Pioneering Marine Spatial Planning in Morocco

An Opportunity to Articulate Conservation and Development

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Shwia b shwia al-haja mqdiya

(little by little, things get done)

—**Moroccan proverb** *(Kapchan, 2022)*

Contents

List of figures

List of tables

List of boxes

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Acronyms and abbreviations

ANDA	*Agence Nationale pour le Dévelopment de l´Aquaculture (National Agency for the Development of Aquaculture)*
ANEF	*Agence Nationale des Eaux et Forêts (National Agency of Water and Forests)*
Blue Economy PforR	*World Bank's Blue Economy Program for Results*
DDARH	*Division of Sustainability and Development of Fisheries Resources (Division de Durabilité et d'Aménagement des Ressources Halieutiques)*
DDD	*Département du Développement Durable (Department of Sustainable Development)*
DPDPM	*Direction des Ports et du Domaine Public Maritime (Authority of Ports and the Public Maritime Domain)*
DPM	*Département de la Pêche Maritime (Department of Marine Fisheries)*
GDP	*Gross domestic product*
GIS	*Geographic information system*
GREPOM	*Groupe de Recherche pour la Protection des Oiseaux au Maroc (Research Group for the Protection of Birds in Morocco)*
ICCAT	*International Commission for the Conservation of Atlantic Tunas*
INRH	*Institut National des Recherches Halieutique (National Institute for Fisheries Research)*
ISPM	*Institut Supérieur des Pêches Maritimes (High Institute of Maritime Fisheries)*
IUCN	*International Union for Conservation of Nature*
IUU	*Illegal, unreported, and unregulated*
MPA	*Marine protected area*
MPA-F	*Marine protected area for fisheries management*
MSP	*Marine spatial planning*
NGO	*Non-governmental organization*
ONHYM	*Office National des Hydrocarbures et des Mines (National Office of Hydrocarbons and Mines)*
ONP	*Office National des Pêches (National Office of Fisheries)*
OREDD	*Observatoire Régional de l'Environnement et du Développement Durable (Regional Observatory for Environment and Sustainable Development)*
TA	*Technical assistance*
UNESCO-IOC	*Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization*

Executive summary

INTRODUCTION AND CONTEXT

With its rich blue assets in the Mediterranean Sea and the Atlantic Ocean, Morocco has a high potential for developing its Blue Economy.

The country has a wealth of marine resources underpinned by high levels of biodiversity, with over 600 identified fish species. In total, Morocco's coastal areas contribute 59 percent of the country's gross domestic product (GDP) and provide 52 percent of its jobs. The fisheries sector alone contributes 1.5 percent of GDP and provides 700,000 direct and indirect jobs. According to the Government of Morocco's Office des Changes (Exchange Office), the fisheries sector produces 7.1 percent of total exports.

The growth of Morocco's Blue Economy has historically been hindered by limited intersectoral cooperation, fragmented policies, and lack of integrated budget-planning across blue sectors. Recognizing the challenges that Morocco's Blue Economy faces, the Government of Morocco initiated an integrated planning processes in 2015 with the adoption of its Coastal Law, national and regional coastal plans, and the National Sustainable Development Strategy, which was adopted in 2017. However, strategy to coordinate blue sectoral approaches was limited. Consequently, siloed and sector-specific processes led to inefficient resource use and, in some cases, contributed to user conflict over coastal and maritime resources. Lack of coordination has also reduced investment opportunities, in effect hindering potential job creation and business development, especially for those who are underrepresented in the sector such as women, youth, and artisanal fishing groups.

In 2019, His Majesty King Mohammed VI called for a fresh approach to close the country's development gaps. In May 2021, a special commission appointed by His Majesty the King published the New Development Model. This model includes a recommendation for the country to harness the full potential of its Blue Economy and develop existing and emerging blue sectors such as aquaculture, seaweed farming, and marine renewable energy. As a mechanism to boost the Blue Economy, the New Development Model calls for the development of coastal clusters to attract investment, wealth, and jobs while ensuring sustainability. The Government of Morocco also recently launched a decentralization process (*régionnalisation avancée*) that requires the establishment of public policy coordination procedures at the regional level. The New Development Model underscores this approach, calling for innovation and the mobilization of the private sector to develop the Blue Economy sector advantages in each region along the coast.

In 2021, the Government of Morocco also set a target to create 450,000 jobs in the maritime fishery and agri-food industries within five years as part of an overall effort to expand livelihoods and help the national economy recover from the COVID-19 pandemic. The government's 2020 Halieutis Strategy[3] identified aquaculture as a subsector with high growth potential due to the steady growth of international and domestic demand for seafood. Together, these sectors contribute to a strong future for livelihoods based on Morocco's Blue Economy.

3 The strategy was launched in 2009 for the period up to 2020. It is currently being updated.

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HOW MARINE SPATIAL PLANNING CAN CONTRIBUTE

With its multistakeholder focus, marine spatial planning (MSP) could support Morocco's New Development Model, the Halieutis Strategy, and post-pandemic job-creation targets by boosting Morocco's Blue Economy in an inclusive manner while helping to reverse the trend toward ecosystem degradation. According to the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (UNESCO-IOC), 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 have been specified through a political process". In other words, MSP is a tool for public authorities to analyze and organize user activities to ensure that ecological, economic, and social objectives are integrated. The MSP process tries to balance needs of different sea users, including the need to protect the marine environment. In Morocco, these competing demands have historically resulted in the inefficient and unsustainable use of precious coastal resources.

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In May 2022, the World Bank approved a US$350 million loan to support the Government of Morocco in launching its Blue Economy Program, which aims to improve job creation and economic growth, as well as food security and the sustainability and resilience of natural resources. This loan, which was approved through the World Bank's own Blue Economy Program for Results (Blue Economy PforR) mechanism, will serve to develop Morocco's institutional frameworks, improve integrated natural resource management, and strengthen selected sectors for a climate-resilient Blue Economy in targeted areas. A key aspect of the government's program is to strengthen coordination and integration among the sectors and stakeholders involved with the Blue Economy. Marine spatial planning could contribute to such integration.

Between April 2021 and December 2022, the World Bank provided technical assistance (TA) to Morocco's Département de la Pêche Maritime (DPM), or Department of Maritime Fisheries, to incubate MSP as a tool to conserve fishery resources while supporting artisanal fisheries.

The ultimate aim of this exercise is for Morocco to create marine protected areas for fisheries management (MPA-Fs) that will support the development of the country's nascent Blue Economy and are based on the best international planning practices.

The MSP process does not only bring benefits for the short and medium term. In addition to anthropogenic pressures, Morocco's coasts are strongly affected by climate change, including the rise of sea levels and major biogeochemical changes that impacts environmental biodiversity and biological productivity. Climate change is a central consideration throughout MSP, which can project the levels of adaptation needed to build the Blue Economy under various climate scenarios. MSP also serves as a tool for transitioning to a circular economy and embedding circularity principles across marine planning.

Using a robust MSP approach to pursue and the creation of MPAs is a strategic choice for Morocco. An MPA created under an inclusive MSP process tends to be more robust and accepted by stakeholders than one created without such planning. Marine areas that are important for conservation form one of the most common data layers within marine spatial plans. Some of these marine areas will be formally declared and receive legal protection as MPAs, while others may be informally protected. Where MPAs do not exist, marine plans can help with the identification of potential areas for protection that incorporate environmental, social, economic, and political considerations.

Marine spatial planning is a powerful tool for developing MPAs because it involves stakeholders in a transparent way throughout the planning process. It entails a major shift from managing marine resources on a sector-by-sector basis to an integrated approach. During this process, the views of key stakeholders and public opinion are included. Threats to users and natural resources are identified, and tension areas are mapped out to diminish conflict and enhance opportunities. The process involves learning and knowledge-sharing through a participatory, evidence-based, and multidimensional approach.

