Menor coast	Environmental restoration	Urban planning	From 2021 to 2026
9 - 10	S	Protection and recovery of the Maritimum-terrestrial Public Domain in the Mediterranean Sea.	Mediterranean sea coast in the Mar Menor context	Environmental restoration	Urban planning	From 2022 to 2026

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9 - 11	P/S	Projects and grants to municipalities to restore and improve the drainage network to avoid nutrient discharges in the lagoon due to floods.	Areas under flood risks in the Mar Menor area	Nutrient inputs	Public administration	From 2022 to 2026
9 - 12	P	Renovation of the impulsion system of Rambla de Albujón to prevent nutrient discharges.	Rambla de Albujón mouth	Nutrient inputs	Public administration	From 2022 to 2025
9 - 13	P	Improvement of the water treatment facilities.	Catchment area of the Mar Menor lagoon	Nutrient inputs	Water treatment	From 2022 to 2026
9 - 14	D	Modification of the PAC strategy to promote a more respectful and adapted agriculture with Mar Menor.	Catchment area of the Mar Menor lagoon	Grants	Agriculture	From 2023 to 2027
9 - 15	D	Promotion of tourism and creation of grants to reduce the negative effects of the degradation of the lagoon on the sector. Promotion of tourism related to water activities (e.g., diving, surfing, windsurfing) and spa. The instrument will be the 2022 call for Plans of sustainable tourism.	Mar Menor context	Tourism dynamization	Tourism	From 2022 to 2023

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9 - 16	D/S	Funding for fisheries to reduce the negative effects of pollution in the lagoon on the sector.	Mar Menor context	Grants	Fishing	From 2022 to 2023
9 - 17	D	Periodic grants to promote transition and innovation to improve the ecological footprint of the economic activities.	Mar Menor context	Grants	General public	From 2022. Calls every 2 years.
9 - 18	D	Development of a new legal frame to regulate agriculture and its impact on the Mar Menor lagoon.	Spain. Region of Murcia, Mar Menor catchment area	Regulation of activities	Agriculture	Under development
9 - 19	S	Development of a continuous and near-real time monitoring of the lagoon and its biological, physical, and chemical state.	Mar Menor lagoon	Monitoring	Public administration	From 2022
9 - 20	S	Improvement of the monitoring systems of the hydrological network and development of models for predicting the nutrients content of water.	Catchment area of the Mar Menor lagoon	Monitoring	Public administration	Development of technologies from 2022 to 2026

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9 - 21	S	Modeling of biogeophysical cycles and their impacts on the biota of the lagoon.	Mar Menor lagoon	Monitoring	Public administration	Development from 2022 to 2023
9 - 22	S	Creation of an integrated information system with cartography, indicators, reports, and a decision support tool.	Mar Menor lagoon	Information access	Public administration	The viewer should be operative in June 2022
9 - 23	S	Creation of channels to promote dialogue between stakeholders and public administration, especially those economic sectors affected by the degradation of the lagoon and the restrictions for its recovery.	Mar Menor area	Public participation	General public	2022
10 - 1	D/P	Awareness Plan for responsible tourism.	Cartagena	Policies and regulations	Tourism	Undefined. Programmed in the period 2022 - 2025
10 - 2	P	Improve the functionality of AVE, FEVE and bus stations and the parking areas of Cartagena to increase arrivals.	Cartagena	Mobility	Tourism	Undefined. Programmed in the period 2022 - 2025

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10 - 3	P	Improve FEVE network to connect La Manga del Mar Menor and Cabo de Palos with Cartagena city.	Cartagena	Mobility	Tourism	Undefined. Planned for the period 2022 - 2025
10 - 4	S/I	Plan for the integrated restoration of La Manga del Mar Menor to remodel the touristic offer, reduce the seasonality and improve the image as a tourist destination.	La Manga del Mar Menor	Tourism dynamization	Tourism	Undefined. Planned for the period 2022 - 2025
10 - 5	S	Renewal and embellishment of the landscape of Mar Menor coast with ecological walks.	Cartagena, in the Mar Menor coast and surroundings	Tourism dynamization	Tourism	Undefined. Planned for the period 2022 - 2025
10 - 6	S/I	Integrated Intervention Plan in Cabo de Palos to preserve the aesthetics of the fishing village and improve the landscape and touristic offer.	Cabo de Palos	Tourism dynamization	Tourism	Undefined. Planned for the period 2022 - 2025

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10 - 7	S	Supporting the recovery project of Salinas de Marchamalo.	Salinas de Marchamalo, in the southern limit of the Mar Menor lagoon	Environmental restoration	Tourism	Undefined. Planned for the period 2022 - 2025
10 - 8	S	Plan for the restoration and development of the cultural and historical value of Campo de Cartagena associated with the rural environment.	Campo de Cartagena	Promotion of ecotourism	Tourism	Undefined. Planned for the period 2022 - 2025
10 - 9	P/S	Restoration and promotion of rural tourism of Sierra Minera.	Sierra Minera	Promotion of ecotourism	Tourism	Undefined. Planned for the period 2022 - 2025
10 - 10	S/I	Plan for rehabilitation and promotion of tourism based on the archaeological resources of Campo de Cartagena.	Campo de Cartagena	Promotion of ecotourism	Tourism	Undefined. Planned for the period 2022 - 2025
10 - 11	S/I	Remodeling of the tourism from a “sun and beach” model to a tourism of self-care and well-being on the coast.	Cartagena coastal areas of Mediterranean Sea and Mar Menor Lagoon	Tourism dynamization	Tourism	Undefined. Planned for the period 2022 - 2025

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10 - 12	D/P	Promotion of sports tourism with low environmental impact such as diving, mountain biking or aquatic sports.	Cartagena, coastal areas of Mediterranean sea and Mar Menor Lagoon	Promotion of ecotourism	Tourism	Undefined. Planned for the period 2022 - 2025
10 - 13	I	Promotion of the gastronomy of Cartagena as a tourist resource, creating a label of local products.	Cartagena	Tourism dynamization	Tourism	Undefined. Planned for the period 2022 - 2025
10 - 14	D/I	Promotion of Cartagena as a destination for ecotourism.	Cartagena	Promotion of ecotourism	Tourism	Undefined. Planned for the period 2022 - 2025
10 - 15	D/I	Support and collaboration with entities of rural tourism to promote ecotourism and rural development.	Cartagena	Promotion of ecotourism	Tourism	Undefined. Planned for the period 2022 - 2025
10 - 16	I	Collaboration with the Fishing Fraternity to promote the fishing traditions and fishing culture as a tourist source.	Cartagena coastal areas	Promotion of ecotourism	Tourism / Fishing	Undefined. Planned for the period 2022 - 2025

