Interreg Atlantic Area
European Regional Development Fund

EUROPEAN UNION

access 2 sea

"NEW OPPORTUNITIES FOR MORE COMPETITIVE AND SUSTAINABLE BLUE GROWTH IN ATLANTIC AREA"

Work package #4

Space planning to foster aquaculture activities

AQUACULTURE SPACE PLANNING BEST PRACTICES AND ASSSESSMENTOF THEIR TRANSFERABILITY

www.access2sea.eu

CEEI Bahía de Cádiz — Centro Europeo de Empresas e Innovación

WestBIC

ciimar — Centro Interdisciplinar de Investigação Marinha e Ambiental

Technopole Quimper-Cornouaille

INVESTIR EN FINISTÈRE

ctaqua — CENTRO TECNOLÓGICO DE LA ACUICULTURA

UAlg — UNIVERSIDADE DO ALGARVE

Údarás na Gaeltachta

CSAR 100 1920-2020 Swansea University Prifysgol Abertawe

TABLE OF CONTENT

1 "ACCESS2SEA" PROJECT: NEW OPPORTUNITIES FOR MORE COMPETITIVE AND SUSTAINABLE BLUE GROWTH IN THE ATLANTIC AREA

1.1. REFERENCE TO INTERREG ATLANTIC AREA PROGRAMME, ERDF

Programme priority

Stimulating innovation and competitiveness

Programme specific objective

Strengthening the transfer of innovation results to facilitate the emergence of new products, services, and processes

Fields of intervention

- Technology transfer and university-enterprise cooperation primarily benefiting SMEs
- Generic productive investment in small and medium –sized enterprises ('SMEs')
- SME business development, support to entrepreneurship and incubation (including support to spin offs and spin outs)
- Support to social enterprises (SMEs)

1.2. PROJECT PARTNERSHIP

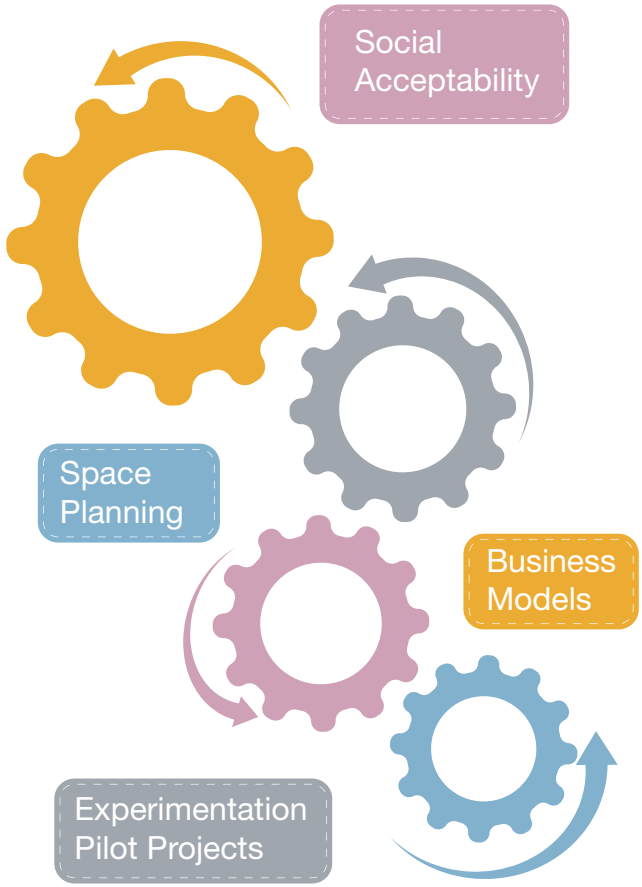
Nº	ENTITY	POSITION	COUNTRY	REGION
1	FUNDACIÓN BAHÍA DE CÁDIZ PARA EL DESARROLLO ECONÓMICO	Lead partner	Spain	Andalucia (Huelva, Cádiz and Sevilla)
2	INNOVATION & MANAGEMENT CENTRE CLG T/A WESTBIC	Partner	Ireland	Border, Midland and Western
3	ÚDARÁS NA GAELTACHTA	Partner	Ireland	Border, Midland and Western
4	FUNDACIÓN CENTRO TECNOLÓGICO ACUICULTURA DE ANDALUCÍA	Partner	Spain	Andalucia (Huelva, Cádiz and Sevilla)
5	INVESTIR EN FINISTÈRE	Partner	France	Bretagne
6	UNIVERSIDADE DO ALGARVE	Partner	Portugal	Algarve
7	TECNOPOLE QUIMPER-CORNOUAILLE	Partner	France	Bretagne
8	SWANSEA UNIVERSITY	Partner	United Kingdom	West Wales and The Valleys
9	CENTRO INTERDISCIPLINAR DE INVESTIGAÇÃO MARINHA E AMBIENTAL DA UNIVERSIDADE DO PORTO	Partner	Portugal	Norte
10	TECHNOPÔLE BREST IROISE	Associated partner	France	Bretagne
11	CUIDEACHTA FEAMAINN TURTAR GORM TEO (TSC-BLEU TURTLE)	Associated partner	France	Bretagne
12	ASOCIACIÓN DE EMPRESAS DE ACUICULTURA MARINA DE ANDALUCÍA (ASEMA)	Associated partner	Spain	Andalusia
13	CHAMBRE SYNDICALE DES ALGUES ET DES VÉGÉTAUX MARINS (CSAVM)	Associated partner	Ireland	Border, Midland and Western

1.3. PROJECT OBJECTIVES

Aquaculture could boost economic development and jobs creation regarding seafood by enhancing the exploitation and preservation of the AA natural assets. Creating new sustainable farms is a key element for the blue economy in the region. However, it is often constrained by complex regulations and low social acceptability. Access2Sea improves the attractiveness of the Atlantic shore for aquaculture.

Marine aquaculture (fish, shellfish, algaculture) is a leading sector of the Atlantic Area Blue Economy that counts on an important tradition in many EU countries and that is relevant in many of its coasts as only 10% of Atlantic shore seafood is aquaculture-sourced there is great opportunity for raising AA aquaculture production in a sustainable way which is the main goal of Access2Sea.

In this context, its objective is to enhance the exploitation and preservation of the AA's natural assets:



By unlocking the existing barriers (legal/ regulatory, technological, existence of suitable areas in costal zones, social acceptance) to provide the industry with technical solutions to give aquaculture businesses access to shore

By enabling onshore production.

By disseminating existing and new solutions and providing support to the aquaculture SMEs, to attract them to the Atlantic Area.

This way it is expected to enable SMEs to assess spatial opportunities to settle in the Atlantic shore new aquaculture business, supporting them in exploiting the natural assets in a sustainable way as well as in improving its performance through the improvement of their business model and be better accepted by local communities It is also expected that Access2Sea improves the co-operation between stakeholders, business support organisations, research institutes, national and regional administrations and local councils facilitating the innovation and knowledge transfer in Aquaculture sector

As an outcome of the work done by the partners and stakeholders under Access2sea, it is expected that:

- SMES will be able to access spatial planning information and tools to identify suitable locations for their business.
- SMES will get guidance on exploiting natural assets in a sustainable way with an appropriate business model.
- The cooperation approach between business, research and other stakeholders will lead to greater social acceptability of Aquaculture enterprises in communities.

2 INTRODUCTION

The Atlantic coast is one of the largest seafronts in Europe. In a context of a globalized economy and increased competition between territories, the Atlantic Area must be able to capitalize and highlight its differentiating assets to develop. **The sea, a natural resource that cannot be relocated, is a differentiating and considerable asset for the AA.**

The maritime economy is a strategic area of interest to EU members and blue growth is a key priority objective at regional and national lev el. Aquaculture is one of the sectors supported by these different policies. Aquaculture is a major food production subsector receiving considerable support to fill the growing seafood supply gap. **However, in the EU and around the globe, the availability of areas suitable for aquaculture is becoming a major problem for the development and expansion of the sector.**

A production activity needs a physical space to produce, this seems to be obvious but in the case of aquaculture, this space is of necessity linked to the sea: aquacultures (shellfish farming, seaweed cultivation,) occupy **areas on land and at sea which require immediate proximity to the sea.** However, the sea and the coast are the object of many uses and are subject to significant pressures: urbanization, artificialization of soils, maritime and land pollution. Aquacultures are found in competition over space with all coastal activities. The maintenance of shellfish farming and its development face strong competition from real estate pressure, yachting, tourism, and other maritime activities.

> *It is therefore essential to perpetuate existing activities and equip oneself with the means to welcome and promote new activities (aquaculture, algoculture, etc.).*

Spatial planning is a means of having clear information on the land and real estate offer on land as well as on concessions and sea zoning, existing or potential, to be able to meet current and future expectations of companies. This also makes it possible to establish an intervention strategy to prioritize the resources of public and / or private operators in these areas.

If we want to develop aquaculture, we must be able to plan the available and potential spaces.

Faced with this challenge, in the Framework of the Access2sea Project, the partners involved and other stakeholders from the five countries involved, have been working on the identification of the best and most relevant Marine Spatial Planning (MSP) methodologies and tools, which can facilitate the maintenance and development of aquaculture activities in the European Atlantic Coastal Area. The aim of this work is to build and validate a common methodology that could deal with the Aquaculture Spatial Planning challenge.

Access2sea partners have shared their knowledge, methodologies, and experience in relation to the existing MSP tools available, making diagnosis of the starting situation, identifying the most relevant practices that can permit to maintain and develop aquaculture activities, propose spatial planning tools to improve the access to the sea for aquaculture producers and the possibility of transferring them to other Atlantic Area regions.

Fig. 1 Timeline wp4 dealing with the spatial aquaculture challenge

As a reminder, the development of aquaculture is also strongly dependent on the acceptability of projects by permanent and seasonal residents and of course the water quality and therefore certain activities near the shoreline (town planning, agriculture, industries, etc.).

It is therefore crucial to consolidate these activities to work on societal acceptability, concerted use management, and economic models. These issues are also worked on and shared within the framework of the Access2Sea project.

The activities developed and deliverables available after the work carried out by Access2sea partners concerning Marine Spatial Planning, led by *Investir en Finistère* (France) have been:

ACTIVITY	DELIVERABLE
Transfer of Knowledge of the existing MSP Tool developed by Investir en Finistère (Britanny – France)	Conclusions report and supporting documents: • *Knowledge transfer transnational Workshop. Conclusions Report.* • *Annex 1: Methodology implemented by "Investir en Finistère", Brest (France)* • *Annex 2: Methodology implemented by "Investir en Finistère", Brest (France). Part 2.* • *Annex 3. Authorization Process Onshore and Offshore. Finistère (France)* • *Annex 4. Space Planning in Andalucia (Spain)* • *Annex 5. Space Planning in Portugal* • *Annex 6. Space Planning in Wales (UK)*
Collection of Data and information about MSP in each territory involved, to produce a state of the art and comparison report about the reality in the territories involved.	Report: Comparison of the Spatial Planning Situation *COMPARISON SPATIAL PLANNING SITUATION in the regions involved (Finistère (France), Galway (Ireland), Andalusia (Spain), Algarve & Porto (Portugal), Wales (United Kingdom)*
Identification and Assessment of the transferability of partner's best practices	Access2sea Best Practice Monographic
Development of an MSP Opportunities Map for aquaculture producers including the sites available in the regions involved.	Tool: Access2sea Opportunities Map *Access2sea Opportunities Map*

More information: www.access2sea.eu

The aim of this document is to summarize the knowledge and tools identified and developed in the framework of "Access2sea" to provide policy makers and other stakeholders involved with MSP with a general view of some MSP tools and methodologies available and the best practices identified, so they can assess their relevance for their territories and consider their implementation.

3 IMPLEMENTATION OF MARINE SPATIAL PLANNING BEFORE ACCESS2SEA

The implementation of worldwide MSP and as a planning tool is quite widespread, and international organisations such as the FAO, the European Union, UNESCO, etc. are working on it. Therefore, the degree of implementation varies greatly depending on the continents and countries, and is closely linked to the availability of existing cartographic data at the national level in each country

If we analyse some of the definitions of this concept, we can advance in the knowledge of this planning tool or process, and thus, we have:

"Marine spatial planning (MSP) is a public process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that are usually specified through a political process." (Ehler, 2014)

"Maritime spatial planning' means a process by which the relevant Member State's authorities analyse and organise human activities in marine areas to achieve ecological, economic and social objectives;" Directive 2014/89/EU, article 3.(2)

Marine (or Maritime) Spatial planning (MSP) is a spatially oriented process that supports management of multiple and competing demands on marine resources, to address conflicts, while considering economic, social and ecological objectives. The character of MSP in specific regions varies widely according to factors such as the socio-political context, the emphasis placed on specific sectors and interests, the terminology used, whether it is legally binding, the institutional framework of planning and its relationship to other regulatory functions, the resources available for the planning process, and the extent to which marine planning has historically been used (Greenhill, 2018). An assessment of how different approaches to MSP have developed to achieve different aims in different contexts and how these relate to theoretical ideals and constructs of MSP are presented in Jones et al., (2016).

A key output of MSP is the allocation of space for different marine uses, to enable the development of maritime sectors, optimizing marine resource use while mitigating conflict. Focus on MSP has increased due to increasing demand for marine resources and space at sea, such as offshore wind, aquaculture, tourism etc. and the resulting potential for conflicts, and to manage

human activities within social and ecological limits. By identifying zones for development, along with policies on how activities should take place, MSP guides the licensing and decision-making processes of specific projects, where these are applicable.

MSP is representative of the holistic approaches which are increasingly important to address competing demands of growing and diversifying maritime economies within interdependent socio- ecological systems. It emerged in response to the recognition that prevalent sector-specific and fragmented management approaches were largely ineffective, and that there needed to be progress towards ecosystem-based management (Ehler, 2018). It is seen as a tool to support delivery of the inter-dependent and diverse UN Sustainable Development Goals (SDGs) in relation to the marine environment.

The result of an MSP process is a plan, which might include maps and policies. In addition to this outcome, the process itself is important. It should include public engagement. In this as well, as in the aim of ecosystem-based management, the key characteristics of MSP (Table 1) can be seen as implementation of the Ecosystem Approach.

Table 1. Features of MSP guidelines

Integrated	MSP addresses the full range of sectors and interests of relevance in the marine area. This integrated and holistic approach is necessary in order to understand cumulative effects of multiple activities, and to enable balancing of different priorities in order to manage conflicts where there is competition.
Ecosystem-based	MSP must be ecosystem-based, meaning that there is fundamental understanding that the ecosystem, its structure, and functioning, must be maintained in order to provide the numerous 'goods and services' utilized by humankind. This requires a systems approach to understand the interconnectedness of different elements of the ecosystem and between various human activities and should ensure that environmental considerations are integrated into planning and decision making in relation to marine activities at the earliest stage.
Forward-looking	The MSP process involves understanding the various policies which are applicable to an area, the ambitions of key sectors, the ecological concerns, and looking ahead to how these can be developed and managed appropriately. This is different to current sector-specific planning which is often reactive to the drive of a particular sector or industry and can result in conflicts arising later in the process where they are more difficult to address.
Participatory	A key principle of MSP is public participation, in order to enable public negotiation and decision-making regarding resource use. It also enables interaction between actors, industry, governments, NGOs and others, which supports exploring the complexity of challenges that exist around conflicts, between users or in relation to social / ecological implications and developing innovative solutions beyond traditional institutional approaches.
Adaptive	The adaptive management cycle of MSP provides a framework for reflection based on participation throughout the process, providing crucial feedback to inform an increasingly refined process. Such participation should be more in- depth than more traditional stakeholder engagement, which tends to be through 'consultation' on developed plans and proposals, rather than on-going interaction which can inform and shape the planning process.
	MSP is an iterative process, and based on a programme of monitoring, reflection and feedback, the plan and process should be amended. This key principle of adaptive management is critical in enabling approaches to management to evolve and adapt, and if implemented fully, represents a significant departure from current approaches whereby monitoring (e.g. of ecological effects) is undertaken, but often without sufficient review and influence of results on amending processes.

MSP in Europe: the EU Maritime Spatial Planning Framework Directive

MSP, as described above, has been applied in some European waters for at least a decade. However, it was often ad hoc, small-scale, and focussed on single sectors (Jones et al., 2016).

The **EU's Integrated Maritime Policy (IMP)** is a policy framework aiming to foster the sustainable development of all sea-based activities and coastal regions by improving the coordination of policies affecting the oceans, seas, islands, coastal and outermost regions and maritime sectors, and by developing cross-cutting tools.

The main objectives and corresponding fields of action of the IMP (COM(2007) 0575) are:

Maximising the sustainable use of the oceans and seas in order to enable the growth of maritime regions and coastal regions as regards shipping, seaports, shipbuilding, maritime jobs, the environment and fisheries management.

Building a knowledge and innovation base for maritime policy through a comprehensive European Strategy for Marine and Maritime Research (e.g. the Maritime Strategy Framework Directive (2008/56/EC) and the Horizon 2020 programme;

Improving the quality of life in coastal regions by encouraging coastal and maritime tourism, creating a Community Disaster Prevention Strategy and developing the maritime potential of the EU's outermost regions and islands.

Promoting EU leadership in international maritime affairs through enhanced cooperation at the level of international ocean governance and, on a European scale, through the European Neighbourhood Policy (ENP) (5.5.4) and the Northern Dimension;

Raising the visibility of maritime Europe through the 'European Atlas of the Seas' internet application, as a means of highlighting the common European maritime heritage, and by celebrating an annual European Maritime Day on 20 May.