THE PRINCIPLES AND PRACTICE OF MARINE SPATIAL PLANNING

The general principles that guide the MSP approach are as follows:

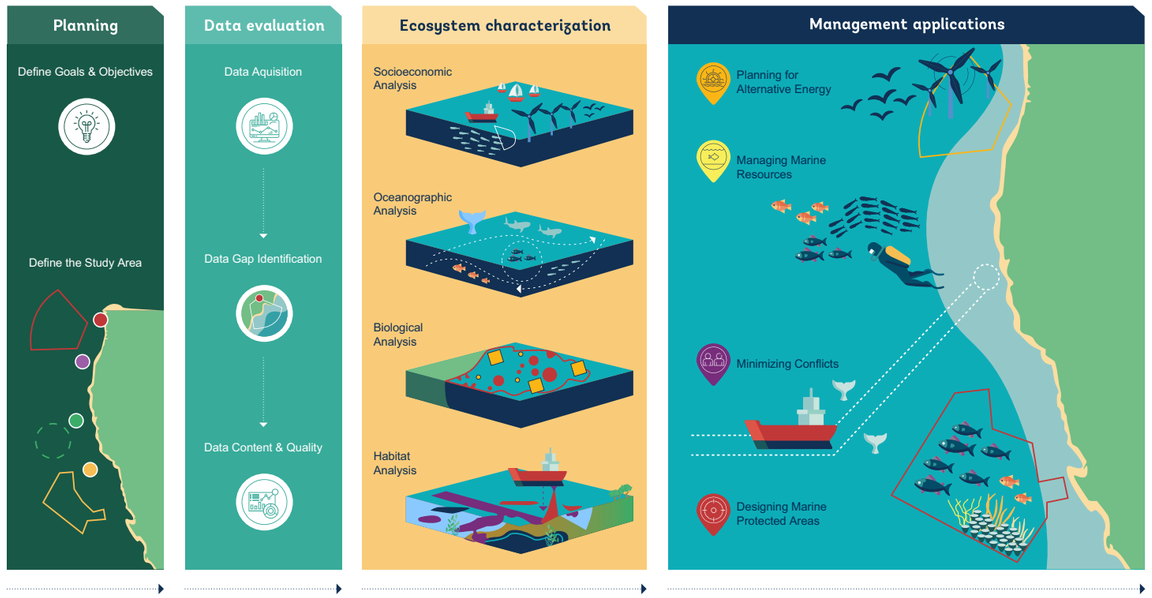
- **Facilitate the identification of sites for new and emerging uses** by following an ecosystem approach that recognizes that humans, with their cultural diversity, are an integral part of ecosystems.
- **Facilitate the identification of sites for new and emerging uses** by following an ecosystem approach that recognizes that humans, with their cultural diversity, are an integral part of ecosystems.
- **Ensure the mitigation of conflicts** between different uses of the marine environment.
- **Promote multi-use or protected spaces** to ensure coexistence and strengthen synergies between activities, and bolster investor confidence by introducing transparency and predictability.
- **Facilitate the process of addressing critical knowledge gaps** in oceans and related sectors.
- **Encourage cross-border collaboration** for regional development.
- **Improve capacity building** using transformative technologies.

These principles are often translated into practice using the following steps:

- **Planning through participatory activities** with stakeholders to determine priorities.
- **Collecting and evaluating data** to identify gaps.
- **Conducting a site diagnostic** based on ecosystem models and processes, including human activities, throughout the area of interest.
- **Identifying the best location for a proposed MPA.**
- **Formulating recommendations** to support the creation of the MPA (for example, developing a GIS database and information sharing system) and to define the stages of its implementation and management.

The figure below summarizes the MSP approach and methodology, adapted to the objectives of creating an MPA.

Figure 1: *Using marine spatial planning to create a marine protected area*



There are three types of MPA to consider. First is the popular concept of an MPA as a closed area, except for scientific research and monitoring. The second concept of an MPA is more specialized, viewing an MPA as a marine no-take area, usually designed to ensure fish reproduction for the benefit of fisheries. This is sometimes called an MPA-F (marine protected area for fisheries management). A no-take MPA (or MPA-F) allows monitoring as well as some tourism and low-impact activities. The third type of MPA takes a comprehensive approach to MSP, or ocean zoning, that envisages a network of different protected areas. In the Moroccan context, an MPA-F could have no-take areas, but also areas where some activities would be restricted, but not others, and which would be supported by a broader spatial management plan (with measures like seasonal closures, caps on capacity/effort, monitoring frameworks, and so on).

PILOT PROJECT: MARINE SPATIAL PLANNING IN AGADIR

The World Bank TA incorporated a practical example of MSP in Agadir, in the Souss-Massa region along the Atlantic Coast, which served to expand the DPM's limited experience of MSP and reinvigorate interest in MSP as a context-sensitive tool for natural resource co-management. Before the TA, MSP activities in Morocco were not sufficiently participatory, excluding important sectors and stakeholders. Through the TA, Agadir became the first area to be considered, through a participatory process, for the development of an MSP in Morocco. The TA also demonstrated the value added by spatial planning tools such as a geographic information system (GIS) database with multi-criteria analysis to highlight conflicts or compatibilities between competing activities.

Marine spatial planning brings together multiple ocean resource users to make informed and coordinated decisions about how to use marine resources sustainably. Participatory mapping workshops were organized in February (virtually) and March 2022 (on-site for artisanal fishers) and interested stakeholders from all sectors and all governance levels (national, regional, and local). A virtual workshop to present the key findings of the MSP diagnostic was organized in April 2022 followed by a dedicated on-site meeting with artisanal fishers in May 2022.

The stakeholders who attended engaged in deep dialogue, with sufficient time allowed for meaningful responses and the thoughtful integration of concerns relating to the creation, management, and fishing regulations of a future MPA. This was an important step as MPA site selection and design are the groundwork for robust and effective marine management. This approach is consistent with World Bank guidance for formulating and implementing an MSP (World Bank, 2022f).

The DPM's leadership and commitment towards a multisector approach has been key for the success of the MSP process to date. This commitment contributed to the active participation of a broad base of institutions and stakeholders from various sectors, including artisanal fishers; the *Institut National des Recherches Halieutique*s (INRH, National Institute for Fisheries Research); the *Agence Nationale pour le Développement de l´Aquaculture* (ANDA, the National Agency for the Development of Aquaculture); the *Office National des Pêches* (ONP, the National Office of Fisheries); *Agence Nationale des Eaux et Forêts* (ANEF, the National Agency of Water and Forests); the *Département du Développement Durable* (DDD, the Department of Sustainable Development); the *Direction des Ports et du Domaine Public Maritime* (DPDPM, the Authority of Ports and the Public Maritime Domain); the tourism, maritime transport, and cultural professions; the *Office National des Hydrocarbures et des Mines* (ONHYM, the National Office of Hydrocarbons and Mines); *Agence Nationale des Ports* (ANP, the National Agency of Ports); the Royal Navy; the Royal Gendarmerie; regional and urban planning organizations; the Department of Agriculture; local authorities (including the Ministry of the Interior); and non-governmental organizations (NGOs), including the Mohammed VI Foundation for Environmental Protection, the *Association de Gestion Intégrée des Ressources* (Integrated Resource Management Association), and the *Groupe de Recherche pour la Protection des Oiseaux au Maroc* (GREPOM, the Research Group for the Protection of Birds in Morocco), among others.

OUTCOMES AND IMPACTS

The TA supported a strong learning process that served to increase understanding of coastal and marine natural resource use while enhancing Morocco's internal capacity to employ MSP tools and principles in the fisheries sector. The participants collectively identified fisheries, aquaculture, and coastal and marine protected areas as the three main resource uses in Agadir, while environmental conditions, water resources, and habitats/biodiversity emerged as the main concerns. Participants also learned to use an MSP approach to select areas with a conservation objective. Finally, the third learning aspect has been developed around the information gaps identified and the need to enhance the design of MPAs using an MSP approach.

The TA produced recommendations to mainstream the MSP approach in the creation of MPAs. In particular, the MSP approach should consider the physical and biological components of a proposed MPA; its socioeconomic environment; and immediate and long-term protection objectives. The MSP process can serve as the basis for agreement on measures and restrictions to ensure the conservation of a protected area, as well as areas designated for fishing, aquaculture, tourism, and other activities. The stakeholder platform created around the MSP process could provide a useful forum for discussing and agreeing on an MPA management plan.

The TA produced a methodological guide for stakeholders to support the scalability and sustainability of the MSP approach. The knowledge exchange and learning process was captured in the methodological guide to using MSP tools to plan MPAs and marine protected areas for fisheries management (MPA-F). The guide foregrounds the lessons learned by the stakeholders who took part in the Agadir pilot and sets out comprehensive steps for properly implementing an MSP approach to create an MPA-F. These include:

- **Step 1:** Preliminary consultation process for acceptability of site selection.
- **Step 2:** Identification and mobilization of funding sources.
- **Step 3:** Pre-planning of the MSP process for the creation of a new MPA.
- **Step 4:** Collection of data and information for spatial diagnostic.
- **Step 5:** Data analysis for diagnostic and selection of the optimal area.

CONCLUSION

Mobilizing stakeholders to engage in MSP processes will support coordination of the Blue Economy at the regional level, as envisaged by the New Development Model. In Souss-Massa, for example, the MSP process can be used as a tool to reinforce coordination at the regional level by bringing together stakeholders for joint planning, ultimately helping to develop the envisioned coastal clusters that will foster economic growth and job creation. Coastal clusters are expected to stimulate coordination between public and private institutions in Blue Economy value chains.

Improved knowledge and capacity around MSP processes has prompted the DPM to implement the MSP approach in planning and design of two further MPA-Fs, which together with the MPA-F in Agadir would be key deliverables of the Blue Economy PforR. The aim of these MPA-Fs would be to sustain the fish population within three nautical miles of the coast. With a total estimated area of 61,500 hectares (ha), the envisaged three MPAs are proposed for Agadir and Larache (both of which are on the Atlantic coast), and Cape Three Forks on the Mediterranean Coast.