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10 - 17	I	Package of actions to remodel the visualization of Cartagena as a touristic brand.	Cartagena	Tourism dynamization	Tourism	Undefined. Planned for the period 2022 - 2025
10 - 18	D/P/S	Awareness campaign for the necessity of changing the touristic model to a more sustainable and diverse touristic model.	Cartagena	Promotion of ecotourism	Tourism	Undefined. Planned for the period 2022 - 2025
10 - 19	D/P/S	Promotion of a local agreement for sustainable tourism in the Cartagena municipality.	Cartagena	Promotion of ecotourism	Tourism	Undefined. Planned for the period 2022 - 2025
11 - 1	I	Management of grants to support the touristic sector affected by the Mar Menor crisis.	Mar Menor surroundings	Tourism dynamization	Tourism	Undefined. Planned for the period 2022 - 2032
11 - 2	D	Integrated Plan for the Mobility in the Mar Menor.	Mar Menor surroundings	Mobility	Broad public	Undefined. Planned for the period 2022 - 2032
11 - 3	S	Creation of a system of recognition of the sustainability of Mar Menor tourism companies.	Mar Menor surroundings	Tourism dynamization	Tourism	Undefined. Planned for the period 2022 - 2032
11 - 4	I	Promotion of the Mar Menor as a strategic destination for tourism in the Murcia Region.	Mar Menor surroundings	Tourism dynamization	Tourism	Undefined. Planned for the period 2022 - 2032

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
11 - 5	P	Good Environmental Practices for tourism and training program for tourism stakeholders.	Murcia Region	Tourism dynamization	Tourism	Undefined. Planned for the period 2022 - 2032
11 - 6	I	Promotion of sports tourism, in the Mar Menor context focused on aquatic sports.	Murcia Region	Tourism dynamization	Tourism	Undefined. Planned for the period 2022 - 2032
11 - 7	I	Plan for the dynamization of sport-tourism for La Manga del Mar Menor to offer activities for all seasons and reduce the seasonality of the sector.	La Manga del Mar Menor	Tourism dynamization	Tourism	Developing of the plan from 2022 to 2025
11 - 8	I	New strategies for promoting the Mar Menor tourism.	Mar Menor surroundings.	Tourism dynamization	Tourism	Undefined. Planned for the period 2022 - 2032
11 - 9	I	Promotion of nautical activities in the Mar Menor to place it as a global spot for sports events.	Mar Menor	Tourism dynamization	Tourism	Undefined. Planned for the period 2022 - 2032
11 - 10	I	Promotion of tourism related to the cultural values and agricultural traditions in the inner lands.	Murcia Region	Promotion of ecotourism	Tourism	Undefined. Planned for the period 2022 - 2032

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
12 - 1	D/P/I	Simplification of the administrative process to approve renewable energy projects and declaration of the projects as public interest due to urgency.	National	Promotion of Renewable energy	Renewable energy	From 2022
12 - 2	P	Prioritization of the environmental procedures of renewable energy projects in areas with low and medium environmental sensitivity (Campo the Cartagena is classified mainly as low).	Campo de Cartagena	Promotion of Renewable energy	Renewable energy	From 2022
13 - 1	P	Concession of 4M€ for the complete closing and restoration of the facilities for storing mining wastes of El Lirio.	Cartagena	Discharges and spills	Mining	From 1st December 2020 to 31st December 2023
14 - 1	P	Concession of 300.000 € to restore coastal areas of Cartagena affected by mud in the Mar Menor.	Cartagena	Environmental restoration	Public administration	From 30 December 2021
15 - 1	S/I	Creation of an endangered and singular species bank for its conservation and reintroduction in the ecosystems of the Mar Menor lagoon.	Mar Menor	Biota protection	Public administration	From 27 May 2021

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
16 - 1	S	Monitoring Plan for controlling and reporting the damage by cattle farms of the Annex V of Law 1/2018 and Law 3/2020.	General area of the law 3/2020	Monitoring	Livestock farming	From 17 March 2022
17 - 1	S	Monitoring Plan for controlling and reporting to public administration the damage caused by agricultural holdings of the Annex V of Law 1/2018 and Law 3/2020.	General area of the law 3/2020	Monitoring	Agriculture	From 2022 to 2024
18 - 1	P	Marina located in the Mar Menor lagoon should have a distinctive "sustainable port". This port should have: - System of management and treatment of wastewater - Ecopoints and solid wastes deposits - New boats should have an ECO certification - Boats with 2-stroke engines should not navigate in its waters - Anchoring is forbidden unless authorized	Mar Menor marinas	Sustainability	Port infrastructures	From 2020
19 - 1	S	Program of educational and formative actions for companies in the Mar Menor context. Actions will include: - Seminars and technical conferences - Experts panel and meeting point for interchange of experiences	Cartagena	Education	General public	One year from January 2022.

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Legal document number - BMP number	Response to DPSI-element	Intervention or BMP	Affected area	Topic	Target (stakeholders /sector)	Temporal frame (dd/mm/yyyy)
		- Diffusion of activities				
20 - 1	I	Creation of a Recovery Plan for the Nautic Sector in the Mar Menor lagoon and its surrounding areas.	Mar Menor lagoon and its surrounding area	Tourism dynamization	Sailing	The creation of the Plan should be done before 31st December 2022

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Analysis of the BMPs and Regulations

Once the analysis of the most relevant legal and administrative actions regarding the Mar Menor environmental issue has been carried out, basic statistical analysis of the data was carried out using descriptive statistical methods. This will be useful to map how efforts are distributed, which socio-economic sectors are most affected and which actions are most critical. This analysis is important to describe the "solutions space" i.e., to identify which sectors are most or least affected by the proposed solutions.

In the BMPs study, the interventions that have been considered are those that have the potential to affect environmental and socio-economic change through direct actions in the context of the Mar Menor lagoon. To simplify data analysis, each BMP was assigned to one topic (element to change) and one stakeholder group (the most affected sector or entity by the BMP). The relationship between stakeholder groups and BMPs can, ranging from directly modifying possible legal actions to directly or indirectly promoting specific practices that are considered conductive to positive change in the Mar Menor lagoon.

After the analysis, a **total number of 316 BMPs** with potential to transform the socio-economic and environmental dynamics of the Mar Menor area have been identified. These BMPs are extracted from **20 administrative actions** that are segregated as follows:

- 4 laws
- 2 Royal-Decrees
- 2 Decrees
- 1 Regulation
- 2 Orders
- 7 Planning documents
- 1 Project framework
- 1 Project

As seen in Table 5, the main instrument used by the government to rectify the current situation is the **Law 3/2020** (code 1). This law has the potential to affect environmental changes in the Mar Menor influence area. It can be understood as a restructuring of the agricultural practices in Campo de Cartagena and the catchment area of the Mar Menor lagoon. Nutrient inputs into the system

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from agricultural lands have been identified as a major driver for the degradation of the lagoon (Eugercios Silva et al., 2017). The phosphorus, nitrogen, and organic matter inputs in the lagoon when heavy rains take place in Campo de Cartagena have generated cases of severe eutrophication followed by anoxia, degrading the lagoon and causing high mortality among many life forms in the lagoon (Jimeno-Sáez et al., 2020). **Law 3/2020 set up 100 BMPs** of the 316 identified BMPs, which implies a third of them (32%), being by far the document that has made the biggest contribution to the list of BMPs.

The Comprehensive Management Plan of the Protected Areas of the Mar Menor and its Surroundings (code 7) is also relevant, with **50 BMPs** (16% of BMPs). This legal document is the framework for the management of all the protected areas related with the Mar Menor, and it defines restrictions and actions for its conservation. On the same level of relevance, the **Code of Good Practices**, developed in the **Annex V of the Law 1/2018** (Code 2), was a direct response to the Mar Menor crisis, as it defined a series of restrictions and new principles to agriculture. In total, there are **47 BMPs** derived from this law (15%).