Introduced in 2014, the EU's **Maritime Spatial Planning Framework Directive** (2014/89/EU), develops this aspect of the IMP and aims (article 1) "at promoting the sustainable growth of maritime economies, the sustainable development of marine areas and the sustainable use of marine resources."

The Directive requires Member States to implement national marine planning by 2021. Progress varies across Europe, but with extensive activity across all sea basins, the North Sea, Mediterranean, Baltic, Black Sea, and Atlantic seas. MSP has advanced particularly in Germany, Netherlands, and Belgium, driven by the intensity of use in these sea areas. Activity to inform MSP is progressing in the Baltic Sea, and with particular emphasis on transboundary working and collaboration, given the small sea area shared by several nations, including EU and non-EU states.

The project Balt Sea Plan (*http://www.baltseaplan.eu/)* presents a wide range of activities undertaken in this area to inform MSP, including the "Balt Sea Plan Vision 2030", which sets out a pan-Baltic vision of sustainable development of maritime activities in the Baltic Sea.

Information on the status of MSP across EU Member States can be found on the European Maritime Spatial Planning Platform (*http://www.msp-platform.eu/*). This website provides an overview of marine planning in each country, along with links to other activities, projects and reports relating to MSP in these countries.

MARINE SPATIAL PLANNING AND AQUACULTURE

The EU IMP includes a Blue Growth Strategy, within which aquaculture is a priority sector. The policy of expanding aquaculture, first mentioned in unit 1 of this module, is driven by economic interest due to the value of seafood to domestic markets of Member States as well as through export, particularly to Asian markets, however it is also influenced by concerns regarding food security, as well as increasing interest in seaweed cultivation for a range of purposes.

The European Commission published the Strategic guidelines for a more sustainable and competitive EU aquaculture for the period 2021 to 2030 (COM/2021/236 final), and with regard to the Building of resilience and competitiveness, these Guidelines identified two key enabling conditions for the EU aquaculture sector to grow as a resilient and competitive sector: **access to space and water**; and a regulatory and administrative framework that is transparent and efficient.

Water is becoming scarce due to climate change. There is also increasing competition for both space and access to water among different economic activities, including aquaculture. Coordinated spatial planning, with the early involvement of relevant stakeholders, is therefore essential. This spatial planning can ensure the allocation of space and water among different activities, while preserving ecosystems. EU Member States have already made some progress in integrating aquaculture activities in their maritime spatial plans, in line with the Maritime Spatial Planning Directive 17 . However, many of these plans are only about to enter into force, and their results for aquaculture mostly remain to be seen. Moreover, further progress is needed in other aspects of the planning for space and access to water for aquaculture activities.

Spatial planning should be based on the designation of areas suitable for aquaculture through a process involving coordination among different relevant authorities at different levels. This process should start with the mapping of existing and potential aquaculture areas in a way that is consistent with existing environmental planning (including River Basin Management Plans). Such mapping should include a process to identify the potential to restore abandoned aquaculture facilities or convert existing industrial facilities to aquaculture. It should also seek to promote synergies between different activities and multiple uses of space, such as encouraging aquaculture development in combination with the development of offshore wind power.

The amount of space needed for current levels of marine aquaculture production is small relative to the space available (Hofherr et al. 2015), however the projected increases in aquaculture across the 27 Member States from published multiannual strategic plans equates to a 57.3% growth in aquaculture production by 2030, substantially increasing demand for space in EU waters. The development and spatial demand of aquaculture varies across Europe, according to the target species, ecological and social conditions, relative importance compared to other sectors and socio-political context.

There is increasing emphasis on developing aquaculture further offshore, to move away from congested inshore areas where social and ecological concerns, as well as interaction with other sea users, limits installation. These new demands for space for aquaculture need to be considered in developing MSP processes.

While there is an acknowledgement at EU level that aquaculture production needs to increase, it faces a number of constraints at a national level, and expansion of the

sector has not progressed as anticipated. Production by states that were EU members in 2013 decreased by around 9% between 2000 and 2013, with notable decline of nearly 26% in aquaculture output from Spain, Italy and France.

In 2013, Spain and then France remained the two largest producers, followed by the United Kingdom and then Italy. However, while the overall trend of aquaculture production in the EU28 production is stagnant or declining, countries associated through the EEA (Norway and Iceland) or other collaborating nations (Turkey and the Faroe Islands) have increased growth (FAO 2017).

Planning Challenges and the potential role of MSP in Aquaculture

MSP presents a new framing for the planning and management of marine resources. As an integrated framework, marine planning presents an opportunity to review, evaluate and rationalize current approaches to the governance of marine activities, and provides a focus for making the transition away from fragmented sector-specific approaches to more coordinated, efficient and cost-effective resource management. MSP could provide several benefits to the development of aquaculture as described below.

Improving public perception and facilitating social license, by bringing the sector into a multi-stakeholder debate, with civil society, MSP could provide the basis for improving the public perception of aquaculture, and ultimately its social acceptability.

Dialogue through engagement and participation in planning processes can educate and inform the public regarding potential ecological and social impacts, setting out how planning decisions have been made in relation to key environmental concerns. As a two-way interactive process, this also enables planners to more accurately understand the perspectives of local communities and to incorporate their concerns.

While a complex challenge requiring addressing at a range of levels, the emphasis on early and effective participation of the public in MSP processes, particularly as it takes a multi-sector and long-term view, may provide a fundamental step in developing social license to locate within a particular area.

Allocating space for aquaculture and mitigating conflict, through identification of areas with high potential for aquaculture development, MSP can support aquaculture, identifying sites for new projects alongside other marine uses and with consideration for social and ecological constraints. Depending on the policy requirements promoting aquaculture within the region of interest, MSP could be used to identify areas for expansion of aquaculture including areas suitable for new species, new practices such as seaweed cultivation or specific areas for research and development, such as technologies for advancement offshore, to support innovation in the sector.

As an integrated framework and with its emphasis on achieving a wide range of policy objectives, and optimising the benefits obtained from marine resources, MSP, including that implemented through the MSPFD,2 is intended to support managing conflict in order to balance the interests of different sectors. The tools that could be employed to undertake MSP, such as visioning and scenario analysis can enable actors to collectively look to the future, anticipate issues and conflicts to find synergies and compromises. It could even support the development of co-location opportunities, where infrastructure is shared between multiple industries, such as the installation of aquaculture facilities around wind turbines.

Reduce uncertainty in planning processes, is an overarching intention of MSP in a European context. It is designed to improve the certainty of developing and encouraging investment in maritime activities. It is therefore intended to simplify the planning and management of different activities, although this depends to what extent it interacts with existing processes. Identifying areas for aquaculture development within MSP provides a level of certainty for investors. And in framing discussion on the planning of respective sectors, MSP could provide an opportunity for proactively reviewing and integrating different layers of management, highlight overlap and redundancies, enabling simplification / rationalisation of the use of resources for cost-effective and fair planning, regulatory and licensing practices.

Adaptive management and review of processes and practice, is a key principle of MSP, and on-going monitoring and evaluation of planning processes enables monitoring feedback from the system, enabling collective learning and improvement as understanding increases. The adaptive cycle and review of planning could enable response, in terms of changes in management approaches, to issues that may arise, such as the emergences of diseases and potential changes in environmental parameters due to climate change.

Faced with the lack of suitable areas for installing marine aquaculture activities, from 2016, Investir en Finistère (IEF) developed a concerted and federated approach to map existing and potential spaces to have an overview at the Finistère level and define an intervention strategy.

Investir en Finistère piloted the realization of a cartography and a GIS "Access to the sea for production activities", this tool audits the existing situation and gives a prospective vision on the potentialities. This methodology was shared with the partners of the Access2Sea project during a dedicated workshop in October 2019 in Brest.

The observation was made during this workshop that each partner region has embarked on planning processes to resolve the issue of space, whether it is related to sharing or finding good locations. Moreover, partners identified various tools which were available before the beginning of the project.

3.1. GENERAL ASPECTS, PARAMETERS, AND CRITERIA FOR SITE SELECTION IN AQUACULTURE.

The choice of the parameters should constitute the main basis for determining the suitability of the area and be directly related to the regulatory context in force for the aquatic activities in the study area. During the planning process, technical procedures of risk analysis should be applied, to identify, assess and treat the risks related to the implementation of the determined areas of aquaculture; they should include social, financial and environmental aspects (Sanchez-Jerez, 2011). Given the limited information on the marine environment and the high cost of obtaining such information, two working lines may be considered:

Basic data: the minimum basic information and data needed to establish and to define the study area.

Table 2. General issues and opportunities for improvement through marine spatial planning (Meaden et al., 2016)

PARAMETER	DESCRIPTION	POTENTIAL AUTHORITIES INVOLVED
Bathymetry	"The science of measuring and charting the depths of water bodies to determine the topography of a lake bed or sea floor" (ESRI, 2001). The most appropriate depth for installations at sea will be the one that allows the technical feasibility of facilities on the one hand, and that allows the body of water to flow and thus facilitates oxygenation and dispersion of the inputs on the other hand. It will vary depending on different parameters, including the species, farming method, etc. The distance between the floor of the cages and the sea bottom has to be duly taken into account. Most installations anchored in the Mediterranean countries are located between 20 and 100 m depth.	Regional, national (e.g. Ministry of Infrastructures, geographic institutions), others
Coastline	The coastline is the land along the edge of a coast, forming a boundary between the land and the ocean, sea or lake. The coastline shown on charts represents the line of contact between the land and a selected water elevation, called the coastline contour.	Regional, national (e.g. Ministry of Infrastructures, geographic institutions, environmental authorities), others
Harbour infrastructures	The existence of ports as support for production and the infrastructure, equipment and services in each port. Aquaculture facilities at sea need port facilities for their vessels, which also provide areas for equipment and from where direct daily management operations can be carried out.	Regional, national, local (e.g. Ministry of Infrastructures)
Basic infrastructures of the territory	The basic infrastructures of the territory include the main roads, local ports, airports, etc., and others that may be of interest to a specific culture, particularly with regards to the transport of products. Infrastructure development in the area around the facility determines the advantages of the company in the development of activities (supply and provision of inputs for production, and output of products for sale).	Regional, national (e.g. Ministry of Infrastructures, geographic institutions), others
Territorial entities	Cities, towns, villages and local territorial organizations in the provinces or regions are essential to understand the social and economic context in which AZAs and aquaculture facilities should be placed. The location for the study of communications and logistics facilities, and their presence close to an aquaculture facility can support the development of daily activities.	Regional, national (e.g. Ministry of Infrastructures, geographic institutions), others

1. Socio-economic and administrative working line:

Analyses each of the socio-economic interferences of use that might occur in the area where aquaculture is planned and identifies the authorities and public bodies that have competencies over the area. This will delimitate the area to be studied and the area of intervention and, therefore, the time and cost of the execution of the following steps.

The administrative and socio-economic data and information to be collected refer to the different uses, activities and occupations that occur in the coastal area and that are often related to the limits established by regulations or specific plans of the various governments that have responsibilities in the maritime-terrestrial space (Table 2).

Table 3. General issues and opportunities for improvement through marine spatial planning (Meaden et al., 2016)

PARAMETER	DESCRIPTION	POTENTIAL AUTHORITIES INVOLVED
Domain areas and port uses	Description, from an administrative point of view, of the existing ports in the area. Ports usually have a Uses and Management Plan that establishes the activities allowed and zones where each type of activity can be run.	National or regional (e.g. ports authority)
Sand deposit areas for regeneration of beaches	Sand areas correspond to sand deposits for the regeneration and/or creation of public beaches. These are areas of the seabed that, due to the dynamic sedimentary sand deposits, have been found suitable for filling and maintenance of beaches. In some countries, where coastal erosion affects the beaches, touristic attractions are regenerated with marine sands; these deposits are of high priority for management bodies. Therefore, in certain countries and regions, aquaculture facilities cannot be on or near large deposits of sand that are used for the regeneration of beaches.	National (e.g. environmental authority)
Protected habitats	Protected habitats, such as nature parks, Ramsar Sites, Sites of Community Importance, marine protected areas, etc. are sea areas that are part of natural areas protected by community law (e.g. some natural habitat proposed for protection under the European Directive 92/40 EEC). Protected areas should have plans of uses that specify which activities may be developed in this space. Aquaculture is often an activity which can be completely integrated into those spaces; MPAs can be an example of reconciling nature conservation and aquaculture sustainable development.	National (e.g. environmental authority)

PARAMETER	DESCRIPTION	POTENTIAL AUTHORITIES INVOLVED
Waste disposal sites	Discharge points located on the coastline and ocean outfalls that discharge to a certain depth; the latter being those that may have some negative effect on the development of productive activities. Aquaculture facilities should be located taking into account these spills or submarine outfalls along the coast, so that the quality of water discharged does not affect the healthiness of production. It is important to recognize the type of discharge (urban, agricultural, industrial, etc.) and activity level.	National (e.g. environmental authority)
Underwater wire exits	Cables and power distribution lines or fuel which flow through the seabed should be taken into account for the location of the moorings of the facilities and, in general, a precautionary distance is usually established between these types of elements and other purposes that share the same space.	National (e.g. infrastructures authority)
Tourist interest zones (beaches)	Due to their strategic location, or unique characteristics, beaches are generally classified according to their use in high-use tourist areas. In some countries of the region, tourism is an important economic activity and the level of interaction with aquaculture should be considered to avoid conflicts in the use of space.	National or regional (e.g. tourism authority)
Marine sports	Due to their location, coastal areas may have the appropriate features for marine sport activities. In some touristic areas, these are also relevant from an economic point of view and could interfere with aquaculture, and therefore conflicts for the use of areas need to be avoided.	National or regional (e.g. appropriate authorities)
Archaeological underwater sites	Archaeological remains may be located on the seabed, leading to the designation of areas of archaeological value. In general, they occupy small areas and for this reason it is important to identify and locate them perfectly in order not to locate aquaculture facilities on archaeological sites. Given the difficulty in locating such remains, positioning studies should be carried out and a precautionary distance established.	National (e.g. culture or heritage authority)
Traditional fishing areas	Traditional fishing areas or fishing grounds are usually areas where artisanal fishing operates daily. Such fishing grounds, and in particular areas of molluscs and shellfish, should be mapped in order not to establish the facility in these localities. Interactions between capture fisheries, especially artisanal, and aquaculture should be analysed. A good knowledge of local fishing patterns will prevent interference with this activity.	National or regional (e.g. fisheries and aquaculture authority)
Artificial reefs	Artificial reefs are composed of modules that populate the ocean floor as a circle of protection, leaving open the layer of water immediately above these structures. The existence of artificial reef areas should be taken into account as they occupy areas of the seabed that could interfere with the anchoring of the aquaculture facilities. Depending on the type of reef, the area where it is located and its purpose, aquaculture could be a complementary activity, strengthening the protection of the water column and the marine environment near the reef.	National or regional (e.g. fisheries and aquaculture authority)

PARAMETER	DESCRIPTION	POTENTIAL AUTHORITIES INVOLVED
Aquaculture installations	Aquaculture facilities in the area should be taken into account in order to know the types of aquaculture that are already carried out and assess the capacity of the system and other competitors for space, including logistical and environmental interactions and impacts among aquaculture farms. To this end, it is necessary to identify and locate all facilities in the study area.	National or regional (e.g. fisheries and aquaculture authority)
Anchoring vessel areas and other installations at sea	Areas in which the anchoring and manoeuvring of ships are carried out must be considered. However, not all of these areas are used by large ships and therefore they do not have the same size or level of use. This means that they may be compatible with other activities. Other industrial installations at sea, such as oil platforms, could also interfere with aquaculture activities due to their large structure.	Ports state authority or/ and industrial companies
Military zones	Areas reserved for the national army, designed to carry out military operations, exercises and training activities on land or sea. Depending on the type of activity, aquaculture will be compatible or not. In most cases, compatibility is an issue between the two activities. Depending on the country, military activities are more or less numerous, but it is a common feature in the region.	Army
Fixed fishing gear near the coast	Along the coast of some countries in the region, fixed fishing gear may be found. Depending on the type of fishing and species, aquaculture conducted in close proximity to these types of gear will be compatible or not. For example, facilities should not be located at the entrance of these systems, but if supported, in the vicinity.	National or regional (e.g. fisheries and aquaculture authority)

2. Environmental working line

Involves a characterization study of the quality of the water, and of the seabed and different ecosystems, where it is planned to locate aquaculture facilities. This working line can also take into consideration particular environmental conditions characterizing the area (i.e. sensitive areas or environmental constraints).

The analysis of administrative parameters offers a short list of areas where there would be no incompatibility of occupation and, therefore, nothing to limit the development of aquaculture. In these pre-selected areas, at this stage and once sufficient information has been obtained regarding the potential interferences of use, it would be possible to demarcate more precisely the area where the aquaculture facilities could be located. At this step, it would be essential to

have information on the current environmental conditions, to assess the technical and biological feasibility of aquaculture farming.