Morocco's experience in establishing three MPA-Fs in 2014—without drawing on the MSP approach—in the Alboran Sea, Mogador Island, and Massa underlined the need to consider and mitigate short-term impacts on artisanal fishing communities. The MSP process introduced through this TA helped to ensure that this crucial stakeholder group was considered and prioritized for capacity-building, equipment provision, and income-generating activities at every step of the planning process.

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MSP is a powerful approach to planning and managing MSP at a wider, ecoregional scale. For example, through the Agadir TA, the World Bank supported the government in identifying several activities that could contribute to the success of the MPA if managed under a wider spatial approach. These include:

- Identifying measures to protect existing species
- Focusing on fishing gear, fishing techniques, and catch size
- Channeling technical and financial assistance to support initiatives within a protected area
- Developing protocols to minimize the impacts of fishing activities and avoid incidental catches ("ghost fishing")
- Creating initiatives such as innovative start-ups to turn fishing-gear waste into business opportunities for women and younger generations
- Diversifying aquaculture species and techniques, and seeking collaborations that stimulate innovation in this sector
- Identifying potential ecotourism activities
- Studying the climate change vulnerability of the MPA and its natural habitats
- Integrating adaptation based on nature-based solutions into the management plan.

A tool to scale up marine spatial planning

A methodological guide has been developed, bringing together lessons learned and making available all acquired knowledge from the experience in Agadir. This guide will be a driving tool for the Government of Morocco, working through the DPM, to create MPAs using an MSP.

Figure 2: *Methodological guide for stakeholders*

The proposed approach is consistent with the World Bank guidance note, "Marine Spatial Planning for a Resilient and Inclusive Blue Economy" (World Bank, 2022f). It is also consistent with the report titled "Marine Spatial Planning for a Resilient and Inclusive Blue Economy: Integrating Cross-Cutting Themes into Marine Spatial Planning" (World Bank, 2022g).

1

Introduction

The Kingdom of Morocco is endowed with a wealth of marine resources, characterized by high biodiversity with at least 600 identified fish species. In total, Morocco's coastal areas contribute 59% of the country's GDP and provide 52% of jobs. There is an even greater untapped potential in existing and emerging blue sectors such as aquaculture, seaweed farming, and marine renewable energy. Morocco can develop coastal clusters that attract investment and create jobs while ensuring sustainability.

With its rich blue assets in the Mediterranean Sea and the Atlantic Ocean, Morocco has high potential for developing its Blue Economy. The fisheries sector alone contributes 1.5 percent of GDP and provides 700,000 direct and indirect jobs. According to the Government of Morocco's Office des Changes (Exchange Office), the fisheries sector produces 7.1 percent of total exports. In 2021, the Government of Morocco set a target to create 450,000 jobs in the maritime fishery and agri-food industries within five years as part of the overall effort to expand livelihoods and help the national economy recover from the COVID-19 pandemic. The government's 2020 Halieutis Strategy identifies aquaculture as a subsector with high growth potential due to the steady growth of international and domestic demand for seafood. Together, these sectors contribute to a strong future for livelihoods based on Morocco's Blue Economy.

With this in mind, the Government of Morocco launched its Blue Economy Program to improve job creation and economic growth, as well as the sustainability and resilience of natural resources and food security. The program aims to develop Morocco's institutional frameworks, improve integrated natural resource management, and strengthen selected sectors in targeted areas for a climate-resilient Blue Economy.

The World Bank defines the Blue Economy as the sustainable and integrated development of economic sectors in a healthy ocean. To support the Government of Morocco in implementing its program, the World Bank has approved a US$350 million loan through its Blue Economy Program for Results (Blue Economy PforR).

As part of Morocco's Blue Economy Program, and with the dual objective of nature conservation and support for artisanal fisheries, the DPM requested technical assistance (TA) from the World Bank on the use of marine spatial planning (MSP) tools for the conservation of fishery resources, with the ultimate aim of creating marine protected areas for fisheries management (MPA-Fs) that are based on the best international planning practices.

This summary report synthesizes the information, results, and recommendations of the documents produced through the TA (World Bank, 2022a–e). This work has also been informed by World Bank knowledge products related to MSP (World Bank, 2022f and 2022g).

2

Marine spatial planning applied to the creation of marine protected areas

2.1 IMPORTANCE AND BENEFITS OF MARINE SPATIAL PLANNING

Marine spatial planning (MSP) is, according to the Intergovernmental Oceanographic Commission of The United Nations Educational, Scientific and Cultural Organization (UNESCO-IOC), “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 have been specified through a political process”. (World Bank, 2022f). In other words, MSP is a process that brings together multiple ocean resource users to make informed and coordinated decisions about how to sustainably use marine resources. The relevant public authorities analyze and organize user activities to ensure that ecological, economic, and social objectives are integrated. An MSP process tries to balance the different demands for using the sea, including the need to protect the marine environment. A marine spatial plan is the outcome of this complex process.

Marine spatial planning transparently involves stakeholders in the planning of maritime activities. It entails a major shift from managing marine resources on a sector-by-sector basis to taking an integrated approach. During this process, the views of key stakeholders and public opinion are included. Threats to users and natural resources are identified, and tension areas are mapped out to diminish conflicts and enhance opportunities.

With more than a hundred documented cases of MSP globally, governments and other stakeholders have a wealth of experience to build on. More than a decade of MSP development shows that success depends on a consultative process that engages all stakeholders, including marginalized and vulnerable communities, at national, regional, and local levels. This dialogue should cover various areas of use, including conservation, and address conflicts between users. It can also explore

The questions at the heart of MSP are: *which natural resources do governments and stakeholders want to preserve or use and where they are located?*

climate change needs and social goals such as gender and transparency. A good plan will integrate sectors and find the right balance between existing and future uses.

MSP is especially useful at targeting financial and technical support for governments and the private sector, and for developing the financial and social rationale for investing in the Blue Economy. In fact, MSP primarily seeks to identify integrated investment opportunities. De-risking and leveraging sector-specific portfolios through integration is a powerful argument for MSP (World Bank, 2022f). Addressing issues and conflicts upstream of investment also gives investors some certainty that their projects will not be delayed by environmental and social challenges. The social case for MSP usually focuses on the effective and efficient delivery of public goods and services, mostly in the form of ecosystem services or newly created jobs.

MSP offers a cohesive framework to overcome the limited intersectoral cooperation and fragmented policies and budget planning across blue sectors that currently undermine the Blue Economy’s potential in Morocco. Recognizing the challenges that Morocco’s Blue Economy faces, the Government of Morocco initiated an integrated planning processes in 2015 with the adoption of its Coastal Law, national and regional coastal plans, and the National Sustainable Development Strategy, which was adopted in 2017. However, strategy to coordinate blue sectoral approaches was limited. Consequently, siloed and sector-specific processes led to inefficient resource use and, in some cases, contributed to user conflict over coastal and maritime resources. Lack of coordination has also reduced investment opportunities, in effect hindering potential job creation and business development, especially for those who are underrepresented in the sector such as women, youth, and artisanal fishing groups.

MSP enables governments to set a clear direction for managing their seas; to clarify objectives and priorities; and to direct decision makers, users, and stakeholders toward more strategic and efficient use of marine resources. It informs decisions about the current and future development of the marine area, aiming to integrate diverse needs.

The MSP process does not only bring benefits for the short and medium term. Climate change is a central consideration throughout MSP, which can project the levels of adaptation needed to build the Blue Economy under various climate scenarios. Climate disruption is already causing diverse and wide-ranging environmental, social, economic, and natural resource impacts. Oceans are impacted as the atmosphere and oceans warm, snow and ice melt, and sea levels rise. Rising sea levels threaten habitable land, coastal infrastructure, and protected habitats and species. Coastal livelihoods in vulnerable parts of the world are disrupted by extreme weather events such as more frequent and intense storms and rainfall. Furthermore, water quality is at risk, and changes are being observed in the distribution and time of lifecycle events of plant and animal species on land and in the oceans. The impacts of climate change will play a part in shaping land-sea interactions, fisheries, and businesses into the future.

MSP serves as a tool for transitioning to a circular economy and embedding circularity principles in marine planning. Prevailing linear economic models—which are based on the extraction of natural resources, the consumption of goods, and the disposal of waste—are global drivers of the loss of terrestrial and marine habitat and biodiversity. In a circular economy, waste and resource use are minimized and the value of products and materials is preserved for as long as possible through good design, durability, and repair. When a product has reached the end of its life, its parts are reused to create further useful products. A sound MSP process may require a coordinated effort between public and private sectors to promote a circular Blue Economy.

The questions at the heart of MSP are: which natural resources do governments and stakeholders want to preserve and/or use, and where they are located? Potential conflicts between the current or projected uses of natural resources also needs to be mapped. The MSP process drives broad public participation and robust negotiation on these and other questions, leading to a new map that captures the trade-offs between competing needs while supporting conservation goals and blue economic growth.