Hydrological planning has also considered the environmental state of the Mar Menor. This has been considered, mainly by promoting the restoration of streamflow and reducing the levels of pollutants that reach the lagoon through the hydric network of the basin. The regulation of the current hydrological cycle constitutes **24 BMPs** (7,6%) while the Management Plan of flood risk contributes **18 BMPS** (5,7%).

The **framework of actions from the MITERD** is also relevant to the set of BMPs. It is expected that the execution of diverse projects that translated into BMPs adds **23 BMPs** (7%) to the list. This intervention is especially relevant, as it will change the physical state of the environment by the implementation of projects and field actions.

The analysis of BMPs highlights the **key importance of tourism in the region**. Mar Menor is a fundamental resource for promoting tourism and, traditionally, has been the main cluster of activity regarding that economic sector. The industry of recreation and hotels is closely intertwined with the lagoon and the administration has stimulated several changes to the sector to facilitate the Mar Menor's recovery, and to diversify tourism to be more sustainable. **Considering The Strategic Plan of Sustainable Tourism of Cartagena and the Strategic Plan of Tourism of the Murcia Region**, a total amount of **29 BMP**s have been identified, which means 10% of the total number.

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Table 5: Number of BMPs identified as relevant for the development in the Mar Menor Catchment per legal document studied. Source: own.

Legal document number	Name	Number of BMPS	%
1	Law 3/2020, 27th July	100	31,7
2	Annex V of Law 1/2018, 7th February	47	14,9
3	Law 13/2015	3	1,0
4	Regulatory provisions of hydrological planning	24	7,6
5	Management Plan of Mineral Resources	4	1,3
6	Update of the Management Plan of Flood Risk	18	5,7
7	Comprehensive Management Plan of the Protected Areas of Mar Menor	50	15,9
8	Plan for the Protection of the Coastal Rim of the Mar Menor	8	2,5
9	Priority Actions Framework for the recovery of the Mar Menor lagoon	23	7,3
10	Strategic Plan of Sustainable Tourism of Cartagena 2022-2025	19	6,0
11	Strategic Plan of Tourism of Murcia Region	10	3,2
12	Royal Decree 6/2022, 29th March	2	0,6
13	Royal Decree 1057/2020, 1st December	1	0,3
14	Decree 327/2021, 29th December	1	0,3
15	Bank of endangered or threatened species	1	0,3

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Legal document number	Name	Number of BMPS	%
16	Order 16th March 2022	1	0,3
17	Order 6th September 2021	1	0,3
18	Law 2/2020, 27th July	1	0,3
19	Resolution of the General Secretary of Water, Agriculture, Cattle, Fisheries and Environment for the collective agreement with the CEOC	1	0,3
20	Decree 292/2021	1	0,3
Total		**316**	**100**

Regarding the topics, the reduction and control of **nutrient inputs** from agriculture into the hydrological system of Mar Menor lagoon has received the greatest attention with **19.7% of BMP**s (24% considering also BMPs for reducing discharges and spills into the lagoon or the drainage network). These BMPs mainly are derived from the **Law 3/2020, The Code of Good Practices, and the Priority actions framework for the recovery of the lagoon**. The fact that almost all BMPs linked to the main cause of the degradation of the lagoon come from legislation that directly affects agriculture points out the strong relation of this economic sector with the environmental degradation of the lagoon and that it is also the focus of public administration to address the problem.

Another topic that has been in the spotlight of public administration's responses is the **environmental restoration** of the catchment area of the Mar Menor, **with 34 BMP**s (**10,8%**). The environmental restorations aim to directly improve the ecological states through directly acting on ecosystems. They are proposed for diverse ecosystem and land-use types (coastal line, streams and drainage network, abandoned agricultural areas, drainage systems of urban and peri urban areas, areas affected by mining, etc.).

Water and the management of the hydrological cycle are also an important cluster of BMPs. The pollutant inputs from catchment areas in the lagoon due to runoff, and the water inputs from filtering through the Campo de Cartagena groundwater body are probably a major transmission channel of nutrients, and pollutants of mining and agricultural origin to the Mar Menor. **Water**

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management, reduction of runoff and erosion and watering regulations represent **17.2% of** BMPs, with **28, 15 and 11 BMPs respectively**.

As mentioned previously, the ecological state of the lagoon affects tourism, as it reduces the interest of visitors in the region due to pollution and bad press. Local stakeholders from the tourism sector have reported in several media outlets that the number of foreign visitors has been decreasing since the beginning of the Mar Menor crisis. The catering industry is also affected by the crisis, as people to a lesser extent want to eat or buy products from the region, probably given a perception of lowered quality of the food due to environmental pollution. Public administration, using laws and plans as tools, have proposed **16 BMP**s (**5**%) with the aim of **reactivating tourism** in the coastal area of Mar Menor and **11 BMPs** (**3,5**%) **for developing** a more sustainable tourism and diversifying the offer with **ecotourism** activities.

Noteworthy is the **lack of BMPs that propose economic alternatives to the most affected socio-economic sectors** (except tourism). Most BMPs are based on changes and restrictions in the methods and approaches on how these sectors currently operate (especially for agriculture). However, with the implementation of these regulations, a large proportion of agricultural holdings and landowners may struggle to retain incomes over time. In some cases, the restrictions could render the agricultural sector unprofitable.

BMPs that offer alternative sources of income are mainly **related with** the approval of **grants and** the **promotion of renewable energies**). Together, these two topics r**epresent only 1,9%, (6) of the suggested BMP**s. This reveals that the strategy of the regional government may be aimed predominantly at reducing environmental pressures on the lagoon but does not consider the effects these interventions have on local stakeholder groups, especially on farmers. This strategy could imply several risks, including the opposition of the agricultural sector to the policies or conflict between stakeholders (i.e., ecologism vs. landowners).

Finally, these new restrictions and modifications of the practices that are legally binding need **monitoring of their compliance**. Moreover, the ecological status of the Mar Menor lagoon needs monitoring. Therefore, data gathering about the lagoon and the compliance control of measures represent **8% of BMPs (28)**.

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Table 6: Number of BMPs per each of the defined topics. Source: own.

Topic	Number of BMPs	%
Nutrient inputs	62	19,7
Environmental restoration	34	10,8
Water management	28	8,9
Monitoring	25	8,0
Land use and land management	23	7,3
Regulation of activities	17	5,4
Tourism dynamization	17	5,1
Runoff & erosion	15	4,8
Discharges and spills	13	4,1
Promotion of ecotourism	11	3,5
Watering	11	3,5
Education	11	3,2
Sustainability	10	3,2
Biota protection	9	2,9
Good practices	5	1,6
Grants	4	1,3
Policies and regulations	4	1,3

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Topic	Number of BMPs	%
Information access	3	1,0
Mobility	3	1,0
Port infrastructures restrictions	3	1,0
Seafloor protection	3	1,0
Promotion of Renewable energy	2	0,6
Public participation	2	0,6
Administrative procedures	1	0,3