The number of environmental parameters to be studied and the level of analysis will mainly depend on the area under consideration, type of aquaculture to be carried out and the financial budget available for the study. The parameters to be considered for the establishment of an AZA (Aquaculture Zone Area) can be grouped and defined as follows:

a) Climatology and Oceanographic Conditions

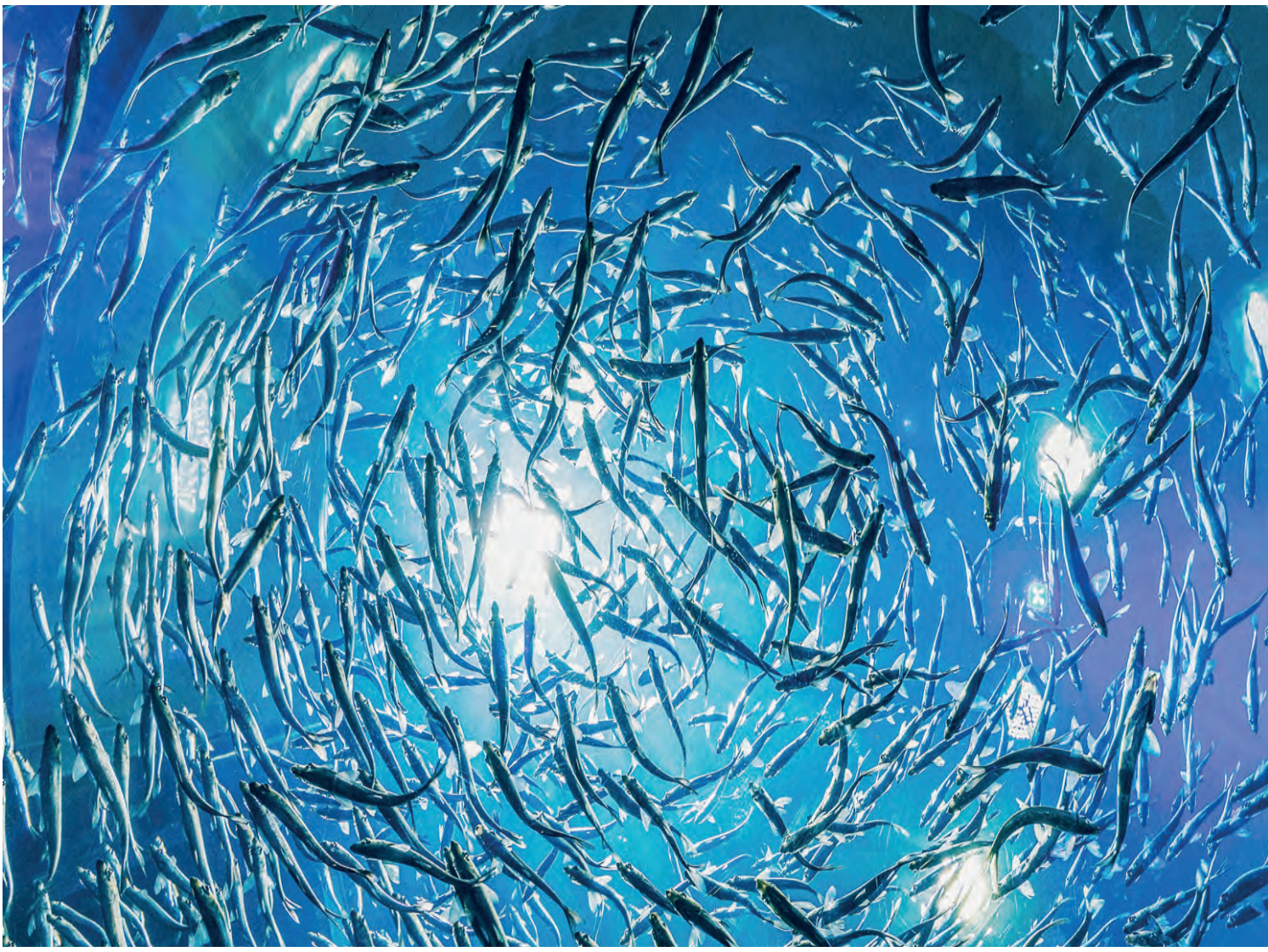
Table 4. General issues and opportunities for improvement through marine spatial planning

PARAMETER	DESCRIPTION
Temperature	The air temperature indirectly reflects the conditions of the nearest water body. The weather in the area will affect the type of aquaculture to be developed. Temperature is measured in degrees Celsius (°C).
Wind	The wind force and direction provide indirect information of the surface currents and the level of storms that the area is regularly affected by. Wind force is measured in metre per second or knots, while wind direction is indicated using the cardinal points.
Precipitation	All liquid or solid phase aqueous particles that originate in the atmosphere and fall to the earth's surface (American Meteorological Society, 2019). At sea, precipitation is important for helping analyse the frequency of storms that may affect the facility. Precipitation is measured in millimetres per year.
Evaporation	Evaporation is relevant particularly in areas such as bays and semi-enclosed bodies, which can manifest increasing salinity and variation in water quality. Evaporation is measured in millimetres per year.
Significant wave height and return period	Significant wave height is defined as the average wave height, from trough to crest, of the highest one-third of the waves, and this parameter, measured in metres, allows the most appropriate technology to be selected for each area in relation to its technical feasibility. Furthermore, the return period (for example, in which the highest wave of a sea storm has a height exceeding a fixed threshold) could also be assessed in order to have a more in-depth vision of the conditions.
Currents: speed, direction	This parameter will allow the positioning of facilities in the best direction with respect to the currents affecting the water quality. At the same time, sea currents are important for spreading the waste away from cages. Current speed is measured in metres per second, while current direction is defined using the cardinal points.
Hydrodynamic modelling/ particle dispersion	The application and results of these models allow the determination of the extent of particle dispersion generated by the proposed activity, and thus the possible environmental impact. This parameter is measured in metres.

(Meaden et al., 2016)

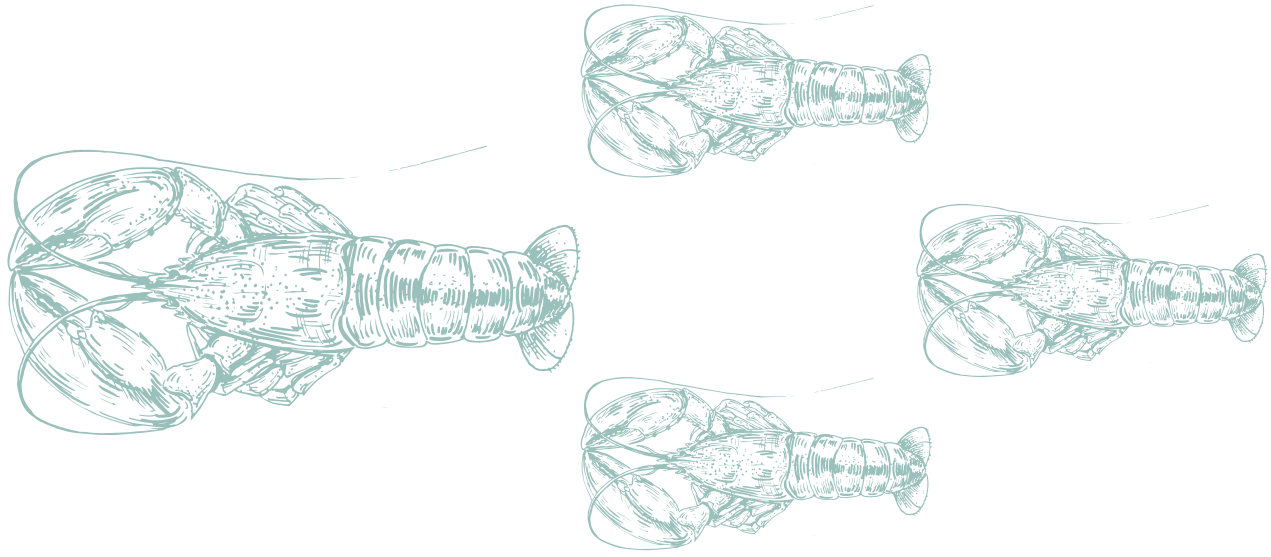
b) Characterization of the seabed

PARAMETER	DESCRIPTION
Granulometry	The particle size distribution or type of seabed in the area allows the most suitable places for anchoring and the most appropriate type of anchors to be selected. For anchoring, the best sea bottom sediment is sand or muddy sand. Granulometry is measured using particle size analysis.
Organic matter/ nutrients	The level of organic matter/nutrients present in the area will help in understanding the seabed dynamics and set the level of the zero state; this parameter is used as a baseline for establishing the preoperational state. The level of organic matter is measured in percentage.
Special habitats	The presence of habitats of special interest and/or protection, such as sea grass meadows or others listed in the Habitats Directive, must be taken into account in order to establish a precautionary area.
Benthic infauna	The characterization of the principal infaunal families and species in the study area is an important component for evaluating the state of the benthic ecosystem. This parameter is used as a baseline for establishing the preoperational state.



c. Water quality

PARAMETER	DESCRIPTION
Dissolved oxygen	The dissolved oxygen concentration in the cages or, preferably, at the benthic boundary layer beneath the aquaculture farm, provides an important indicationof the ambient conditions in the environment, as well as an alarm for risks that might endanger the production and/or the health of the farmed stock. In the open sea, the dissolved oxygen concentration is not usually a limiting factor for cultivation; however, knowing its value allows the most suitable forms of aquaculture to be established in each area. Dissolved oxygen is measured in milligrams per litre or percentage of saturation.
Temperature	Knowing the ranges of these parameters will help select the most interesting type of aquaculture for each zone and describe the preoperational values for future monitoring.These parameters are measured as follows: • dissolved oxygen (ml/l or % saturation) • temperature (degree Celsius) • salinity: usually expressed in practical salinity units or in parts per thousand(ppt or %) • pH (unit) • redox potential (mV) • chlorophyll a (mg/l) • total suspended matter (mg/l) • water turbidity (m) • nutrients (micromolar)
Salinity	
pH	
Redox potential	
Chlorophyll a	
Total suspended matter	
Water turbidity	
Nutrients (nitrates, nitrites and phosphates)	



4 BEST PRACTICES OF MARINE SPATIAL PLANNING IDENTIFIED IN THE ATLANTIC COASTAL AREA.

Beyond the comparison, the ACCESS2SEA partners highlight below, the best practices about aquaculture that could be transferred in other Atlantic regions.

Welsh National Marine Plan

WALES CASE STUDY

OBJECTIVES

- The Welsh National Marine Plan (WNMP) is the first Marine Plan for Welsh Waters. It sets out the Welsh Government's vision and objectives for the Welsh marine plan area and policies to support their achievement, helping marine users and those undertaking land-based activities (with the potential to affect the plan area) to support the sustainable development of our seas.

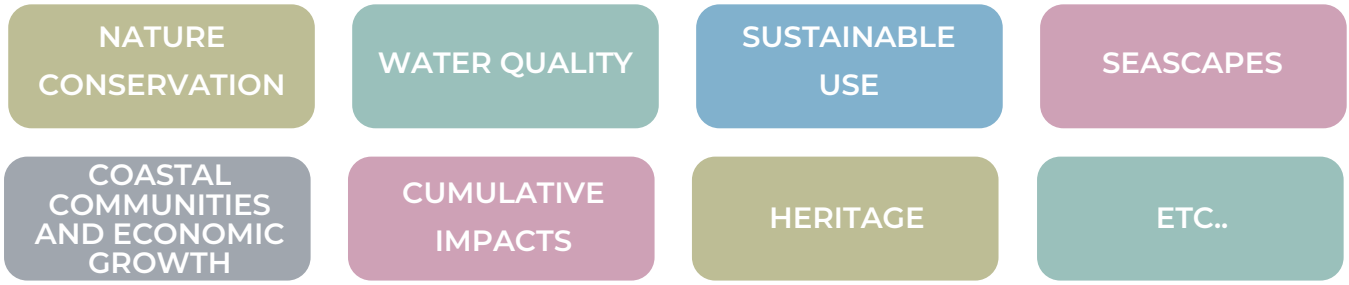
- The Welsh Government's vision is to support clean, healthy, safe, productive, and biologically diverse oceans and seas.

CONTENT

The marine plan area around Wales covers 32,000 km2 of sea, with 2,120 km of coastline.

The WNMP covers the inshore plan area from high water spring tides out to 12 nautical miles and the offshore plan area beyond 12 nautical miles.

The WNMP includes policy in relation to a wide range of general considerations (set out as a series of General Policies) including:



These General Policies are organized under the themes of the shared UK High Level Marine Objectives.

They will be used to guide proposals as they come forward and any related consent or authorization decisions taken by public authorities.

General policies will be applied to all decisions.

The WNMP contains **sector objectives and sector policies for 11 different sectors that operate in the marine area.**

These are **Aggregates, Aquaculture, Defense, Dredging & Disposal, Fisheries, Renewable Energy, Oil & Gas, Ports & Shipping, Subsea cabling, Surface water and Wastewater treatment and disposal and Tourism & Recreation.**

Sector Policies include 'supporting' and/or 'safeguarding' policies to help ensure each sector can develop in a sustainable way. A sector specific supporting policy encourages, over the term of the plan, the sustainable growth of that sector.

Effective date	
2019 - Plan adopted	2022 - First 3 yearly WNMP Monitoring Report published

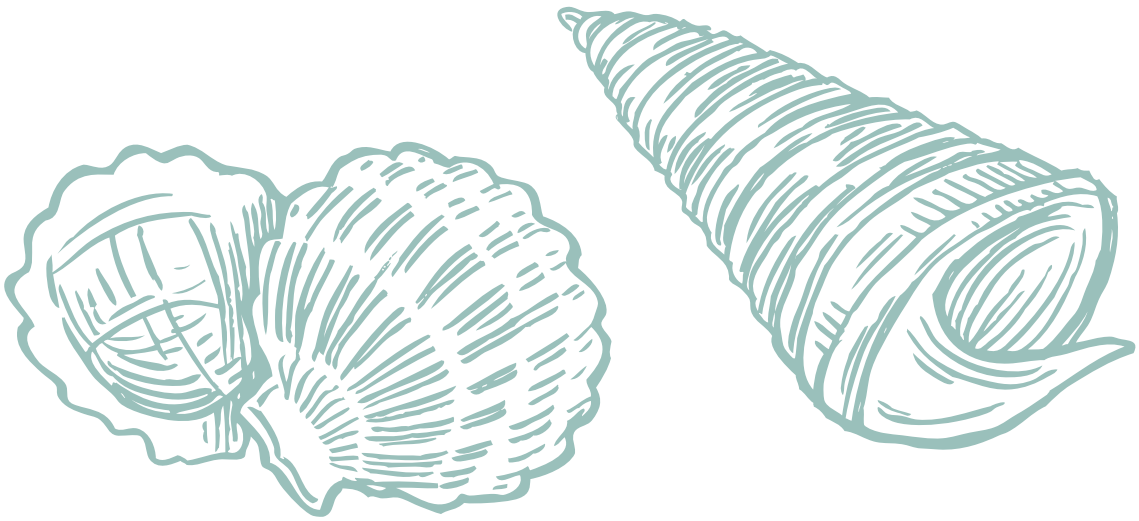
Sector safeguarding policies seek to protect established authorized activities or **already** well-developed proposals from adverse impacts on Aquaculture.

AQUACULTURE Sector Objective

To facilitate the development of sustainable aquaculture in Welsh waters, including promoting associated supply chains resulting from other sector activities.

How to do it?

- The WNMP supports sustainable development by guiding and supporting effective, proportionate, and consistent decision making.
- The WNMP will apply to all decisions with the potential to affect the marine plan area. In this context, decision makers are defined as the (Relevant) Public Bodies or Relevant Public Authorities (RPAs) who make decisions relating to the marine area.
- The plan takes a 20 year view.
- Similar plans are being made across the UK and by our neighbours around the Irish Sea.
- The Welsh Government has been working with the UK Government, local councils, and other public authorities to ensure a joined up approach.
- The plan works alongside other UK marine plans and will also be compatible with land use plans including Local Development Plans and the new National Development Framework – when published.
- The WNMP has been developed in line with of the Well-being of Future Generations (Wales) Act 2015 and Environment (Wales) Act 2016 and will also support achievement of Good Environmental Status (GES) as defined by the 11 descriptors of GES in the UK Marine Strategy.



CLAMS, Co-ordinated Local Aquaculture Local Aquaculture Management System

IRELAND CASE STUDY

Objectives

- Incorporate Single Bay Management with Coastal Zone Management policy and County Development Plans

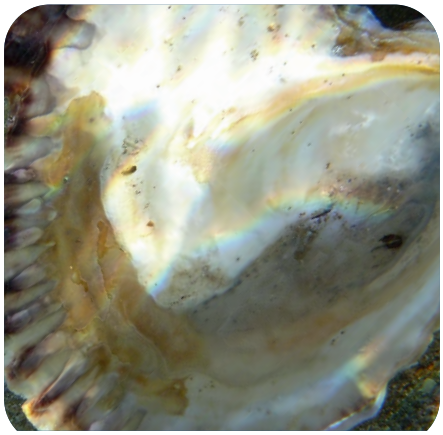
Content

CLAMS, Co-ordinated Local Aquaculture Local Aquaculture Management System, often abbreviated Single Bay Management, a concept on whose principles CLAMS is based, has its origins in 2001 the Cuan Mó/Clew Bay plan published in 2001, *http://www.gesaq.org/p2clew/documents/clams_clew_bay_2001.pdf.*

Single Bay Management, introduced in 1997 has been very successful *https://www.marine.ie/site-area/areas-activity/aquaculture/sea-lice/single-bay-management* and CLAMS is a refinement of this as defined in the objectives above, *https://www.marine.ie/site-area/areas-activity/aquaculture/sea-lice/co-ordinated-local-aquaculture-management-systems*.