2.2 HOW MARINE SPATIAL PLANNING HELPS CREATE STRONG MARINE PROTECTED AREAS

Morocco's Halieutis Strategy emphasized both the protection of fishing activities and the preservation of natural resources in the form of a network of MPAs. MSP can serve to achieve both these objectives by drawing on a comprehensive, strategic, and collaborative process to analyze and allocate the use of maritime areas to minimize conflicts between human activities and maximize benefits for people and the economy while ensuring the resilience of marine ecosystems. There is a strong link between this type of exercise and marine protected areas (MPAs). Under an MSP process, the creation of an MPA tends to be more robust and accepted by stakeholders than without such collaborative planning.

Marine areas that are important for conservation form one of the most common data layers within marine spatial plans. Some of these marine areas will be formally adopted/declared and have legal protection as MPAs, while others may be informally protected. Where MPAs do not exist, marine plans can help with the identification of the best potential areas for protection that incorporate environmental, social, economic, and political considerations.

The MSP process is based on an ecosystem approach that considers the marine environment as a continuum, considering the relationships between the different components of the system, including the short-, medium-, and long-term effects of resource use. The MSP process typically uses GIS to organize and analyze spatial and temporal variations in biological, ecological, and socioeconomic data.

The general principles that guide the MSP approach are as follows:

- **Facilitate the identification of sites for new and emerging uses** by following an ecosystem approach that recognizes that humans, with their cultural diversity, are an integral part of ecosystems.
- **Ensure the mitigation of conflicts** between different uses of the marine environment.
- **Promote multi-use or protected spaces** to ensure coexistence and strengthen synergies between activities, and bolster investor confidence by introducing transparency and predictability.
- **Facilitate the process of addressing critical knowledge gaps** in oceans and related sectors.
- **Encourage cross-border collaboration** for regional development.
- **Improve capacity building** using transformative technologies.

Drawing on these principles, MSP is used to identify areas for the declaration of new MPAs.

MPAs and marine plans are generally based on current information, be it habitat/species distribution or marine uses. At the same time, both marine plans and MPAs can be to drive the future sustainable use of marine resources. This requires a comprehensive view of existing uses and deep understanding of how these uses may be affected by climate change, economic development, marine users' social license to operate, and how the government envisions its seas to be used in future.

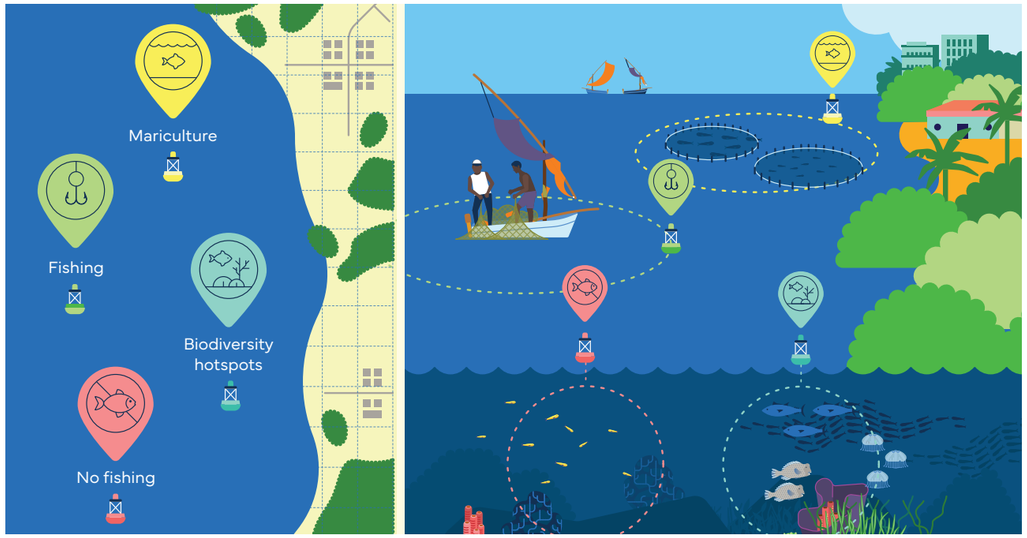

Figure 3: *Using marine spatial planning to support the creation of a marine protected area for fisheries management (World Bank, 2022h)*

2 The Halieutis Strategy supports fisheries management by enhancing the sustainability of fisheries in marine ecosystems, respecting the regeneration cycle of marine resources, and promoting scientific knowledge exchanges.

Table 1 compares traditional MPAs, which focus on conservation, with MPAs created within an MSP program, such as the MPA-F pilot created at Agadir (see Section 5).

Table 1: *Traditional marine protected areas versus marine protected areas created through marine spatial planning*

CRITERIA	TRADITIONAL MARINE PROTECTED AREA	MARINE PROTECTED AREA BORN FROM MARINE SPATIAL PLANNING	COMMENTS ON INNOVATIONS
Geographical scale	**Local and regional (depending on size)** Commonly focuses on flagship species or unique habitats	**Local, regional, and ecoregional** Incorporates larger marine and coastal territorial context, so supporting a more comprehensive approach to survival of migratory species and ecosystem processes Larger scale allows for innovations in ecosystem conservation	Traditional marine protected areas (MPAs) are generally useful for conservation but they often lack a larger-scale context, limiting their biodiversity preservation goals A network of MPAs designed through marine spatial planning (MSP) can better support biodiversity goals Ecosystem services can be the object of innovative approaches to preserve them
Level of conflict with productive and other non-conservation sectors	**High** Productive sectors (fisheries, energy, and transport) often oppose the projects of traditional MPAs	**Low** MSP's multi-sectorial, collaborative approach to allocating maritime areas allows for potential conflicts to be identified early Tension areas are mapped to reduce conflicts and enhance opportunities	MSP ensures negotiation with interested productive sectors from the beginning. In this way, future conflicts are minimized and innovations such as SDG intersectoral alliances grow
Degree of flexibility on design and characteristics	**Low** Classic MPAs have strong conservation goals and are usually supported by environmental activists and social networks Productive sectors are frequently reluctant to contribute to their design	**High** The diversity of sectors involved allows for the MPA to have some goals that align with the interests of other sectors on a case-by-case basis	MSP-based MPAs are sometimes designed to support the fishing sector. They may also surround energy production or aquaculture areas, to improve the security of these areas and facilitate better monitoring New functions arise from their interactive development
Stakeholder engagement and consultation	**Low to medium** Some governments try to involve productive sectors in classic MPA creation plans. However, these sectors do not usually participate in MPA design and development Consultation mechanisms are weak, frequently resulting in the rejection of conservation goals	**High** Stakeholders are included in discussions about the desired characteristics of the MPA from an early stage Consultation is almost mandatory for all aspects of the MPA (location, design, roles, development, and monitoring and evaluation)	High levels of engagement and consultation in MSP ensures a flexible process that supports a diversity of positive outcomes Transparency of the MSP process ensures the inclusion of groups that might otherwise be marginalized

Continues on next page

Table 1: Traditional marine protected areas versus marine protected areas created through marine spatial planning

CRITERIA	TRADITIONAL MARINE PROTECTED AREA	MARINE PROTECTED AREA BORN FROM MARINE SPATIAL PLANNING	COMMENTS ON INNOVATIONS
Innovation	**Low to medium** Low levels of intersectoral planning weaken innovative solutions for MPA development, implementation, and monitoring	**High** Intersectoral planning enhances innovation in MPA development, implementation, and monitoring Institutional learning is accelerated due to the diversity of stakeholders' experience	The DPM's active leadership was an innovative feature of the pilot MSP project in Morocco An MPA created under the leadership of a fisheries institution instead of a conservation one shows the power of a multisectoral approach that involves all sectors
Consensus-building capacity	**Low** Traditional MPAs are based on broad consensus Society often only hears about them when they are created by law	**High** MSP takes an integrated approach to marine resource management that considers a broad consensus base including key stakeholders and the public Learning and knowledge-sharing are accelerated through a participatory, evidence-based, and multidimensional approach	The participatory process facilitates learning cycles that stimulate innovation and enable the development of coordinated coastal clusters of start-ups that attract investments, wealth, and jobs
Blue Economy tools	**Few** Traditional MPAs do not provide many options for Blue Economy development	**Several** An MSP-based MPA may offer several tools for Blue Economy development Each productive sector involved could benefit from information gathered through the MSP process	The tourism, carbon offsetting schemes, fisheries, aquaculture, transport, and energy sectors will benefit from MSP-based MPAs that have clear, predictable, and broadly accepted rules for marine resource use
Potential for job creation	**Limited** Jobs in a traditional MPA will come mainly from marine science and monitoring	**Expanded** MSP-based MPAs could create jobs in a range of sectors, including tourism, energy, aquaculture, transport, commerce, fishing sector, and marine science.	The interaction between the sectors in an MSP-based MPA promotes a wide diversity of new jobs Several jobs may arise from innovative intersectoral associations
Decentralization processes to empower regional development	**Limited** A traditional MPA, given its local geographical benefits, may deliver some benefits for a decentralization plan	**Substantial** An MSP-based MPA supports decentralization and regional development by enabling the development of local energy, fisheries, aquaculture, tourism, and other sectors	The larger-scale process of MSP supports any decentralization process like the Moroccan government's regionalization avancée
Long-term funding options	**Restricted** Usually limited to government and international institutions	**Larger** The private productive sectors involved in design are possible additional income sources, complementing government and international sources	Involving the private productive sector in the MSP process may lead to benefits for that sector, so stimulating their funding participation in the resulting MPA

*The MSP process is based on an **ecosystem approach** that considers the marine environment as a continuum, considering the relationships between the different components of the system, including the short-, medium-, and long-term effects of resource use.*

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2.3 BENEFITS OF CREATING A MARINE PROTECTED AREA

The International Union for Conservation of Nature (IUCN) defines an MPA as "a clearly defined, recognized, and administered geographical area, legally or by other effective means, which aims to conserve nature, ecosystem services, and associated cultural values in the long term" (Day et al., 2012). More than 20 years ago, IUCN declared: "Marine protected areas only succeed if backed by the public (IUCN, 1999)."