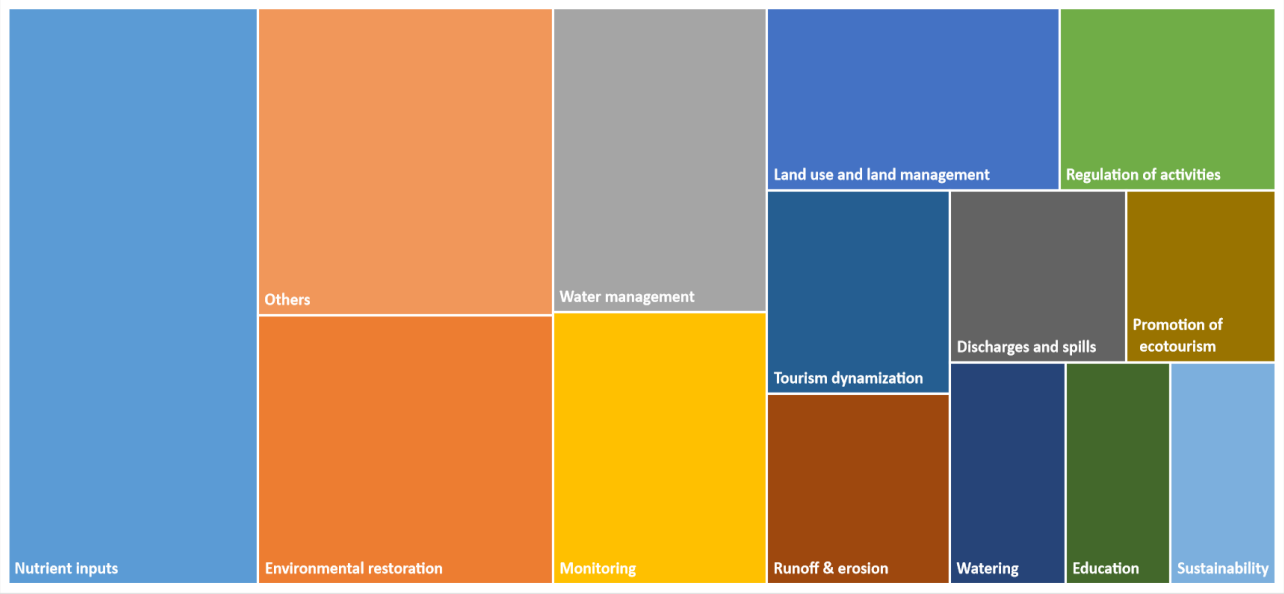

Figure 10: Proportion of the total number of BMPs that affect the topics. Less relevant topics have been grouped in the category "others". Source: own.

As demonstrated through previous analyses, the by far most affected sector by BMPs is agriculture. **Agriculture** is the focus of the interventions, **being affected by 110 BMPs**, which represents more than a third. It is also remarkable that since the beginning of the problem of the lagoon, two laws

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have been published, which mainly focused on the regulation of this sector and one specific order for monitoring the compliance of that regulation.

Public administration is also affected by BMPs, as some recurrent actions are the development of specific plans, the creation or reinforcement of departments in the administrative structure or changes in the administrative procedures. In total, **45 BMPs** affected different levels of public administration, which **represent 14,2% of the interactions**. It should be noted that a considerable part of these BMPs involve the development of regulations or planning that will affect other stakeholders. However, until these documents are completed, it is not possible to assess how other sectors will be affected.

After agriculture, **tourism** is the economic sector most affected by BMPs. In contrast with agriculture or other primary sectors such as livestock farming, BMPs do not only include restrictions or regulations. The BMPS also include interventions for a **reinforcement of the activity** - although with slight changes of current practices i.e., shift from beach-and-sun tourism to more diversified tourism including agroecological tourism. The BMPs, which address the tourism sector, also include mitigation interventions to partly compensate the negative economic effects caused by the Mar Menor crisis. **Tourism is affected by 39 BMPs (12%)**. This is quite relevant, as it manifests that the main strategy of the regional government for reducing the dependency of the Campo de Cartagena economy on intensive agriculture is the promotion of a more sustainable tourism based on the cultural and natural resources, in which traditional and ecological agriculture plays a key role for its development.

One of the main **alternatives** available **to landowners** and with potential to increase its **incomes** are **renewable energies, specifically photovoltaics**. However, despite rapid growth in the last years in the Region of Murcia, there is no specific plan to manage and to make use of this alternative source of income with the potential to reduce local income dependency on intensive agriculture. The absence of planning or strategic documents regarding renewable energies there is a danger of uncontrolled expansion of solar plants in vulnerable areas and conflict between stakeholders due to economic, social, and environmental impacts of solar plants. On the other hand, they offer increased electricity prices and the political focus on a larger independence of Europe from foreign energy sources and the opportunity that photovoltaics might offer a stable long-term income source. BMPs related with renewable energy currently mainly depend on national legislation and only affect the administrative procedure that new plants should pass before it's materialization, making the process more dynamic. In total, just **2 BMP**s affect the sector of renewable energy.

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Table 7: Number of BMP by affected stakeholder. Source: own.

Stakeholder	Number of BMPs	%
Agriculture	110	34,6
Public administration	45	14,2
Tourism	39	12,3
General	27	8,5
Urban planning	24	7,5
Livestock farming	17	5,3
Fishing	9	2,8
Mining	9	2,8
Port infrastructures	8	2,5
Sailing	7	2,2
Forestry	5	1,6
Infrastructures	3	0,9
Water treatment	3	0,9
Desalination plants	2	0,6
Water treatments	2	0,6
Hunting	2	0,6

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Stakeholder	Number of BMPs	%
Renewable energy	2	0,6
Aquaculture	1	0,3
Diving	1	0,3
Industry	1	0,3
Salt flats	1	0,3

6. Other policies

The previous chapter was the analysis of the instruments that public powers have used to give a response to the collapse of the lagoon and all the impacts that it has generated in the society and the environment. These documents are specific to the issue or have direct references to it. Also has been analyzed laws or regulations that could modify deeply some of the sectors related with the environmental status of the lagoon or the economy of the region, fostering changes on the behavior of the system.

However, there are more layers of policies that determine how the system works. These policies are not responses to the Mar Menor problem and will not modify the functioning of the system but establish conditions and base lines. Most of those documents are basic legislation, planning documents at Communitarian level or National level, old laws, or projects for the future planning of some strategic sectors. All that documents have been reviewed and the main relations with the socio economic and environmental systems of the Mar Menor Region have been identified and outlined in the following paragraphs.

Regulations and legally binding plans

Marine Strategy for the Levantino-Balear Demarcation

This document is the marine strategy applied in the levantino-balear marine demarcation, and covers the area where Spain has jurisdiction. The demarcation extends between the imaginary line with 128º of orientation from the meridian passing through Cabo de Gata to the limit of jurisdictional waters between Spain and France, in the Leon Gulf.

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The strategy is the main planning instrument intended to ensure the good environmental state of marine ecosystems in the demarcation. It establishes the general frame to which other policies and administrative actions fit. The strategy includes the environmental evaluation of the water seas, the definition of the good environmental state (GES), the definition of the environmental objectives, a monitoring program, and actions to reach those objectives.

With the entry into force of the Royal-Decree 1365/2018, of 2nd November on the approval of marine strategies, the first cycle of the plan has been completed. Since 2018, the marine strategy is in its second cycle (2018 - 2024). The evaluation of the good ecological state has been completed at the end of the first cycle updating some indicators and re-assessing the ecological status of the marine waters within the strategy. According to the results of the assessment, new problems have been found, and strategies to address them have been proposed.