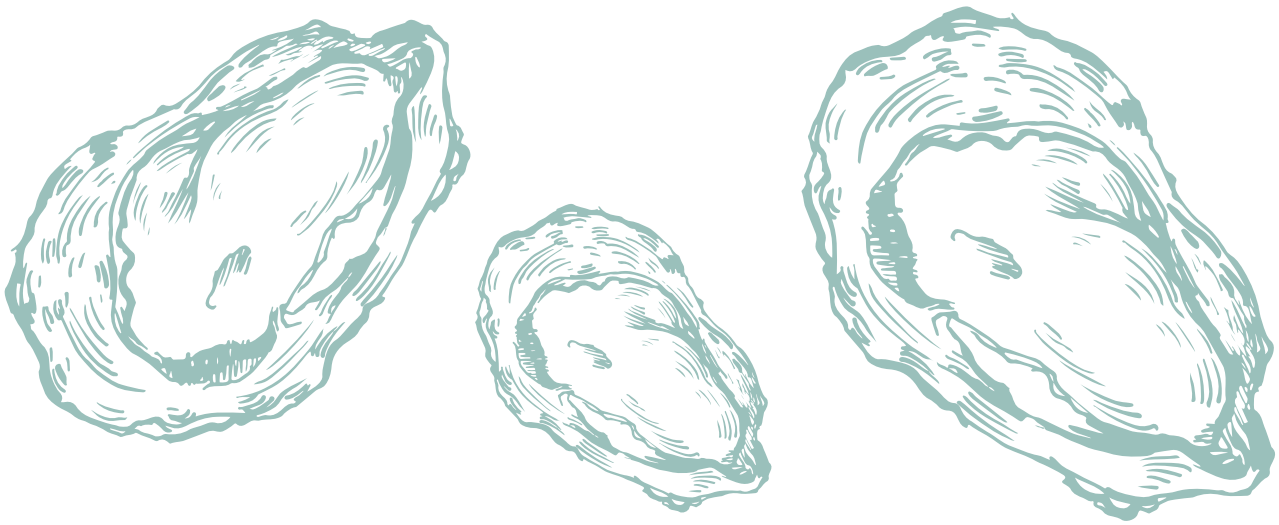
The then Minister for the Marine, Frank Fahey described CLAMS in specific reference to the Clew Bay plan in the publication's foreword:

"CLAMS aims to ensure that the development of the Irish aquaculture industry is in keeping with the principles of Single Bay Management. It is distinct from national aquaculture policy and development programmes because it focuses on the local bay level, while still taking on board relevant national policies."



Effective date
1997, 2001

Actively under renewal at the moment in six bays



The 2001 CLAMS document for Clew Bay details both a management plan and a development plan for the bay while incorporating and extending the successful concepts of Single Bay Management to all farmed species (including extensive culture). Its aim has been to enable more efficient production by optimising conditions within the bay and lay the foundations for co-operative ventures between operators in the same bay. The publication of the CLAMS plan for Clew Bay provides an integrated management and development plan for the bay in one document. The Marine Institute and BIM have been crucial in supporting this plan which can be easily integrated into County Development Plans or other plans being developed for the management of Ireland's valuable coastal resource. The active participation of the Clew Bay Oyster Co-operative and the involvement of individual shellfish producers and fin fish producers in the bay, right from the outset, was the key to the development of this plan. It marks the start of an ongoing process of integrated management for the aquaculture industry in the bay. "

The 2001 plan was voluntary—neither funded nor mandated in its original form and fell into disuse in the intervening years. This is being revived in recent years and there are management plans being drawn up by BIM at the present time in six bays, with the support of the Marine Institute. In the case of Clew Bay, it is worth noting that the relatively successful cooperation of the tourist industry, aquaculture and fishing have benefited from their bay management system. Key to this is the architecture of CLAMS itself—that every stakeholder in the bay is represented in the bay management plan.

How?

The national seafood agency BIM along Foras na Mara/The Marine Institute are responsible for renewing the individual bays. Completed plans for several bays are due soon.

Benthic Monitoring around finfish farms

IRELAND CASE STUDY

Effective date
1 July 2021

Objectives

- Monitoring of benthic health trends at fish farms over time

Content

Is there a positive/improving benthic health around fish farms in Ireland?

First of all, is this assertion about the benthic health in aquaculture zones in Ireland a fair (albeit one-liner) overall assessment of Ireland in the last ten years?

How?

The Marine Institute have not carried out any analysis of trends in benthic health at fish farms to date so can't provide any direct comment on the question above (is there an improvement…?). The excerpt from the Marine Institute's annual review of benthic monitoring reports at finfish farms as sent to DAFM, the Department of Agriculture, Food and Marine earlier this year. This table gives an indication on the level of environmental compliance of finfish farms that submitted reports to DAFM over the last ten years.

This study case gives a rough indication as to the level of compliance of finfish farms with benthic environmental standards. The data appears to show a downward trend in compliance; this apparent trend should be read with caution.

For example, during the first ten years reporting was lower and compliance appears higher, but, it's possible that a number of non-compliant farms did not report during this time.

An analysis of the trends in benthic health at finfish farms will be once again carried out in 2022.

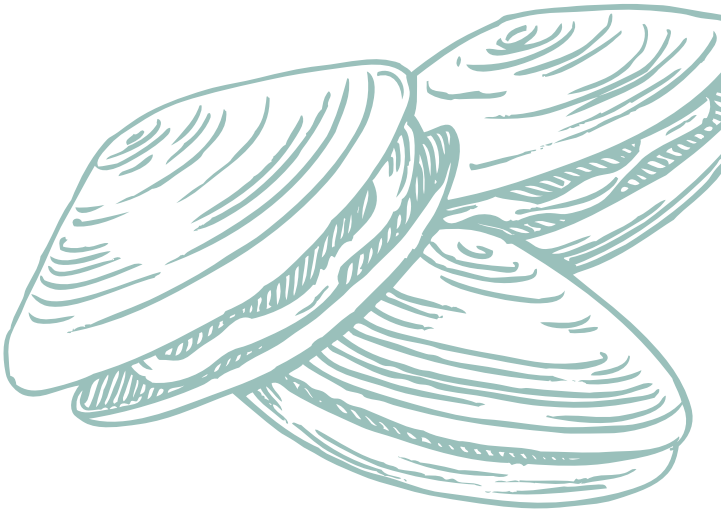
There is a benthic monitoring protocol that DAFM has produced which operators of finfish farmers must adhere to. DAFM scientific advisors provided some input into this protocol when it was drafted. The protocol sets reporting standards and requirements, environmental standards and analytical standards for benthic monitoring at finfish farms.

DAFM are considering an update to this protocol currently. A resource that gives a broad outline of the health (which is based on measures of benthic health among others) of the coastal environment around Ireland is the EPA data portal: ***https://gis.epa.ie/EPAMaps/***.

Go to the water tab and turn on the 'status' layers that you would like to view. Transitional and coastal waters are the relevant layers to marine finfish farms. This information is based on a nationwide monitoring programme that the MI is involved with, which the EPA oversees.

Catalogue of the location of suitable areas for the development of marine aquaculture in andalusia

SPAIN CASE STUDY



Objectives

- To identify optimal areas for aquaculture based on compatibility between activities in the same area and technical criteria such as depth and distance to the nearest port.

Content

This is a technical-administrative process by which, based on a sectoral and spatial analysis, those geographical areas are determined where, from an administrative point of view, future development of aquaculture activity can be planned.

How?

The localisation work has been carried out by the Andalusian Agricultural and Fisheries Management Agency (Junta de Andalucía) since 2006, and the studies are due to be updated by the end of 2021.

An interaction analysis shows whether the analysed uses and activities and the future aquaculture zones may coincide or be adjacent in the maritime space, thus taking the spatial component of each activity and the identification of possible conflicts as a basis for the analysis.

The uses and activities that are analysed are grouped together:

1º Base Plan: delimitation, hydrographic network...

2º Protected Natural Areas: Natura 2000 Network, Natural Resources Management Plans...

3º Fishing and Aquaculture: mollusc production areas, current aquaculture, artificial reefs, traps...

4º Port System: ports and port areas...

5º Dumping: urban and industrial, outfalls...

6º Historical Heritage: archaeological areas

7º Other uses and activities carried out in the terrestrial maritime space: aggregate extraction areas, maritime traffic, military areas...

Some of these parameters have an associated area of influence that is generally excluded for the development of aquaculture based on safety criteria. For example, a buffer of 1 km is generated for outfalls or gas pipelines, and the mouths of ports have an area of respect of 1 mn.

Effective date
2006 - 2021

Depending on each activity analysed with respect to aquaculture, different levels of potential are determined, which will lead to different degrees of suitability.

A- LEVEL OF POTENTIALITY:

Regarding the development of aquaculture together with other activities in the same area, different levels of potentiality can occur:

HIGH POTENTIALITY

The identified activity can be developed simultaneously with aquaculture, generating enabling or favourable conditions for the development of both.

MEDIUM POTENTIAL

The development of the aquaculture activity in areas where other activities are identified can generate some conditioning factors without being unfavourable for the synergy between both activities, i.e. without producing negative effects.

POTENTIAL FOR CONFLICT

When the development of an activity means limiting or disabling the development of aquaculture.

B- DEGREE OF SUITABILITY:

SUITABLE AREAS

Wide areas in which marine aquaculture can be developed, according to general (administrative) and technical (depth and distance) parameters, differentiating between

SUITABLE AREAS

Those that have been defined based on parameters and criteria that do not limit the activity.

SUITABLE AREAS WITH LIMITATIONS

Those that may be limited by parameters, other uses, or regulatory limitations.

AQUACULTURE EASEMENT ZONES

More restricted areas where exhaustive studies will be carried out and which are considered suitable for the development of aquaculture activity.

These are areas that do not contemplate parameters or criteria that could limit the activity and are the object of study for their declaration as Areas of Interest in the future.

They also have a minimum surface area to house an economically and technically viable aquaculture project and with a geometry that is easy to transfer to a polygon.

A more efficient and shorter licensing process

PORTUGAL CASE STUDY

Objectives

- To simplify the licensing process and to obtain more easily and quickly the authorizations and licenses.

Content

At the Portuguese level, the evolution of the panorama related to the licensing process has undergone few changes over the last decades. Until April 2017, when Decree-Law No. 40/2017 was published, the licensing of aquaculture units was differentiated between aquaculture in inland waters (fresh) and marine/brackish waters.

It is also necessary to clarify that, until the publication of the aforementioned Decree-Law, there were two distinct licenses that aquaculture companies located in marine or brackish waters had to obtain, the License for the Use of Water Resources (Decree-Law no. 226-A/2007) and the Exploration License (Regulatory Decree nº 14/2000). The second, granted by the Directorate-General for Natural Resources, Security and Maritime Services (DGRM), could not be obtained without the first, granted by the Portuguese Environment Agency. In the case of inland waters, with a different licensing procedure, the installation and exploitation authorization granted by the Secretary of State for Forests could not be granted without obtaining a License for the Use of Water Resources. Below it is summarized the licensing procedure in Portugal until the publication of Decree-Law No. 40/2017, including the main constraints it caused to producers and the main innovations introduced by the new legislation.

Effective date	The publication of Decree-Law No. 40/2017

How? Legislation from 2000 to 2017

The regulation of Decree-Law No. 383/98 comes with the publication of Regulatory Decree No. 14/2000 of September 21st, which had the "objective of defining the requirements and conditions relating to the installation and operation of marine and related culture establishments, to attribution of authorizations and licenses and the conditions for their transmission and termination".

This was the first legislation that standardized and updated the various procedures that were dispersed and introduced a simplification of licensing processes. This new Regulatory Decree has compiled in a single document the content of the three aforementioned Ordinances (Orders no. 980-A/89, 980-B/89 and 980- C/89).

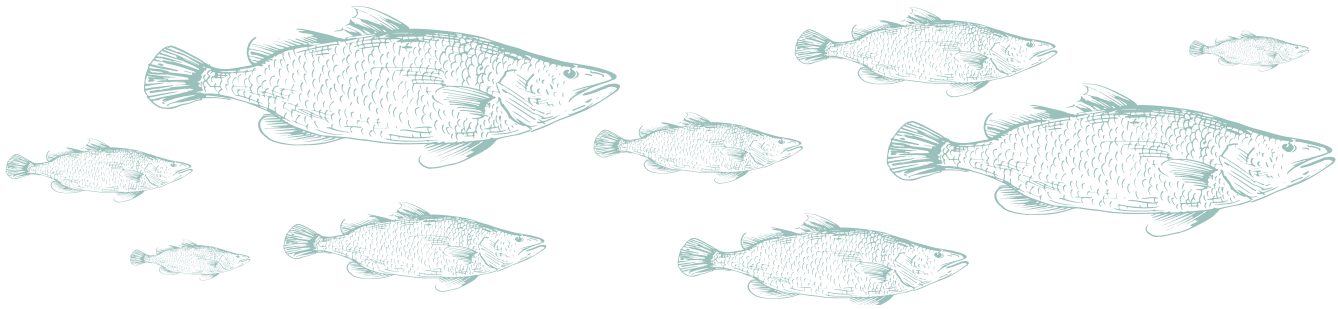
One of the novelties of this diploma was the creation of an activity control register (article 3), in which producers should send to the DGPA, by the last day of February, the production maps for the previous year. The data contained in the production maps would serve for statistical purposes and the publication of the document "Fisheries Statistics" by INE (National Institute of Statistic).

The inspection committee was also made up of ten entities and was formed 30 days after the entry of the application for installation authorization addressed to the DGPA. The notice was posted for a period of 30 days, within which the inspection committee was also required to visit the site, analyze the project and issue an opinion.

The opinion of each of the entities was binding, with only one of them giving an unfavorable opinion for the project to be rejected. The DGPA communicated the committee's decision to the interested party within 30 days, and the authorization order was published. The works would have to be completed within 3 years, and the interested party must request the DGPA for an exploration license within 3 months after the completion of the works.

The term of the exploration license is now 15 years in the case of private land and for the same period as for the private use licenses of land located in the public domain. In both cases, the exploration license was renewable.

With this Regulatory Decree it was possible, in theory, to authorize the installation of a new establishment within 90 days. However, prior licensing was always required, whether the establishment was on private land or in the public domain.



Law N°2019-469 du 20 mai 2019

For the land protection of agricultural activities and marine culture in the coastal areas are concerned: shellfish activities (oyster, mussels, scallops, clams, cockles, …), but also finfish farming, seaweed, seaworms, phytoplankton, zooplankton...)

Effective date
2019, May 20

FRANCE CASE STUDY

Objectives

- To protect these activities which are subject to strong land pressures in the coastal areas (and especially the transformation of professional buildings into residential housing)
- The goal is to protect and keep the production areas (such as building on land) necessary to maintain and develop the marine cultures.

Content

Now, to change a professional building into a house, 20 years are required instead of 5 years previously.

The objective is to control the sales prices of real estate. Indeed the prices gap is very important if you sell as a house and not as a production building (1*5).

This very significant price gap makes it more difficult to settle new producers, all the more it is nearly impossible to create new aquaculture areas. For example, in South Britany, in Morbihan (county) a 20% of the shellfish land disappeared for 20 years.

How?

Concretely, this new legislation strengthens the pre-emptive right of the SAFER in coastal areas.

Until today, the SAFER could only pre-empt a farm for sale offering only if it had been used in cultivation in the last five years (and this right wasn't often respected). With the law, the period is now 20 years.

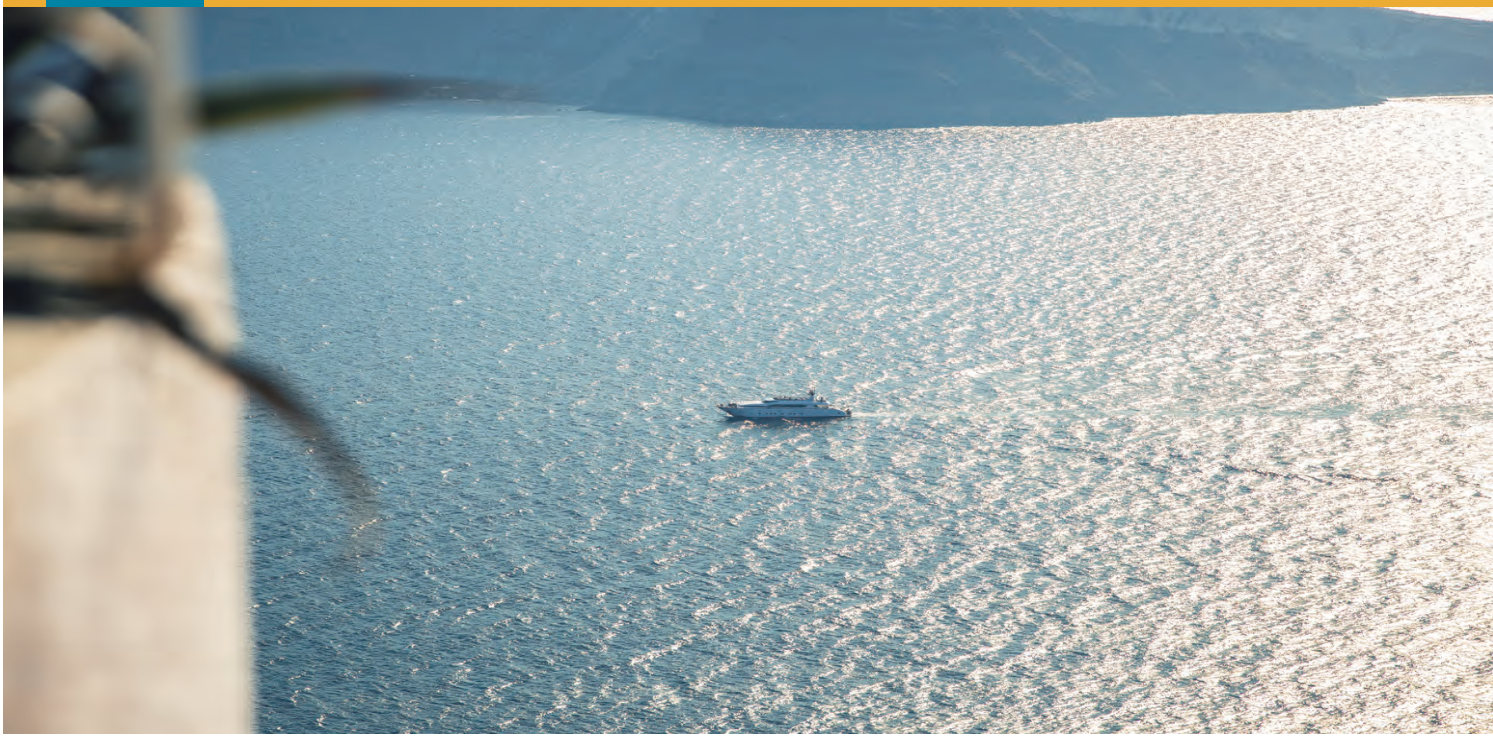
« In coastal municipalities, it can be exercised in the event of the sale of buildings which have been used for the exploitation of "marine cultures" requiring immediate proximity to water, during the 20 years preceding the sale ».