There are three types of MPA to consider. The first is the popular concept of an MPA as a closed area except for scientific research and monitoring. The second concept is more specialized, viewing an MPA as a marine no-take area, usually designed to ensure fish reproduction for the benefit of fisheries. (This is sometimes called a marine protected area for fisheries management, or MPA-F). A no-take MPA/MPA-F allows monitoring as well as some tourism and low-impact activities. The third type of MPA takes a comprehensive approach to MSP, or ocean zoning, that envisages a network of different protected areas. In the Moroccan context, an MPA-F could have some no-take areas and some areas where certain activities are restricted. Such an MPA-F could be supported by a broader spatial management plan with measures like seasonal closures, caps on capacity/effort, monitoring frameworks, and so on.

In isolation, a small MPA might not support fish and invertebrate populations that are large enough to sustain themselves. To make sure there are enough young marine organisms to replenish and sustain fisheries populations within MPAs, the area of protection must be large. However, in many regions, economic, social, and political constraints make it impractical to create one single large MPA of sufficient size to support viable, self-sustaining populations of all species.

The Kingdom of Morocco is planning MPAs that could form part of a greater network. Establishing networks of multiple small-to-moderately-sized MPAs may help to enhance conservation and fisheries benefits without increasing socioeconomic impacts. Well-planned networks provide important spatial links, which are needed to maintain ecosystem processes and connectivity. These links also improve resilience by reducing the risks of localized disasters, climate change, failures in management, and other hazards across multiple areas, so helping to ensure long-term sustainability better than single MPA sites.

Networks of MPAs are typically part of an MSP process because of their benefits for local communities and the fishing sector, which in turn improves support by these stakeholders. MPAs protect local fish populations by giving fished species space to recover. Recovered populations then move beyond the boundaries of the area, resulting in a higher catch rate of the species near the protected area than what would have been observed if the area had not been protected.

Questions remain about whether MPAs would work to protect species that migrate or travel long distances, since most MPAs are small relative to the geographic range of these migratory species. However, recent research has found that the world's largest fully protected MPA, near Hawaii, has clear spillover benefits for migratory yellowfin (Thunnus albacares) and bigeye (Thunnus obesus) tuna populations. It is thought that less migratory species, and those that spawn in or near the MPA, will experience a stronger spillover effect (Medoff et al., 2022). This study raises the possibility that a comprehensive network of MPAs could also support large, migratory fish species, provided some areas are specially designed for that goal. Further research is needed in this regard.

2.4 MOROCCO'S PRAGMATIC APPROACH TO PIONEERING MARINE SPATIAL PLANNING

Morocco is adopting new approaches to plan and manage its Blue Economy. The TA discussed in this report has helped to incubate MSP as a critical tool to support this endeavor.
In 2019, His Majesty King Mohammed VI called for a fresh approach to close the country's development gaps. In May 2021, a special commission appointed by His Majesty the King published the New Development Model, which includes a recommendation for the country to harness the full potential of its Blue Economy and develop existing and emerging blue sectors such as aquaculture, seaweed farming, and marine renewable energy. As a mechanism to boost the Blue Economy, the New Development Model calls for the development of coastal clusters to attract investments, wealth, and jobs while ensuring sustainability. The Government of Morocco also recently launched a decentralization process (régionnalisation avancée) that requires the establishment of public policy coordination procedures at the regional level. The New Development Model underscores this approach, calling for innovation and the mobilization of the private sector to develop the Blue Economy sector advantages in each region along the coast.

An MSP process tries to balance the different demands for using the sea, including the need to protect the marine environment. In Morocco, as in many other countries, these competing demands often result in inefficient and unsustainable use of precious coastal resources. An MSP approach could help reverse the trend toward degradation and boost Morocco's Blue Economy.

In 2009, the DPM launched its initial Halieutis Strategy, a growth and competitiveness plan for the period up to 2020, to contribute to the development of a sustainable Blue Economy with high added value. Under the strategy, 20 management plans were developed; MPAs were declared at Alboran, Mogador, and Massa; and various management measures were introduced such as area closures, market size shifts, the protection of endangered species, and the prohibition of harmful gear to enhance the management and protection of the country's marine and coastal ecosystems.

Despite these achievements, the second draft review of Morocco's Environmental Performance, coordinated in 2021 by the United Nations Economic Commission for Europe (UNECE, 2021), found that stocks of more than 15 species—especially Mediterranean swordfish, red seabream, meagre, hake, sardinella, and pink shrimp—are exploited beyond their maximum sustainable yield. Morocco is an active member of the International Commission for the Conservation of Atlantic Tuna's (ICCAT's) Regional Fisheries Management Organization, which manages and plans bluefin tuna resource use. All recommendations issued by ICCAT and the United Nations Food and Agriculture Organisation's General Commission for Mediterranean Fisheries are applied at the national level in Morocco.

It is in this context that the Government of Morocco approached the World Bank for TA to improve internal capacity for MSP, with the ultimate aim of identifying the best possible locations for future MPAs that could support the country's New Development Model coordination guidelines while protecting marine ecosystems, promoting the recovery of fish stocks, and ensuring the sustainability of fishing activity, especially artisanal fishing. The Agadir region was chosen for this endeavor (see Box 1).

THE SELECTION OF AGADIR AS A PILOT SITE

As part of the World Bank's TA, which was supported by the Korean Green Growth Trust Fund, DPM consulted with national stakeholders within the fisheries sector to learn MSP techniques, gain exposure to new approaches, and see lessons learned in action. Together, these actions focused on building a better understanding of how an MSP process can support the creation of an MPA-F. Consultations were held with the Institut National des Recherches Halieutiques (National Institute for Fisheries Research, INRH), Agence Nationale pour le Développement de l´Aquaculture (National Agency for the Development of Aquaculture, ANDA), and institutional representatives of the Chambre des Pêches Maritimes (Chamber of Maritime Fisheries) of the Mediterranean and the Central Atlantic in Larache and Agadir.

Through this process, the Agadir region was chosen as a site where stakeholders could learn and apply new concepts and approaches around MSP and the creation of an MPA. This learning-by-doing approach was widely supported by the institutions concerned, especially the Central Atlantic Chamber of Marine Fisheries, which formally expressed its interest to the DPM to initiate such a process. This reflects the strong support of artisanal fishers in the region who see the creation of an MPA as an opportunity to protect fishery resources to ensure the sustainability of artisanal fishing.

2.5 BUILDING KNOWLEDGE OF MARINE SPATIAL PLANNING IN REAL TIME

2.5.1. Marine spatial planning methodology

The TA followed best international practice for MSP, which has as its foundation obtaining and analyzing relevant information in a collaborative manner. This method was shared with the DPM and other participants to allow future replicability. The key steps in MSP are:

- **Planning through participatory activities** with stakeholders to determine priorities.
- **Collecting and evaluating data** to identify gaps.
- **Conducting a site diagnostic** based on ecosystem models and processes, including human activities, throughout the area of interest and identifying the best location for a proposed MPA.
- **Formulating recommendations** to support the creation of the MPA (for example, developing a GIS database and information sharing system) and to define the stages of its implementation and management.

This methodology is designed to display geographical information from a range of sources in an intuitive manner using maps and spatial analyses. In this way, it supports the decision-making process for site selection. The MSP process benefits from advanced data and knowledge management approaches such as geospatial predictive modeling using techniques such as geostatistical modeling to fill data gaps; the merging of existing datasets; and/or extrapolating trends across space.

2.5.2. Marine spatial planning methodology

Through the TA, an MSP knowledge-sharing and learning approach was initiated in the Agadir region. A diagnostic that aimed to preserve biodiversity and ensure the sustainability of fishing activities was prepared. This approach aimed to discover synergies and avoid conflict between key sectors in Agadir Bay such as aquaculture, tourism, and transport.

Data collection was the first knowledge and learning step in the diagnostic process. This was facilitated by the World Bank's team of national experts through several meetings with the stakeholders involved in the MPS process and under DMP leadership. Data focused mainly on spatial information regarding the relevant biological, environmental, and socioeconomic variables.

The second step was to perform an integrated analysis using GIS to carry out a diagnostic of the site and identify the most suitable areas for a potential MPA-F.