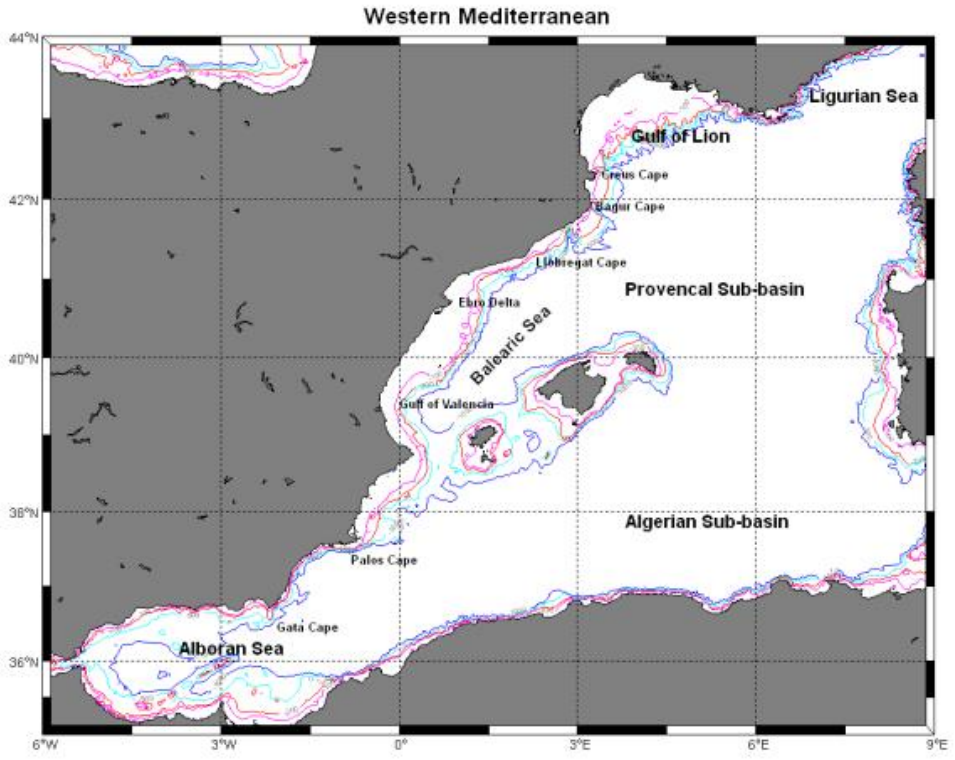

Figure 11: Western Mediterranean Sea and the levantino-balear demarcation. Source: MTERD

The assessment has been exposed only to those indicators that have been reformulated or those whose evaluation has changed compared with the first cycle. The following conclusions regarding the Mar Menor lagoon can be extracted from the evaluation of the ecological status of the demarcation in the 2nd cycle planification:

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Pressures indicators:

- Alien species (D2): The Mar Menor lagoon is not in GES.
- Exploitation of marine species (D3): The Mar Menor lagoon is not in GES
- Eutrophication (D5): The Mar Menor lagoon is not in GES
- Hydrographic conditions (D7): The Mar Menor lagoon is not in GES
- Pollutants in fish and other products for human consumption (D9): not sufficient data available to assess the environmental status.
- Marine waters (D10): The Mar Menor lagoon is not in GES
- Noise (D11): It is not possible to assess the pressure appears temporarily.

State indicators:

- Biodiversity (D1): There is no direct reference to the Mar Menor lagoon, but the Mediterranean coastal waters have not reached the GES.
- Trophic chains (D4): There is not enough information.
- Seafloors (D6): The update has not been possible due to insufficient data.

In general terms, the evaluation of the GES for the whole demarcation and especially those which make direct reference to the Mar Menor lagoon led to the conclusion that the Mar Menor does not meet the criteria defined for being in good ecological status.

Finally, the 2nd cycle of the strategy proposes new objectives for the water bodies, also the monitoring programs have been updated and adapted to the new objectives. It is important to underline that there are no specific strategies or objectives regarding the Mar Menor lagoon, as it is included in the managed unit of coastal waters.

Regulation of the Tagus-Segura Transfer

The Tagus-Segura Transfer is one of the human actions that has contributed the most to the changes of the hydrological cycle of the Mar Menor catchment. Water inputs from outside the system have drastically changed the socio-economic dynamics as well as the ecological states of ecosystems in the catchment

The inputs of water from outside the hydrological system has modify the dynamics of the aquifers and the whole system in general. This water input has allowed the development of an intensive and irrigated agriculture in landscapes where rainfed crops, sustained by the local water resources of

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the system, were the traditional agricultural model. Irrigation and application of high amounts of fertilizer have increased the piezometric level of the groundwater, the percolation of nutrients and other agrochemicals to aquifers and led to a constant inflow of polluted and nutrient rich water to the Mar Menor lagoon. They were the preconditions for the current deteriorated environmental state of the Mar Menor and its ecosystems.

Considering the importance of the transfer, it is useful to have a general overview of the regulatory bases to manage that infrastructure. The basic legislation is:

- Royal-Decree 773/2014, of 12th September, on approval of several regulatory norms of the transfer by the Tagus-Segura aqueduct.
- Fifth additional provision of the Law 21/2015, of 20th July, on modification of the Law 43/2003, of 21st November, on Forests.

According to the Royal-Decree 773/2014, the maximum volume of water to transfer from the Tagus River to the Segura Basin was fixed as 650 hm^3 for each hydrological year. Lately, the Law 21/2015 coming into force, the maximum amount of water was reduced to 600 hm^3. In practical terms, water

Order 23rd December 2019, from the Office of Water, Agriculture, Cattle farming, Fishing and Environment, on designation of new vulnerable areas to nitrate pollution due to agricultural activity in CARM, extension of the existing ones and designation of the Mar Menor water body as affected or in risk, by nitrate pollution.

Pollution due to diffuse nitrate inputs in the superficial and ground water bodies is a crucial matter in the European Union. That's why the EU approved the Directive 91/676/CEE of the Council, related to the protection of waters against nitrate pollution.

The transposition into the Spanish legislation of the directive 91/676/CEE was the Royal Decree 261/1996, 16th February, on protection of waters against pollution produced by nitrates from agriculture. This law defines that if a water body is located completely within the boundary of an Autonomous Community it is the competence of the regional government to identify if these water bodies are vulnerable to nitrate pollution and to develop action plans to reduce these pressures on water bodies. It is in that context that the government of CARM developed the Order 23rd December 2019. The implications of that law are in the context of the Mar Menor lagoon are:

- The Mar Menor water body has been added to the list of water bodies being affected or being at risk of being affected by nitrates.

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- An increase in the surface of land classified as affected by nitrates in Campo the Cartagena Region.

Under this new consideration, a new framework of legal actions has been activated. The main response is the application of the Code of Good Agricultural Practices (Annex V of Law 1/2018) in the areas designated as vulnerable. Also, some responses are included in the Law 3/2020. This legal order does not imply direct regulations but promotes new regulations to come into force in the territory.