The goal is to use these buildings for the exploitation of marine cultures.

Concretely: to sell a property, you have to go to the notary who will be obliged to send a declaration of intention to alienate to SAFER, who then has 2 months to intervene or not.

(The law applies to the private domain, in France, the public domain is inalienable).

5 COMMON GUIDELINES FOR MARINE SPATIAL PLANNING AT GLOBAL LEVEL



The United Nations have also enshrined the quest for enhanced governance of marine resources in their agenda. In 2015, 17 Sustainable Development Goals (SDGs) were adopted to end poverty, protect the planet, and ensure prosperity for all as part of a new sustainable development agenda. For each SDG, specific targets were defined to be achieved by 2030. In particular, SDG 14 (Conserve and sustainably use the oceans, seas and marine resources) tackles aquaculture development and Target 14.7 aims to "increase [by 2030] the economic benefits to small island developing states and least developed countries from the sustainable use of marine resources, including through sustainable management of fisheries, aquaculture and tourism".

Within FAO, among the five Strategic Objectives driving its work, Strategic Objective 2 "Make agriculture, forestry and fisheries more productive and sustainable" acknowledges the need to increase the production of fishery products in order to reduce poverty and achieve food security, in the context of an increasing world population, underlining that increased productivity is to be achieved with an enhanced sustainability, thus reiterating the need for a better management of the aquaculture sector.

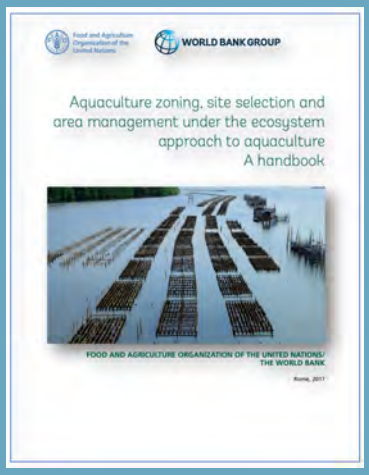
In line with the efforts of FAO towards food security and considering the principles of its Blue Growth Initiative, promoting the sustainable use and conservation of marine living resources in an economically, socially, and environmentally responsible manner is inscribed in the Agreement for the establishment of the General Fisheries Commission for the Mediterranean adopted in 1949. Indeed, Article 5.e reads that the Commission shall "foster, as appropriate, a subregional approach to fisheries management and aquaculture development in order to better address the specificities of the Mediterranean and the Black Sea".

5.1. INTERNATIONAL GUIDELINES FOR PLANNING IN AQUACULTURE.

The main documents containing recommendations and useful information for spatial planning of aquaculture are, among others, the following:

Aquaculture zoning, site selection and area management under the ecosystem approach to aquaculture. A handbook.

(Aguilar-Manjarrez, J., Soto, D. & Brummett, R. 2017).

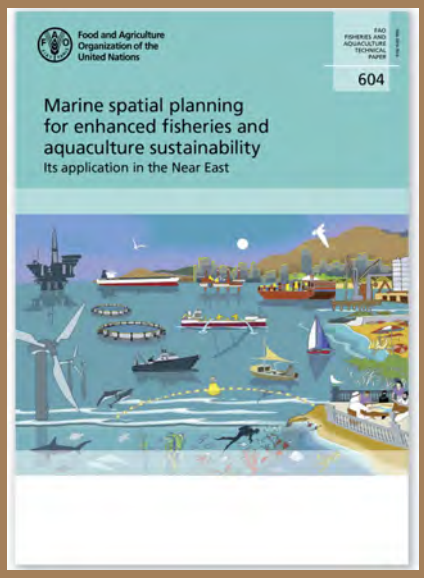


The purpose of the publication is to provide practical guidance on spatial planning to managers, policy- makers, technical staff, and farmers.

The publication reviews spatial planning and management of aquaculture development within the framework of the ecosystem approach to aquaculture development and presents suggestions for a strategy for their implementation, e.g. using an area management approach to ensure greater sustainability for future aquaculture development initiatives by governments. It is based on the FAO Code of Conduct for Responsible Fisheries, which contains principles and provisions in support of sustainable aquaculture development.

Marine spatial planning for enhanced fisheries and aquaculture sustainability Its application in the Near East

(Meaden, G.J., Aguilar-Manjarrez, J., Corner, R.A., O'Hagan, A.M. & Cardia, F. 2016).



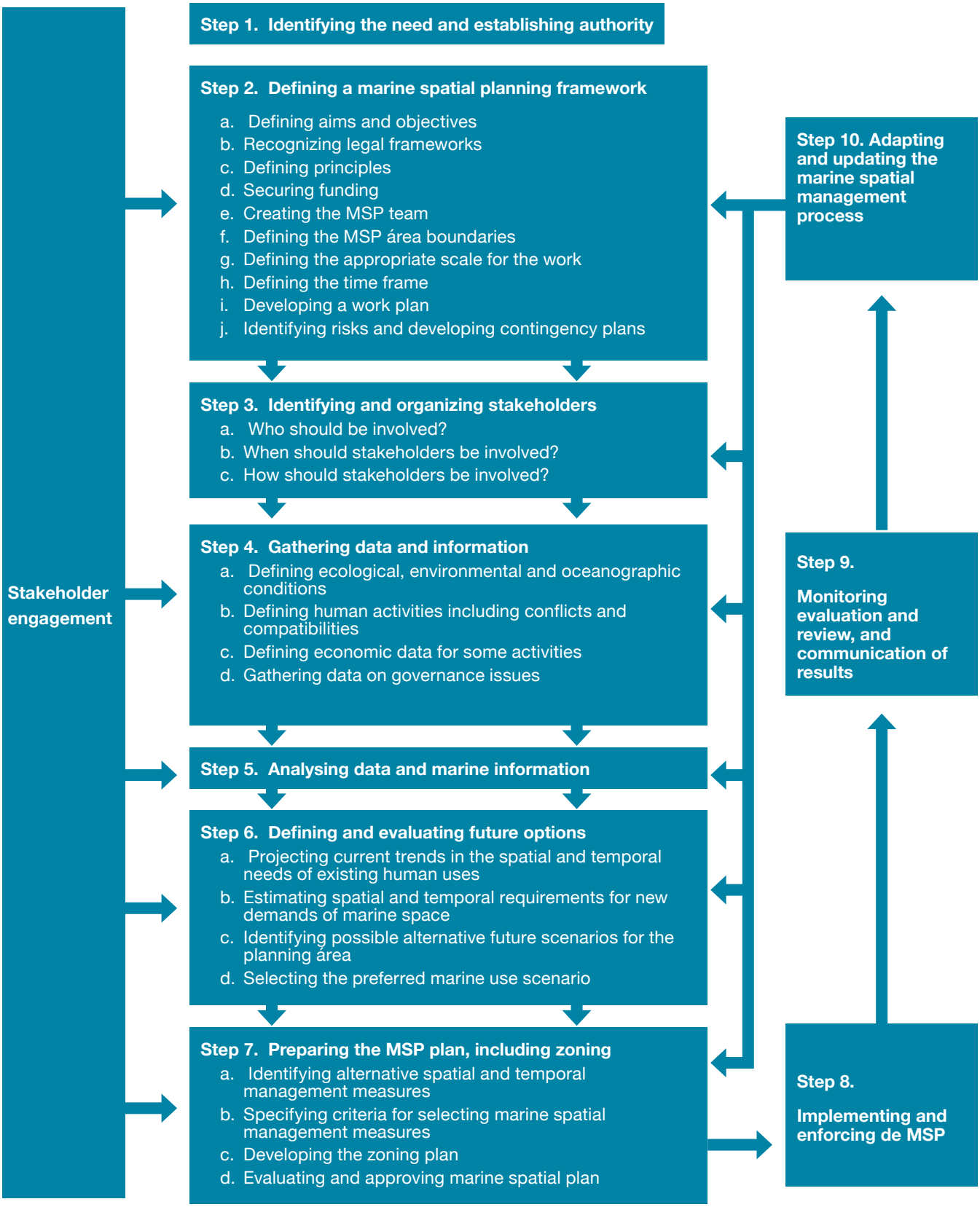
This technical paper provides national fisheries and aquaculture sector policymakers and senior managers in the Regional Commission for Fisheries (RECOFI) region with an overview of procedures involved in marine spatial planning (MSP). It provides support for RECOFI members to plan and develop more sustainable fisheries and aquaculture sectors through a more unified approach to spatial planning and management of marine environments in the context of multiple users and uses.

This document will also be of relevance to aquaculture operators, industry organizations, non-governmental organizations and other groups interested in understanding MSP. This is particularly relevant given their respective influence and impact in the development of master plans, regulations, and the management of aquatic resources. While of specific relevance to the RECOFI group of countries, this paper is also more generally relevant internationally, especially for those embarking on the use of spatial planning for fisheries and aquaculture.

The key to successful implementation of the MSP process will be to identify appropriate government agencies within the RECOFI region that are willing to share data and that will cooperate productively by developing both national and regional marine spatial plans, thereby integrating the environmental, social, economic and governance objectives for sustainable development in the RECOFI region.

This Technical Paper presents schematically a summary of the main steps for MSP. It is stressed in the paper that although these steps are not prescriptive, they should be implemented in the given order.

Figure 2: Schematic diagram showing progresion and linkages in MSP implementation



Source: Adapted from Ehler and Douvere (2009)

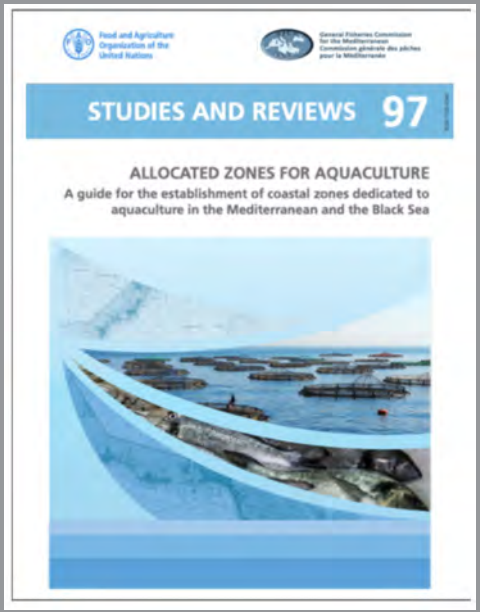
Notes:

- In practice stakeholders can be identified as part of the Step 2 process, i.e. once the boundaries of the MSP have been defined.
- Steps 1 to 7 can be completed in a medium-term time frame of about 1 of 5 years, but it might take about 20 to 25 years to reach Step 10 whereby the entire marine spatial planning process had been developed, refined and adopted.
- Two elements are fundamental throughout the MSP porcess: (i) to collect and use the best avaible information and (ii) to have broads stakeholder participation.

(Meaden et al., 2016)

Allocated Zones For Aquaculture: A guide for the establishment of coastal zones dedicated to aquaculture in the Mediterranean and the Black Sea. (GFCM Region).

(Macias, J.C., et Al, 2019)



This guide intends to be a practical tool to facilitate the understanding of site selection and planning for aquaculture and provide information on processes for establishing allocated zones for aquaculture (AZAs) in the Mediterranean and Black Sea region. It is complemented by a toolkit, prepared by the GFCM Secretariat, which gathers a collection of useful documents and information regarding the practical implementation, benefits, and management of AZAs in Mediterranean and Black Sea countries.

This guide goes into the he needs for allocated zones for aquaculture. An Allocated Zone for Aquaculture (AZA) is “a marine area where the development of aquaculture has priority over other uses, and therefore will be primarily dedicated to aquaculture. The identification of an AZA will result from zoning processes through participatory spatial planning, whereby administrative bodies legally establish that specific spatial areas within a region have priority for aquaculture development” (Sanchez-Jerez et al., 2016).

The rapid development of aquaculture calls for an integrated coastal zone management (ICZM) approach to secure the sustainability of the sector. To this end, the urgent implementation of short, medium- and long-term measures is required to address the challenges currently facing the aquaculture industry, including market competition, environmental issues, allocation of space in coastal areas for aquaculture farms, and competition among the different users of the coastal space and resources. The latter challenge represents one of the major sources of concern and has increasingly become a focus of attention.

Considering the increasing pressure on coastal zones, the availability of suitable areas for marine aquaculture is becoming a bottleneck for the further development of the sector in the Mediterranean and Black Sea region. This situation calls for the improvement of site selection and the establishment of specific marine spatial planning for aquaculture, with a view to promoting a harmonious integration of aquaculture with other human activities occurring in coastal zones. In this context, establishing AZAs is considered a priority for the sustainable development of aquaculture in the Mediterranean and the Black Sea, as it could facilitate its integration into coastal areas and contribute to improved coordination among the different authorities and actors involved.

Guide for the Sustainable Development of Mediterranean Aquaculture 2.
Aquaculture site selection and site management.
(IUCN, 2009).

Sharing public domain areas and Conservation for the Mediterranean Sea reduce the availability of aquaculture areas. However, the demand for aquaculture products is on the rise, largely supported by the capacity of the aquaculture industry of the Mediterranean to provide a constant supply of quality products at stable prices. To ensure the sustainable development of the aquaculture in the Mediterranean requires even greater efforts; with this purpose, the selection and management of aquaculture sites, are important processes that need to be carried out in a sustainable way.

Most of the problems stem from the lack of a full notion of the essential elements that must be present in the selection processes and site management. Wrong decisions based on incomplete information, can jeopardize the sustainable development of aquaculture in the Mediterranean.

This guide aims to provide the reader with a comprehensive set of parameters and ideas to reflect on and then apply in the selection and management of aquaculture sites. They may not have addressed all aspects, but a real effort has been made to include those which, in our opinion, are sufficiently relevant and relevant within a sustainable work context.

CONCEPTS

Guide A: Importance of Knowledge
Guide B: Participatory approach
Guide C: Social Acceptance
Guide D: Precautionary Principle
Guide E: Scale Approach
Guide F: Adaptive Approach
Guide G: Economic Aspects

FRAMEWORKS

Guide H: Importance of Governance
Guide I: Legal framework
Guide J: Administrative Procedures
Guide K: Sectoral Planning
Guide L: Private Sector Organization

METHODS

Guide M: Integrated Coastal Zone Management (ICZM)
Guide N: Site Selection Process
Guide O: Ecosystem Approach

TOOLS

Guide P: Load Capacity, Indicators and Models
Guide Q: Environmental Impact Assessment (EIA)
Guide R: Environmental Monitoring Plan (PVA)
Guide S: Geographic Information Systems (GIS)

6 METHODOLOGICAL GUIDE TO SITE SELECTION

The methodology to be used for the selection of areas for aquaculture, in general terms, may contain many common aspects, but it will always be closely related to the type of aquaculture that is to be developed.

Therefore, it is very important to adapt the methodological processes described to the type of aquaculture being developed in each country or zone, and to apply the scale approach and the adaptive approach according to the level of development that is intended.

Coordinated spatial planning should encompass not only marine aquaculture, including transitional (brackish) waters, but also freshwater as well as land-based aquaculture (Recirculating Aquaculture Systems, RAS). It should also anticipate the development of offshore aquaculture, where natural conditions allow.

6.1. GENERAL GUIDELINES TO THE ESTABLISHMENT OF A SITE FOR AQUACULTURE.

Site selection first depends on the existing environmental conditions, and then on the activity planned. In designing a process for the establishment of Allocated Zones for Aquaculture (AZA), all limiting factors or priorities that could interfere with the proposed objectives of selecting sites for the sustainable development of aquaculture have to be taken into account (IUCN, 2009).