Figure 4: *The fundamental stages of work*

Through the TA, an MSP knowledge-sharing and learning approach *was initiated in the Agadir region.*

The diagnostic included a review of the main legal instruments and strategies for land and coastal planning and the protection of natural resources, at all levels (international, national, and regional). Key instruments and strategies identified were:

- **The National Coastal Plan**,[3] which aims to ensure a balance between the development and preservation of a sustainable coastline through the implementation of a holistic and integrated development approach and a model of harmonious management of spaces and resources. This plan stood out because of its focus on coastal zones and inclusivity: it establishes a new integrated coastal zone management policy for the Moroccan coastline, including 12 nautical miles out of territorial seas and the adjacent land, and involves all stakeholders—citizens, users, and decision-makers. However, the plan does not include MSP as a tool to improve marine planning. Pioneering an MSP approach in Agadir Bay served to fill this gap and strengthen the capacities of Moroccan stakeholders involved in the management of the coastal and marine zones.
- **The Halieutis Strategy**, through which Morocco supports fisheries management by strengthening the sustainability of fisheries in marine ecosystems, aiming to respect the cycle of regeneration of marine resources and promoting the exchange of scientific knowledge. The DPM presented three MPA pilot sites in Morocco that are part of the sustainability axis of the Halieutis Strategy. These are Alboran, Mogador, and Massa, where the new Agadir MPA-F is being contemplated.
- **Aichi Biodiversity Target 11**, which calls for the conservation of at least 17 percent of terrestrial areas and inland waters, and 10 percent of coastal and marine areas.
- **Morocco's National Biodiversity Strategy and Action Plan 2016–2020.**

Using an MSP approach to create a new MPA-F in Souss-Massa would support the goals of the country's coastal plan while contributing to both Aichi Biodiversity Target 11 and Morocco's National Biodiversity Strategy and Action plan. It would also contribute to the achievement of the following objectives of the Halieutis Strategy:

- **Protect and preserve the natural environment**, including fisheries resources, for the long term.
- **Maintaining the activities of small-scale fisheries** and improving their sustainability.
- **Ensure compatibility of different uses of the marine environment** and diversify growth opportunities as part of the Blue Economy strategy.
- **Improve the ecological connectivity of marine and coastal areas** to maintain key processes that support the renewal of fisheries and aquaculture resources.

The data compiled in the database was mapped and analyzed using GIS. This allowed for the identification of spatial and temporal patterns of human activities in coastal and marine environments (including urban development areas, shipping routes, traffic, fisheries resources, and aquaculture developments), as well as ecological threats related to these activities (such as pollution sources, risk areas, and restrictions on fishing techniques).

In this way, a series of maps was generated showing different patterns such as social values (for example, areas of increasing interest for tourists), ecological hotspots (for example, spawning grounds of fish species and larval source areas, protected areas, and ecologically sensitive areas such as a rocky seabed, important areas for migratory birds, wetlands, and so on). Key information gaps were also identified through the process.

After mapping and analyzing the data, considering the available information, and identifying gaps, the site selection process focused on establishing a set of criteria that could be used to decide whether an area should be included in the MPA-F, and to determine the MPA-F's potential boundaries.

In this case, the economic importance of fishing activities and the conservation of fishing stocks were identified as priorities, since the MPA-F must contribute to supporting small-scale fishing activity while reducing its environmental impact. Other criteria were also adopted, based on data available in the region (Table 2).

By superimposing geographical data and data relating to social, economic and conservation variables and then filtering the variables based on the priority criteria, it was possible to identify optimal areas for the establishment of an MPA-F. The filtering process was achieved by assigning numerical weighting to each layer of information. When these layers were combined, areas of high impact for a potential new MPA-F were revealed.

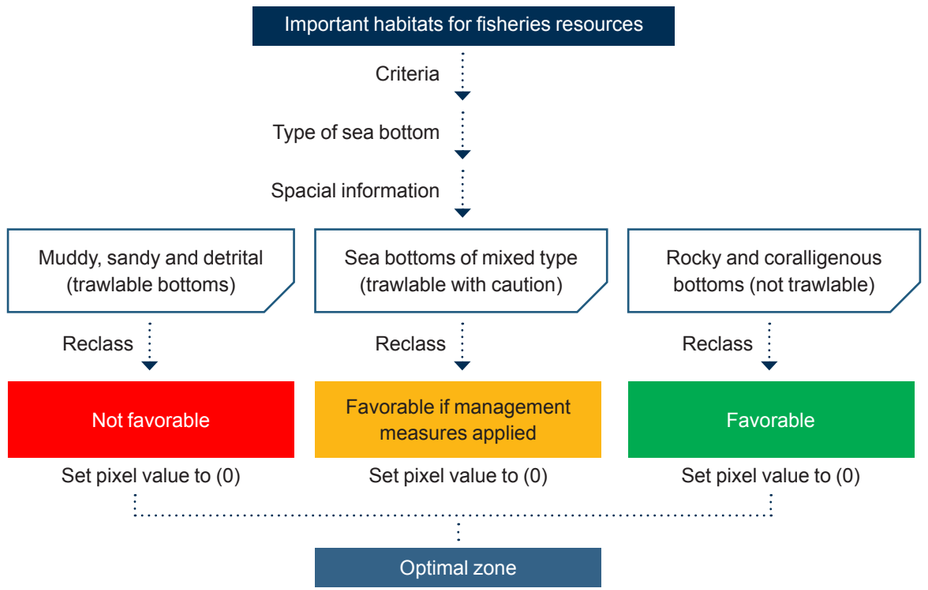
3 Consolidated by the draft Decree n. 2.21.965 approving its adoption on May 5, 2022.

Table 2: Site selection criteria for the creation of a new MPA based on available spatial data

INFORMATION LAYER	CRITERIA
Important habitats	› Presence of sensitive or important habitats for threatened species (wetlands). › Presence of habitats important for fishing (rocky bottoms) .
Economically and socially important	› Existence of areas that are a source of species of economic importance. › Existing or potential value to local communities because of aesthetic, educational, or recreational qualities.
Practical or feasible for protection	› No-trawl areas (incompatible fishing gear). › Areas with less aquaculture pressure. › Existence of regulation of fishing activity (for the conservation of fish populations and resources). › Less pressure from tourism and potentially harmful or conflicting tourism activities. › Extent to which area is protected from the pressures of urbanization. › Degree of isolation from sources of pollution (marine and land). › Degree of pressure due to the intensity of maritime traffic (and associated risks). › Threat level due to energy developments.
Ecological connectivity and functionality	› Ecological continuity with other protected areas (synergies). › Presence of nursery or juvenile areas. › Presence of feeding, breeding, or resting areas. › Ecological processes or support systems for marine life as a source of nutrients, larvae, and so on (for example upwelling zones).
Research interest	› Value for coastal research and hazard monitoring. › Value for the development of climate adaptation projects.

Figure 5 presents an example of reclassification with fisheries in mind, according to the type of sea bottom. In this example, an unfavorable type of marine bottom for trawling activity receives a 0-value on the pixel that corresponds to its location. A favorable type receives a +2-value.

Figure 5: Data reclassification process for the selection of an optimal marine protected area site



2.5.3. A strong stakeholder engagement process

The successful application of the MSP approach requires a participatory, evidence-based, and multidimensional approach, based on secondary data analysis and public consultations. The process followed in Agadir aligned with the Halieutis Strategy's sustainability principles and focused on the development of adequate tools to support the effective creation and future implementation of an MPA-F in the selected pilot site.

Due to COVID-19 restrictions, the first participatory workshop was held online on February 17, 2022. The second workshop was held in person in Agadir on March 17, 2022. Both were attended by a wide range of stakeholders from a variety of sectors representing national, regional, and local interests. Two further virtual mini-workshops were organized to carry out the practical participatory mapping exercise. Workshops were attended by a wide range of stakeholders, including the DPM, artisanal fishers, Institut National des Recherches Halieutiques (INRH, National Institute for Fisheries Research); Agence Nationale pour le Dévelopment de l´Aquaculture (ANDA, the National Agency for the Development of Aquaculture); the Office National des Pêches (ONP, the National Office of Fisheries); Agence Nationale des Eaux et Forêts (ANEF, the National Agency of Water and Forests); the Département du Développement Durable (DDD, the Department of Sustainable Development); the Direction des Ports et du Domaine Public Maritime (DPDPM, the Authority of Ports and the Public Maritime Domain); representatives from the tourism, maritime transport, and cultural professions; the Office National des Hydrocarbures et des Mines (ONHYM, the National Office of Hydrocarbons and Mines); Agence Nationale des Ports (ANP, the National Agency of Ports); the Royal Navy; the Royal Gendarmerie; Ibn Zohr University; regional planning/urban planning; the Department of Agriculture; local authorities (Ministry of the Interior); and NGOs (the Mohammed VI Foundation for Environmental Protection, Association de Gestion Intégrée des Ressources (Integrated Resource Management Association), and Groupe de Recherche pour la Protection des Oiseaux au Maroc (GREPOM, Research Group for the Protection of Birds in Morocco)).