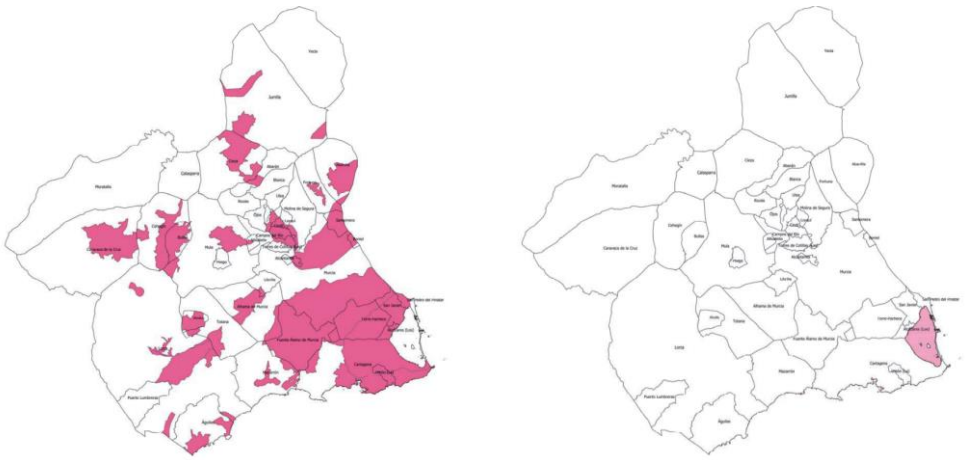

Figure 12: Left: vulnerable areas affected by nitrates in CARM. right: Mar Menor lagoon classified as a water body at risk. source: Annex II of the Order 23rd December 2019.

Decree 91/1984, 2nd August, from the Consejería de Agricultura, Ganadería y Pesca, on the approval of the Mar Menor fishing Regulation.

The main regulation on Fisheries in the Mar Menor lagoon is the Decree 91/1984. This regulation has defined the legal framework of the sector in the lagoon in the last decades, but the regulations need to be updated and adapted to the new ecological and socio-economic challenges that have been growing during the last years. The legislation is quite general and does not cover aspects such as maximum extractions or a clear zoning. CARM has expressed its desire to reformulate and update the fishing regulation in the lagoon, but, until the approval of the Management Plan of Mar Menor lagoon, the Decree 91/1984 remains the main regulation of the activity.

It is noteworthy that the use of trawl fishing and rims with artificial light is prohibited. Moreover, the periodicity of the activity depending on the targeted species is established to assure the maintenance of the biological cycles of the fauna. In total, 15 species can be extracted in the CARM's waters for commercial purposes: 12 fish species (including eel), 1 species of mollusks and 2 species of shellfish.

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Decree n. º 72/2016, 20th July, on the regulation of recreational fisheries in the inner waters of the Autonomous Community of Murcia Region.

The objective of the Decree 72/2016 is the regulation of marine recreational fishing in the inner waters of the CARM. The concept of recreational fishing is defined as the extractive activity that is done for self-consumption, due to interest in the activity and free of commercial purposes.

According to the Decree, the recreational fishing in inner waters can be done in two modalities:

- Surface recreational fishing: can be done from earth or from boat.
- Submarine fishing: swimming or diving, always free of oxygen tanks.

Authorized species that can be caught are those defined in the Annex I of the Royal-Decree 347/2011 and the minimum sizes for each species are also specified. The extraction limit is 5 kg per person and day.

Regarding the Mar Menor lagoon, the following aspects of the Decree are also of special interest:

- The sale of the catch is forbidden.
- It is compulsory to dispose of the proper license for each kind of recreational fishing modality.
- In general, it is forbidden to extract mollusks, crustaceans, and marine invertebrates, with exception of those included in the Annex I of the Royal-Decree 347/2011, of 11th March.
- The capture of non-authorized, protected or excluded species is forbidden.
- It is forbidden to fish in the Estacio Channel.

Law 12/2013, 20th December, on Tourism of Murcia Region

This law attempts to improve the legislative framework regarding economic activity, specifically for the tourism sector. The law looks for an update of the legislation to current market needs and the fast evolution and growth that tourism is experiencing in the Mediterranean.

One of the main aspects of that law with potential to influence the socio-economic environment of the Mar Menor lagoon is its willingness to reduce the dependence of the tourist sector of Murcia on the summer seasonality and the “beach and sun model”. This question has been repeated several

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times in this deliverable, due to CARM putting great efforts into diversifying the touristic offer of Murcia. This is also reflected in the BMPs analysis and in the different related legal documents.

To reduce that dependence and diversify the sector, the law foresees a legal framework to promote projects with capacity to promote tourism by considering it as projects of public interest.

Another relevant aspect of the law is that the tourism office of CARM is pointed out as the entity in charge of the promotion of ecotourism in the region. Also, the law adds the necessity to analyze and consider how tourism resources could be affected by land management and urban planning. This legal consideration has the purpose of not compromising a sector that is strategic to the economy or Murcia such as tourism by the development of other services and sectors.

Finally, even though the law was developed before the ecological crisis of the Mar Menor lagoon, the environmental dimension has already been included. This consideration appears as the necessity of public actions to reinforce ecotourism and the support of the sector to update and improve its efficiency and sustainability.

Local regulations

According to the competences in the different levels of public administrations, land management and zoning depend on local governments. These competences could completely define the territorial model at local scale and establish restrictions to certain activities and define areas for protection or conservation.

The legislation that could affect the Mar Menor lagoon has been studied for the following municipalities:

- Cartagena
- Los Alcazares
- Torre Pacheco
- San Javier
- San Pedro del Pinatar

The orders and local legislation of these towns have been analyzed to identify elements that could affect the environment of the Mar Menor lagoon. Despite all city councils having some regulation that affect the coast, none of them is focused on the environmental aspect nor restrictions to economic sectors that could be translated in an improvement of the lagoon. Mainly, regulations are proposed is to guarantee and harmonize the public use of the coastal public domain. The norms refer to the installation of sport areas, the timetable of activities and restrictions related with the presence of users in the beaches.

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European Green Deal

Biodiversity Strategy for 2030

The Biodiversity Strategy for 2030 is presented by the EU as a Strategy to put Europe's biodiversity on the path to recovery by 2030 for the benefit of people, climate, and the planet. For achieving that ambitious objective, the Strategy proposes the following actions:

- Establishing a larger EU-wide network of protected areas on land and at sea. This will be done by increasing the Natura 2000 network area and establishing strict protection for areas with very high biodiversity.
- Launching an *EU nature restoration plan* to restore degraded ecosystems and manage them sustainably.
- Introducing measures to enable the necessary transformative change by unlocking funding for biodiversity and setting new governance frameworks.
- Introducing measures to tackle the global biodiversity challenge under the framework of the Convention on Biological Diversity.

In the EU NATURE RESTORATION PLAN, there are several elements that could have a positive impact on the Mar Menor ecosystems. Target 4 aims to restore 30% of habitats not in favorable conservation status. Also, target 6 aims to reduce by 50% the overall use of chemicals and pesticides, which would bring improvements in the water quality of the Mar Menor lagoon and a reduction of its outer pressures. Target 8 to achieve 25% of agricultural land under ecological management in the EU. Incentivization of ecological holdings is especially relevant in Campo de Cartagena not only through reducing pollution of the water system, but also because it is an alternative to agricultural and cattle producers in the Region of Murcia to balance the costs of restrictions with the price increase of ecological products. Also, an increase of exports could be achieved with ecological products.