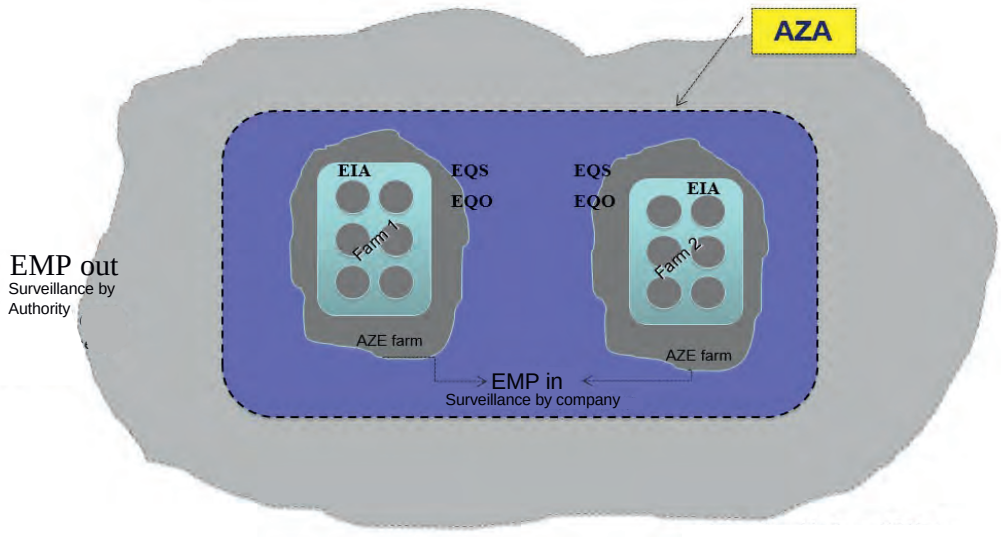
The IMO/FAO/UNESCO-IOC/WMO/WHO/IAEA/UN/UNEP Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP, 2001) defined "zoning" as follows:

Zoning may be used either as a source of information for potential developers (for example by identifying those areas most suited to a particular activity); or as a planning and regulating tool, in which different zones are identified and characterized as meeting certain objectives. Zoning of land (and water) for certain types of aquaculture developments may help in controlling environmental deterioration at the farm level, and in avoiding adverse social and environmental interactions. Conflict between different resource use activities can be avoided. By creating exclusive zones, a sense of ownership and heightened responsibility for environmental management may be created in the user community.

Zoning has also been defined by FAO, as the action of "dividing an area in zones or sections with different characteristics, or reserved for different purposes or uses, or conditions of use such as no take zones or reserves (see marine protected areas [MPAs]), biodiversity corridors, non-trawling areas and areas for exclusive use by small-scale fisheries or aquaculture" (Carocci et al., 2009).

The concept of AZA refers to a system that is enshrined within the wider ecosystem relations and that intrinsically involves the performance of different processes, such as identification, study, selection, and spatial analysis in order to obtain an area dedicated to planning, management and best practices in aquaculture (Figure 1).

FIGURE 1: Example of environmental monitoring areas within and outside the allowable zone of effe



EQO: environmental quality objective.
The legislation should define the EQO in order to preserve ecosystem services (Ref. Glossary in Appendix 3).

EQS : environmental quality standard.
The EQS is a value which specifies the maximum permissible concentration of a chemical in the water column and in the sediment (Ref. Glossary in Appendix 3).

AZE = Allowable Zone of Effects
EQO = Environmental Quality Objective
EMP = Environmental Monitoring Programm
EQS = Environmental Quality Standard
AZA = Allocated Zone for Aquaculture

(Macías et al., 2019)

Furthermore, the concept of AZA is used to refer specifically to a particular area identified within the planning or zoning of a larger and more important area in terms of spatial and temporal scale. AZAs can be considered as a spatial planning system or zoning carried out at the local or national level and aimed at integrating aquaculture activities into coastal zone areas, where aquaculture should have priority over other activities and uses of marine space and resources, and where negative interferences with these activities and uses are minimized or avoided. It involves coordination among different authorities and is based on a participatory approach.

Establishing AZAs is key for the development of aquaculture activities in each area as it allows one to streamline processes, offer suitable sites to companies, prevent or minimise conflicts among different activities and users, increase competitiveness, share costs and services, and secure investments. This process should be based on the best social, economic, and environmental information available.

The main aspects to consider for the establishment of AZAs are the type of activities proposed (type of aquaculture) and the geographic location and delimitation of the areas where cage farming would take place. If the development of aquaculture is declared of priority within AZAs, these zones are not limited to aquaculture. Other uses of the coastal space and resources can be implemented within AZAs and contribute to coastal development, which are also within the framework of the blue growth concept.

There is no fixed shape of spatial scope to be respected for the definition and establishment of an AZA. The shape, extent and dimensions can differ depending on the country, space availability, environmental conditions, type of aquaculture and number of companies present. Therefore, an AZA may be a specific area, a polygon, an entire bay, a part thereof, or of any other shape resulting from a zoning process of physical planning in which specific areas are assigned to aquaculture activities.

The general aspects to be taken into consideration as a starting point for the selection and establishment of AZAs could be summarized as follows:

- Which kind of aquaculture will be developed?
- Type of aquaculture existing in the area (if any)?
- Main activities in the area?
- Legal context in place?
- Environmental conditions in the area?
- Socio-economic context in the area?
- Competent authorities and main stakeholders in the area?
- Market opportunities?

The identification, selection, and establishment of AZAs are mainly based on:

BASIC KNOWLEDGE

As much information as possible must be gathered, based on criteria of information utility and costs of collection. A minimum set of parameters should be selected for administrative, environmental, and socio-economic aspects, based on scientific and local traditional knowledge.

ANALYSIS

The use of geographic information systems (GIS) to select the optimal areas for aquaculture, and an analysis of the data related to the selected parameters are then necessary to verify the feasibility of the implementation of AZAs and determine the best applicable options.

INTERPRETATION

The interpretation of the analysis results is the intermediary step linking together the analysis of the parameter data and the proposal.

AGREEMENT AND CONSENSUS

The proposal should be agreed among users and stakeholders.

ESTABLISHMENT OF THE AZA

Following a participatory approach;

MONITORING AQUACULTURE ACTIVITIES

Temporal and spatial control are always necessary to ensure the efficient management and best use of AZAs from an environment-friendly point of view.

The establishment of an AZA is a complex process in which various phases should be adjusted according to the study area context, requirements and needs. The implementation of the different phases is reported as following:

PHASE 1: CONTEXTUALIZATION OF THE ESTABLISHMENT PROCESS

1 Analysis of the aquaculture sector in the study area

This analysis takes into consideration, among others, the needs or development goals for establishing an AZA in three types of areas:

- For areas with no existing aquaculture activities, thus finding new areas for the development of the sector.
- For areas where the development of the activity is at an early stage, thus identifying areas for aquaculture; and
- For areas where the sector is already developed, and appropriate regulation is still needed for managing the activity.

2 Analysis of the legal framework

The development of aquaculture should be framed within the current legal and regulatory context specific to each country, concerning in particular: aquaculture activities, space occupation, environmental protection, food security, health monitoring and control.

The analysis of the legal framework is focused on the process involved for obtaining a licence and the potential limiting factors that influence licencing processes at the local level. These limiting factors will have to be taken into consideration in a detailed analysis in order to overcome potential difficulties.

3 Spatial analysis and delimitation of the study area

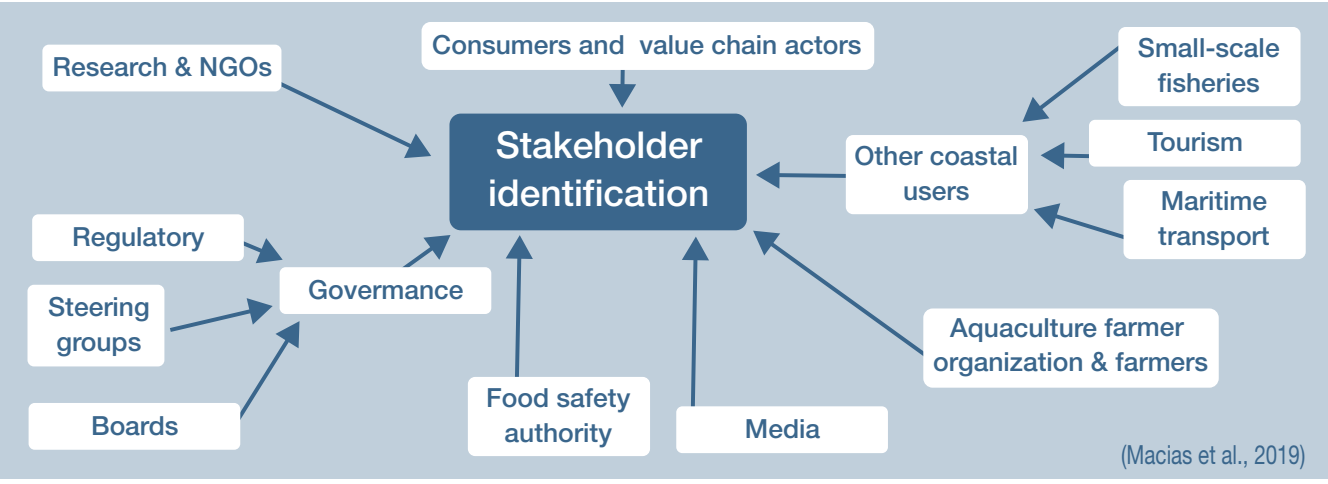
The geographical boundaries of a specific study area can be established once the knowledge on the sector and its regulatory, environmental, and socio-economic context is gathered. To support the spatial analysis, different maps or existing charts could be used, such as:

- Appropriate scale base mapping.
- Digital orthophotography of the area; and
- Nautical charts of the area, or other maps.

4 Identification of the agents and other stakeholders that influence the AZA establishment process

Government agencies are identified, including national and local authorities and other stakeholders, as appropriate, for each topic related to the activity. The stakeholders need to be involved at different levels during the various phases of the process of the identification and implementation of the AZA.

FIGURE 4: Example of potential stakeholders in the establishment of AZAs



PHASE 2: INFORMATION AND DATA COLLECTION

1 Selection of scope and study parameters

The selection of the parameters to be analysed is carried out based on a dual analysis taking into consideration both the administrative and the environmental working lines.

2 Field work and data collection

The collection of information includes the following:

- Strategic documents relevant to the study: strategic plans and sector-specific studies, standards and applicable laws, technical studies and projects related to the subject matter, mapping, satellite images and others.
- Scientific fieldwork: environmental data and information from grey literature.
- Snon-scientific fieldwork: technical visits and interviews with stakeholders; and
- Other sources.

PHASE 3: PRE-SELECTION OF AZA

1 Establishment of criteria for spatial analyses, for representation is as important as the technical knowledge of GIS tools, since they will determine the spatial analysis to be performed. These criteria will be directly related to the information provided by the different administrations, according to the project objectives and the conditioning factors, which are part of the process. They are criteria of both administrative and environmental types.

2 Preliminary maps and reports. In parallel with the collection of information and fieldwork (i.e. technical visits, interviews, etc.), a process of integration and mapping of the information and technical reports has to be undertaken.

PHASE 4: CONSULTATIONS AND VALIDATIONS OF PROPOSED AREAS

1 Consultations: application of the participative approach. Once data are available and a first approach to the AZA has been prepared, this information (including reporting and mapping) must be shared with all the stakeholders involved in the process in the context of workshops, multi-stakeholder platforms, meetings and expert panels for analysis, validation and suggestions for improvements, with a view to enhancing social acceptability and avoiding conflicts.

2 Thematic cartography and support reports. The cartographical information generated is based on the aquaculture operations, availability of space, uses and activities, legal framework and criteria obtained from the interviews.

PHASE 5: ANALYSIS OF AQUACULTURE POTENTIALITY

1 Environmental studies: characterization of the area and carrying capacity.

The environmental characterization of the study areas is also a key aspect to determine the suitability for carrying out different types of aquaculture. Indeed, the promoters and companies interested in developing aquaculture initiatives need to know if the environmental conditions and water quality in the area are suitable for the establishment of an aquaculture operation. A description of the main environmental factors that may contribute to determining the suitability for marine farming including climate, water quality, hydrology, oceanography and bathymetry.

2 Description of the socio-economic context

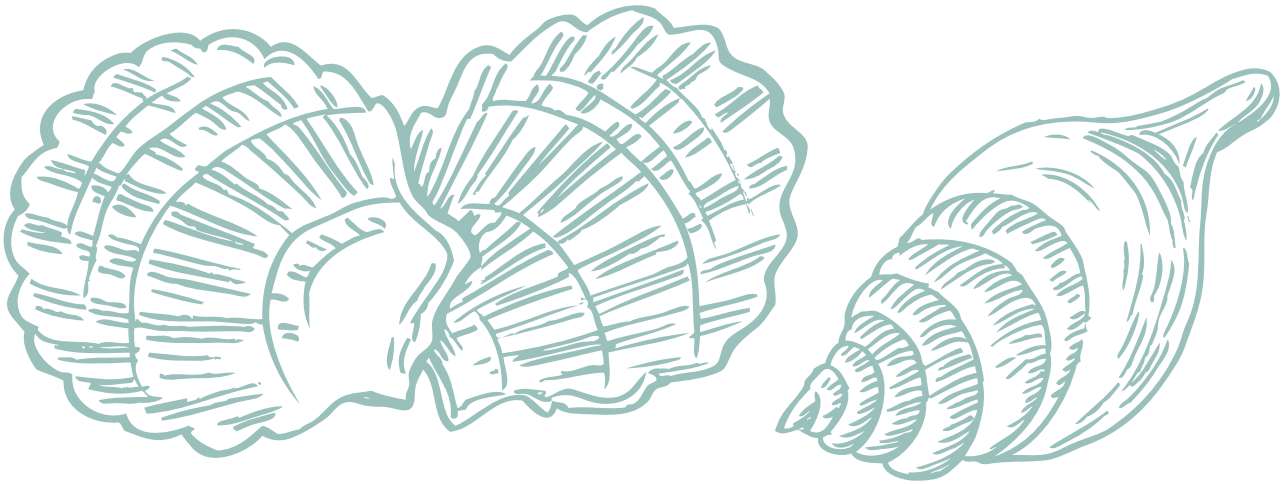
An analysis of the socio-economic status of the study area should be undertaken in order to identify the context in which aquaculture is going to take place, including the interrelations and possible effects of other users such as traditional artisanal fisheries.

3 Degree of compatibility

Greater depth analysis should be undertaken based on the preliminary maps. Specifically, according to the results of the phase 3 (normally based on administrative incompatibilities of spatial uses) and having integrated all the information obtained during the previous steps, a level of interest should be estimated and introduced into the model.

4 Proposal of aquaculture activities inside the AZA

AZAs are areas in which specific aquaculture projects are located. This could imply the creation and establishment of new companies (producers) that require new licences and leases. These new licences and leases undergo specific and complex administrative processes, in which the proposal of the project is central (GFCM, 2018).



PHASE 6: CARRYING CAPACITY AND MONITORING PLANS

1 Design and drafting of management and monitoring plans for AZAs

Management plans must be designed and implemented in coordination with the users of the AZA. Since a project is developed in the maritime-terrestrial public domain of the coastal areas, the evolution and dynamics of the uses and new uses must be considered. Changes need to be monitored and indicators established for testing the evolution and performance of the system.

2 Carrying capacities

An holistic approach to carrying capacity is necessary and has to take into consideration all measurable parameters, including environmental, social, physical, production and economic aspects of the activity (IUCN, 2009). Some projects such as MIMECCA led by CTAQUA has been aware of these gaps, compiling relevant information, elaborating execution indicators and developing carrying capacity protocols for offshore and onshore aquaculture.

Indeed, "carrying capacity is an important concept for ecosystem-based management, which helps set the upper limits of aquaculture production, given the environmental limits and social acceptability of aquaculture, thus avoiding 'unacceptable change' to both the natural ecosystem and the social functions and structures" (Ross et al., eds, 2013). Four categories of carrying capacity have been defined, i.e. physical, production, ecological and social carrying capacity, as reported by Inglis, Hayden and Ross (2000), and by McKinney et al. (2006) (cited in Ross et al., eds, 2013):

- Physical carrying capacity is based on the suitability for development of a given activity, taking into account the physical factors of the environment and the farming system.
- Production carrying capacity estimates the maximum aquaculture production and is typically considered at the farm scale. For the culture of bivalves, it is the stocking density at which harvests are maximized.
- Ecological carrying capacity is defined as the magnitude of aquaculture production that can be supported without leading to significant changes to ecological processes, services, species, populations or communities in the environment.
- Social carrying capacity has been defined as the amount of aquaculture that can be developed without adverse social impacts.

3 Establishment of AZAs and management and monitoring plans

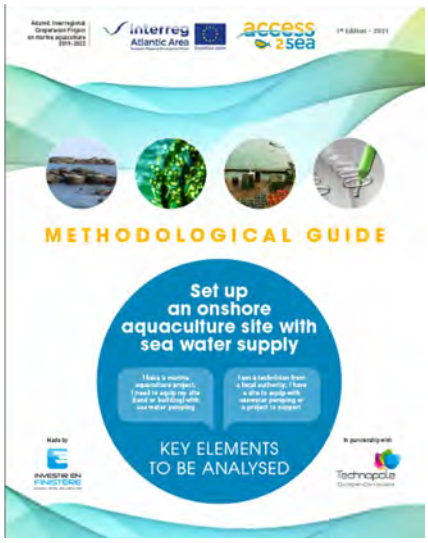
At the end of the process, the authority with competencies in aquaculture, in coordination with other authorities such as the ministries dealing with maritime affairs, transport and environment and other local authorities, should legally establish the AZA and include it into national legislation and regulations, as appropriate.