Figure 6: Virtual participatory mapping workshop (February 17, 2022)

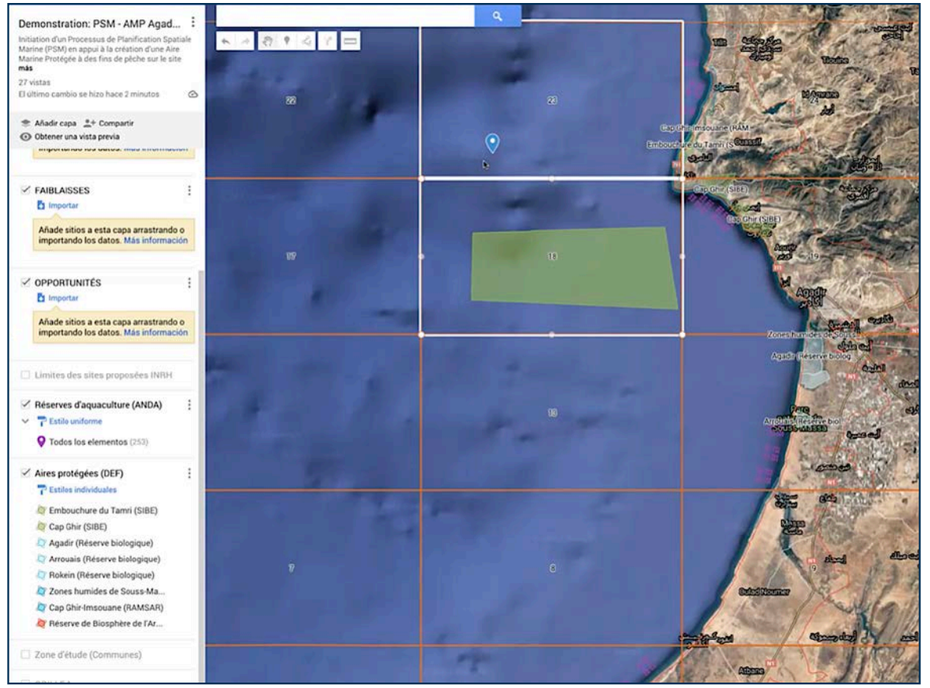
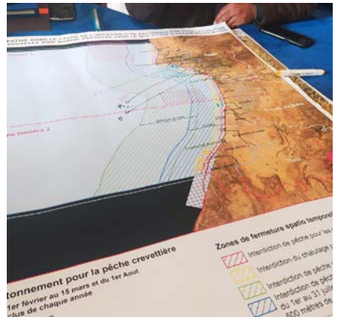
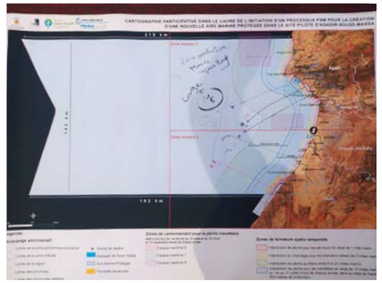
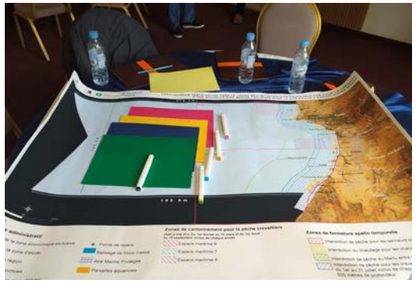
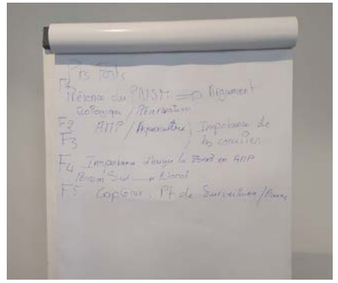


Figure 7: *Participatory mapping workshop in Agadir (March 17, 2022)*









FORCES

1. *Quels sont les zones importantes pour la conservation de la biodiversité (zones à haute valeur naturelle) ?*
2. *Quels sont les zones les plus importantes pour le maintien des ressources halieutiques ?*

FAIBLESSES

3. *Pouvez-vous identifier des zones où il existe une « concurrence » pour l'espace entre différents usages (pêche, tourisme, sports nautiques, etc.) ?*
4. *Pouvez-vous identifier une zone où la conservation de la nature empêche le développement d'autres activités ?*

OPPORTUNITÉS

5. *Quelles sont les autres utilisations marines pour lesquelles la demande est susceptible d'augmenter dans le futur (liées au tourisme, à la pêche, à la protection du littoral, à la recherche, autres...) ?*
6. *Quels sont les zones adéquates pour développer ces activités ?*
7. *Pouvez-vous identifier les zones ou les points socialement importants (zones de valeurs culturelles, spirituelles / religieuses, esthétiques / marines, récréatives ou autres) ?*

MENACES

8. *Connaissez-vous des zones qui devraient changer en raison du changement climatique (zones où il y a une tendance à l'érosion côtière, des événements extrêmes et d'autres risques connexes) ?*
9. *Y a-t-il des zones où les ressources halieutiques sont rares ? Que peut-on y constater (dégradation, contamination/pollution, autres problèmes...) ?*

A workshop was held to present the findings of the diagnostic to all involved stakeholders on April 27, 2022. This online event was complemented by an in-person workshop with artisanal fishers on May 19, 2022, at the Maritime Fisheries Delegation of Agadir. The aim of the in-person workshop was to strengthen the MSP process by explicitly engaging artisanal fishers, who are typically not able to attend online meetings. This workshop sought to:

- Present the MSP process in support of the creation of an MPA-F in Agadir.
- Present the results of the mapping of the Agadir site to fishers.
- Collect the opinions of fishers and discuss the conclusions of the diagnostic in this area.

The presentation, which was given by the National GIS Expert of the World Bank, summarized the strategic context, the legal framework, the environmental diagnostic, the analysis of geographical information, and the evaluation of alternatives. This was followed by a discussion between the fishers, institutional representatives, and the World Bank team. At the end of the meeting, it was noted that:

- Artisanal fishers were calling for training and awareness-raising on the importance of MPAs.
- Artisanal fishers were aware of the interest in creating MPAs in general, and with regard to the Massa MPA in particular.
- The MSP process and its benefits for ecosystems, society, and the economy were presented to fishers.
- Fishers welcomed the project to create a new MPA-F in the Agadir region.
- The preference of fishers was to create the MPA-F to the south of the Souss-Massa region.
- Fishers were committed to working together to create an MPA-F.

During the meeting, fishers were invited to answer the questionnaire previously given in the diagnostic workshop to evaluate the criteria for creating an MPA. The results were highly consistent with those obtained in the evaluation carried out in the workshop, but with more support for the southern zone, according to the criteria. Fishers discussed the three site options and agreed on the one selected.

Concerns, opportunities, and issues raised by fishers

A methodological guide has been developed, bringing together lessons learned and making available all acquired knowledge from the experience in Agadir. This guide will be a driving tool for the Government of Morocco, working through the DPM, to create MPAs using an MSP.

Fishers highlighted the possible impact of human factors (such as trawling by coastal fishing vessels, the seawater desalination project in Douira, and sewage canals) on the proposed MPA-F. They also identified potential "black spots"—areas that could experience high environmental pressure—such as river mouths, sewer canals, and high-population areas.

They agreed that educating mariners about the importance of the proposed MPA-F and ensuring that the reserve provided positive results for mariners would be crucial for the success of the initiative. A specific map with environmental standards would be of benefit.

Other issues that fishers wanted to be considered include:

- The economic situation of traditional fishers and all other stakeholders in the MPA-F.
- The social situation of all stakeholders in the MPA-F.
- The fishing means and equipment used, and their impact on fish stocks and their sustainability.
- Features that affect the fishing process and management's ability to monitor fish stocks and control fishing activities.

The strong interest shown by fishers throughout the participatory MSP process reflects their concern about their involvement in the creation and management of the future MPA-F; the regulation of fishing activities; and the techniques to be used to protect fisheries resources, as outlined during the initial stakeholder consultations and reporting by the DPM. Ensuring that this key stakeholder group remains an active and positive participant in the MSP process is an important step for the robustness of the resulting MPA-F.

MSP emphasizes the importance of this kind of stakeholder participation. Worldwide, people who depend on marine resources for their incomes and livelihoods have their views and needs ignored in marine resource decision-making. These marginalized users include youth and the elderly; individuals in small-scale fishing and coastal communities; indigenous people; migrants (including seasonal migrants and displaced people); and women and girls. Artisanal fishers must be, at the end of the day, the main beneficiaries of an MPA-F goal. They enrich and validate the plan through their experience and local knowledge.