Inside the Biodiversity Strategy there is also a specific bundle of actions as part of the restoration actions that are specific for the marine ecosystems. The Mar Menor lagoon, as one of the most unique and relevant marine areas in the whole EU, could take profit from this package, with huge investments intended to improve its ecological state. Economic packages count with 20 billion €/year to invest in biodiversity, this is a promising opportunity to resolve the crisis of the Mar Menor if regional and national governments can materialize it. However, an excessive delay in the application and development of the investments could signify that the lagoon reaches a non-return point, with no options for a real recovery of its ecosystems.

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In contrast, some negative effects are expected in the productive systems of the primary sectors with agriculture likely being the most affected. There is also a risk of incompatibility with other strategies and with national policies of member states that could indicate delays and conflicts in the application of the EU Biodiversity Strategy for 2030 (Hermoso et al., 2022) and those could reduce the effectiveness of the strategy.

The farm to fork strategy (F2F)

The strategy aims to impact the production model of food in the EU. Currently, the food production sector represents a third of the total GHG emissions, consumes large amounts of resources, is one of the main causes of biodiversity and pollinator loss and is an unfair system due to the inequality of wealth distribution in the agricultural sector.

The requirements that the food productive system should have in the EU according to the F2F are:

- To have a neutral or positive environmental impact.
- To help mitigating climate change and adapt to its impacts.
- To reverse the loss of biodiversity.
- To ensure food security, nutrition, and public health, making sure that everyone has access to sufficient, safe, nutritious, sustainable food.
- To preserve affordability of food while generating fairer economic returns, fostering competitiveness of the EU supply sector, and promoting fair trade.

The legislative actions are planned to be adopted in 2023 but have not been published yet. Despite the existing uncertainty about the impacts for local agriculture in the Mar Menor basin, the application of that strategy will remodel the current image of agricultural holdings. Changes in communitarian frameworks will need the redefinition of national and regional legislation and this will be physically adopted by the agricultural sector of Murcia.

According to the Inception Impact Assessment of the Proposal for a Regulation in the framework of the Farm to Fork Strategy (European Commission, 2020), the expected impacts that could affect agriculture of Campo the Cartagena are:

- The implementation of new regulations regarding the productive system could affect the binomial cost/prices in the short term. However, in the Mar Menor context, there have already been severe restrictions and modifications due to Law 3/2020. In this sense, it may be that there will be no additional costs created through F2F.

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- In the long term it is expected that several incentives and programs will support the most sustainable productive models. Also, changes in consumer preferences will increase the consumption of sustainable products, making it more profitable than other systems. This is especially relevant in the Mar Menor context because bad press of local agriculture in the international markets could affect the future exports of Campo de Cartagena products, but if more sustainable principles are applied in the production chain, this negative effect could be avoided.

- The transcription of Farm to Fork Strategy into legally binding documents will also have a clear impact on the environment in all of Europe and locally in the Mar Menor area. Reducing the use of fertilizers and pesticides will bring biodiversity back to the intensive agricultural holdings in the area, improving connectivity between ecosystems. Another expected impact is the improvement of water quality in the lagoon due to reduction of nutrient inputs and chemicals. It is true that nowadays quite constraining legislation regarding nutrient use has been established in Law 3/2020, but this only affects a restricted area of Murcia Region. With the coming into force of general legal constraints to agriculture, not only an improvement of water quality and soil will be acquired in Mar Menor, but also in the whole region, and this will influence ground water quality and the stream network that also will have some positive impacts on the lagoon.

- Finally, as some authors pointed out, a reduction of agricultural production will take place after the application of the strategy, and this will lead to an increase of imports and a reduction of exports (Bremmer et al., 2021). There are also risks regarding the appropriate implementation of the measures. One of the main proposals to improve the sustainability of agriculture is the extension of organic farming, but if not done appropriately, it could have negative impacts on the Mar Menor lagoon, because organic farming can in some cases be as intensive as conventional farming, with little benefits for biodiversity if not done correctly (Rinaldi, 2021).

Nutrients - Action Plan for Better Management (EU Commission)

In the context of the European Green Deal, the European Commission will develop an integrated nutrient management action plan to help reduce nutrient losses by at least 50%, while ensuring there is no deterioration in soil fertility.

Human activities have altered cycles of nutrients in soil, especially those of nitrogen and phosphorus. The commission explained in the problem definition of the action plan that surplus nitrogen and phosphorus levels in the environment are exceeding safe planetary boundaries (N by a factor of 3.3 and P by a factor of 2), which represents a severe threat to nature and climate.

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When analyzing the origin of those elements, two thirds come from fertilizers used in agriculture and a third comes from industrial and domestic wastewaters. This situation, defined by the EU commission, is exactly what happens in the Mar Menor area. In the context of the lagoon, fertilizers and diffuse discharges from cattle farming and urban areas have drastically increased the levels of nutrients in water and soil, polluting groundwater, water streams and the whole lagoon. It could be said that the Mar Menor is a warning of what could happen in other European ecosystems if the inputs of nitrogen and phosphorus exceeds the ecosystems carrying capacity.

The Nutrients - Actions Management Plan is currently under development, but the aims of the plan have already been defined. The specific effects of the action cannot be anticipated as there is not enough information about measures. But the Plan points out the objective of reducing the use of fertilizers by at least 20%. The action plan will also contribute actively to reduce emissions and to create tools for appropriate application of environmental legislation. The application of restrictions and a new paradigm at European level regarding fertilizers could be a critical point in the Mar Menor environment and for the agricultural holdings of the region. It is true that national and regional governments have taken actions against the use of fertilizers in the Mar Menor catchment area, but with the existence of a common frame, not only the land and water pollution in the surroundings of the Mar Menor will be reduced, but also in the whole Region of Murcia, what will surely improve the environment in the catchment area of the lagoon and will reduce the pressures on groundwater and on the water stream networks.

Local actions

Project to remove marine litter

Since 1996, CARM in collaboration with the city councils of Águilas, Mazarrón, Cartagena, San Pedro del Pinatar and the Murcian Federation of Fishing Fraternities, has been developing a project to remove marine litter from the coastal waters of the region.

Periodically, CARM offers grants to bottom fishers who collect, classify, and deliver the litter found in their fishing nets. This project illustrates an example of a participatory policy to engage specific sectors in the management, maintenance, and restoration of marine resources. In 2020, Murcia fishers removed from the marine waters a total amount of 7.500 kg of marine litter, with the participation of more than a hundred fishers and 23 boats. At national level, in similar initiatives the total amount of wastes for the same year was 180 tons.

Legal entity for the Mar Menor lagoon

As reaction against the degradation of the lagoon, a Popular Legislative Initiative (ILP by its initials in Spanish) was presented in the Plenary session of the Congress with the aim to approve a specific law to recognize the lagoon as a legal entity with rights to exist, being recovered and to persist in time.

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The process began with the collection of more than 600,000 signatures and subsequently, was presented in the Congress April 5th (2022). The proposition was accepted with a wide majority. This situation sets up a new paradigm in conservation in Spain and in the whole European Union, as is the first case of a natural space acquiring legal entity. With this, each action that weakens the rights of the lagoon will generate penal responsibility and will be punished and treated in the law courts. Also, the administration and governance of the Mar Menor lagoon will be shared by three figures: legal representation formed by a member of the regional environmental administration and a representative of the local citizens; a monitoring commission and a scientific commission.