PHASE 7: INTEGRATION OF AZAS INTO THE LEGAL FRAMEWORK

The results obtained constitute in themselves a planning tool and, as such, must be integrated into national strategic plans and implemented. Integrating the AZA within the legal framework aims at endowing the selection and establishment of the area with legality and formality. Sometimes, the publication of studies and reports and their dissemination in the scientific, administrative and private domains can be tools for planning.

For each context, the best strategy to be followed must be coherent with the strategic plan and based on the rules governing aquaculture in that country.

6.2. CASE STUDY ON ONSHORE AQUACULTURE SITE WITH SEA WATER SUPPLY.

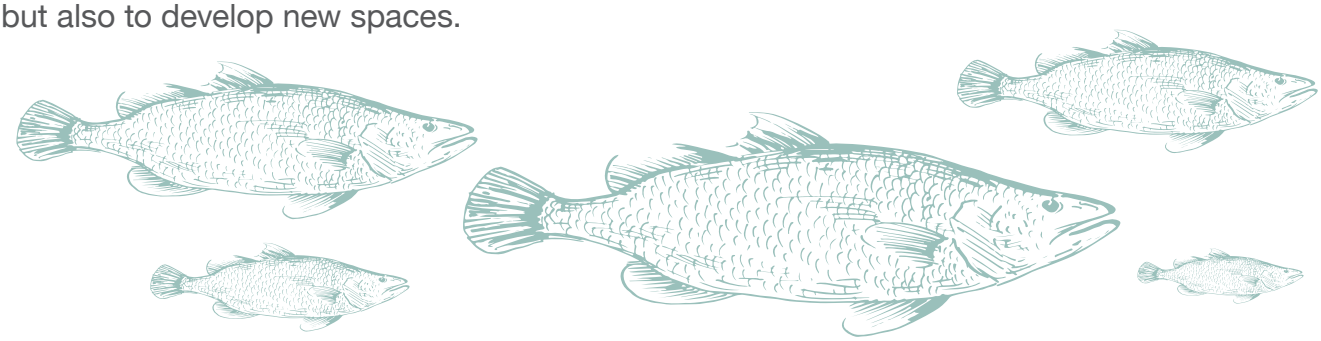


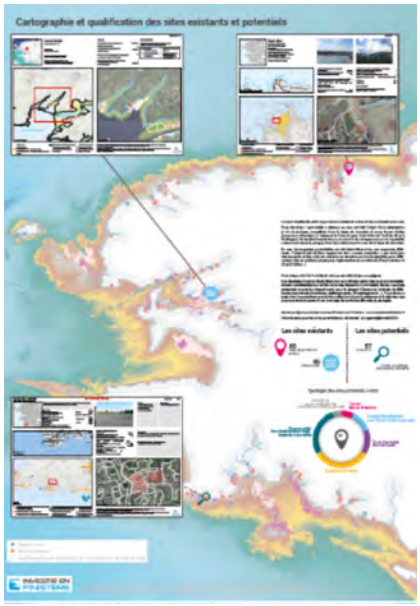
This is the specific case for the region of Finistère and established in the **METHODOLOGICAL GUIDE: Set up an onshore aquaculture site with sea water supply.**

Finistère has an undeniable natural asset that cannot be relocated: its seafront! Its 1,391 kilometres of coast make it the first maritime department of metropolitan France. Marine aquaculture has been present here for a long time, particularly shellfish farming centred on the breeding of mussels and oysters, harvesting and growing seaweed. It is a space rich in resources and carrying a major potential for the economy of the territory.

Spontaneously, the notion of sea access evokes naval, nautical or tourist activities. But access to the sea is also a necessity for production companies using seawater in their processes: on the ground with pumping equipment or basins and at sea, through concessions. This is the case of shellfish farmers, wholesalers and more generally all aquaculture activities, or companies in the cosmetics or biotechnology sector.

The sea is a resource that cannot be relocated, and Finistère has a real interest in maintaining and developing aquaculture activities. In Finistère, marine aquaculture covers two geographical realities which, depending on the project, may be complementary or independent: sea-based concessions and land-based sites supplied with sea water. For offshore aquaculture activities that require onshore structures, the choice of site is decisive (often in the immediate vicinity of production). The professionals must be able to have concessions at sea and spaces on land dedicated to these production activities. This implies to consolidate and maintain existing sites, but also to develop new spaces.





However, setting up an economic activity on the coast requires dealing with various kinds of difficulties (legal complexity, land pressure, acceptability, etc.) that slow down or even provoke the relocation of projects. Spatial planning of dedicated spaces is a means of promoting the cohabitation of activities and their acceptability. This is the objective of the proposed cartography and geographic information system (GIS): to identify and qualify existing spaces and identify potential spaces.

This work aims to **make sustainable blue growth a reality in Finistère and facilitate the creation and development of companies.** The latter are creators of territorialized jobs; they are essential links to any value chain and the economic vitality of the territory.

The location of the aquaculture premises must take into account the distance from the coastline for both the raw seawater supply and the wastewater discharge. The pressure of land use on the seashore and the occupation of harbours may lead the project developer to look for a more distant site. However, depending on the activity, areas more than 2500 m from the coast and at an altitude of more than 50 m are generally considered to be outside the scope of the study for technical and economic reasons.

Aquaculture remains a primary production sector overall (comparable to agriculture): the supply of quality sea water is at the heart of the aquaculture production system. In its search for a site, the project owner must be able to be confident of a regular, high-quality water supply, the possibility of carrying out controls and sanitary monitoring, of being able to intervene in an emergency in the event of a failure, and of carrying out adequate maintenance of pumping units and pipes.

It is because these activities have characteristics and constitute a development potential for Finistère, that Investir en Finistère, with the support of the Technopole of Quimper Cornouaille, decided to produce this methodological guide.

Methodology

Regarding to the site selection, the location of the aquaculture premises must consider the distance from the coastline for both the raw seawater supply and the wastewater discharge.

The following must be checked:

1) The possibility of siting a seawater pumping system considering the constraints of raw water quality, the regulatory framework, the tidal range, the available land, the protection against marine submergence and climatic phenomena (see flowchart for the implementation of a pumping station).

2) The possibility of laying seawater discharge pipes between the place of abstraction and the site of installation and obtaining permission to lay private pipes in public domain.

3) The way the raw sewage is to be treated. 4) Acceptability of the receiving environment regarding environmental constraints or authorization for discharge to a treatment plant.

The types of aquaculture have been considered in this guide are the following:

- SHELLFISH AQUACULTURE
    - o Land-Sea interface at the heart of the activity
- LAND-BASED CULTURE IN PONDS
    - o Seaweed Farming
- FISH FARM:
    - o Small experimental platform, multi-species experimental platform, sea bass and sea bream hatchery, Turbot type hatchery Pre-growth (PG), Recirculating production system salmon.
- BIOTECHNOLOGY AND COSMETICS

Differentiated cartographic approaches on land and at sea

The exploitation of the database made it possible to elaborate an atlas of the existing sites with their precise characterization (land, real estate, equipment, town planning ...). Potential sites have been identified in several stages. On land, spaces that cannot be used for production activities have been excluded (altimetry, regulatory criteria, etc.) areas with stakes have been defined with their assets and constraints. Then, based on factual criteria (regulation, pumping conditions, water quality ...) potential sites were prioritized according to their degree of operational opportunity. An initial estimate of the costs of connection to seawater has been made. At sea, the mapping has highlighted potential areas, after exclusion of perimeters that cannot accommodate marine crops (currents, swells, bathymetry ...).

Share knowledge with professionals and elected officials

The results of this work are intended to be shared to facilitate the implementation of entrepreneurial projects in the fields of aquaculture and marine biotechnology. Their dissemination to elected officials will also facilitate a better consideration of the maritime economy and the needs of professionals in planning and economic development policies. The database will be updated regularly.

Data Producers / Partners

Planning documents, Road network, Topography, Shellfish Establishments, Shellfish cadastre, Water intakes, Coastal towns, Coastline

DATA BASES

Some criteria used are the following:

REGULATORY CONSTRAINTS	Planning documents	Protected areas under article L146-6 of the urban planning code / remarkable coastal areas
		Wetlands
		Regulatory zoning prohibiting new constructions
		Military Zoning
		Protected woodlands
	Coastal law	Spaces in discontinuity of urbanization
		Spaces located behind a dune cordon or protected area without existing infrastructure allowing access to the sea
	Easements	Spaces within 100 m of ICPE Classified Establishments
	Protected areas	Classified sites
		Spaces under protection of biotope protection orders
		Sensitive Natural Spaces owned by the County Council or the Coastal Conservatory
		ENS pre-empting areas
		Other protected areas
IMPLEMENTATION FACILITIES	Mutability	Urbanized residential areas or urbanization in the short term
		Active tourist areas
		Built sites or former aquaculture sites that have been transferred or do not offer transfer capacity without engaging in major work
		Spaces with agricultural vocation whose interest to mutate is to be determined
		Land hardness
		Proximity to activities related to the sea
	Regulatory	Zoning specific to aquaculture activities
	Political Leadership	Ongoing project / preflighted space for the development of sea-related activities
	Logistics	Access equipment to the sea
		Proximity to / inscribed in a port area
		Proximity of / registered in a zone of economic activity
		No road access to the site
		Difficult access heavy trucks to the site
		Network topology

CONDITIONS OF ESTABLISHMENT / EXPLOITATION	Topography	Topography of the site
	Risks	Risks of marine submersion
		Risks of erosion of the coastline
	State of the land	State of the land (built / wasteland / bare land serviced or to be serviced / port moored)
		Surface of the site (perimeter of study / operational perimeter)
PUMPING CONDITIONS	Costs of connection work	Space located at more than 60 m of altitude
		Space located more than 2 km from the coastline
		Space more than 20 m above sea level and more than 1,000 m from the low water mark
		Accidentology of the course
		Coastline geology
	Availability of the resource	Pumping capabilities
	Equipment / pooling	Site equipped / near water intake(s)
		Presence of a wedge type infrastructure that can be used as a support for the installation of a future water intake
WATER QUALITY	Quality	Sanitary classification for seashells
		Risks of pollution (capture / exploitation / rejection)
		Checkpoints
	Physical characteristics	Risks of variation of the salinity of the water
		Coastal Geology (muddy bottoms)
		Strong brewing / strong currents
RISKS OF CONFLICT OF USE	Related to the vocation of the spaces	Proximity of / inscription in / located in front of littoral zone of dense habitat
		Proximity to camping in activity
	Linked to the risks of legal recourse	Status of planning documents
	Related to water quality	Near the beach

Collection and processing of data

At first, an important work of census, collection and aggregation of the data was initiated. This phase made it possible to assess the state of knowledge, identify gaps and organize information, sometimes heterogeneous, in a common cartographic reference system at the Finistère scale. From these reference data, a first list of existing sites has been drawn up.

Concertation / Land

Interviews with professional federations

Meetings with communities and research organizations

Field visits

Exchanges with local actors and field verifications

All the sites surveyed were visited when they were accessible and public. Numerous exchanges made it possible to refine the identification and the qualification of the sites. Extensive consultation work has been conducted with institutional stakeholders, representatives of maritime industry professionals and the scientific community. A working group co-piloted the study, associating the Regional Council, the County Council, the DDTM of Finistère, the CCIMBO, the three maritime countries, the intercommunalities, the technopoles, the Natural Marine Park of Iroise, the World Campus of the Sea, the Brittany Atlantic Sea Pole and Hop!

Structuring a map database

All information has been organized into a single map database for the whole department, whether the site is on land or at sea, existing or potential. This database constitutes an initial inventory of sites and can be further enriched and updated. It is based on a fine geographical grid since the information has been structured at the plot scale (land or shellfish cadastre).

7 MARINE SPATIAL PLANNING (MSP) IN AQUACULTURE: KEY TRANSFERRING ASSESSMENT INDICATORS

Marine Spatial Planning is a long process involving various actors as well as data. However, this process allows to plan and share coastal spaces in particularly stressed areas.

From the different methodologies analysed, the case studies and the specific bibliography for the selection of areas for aquaculture, a series of common aspects and indicators can be extracted from which to carry out the transfer of knowledge.

It is also important to consider the different terminology used for the designation of areas for aquaculture. So, there are areas of interest, suitable areas, assigned areas, aquaculture management area (AMA), etc., but in this case, we will focus the analysis on the allocated zones for aquaculture (AZA).

In general terms, in each area, the process to establish AZAs or any kind of site for aquaculture, should conform to the existing strategic plan(s) for aquaculture and comply with the following principles, among others:

- an AZA should be considered within an EAA perspective, promoting sustainable development, equity, and resilience of interlinked social and ecological systems.
- an AZA should be considered within an ICZM approach.

- the AZA establishment process should follow a participatory approach and be transparent.
- the identification of AZAs should be based on the best administrative, social, economic, and environmental information available.
- the reliability of the information should be ensured, and the dialogue among stakeholders and all users of the maritime public domain should be facilitated.
- the monitoring of AZAs should be mandatory; an environmental monitoring programme should be defined for each AZA, be flexible and take into account the scale (time and space) approach.
- the preparation of the AZA establishment process should be coordinated by the main authority responsible for marine planning at the local level, and prepared in cooperation with the different authorities and stakeholders involved in aquaculture licensing and leasing procedures and monitoring; and
- AZAs should be regulated by normative frameworks and included in national or regional legislations.

In addition, AZAs should:

- be perfectly positioned geographically and defined by a coordinate system compatible for integration within spatial planning tools.
- define a management plan in which all aspects are considered (i.e. the performance of the established companies, their interrelation and interactions with the common environment);
- include zones fiscally reserved for aquaculture activities and facilities; and
- be part of the physical plan in which the criteria for their preparation are described in terms of exclusion.

The management plan must address all the relevant issues, have very clear and achievable operational objectives for each issue, and a clear timeline for completion with targets and indicators.

SOCIAL	ECONOMIC	ENVIROMENTAL	GOVERNANCE
• Quality of labour conditions • Socio-economic benefit to the local community • Positive perception by local community • % of local people employed • % of local women employed	• Average farm profitability • Level of disease outbreak • % of losses during poduction period • Market demand • Product quality and safety • % certified	• Average food conversion rate • Level of eutrophication (e.g. TRIX index) • Benthic diversity at edge of area (cages) • Water quality at outfall (ponds)	• Adoption of Code of Conduct or good aquaculture practices • AMA certification • Compliance of farmers to management measures • Level of transparency

(Aguilar-Manjarrez, J., Soto, D., & Brummett, R. (2017).

Performance indicators must be set to inform whether set targets are being achieved, while efficiency indicators would show if there has been any improvement. The indicators that are selected should cover sustainability dimensions (social, economic, environmental, and overarching governance) at the aquaculture area scale.

For each objective, an indicator and its associated performance measures should be selected so that the performance of each objective can be measured and verified (Table). The choice of indicators to be measured should reflect the cumulative impacts within the management area. A monitoring programme to keep track of implementation must be put in place.

	ISSUES	OPERATIONAL OBJETIVES	
SOCIAL	Limited acces to inputs (seed, feed, capital, etc.)	Increase access to seeds by 20% (all farmers in the area) in two years	
ECONOMIC	Production losses due to fish diseases	Diminish losses by 30% in two years	
ENVIROMENTAL	Eutrophication of the common area	Diminis eutrophication by 40% in three years	
	Use of chemicals impacting biodiversity	Use only authorized medication; All medication used under guidance of heath specialist	
GOVERNANCE	Inadequate monitoring and control	Regular monitoring of performance indicators and compliance of farmers; All farmers in the area management complying to management plan	
	Lack of institutional capacity	Designated management commitee members are knowledgeable, efficient and well trained	

	INDICATORS	TARGET (E.G. IN 1 YEAR)	MANAGEMENT MEASURES
	Average seed (biomass,numbers, etc.) being bought by farme per growing cicyle	10% increase first year	Build a hatchery for the AMA
	Mortality Index	20% reduction by second year, continual reduction thereafter	Establish a biosecurity framework in the area with all relevant procedures
	Oxygen, fish kills, chlorophyll-a (Chl-a)	Diminish eutrophication by 20% in the first year	Establish the carrying capacity for nutrients in the area; Reduce total production until meeting maximum allowable according to carrying capacity
	Use of (extent, percentage, biomass, etc.)banned chemicals and medication	Zero use of banned chemicals and medication by year 2	Designation of a common veterinarian; All medication given under supervision and coordinated
	Number of performance indicators and related thresholds being recorded	Thorough annual monitoring of indicators and full report after year 2	Regular monitoring survey with standard analysis and regular reporting and evaluation
	Number of key post filled	All area management post filled in first year	Training and standard operating procedures on key management measures

Aguilar-Manjarrez, J., Soto, D., & Brummett, R. (2017)

From the point of view of the transfer of knowledge obtained for the selection of areas for aquaculture, the main indicators to consider are the following:

INDICATORS	DESCRIPTION
Information and data collection	This indicator refers to the level of information and data necessary to initiate a zone selection process by applying marine spatial planning.
Criteria, methodology and models	This indicator refers to the criteria adopted for the selection of zones, the methodology used, and the models selected for the spatial analysis.
Knowledge and research	This indicator refers to the level of prior knowledge, researchers involved in the process, experience in selecting areas for aquaculture.
Participation	This indicator refers to the application of the participatory approach to design the zone selection process, counting on all the parties and agents involved.
Sectorial planning and sector bodies	This indicator refers to the information available on the aquaculture sector and its representative organizations, and their development and expansion objectives, which must be considered for the zone selection process.
Legal framework	This indicator refers to the analysis of the legal context and its relationship with the development of aquaculture, so that the selection of areas is fully aligned with current legal criteria.
Integrated management coastal areas	This indicator refers to taking into account the integrated management approach in zone selection processes, given the number of agents involved and the complexity of coastal zones.
Ecosystem approach	This indicator refers to the application of the ecosystem approach in the design of area selection procedures, with the aim of achieving sustainable development of aquaculture.
Spatial analysis (GIS)	This indicator refers to the use and application of spatial analysis for the selection and establishment of areas for aquaculture, as a fundamental tool to achieve correct and adequate planning.
Environmental assessment and monitoring	This indicator refers to the need to include in the analysis of the selection of areas, good information on the environmental evaluation of the activity, as well as the necessary follow-up processes afterwards.
Carrying capacity	This indicator refers to the evaluation of the carrying capacity of the system, as a key element for the proposals for the development of the activity carried out in the areas selected for aquaculture.
Economic aspect	This indicator refers to the need to include socio-economic aspects in the feasibility analyses carried out for the development of the activity in the selected areas.
Social acceptability	This indicator is linked to the participatory approach and is related to the need to have the acceptance of the activity by society, as a fundamental element for the good development of the activity.

Comparing and sharing their experiences, A2S partners identify some common steps to all the approaches studies:

- Terminology used in each case for the designation of zones for aquaculture.
- The importance of aquaculture planning and development: needs, growth and trends.
- Key environmental aspects to achieve sustainability goals.
- It is necessary to generate documentation, cartographic tools and dissemination
- Very important to adapt methodologies to different areas and different scenarios
- Spatial approach can be a beginning
- Cartography and GIS support needed
- As basic and starting information, it is important to know the area and the legal aspects
- It is highly recommended to include economic aspects in our viability and growth analyses.

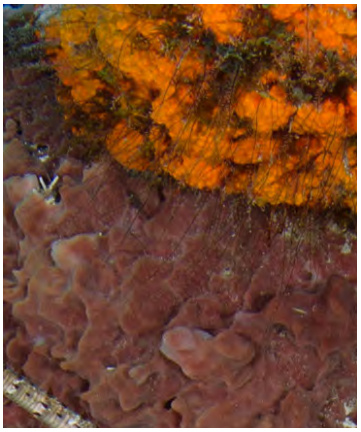
8 CONCLUSIONS

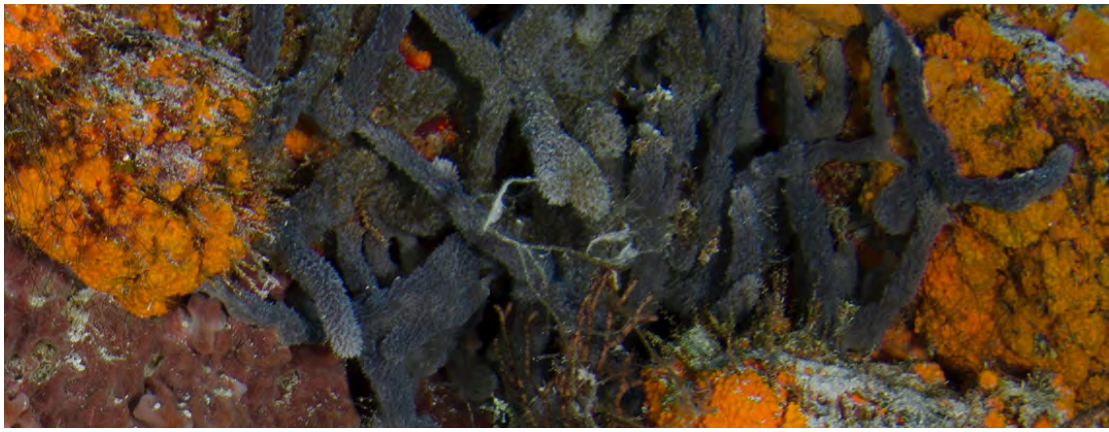
From all the information analysed in relation to marine spatial planning and zoning in aquaculture, in the context of this project, the following conclusions have been obtained:

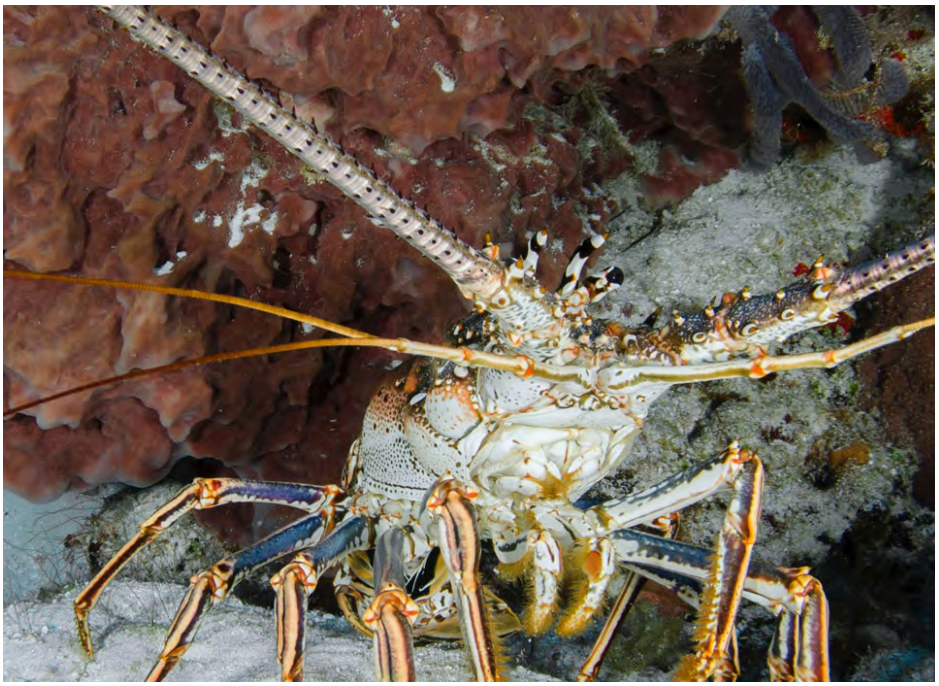
- Aquaculture in general and on the European Atlantic coast has great potential, but it needs spaces for its development as a productive activity. This activity is a special sector included in the Blue Growth Agenda in the EU, driven by a range of factors including increasing consumption and export potential.
- Aquaculture constraints in its expansion, due to the competition for space with other marine uses, concerns regarding ecological impacts, difficulties in obtaining 'social license', complicated planning regimes, along with other challenges.
- The need for spaces for the development of the activity implies the constant search for new areas, which must comply with many conditions and specifications.
- Marine spatial planning is identified as a tool to support the selection of areas for aquaculture, following the criteria of an integrated approach and joint analysis.
- The implementation of MSP in Europe, as an integrated, cross-sectoral and ecosystem-based planning framework, with its requisite features of integration, participation and

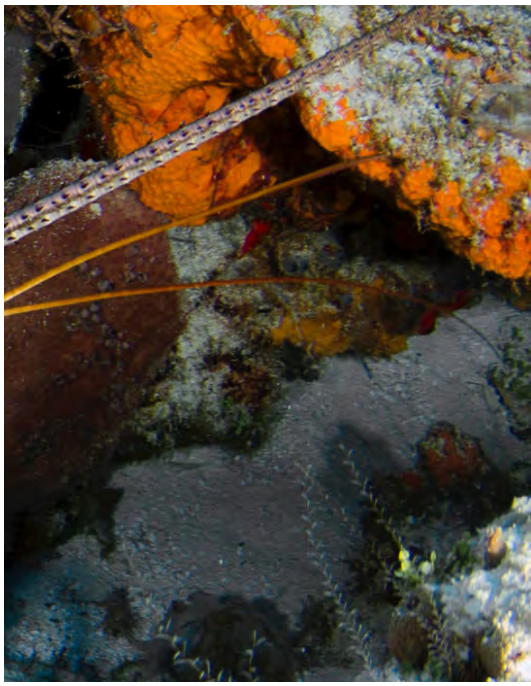
adaptiveness, provides a developing context which may provide an opportunity to address some of the planning constraints faced by the sector.

- The practical cases analysed in the context of the project and coming from different countries and scenarios, allow us to extract relevant methodological aspects for their transfer to other Atlantic areas.
- In general, the methodologies analysed for the selection of areas are similar and include a series of common aspects such as spatial analysis, the participatory approach, environmental aspects, etc.
- Based on the information collected in the project, complemented with other sources that work on the selection of areas for aquaculture, it provides a set of information and methodological recommendations, highly interesting for the sustainable development of aquaculture.
- The planning models analysed within the framework of this project highlight the importance of marine spatial planning tools for the development of aquaculture in its different modalities. So, in the Atlantic areas, there are normally going to be two situations: inland aquaculture/intertidal zones, and on the other hand off shore marine aquaculture. In both cases, a good selection of parameters and criteria, good information and data, such as those identified in the analysed Atlantic models, allow increasing the guarantees of success of aquaculture projects on the European Atlantic coast.









9 BIBLIOGRAPHY

- Aguilar-Manjarrez, J., Soto, D. & Brummett, R. 2017. Aquaculture zoning, site selection and area management under the ecosystem approach to aquaculture. A handbook. Report ACS18071. Rome, FAO, and World Bank Group, Washington, DC. 62 pp. Includes a USB card containing the full document (395 pp.).
- Carocci, F., Bianchi, G., Eastwood, P. & Meaden, G. 2009. Geographic information systems to support the ecosystem approach to fisheries: status, opportunities and challenges. FAO Fisheries and Aquaculture Technical Paper. No. 532. Rome, FAO. 101 pp.
- Directive 2014/89/EU of the European Parliament and of the Council of 23 July 2014 establishing a framework for maritime spatial planning.
- Ehler, C. (2014). A Guide to Evaluating Marine Spatial Plans. IOC Manuals and Guides, 70 (ICAM Dossier 8).
- Ehler, C. N. (2018). Marine spatial planning: an idea whose time has come. pp 6-17 in Offshore Energy and Marine Spatial Planning, ed. Yates, K. & Bradshaw, C. Routledge, London.
- European Commission (2013). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Strategic Guidelines for the sustainable development of EU aquaculture. (COM(2013)229).

- European Commission (2021). COMMUNICATION FROM THE COMMISSION TO THE EU-ROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMIT-TEE AND THE COMMITTEE OF THE REGIONS Strategic guidelines for a more sustainable and competitive EU aquaculture for the period 2021 to 2030.
- European Commission (2007). COMMUNICATION FROM THE COMMISSION TO THE EU-ROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMIT-TEE AND THE COMMITTEE OF THE REGIONS An Integrated Maritime Policy for the Euro-pean Union {COM(2007) 574 final)}
- FAO, IFAD, UNICEF, WFP and WHO. 2017. The State of Food Security and Nutrition in the World 2017. Building resilience for peace and food security. Rome, FAO. viii+119 pp.
- Jones, P. J., Lieberknecht, L. M., & Qiu, W. (2016). Marine spatial planning in reality: Introduction to case studies and discussion of findings. Marine Policy, 71, 256-264.
- Galparsoro, I., A. Murillas, K. Pınarbaşı, Á. Borja, A. M. O´Hagan, E. MacMahon, . . . L. Arantzamendi (2018). Synthesis of the lessons learned from the development and test-ing of innovative tools to support ecosystem-based spatial planning to aquaculture (revised). AquaSpace project (H2020 no 633476) Deliverable 5.1. Oban, SAMS. 103 pp.
- GESAMP (IMO/FAO/UNESCO-IOC/WMO/WHO/IAEA/UN/UN Environment Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection). 2001. Planning and management for sustainable coastal aquaculture development. GESAMP Reports and Studies. No. 68. Rome, GESAMP. 90 pp. (also available at www.fao.org/3/a-y1818e.pdf).
- GFCM. 2018. Strategy for the sustainable development of Mediterranean and Black Sea aquaculture. Rome, FAO. 16 pp. (also available at http://www.fao.org/3/I9766EN/i9766en.pdf).
- Greenhill, L. 2018. Challenges and Opportunities for Governance in Marine Planning, pp. 56-73, in Yates, K and
- Hofherr, J., Natale, F., & Trujillo, P. (2015). Is lack of space a limiting factor for the development of aquaculture in EU coastal areas? Ocean & Coastal Management, 116, 27-36.
- IUCN. 2009. Guide for the Sustainable Development of Mediterranean Aquaculture 2. Aquaculture site selection and site management. IUCN, Gland, Switzerland and Malaga, Spain. VIII + 303 pp.(also available at por-tals.iucn.org/library/sites/library/files/documents/2009-032.pdf).
- Macias, J.C., Avila Zaragozá, P., Karakassis, I., Sanchez-Jerez, P., Massa, F., Fezzardi, D., Yücel Gier, G., Franičević, V., Borg, J.A., Chapela Pérez, R.M., Tomassetti, P., Angel, D.L., Marino, G., Nhhala, H., Hamza, H., Carmignac, C. & Fourdain, L. 2019. Allocated zones for aquaculture: a guide for the establishment of coastal zones dedicated to aquaculture in the Mediterranean and the Black Sea. General Fisheries Commission for the Mediterranean. Studies and Reviews. No 97. Rome, FAO. 90 pp.
- Meaden, G.J., Aguilar-Manjarrez, J., Corner, R.A., O'Hagan, A.M. & Cardia, F. 2016. Marine spatial planning for enhanced fisheries and aquaculture sustainability – its application in the Near East. FAO Fisheries and Aquaculture Technical Paper No. 604. Rome, FAO.
- Sanchez-Jerez, P. 2011. Environmental criteria for site selection. In GFCM. 2011. Site selection and carrying capacity in Mediterranean marine aquaculture: key issues (WGSC-SHoCMed).

PROJECT FINANCED BY THE INTERREG ATLANTIC AREA PROGRAM
TO THROUGH THE EUROPEAN REGIONAL DEVELOPMENT FUND.

Deliverable: Access2sea best practices Monographic
Author(s): Aurore Coppens / José Carlos Macías
Date: 30/8/2022
WP, Action: WP4, Action 3
WP Leader: Investir en Finistère
Contact: access2sea@ceeicadiz.com

	Name	Partner	Date
From	Aurore Coppens	P5. Investir en Finistère	1/2/2022
Reviewed by	All partners	All Access2sea partners	30/5/2022
Approved by	Ana Suárez Lena / María Galindo	P1. CEEI Bahía de Cádiz / P4. Centro Tecnológico CTAQUA	30/8/2022

Version	Date	Comments/Changes	Author/Partner
1	30/8/2022		Aurore Coppens P5. Investir en Finistère and José Carlos Macías as External Expert of P1. CEEI Bahía de Cádiz

DISCLAIMER

Lead Partner

CEEI Bahía de Cádiz
C/ Manantial, 13. Edificio CEEI
Polígono Ind. Las Salinas de San Jose Bajo
11500 El Puerto de Santa María (Cádiz) - Spain
Tlf: (+34) 956 860 654 / Fax: (+34) 956 860 028
E-mail: asuarez@ceeicadiz.com
Web: www.ceeicadiz.com

Partners

Centro Tecnológico de Acuicultura de Andalucía
Muelle Comercial S/N
11500 El Puerto de Santa María (Cádiz) - Spain
Tlf: (+34) 956 56 93 63
E-mail: mm.agraso@ctaqua.es
Web: www.ctaqua.es

Swansea University
Centre for Sustainable Aquatic Research
Wallace Stores, Singleton Park
SA2 8PP - Swansea
Tlf: +44(0) 1792 29 53 83
E-mail: p.n.howes@swansea.ac.uk
web: www.swansea.ac.uk

Údarás na Gaeltachta
Na Forbacha, Co. Dublín. Galway
Tel: 091-503100
Fax: 091-503101
E-mail: foh@udaras.ie
web: www.udaras.ie

Innovation & Management Centre
CLG T/A WESTBIC
11 Galway Technology Centre, Wellpark Road
Galway, H91 E2W5 - (Ireland)
Tlf: (+353) 86 2574978
E-mail: smccormack@westbic.ie
web: www.westbic.ie

Technopole Quimper Cornuaille
2 rue François Briant de Laubriere
29000 Quimper - Francia
Tlf: +33(0)298 100 200
E-mail: rachel.sellin@tech-quimper.fr
web: www.tech-quimper.fr

CIIMAR | Interdisciplinary Centre of Marine and Environmental Research of the University of Porto
Novo Edifício do Terminal de Cruzeiros do Porto de Leixões
Avenida General Norton de Matos, S/N
4450-208 Matosinhos | Portugal |
Tlf: (+351) 223 401 852
E-mail: rodrigo.ozorio@ciimar.up.pt
web: www.ciimar.up.pt

University of Algarve
CRIA - Pavilhão B1
8005-139 Faro (Portugal)
Tlf: +351 289 800 097
E-mail: ajmarq@ualg.pt
web: www.ualg.pt

Investir en Finistere
46, quai de la Douane
CS 63825 29238, Brest cedex 2
Tlf: +33 (0)298 339 773
E-mail: a.coppens@investir29.fr
web: www.investir29.fr

Interreg Atlantic Area
European Regional Development Fund
EUROPEAN UNION
access 2 sea
www.access2sea.eu