Finally, and maybe the most relevant aspect of the fact that the Mar Menor lagoon acquires legal entity is that as it is said in the 6th article of the law proposition, "*Every physic or juridic person is legitimated to defense the ecosystem of the Mar Menor and can use the rights and prohibitions of this law presenting legal actions in the competent court.*"
As the law proposition says in its.

It is obvious that this situation will have a great impact on the conservation of this marine space and will have a clear impact in the future of the ecological and socio-economic state of the lagoon and its area of influence.

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7. Conclusion

The current state of the Mar Menor lagoon cannot be explained in a simplistic way, just analyzing isolated facts. This is because the lagoon is immersed in a complex environment that has dynamically changed during the last decades. The confluence of different interests makes harder to implement strong responses with effective impacts to revert the degradation of the lagoon, and currently, in 2022, the degradation of the lagoon keeps its evolution with periodic cases of eutrophication and massive fish mortalities.

It is remarkable the dependance of the ecological state of the lagoon with the agricultural economic sector, as its modernization and the implementation of agricultural models based on watering and fertilization has modified the quality and dynamics of the hydrological cycle. In the opposite direction, the incomes of tourism strongly depend on the landscape and a good ecological status of the waters of the lagoon, where the economic impacts of the ecological collapse of the lagoon have been already noticed by tourism sector.

After the analysis of responses given by administration in all its levels (BMPs), almost all the sectors are affected in some way, directly or indirectly. But the BMPs are mainly focused on agriculture and tourism. The first one is affected by restrictions while responses affecting tourism try to reformulate the sector to make it less dependent on the Mar Menor and less seasonal, promoting ecotourism.

Identification of BMPs will be necessary for the later phases of SMARTLAGOON, where several socio-environmental scenarios will be modelled with different stakeholders' groups. BMPs will allow to stablish different levels of accomplishment of the responses and could help to identify the future impacts that human activities will have on the lagoon and how the ecological status of the lagoon will affect key sectors in the future.

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8. Bibliography

ANTOLINOS, J.A. & SOLER, B. (2007). Los orígenes de la arqueominería en la Región de Murcia (I): Los hallazgos en la Sierra Minera de Cartagena-La Unión. *Mastia* (6); 125 - 144.

BALLESTEROS, G. & FERNÁNDEZ, J. F. (2013). La explotación industrial de las Salinas de San Pedro del Pinatar (Murcia). *Papeles de Geografía*, 57 - 58; pp. 55-68

BELMONTE, F., ROMERO, A. & MORENO, J. (2010). Contaminación ambiental por estériles mineros en un espacio turístico en desarrollo, La Sierra Minera de Cartagena-La Unión (sureste de España). *Cuadernos de Turismo* (25); 11 - 24.

BOSCH, D. I. C., MARTÍNEZ, D. C. V., & DURÁN, D. J. M. R. (2010). La relación del consumidor con las etiquetas sociales y medioambientales. Estudio diagnóstico para orientar la definición de políticas públicas y la acción empresarial.

BRADLEY P. & YEE, S. (2015). Using the DPSIR Framework to Develop a Conceptual Model: Technical Support Document. US Environmental Protection Agency, Office of Research and Development, Atlantic Ecology Division, Narragansett, RI. EPA/600/R-15/154.

BREMMER, J., MARTINEZ, A. G., JONGENEEL, R. A., HUITING, H. F., & STOKKERS, R. (2021). Impact Assessment Study on EC 2030 Green Deal Targets for Sustainable Food Production: Effects of Farm to Fork and Biodiversity Strategy 2030 at farm, national and EU level. Wageningen Economic Research.

CABALLERO PEDRAZA, A., ROMERO DÍAZ, A., & ESPINOSA SOTO, I. (2015). Cambios paisajísticos y efectos medioambientales debidos a la agricultura intensiva en la Comarca de Campo de Cartagena-Mar Menor (Murcia). *Estudios Geográficos*, *76*(279), 473–498.

CALATRAVA, J., & MARTÍNEZ-GRANADOS, D. (2019). La productividad económica en los sistemas agrarios intensivos del Mediterráneo. *El regadío en el Mediterráneo Español. Serie Monografías nº*, *38*.

DASÍ, J. F., CANTOS, J. O., AMORÓS, A. M. R., NAVARRO, C. R., DEL ROMERO RENAU, L., MARÍN, C. E., & REBOLLO, J. F. V. (2005). Planes estratégicos territoriales de carácter supramunicipal. *Boletín de la Asociación de Geógrafos Españoles*.

DOLBETH, M., STÅLNACKE, P., ALVES, F. *ET AL.* (2016). An integrated Pan-European perspective on coastal Lagoons management through a mosaic-DPSIR approach. *Sci Rep* 6, 19400 (2016).

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101017861.

EEA Technical report No 25/1999. Available at: https://www.eea.europa.eu/publications/TEC25

EUGERCIOS SILVA, A.R., ÁLVAREZ-COBELAS, M., MONTERO GONZÁLEZ, E. (2017). Impactos del nitrógeno agrícola en los ecosistemas acuáticos. *Ecosistemas* 26(1): 37-44.

GARCÍA-AYLLÓN, S. (2018) GIS Assessment of Mass Tourism Anthropization in Sensitive Coastal Environments: Application to a Case Study in the Mar Menor Area. *Sustainability*, 10, 1344.

HERMOSO, V., CARVALHO, S. B., GIAKOUMI, S., GOLDSBOROUGH, D., KATSANEVAKIS, S., LEONTIOU, S., & YATES, K. L. (2022). The EU Biodiversity Strategy for 2030: Opportunities and challenges on the path towards biodiversity recovery. *Environmental Science & Policy*, *127*, 263-271.

MARTÍNEZ-CARRASCO PLEITE, F., & MARTÍNEZ PAZ, J. M. (2012). El clúster agroalimentario de la región de Murcia. *Cuadernos de Estudios Agroalimentarios (CEA)*, (2), 175-198.

MESEGUER, E. G. (2006). Los paisajes agrarios de la Región de Murcia. *Papeles de Geografía*, (43), 19-30.

REPETTO, F. Y FERNÁNDEZ, J.P. (2012). Coordinación de políticas, programas y proyectos sociales. Buenos Aires: CIPPEC y UNICEF.

RINALDI, A. (2021). Biodiversity 2030: a road paved with good intentions: The new EU Commission's biodiversity Strategy risks to remain an empty husk without proper implementation. *EMBO reports*, *22*(6).

TORRES, F., & GADEA, M.E. (2012). Agricultura intensiva de exportación, inmigración y transformación rural. El caso del Campo de Cartagena, 1990-2010 (Murcia).

UNEP/Grida - https://www.grida.no/resources/5810

UCAM & SANTANDER BANK (2016). Aproximación al dimensionamiento del sistema agroalimentario de la Región de Murcia. *Cátedra UCAM-Santander*.

EUROPEAN COMMISSION (2020). Inception Impact Assessment on Proposal for a revision of Regulation (EU) No 1169/2011 on the provision of food information to consumers. REf. Ares (2020)7905364.

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SMARTLAGOON

End of Deliverable 4.2

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