3

How to make a critical choice using the marine spatial planning approach

Using an MSP approach, considering the marine and coastal environment conditions and all uses occurring in Agadir Bay (see Appendix 1 for details), and assuming the criteria discussed in this report, three possible options have been proposed:

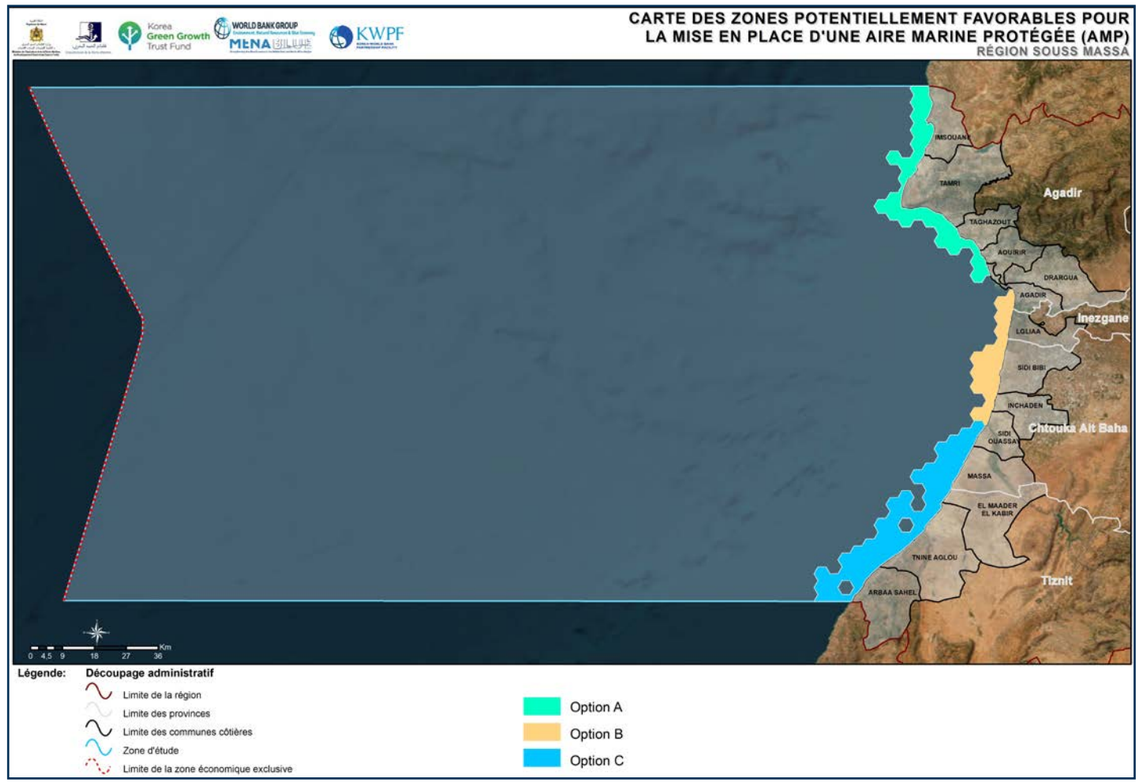
- **Option A: North of the bay of Agadir (Imsouane to Taghazout).** This area of high biological diversity, characterized by an abundance of protected areas and wetlands, could benefit from the ecological connectivity of a new MPA-F. Several aquaculture development projects need to be assessed in terms of potential impacts. There is also an interest in energy exploitation in this area (little information is available on these developments). However, given the global circumstances and the pulse of energy, this can be seen as a threat that would potentially create a risk for a potential MPA-F in the north-central area of the pilot site.

- **Option B: Center of Agadir and south of the bay.** This area is experiencing a significant increase in tourism and urbanization. Maritime traffic is intense and the pressure of urban centers and industrial activities is higher than in the north and the south. The southern part of the bay, which communicates with the Souss-Massa National Park, has several sites of ecological and biological importance, as well as wetlands that provide important ecosystem services.

- **Option C: South of the Massa river and Souss-Massa National Park.** The existence of Souss-Massa National Park offers an opportunity to strengthen the protection of natural resources and increase ecological connectivity between land and sea in an area that already has valuable ecosystems, rich biodiversity, and a unique landscape. The presence in this area of a large area of rocky seabed that serves as a refuge, breeding, and feeding habitat for many species of fish is another feature to consider. As indicated in Figure 24 (Appendix 1), the park is located at the intersection of several spawning areas. In addition, it is an area that (a) has been well studied in terms of biodiversity due to the presence of the national park, and (b) is an area at high risk of drought, making it a suitable location for climate adaptation projects. It is also a highly valued area because of the presence of the national park, which stakeholders (and fishers in particular) highlighted as important for fisheries resources.

Figure 8 shows the three areas assessed through the learning and capacity-building exercise for the creation of a new MPA-F. The results confirmed the assessments previously conducted by the INRH and presented during preliminary stakeholder consultations convened by the DPM between June and November 2021 (DPM and INRH, 2021).

Figure 8: *Location of options for proposed new MPA (World Bank, 2022a)*



The evaluation of these three options was carried out through a training session demonstrating a multi-criteria evaluation based on the superposition of geographical information. Once the evaluation was carried out, option B was rejected and the other two options were selected to be presented at the diagnostic restitution workshop that took place on April 27, 2022.

Workshop participants assessed the same criteria for their importance, to explore the vision of stakeholders. After assessing compliance with each criterion for each of the site options for the creation of an MPA-F (full compliance = 1; partial compliance = 0.5; non-compliance = 0), these values were multiplied by the weighting value of the criterion (average importance value given by stakeholders on a scale of 1 to 3).

Table 3: *Pre-selection of alternative sites for the creation of the MPA-F weighting the criteria*

NO.	SPATIAL CRITERIA TAKEN INTO ACCOUNT ON THE BASIS OF GEOGRAPHICAL INFORMATION	IMPORTANCE (WEIGHTED VALUE)	OPTION A: NORTH OF THE BAY OF AGADIR (IMSOUANE TO TAGHAZOUT)	TOTAL SCORE (OPTION A)	OPTION C: SOUTH OF THE MASSA RIVER AND SOUSS-MASSA NATIONAL PARK	TOTAL SCORE (OPTION C)
1	Presence of sensitive or important habitats for threatened species (wetlands)	2,8	1	2,8	1	2,8
2	Presence of habitats important for fishing (rocky bottoms)	2,5	0,5	1,25	1	2,5
3	No-trawl areas (incompatible fishing gear)	2,5	0,5	1,25	1	2,5
4	Ecological continuity with other protected areas (synergies)	2,5	1	2,5	1	2,5
5	Presence of nursery or juvenile areas (spawning areas)	2,6	0	0	1	2,6
6	Existence of areas that are a source of species of economic importance	2,3	1	2,3	1	2,3
7	Presence of feeding, breeding, or resting areas for important fishing species	2,6	0,5	1,3	1	2,6
8	Priority areas with less aquaculture pressure	1,8	0	0	1	1,8
9	Existence of fishing regulations for the conservation of fish populations and fishery resources	2,6	1	2,6	1	2,6
10	Existing or potential aesthetic, educational or recreational value to local communities	2,1	1	2,1	1	2,1
11	Compatibility with tourist uses	2,2	0,5	1,1	1	2,2
12		2,5	1	2,5	1	1,25
13	Extent to which the area has been protected from urbanization	2,7	0,5	1,35	0,5	1,35
14	Degree of pressure due to the intensity of maritime traffic (and associated risks)	2,5	0,5	1,25	0,5	2,5
15	Level of threat due to energy developments	2,2	0,5	1,1	1	1,1
16	Value for coastal risk research and monitoring	2,3	0,5	1,15	1	2,3
17	Value for the development of climate adaptation projects	2,1	0,5	1,05	1	2,1
18	Ecological processes or support systems for marine life as a source of nutrients, larvae, etc. (upwelling areas)	2,3	1	2,3	0,5	1,15
				27,9		**38.25**

This analysis was complemented by the development of a compatibility matrix: a simple tool that identifies and classifies uses that may be compatible. This includes those that could be compatible in the context of management measures, and those that are incompatible according to the fragility of the target area.

Areas that display low fragility and low operating pressures are generally compatible. Conversely, areas that display high fragility and high use pressures are incompatible. Combinations with intermediate values require management measures to ensure that the use is compatible with, or does not affect, the ecological integrity of the area in question. In this case, the compatibility of the values was assessed concerning the objective pursued, namely the creation of a new MPA-F to protect fisheries' resources and sensitive ecosystems that are important for the maintenance of artisanal fishing.

This analysis was complemented by the development of a compatibility matrix: *a simple tool that identifies and classifies uses that may be compatible.*

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Figure 9: *Compatibility matrix: fragility and pressures to create an MPA at the site*

CRITERIA		SPATIAL DATA CLASSIFICATION	POTENTIAL EFFECT
Sensitive habitats for endangered species	1	Wetlands and mouths	2
	2	RAMSAR sites	2
	3	Biological reserves	2
	4	Sites of Biological and Ecological Interest	2
	5	Areas with presence of water birds (buffer)	2
Important fisheries habitats	6	Rocky bottoms	2
Zones without trawling (seabed protection)	7	Non-trawlable areas	2
	8	Carefully trawlable areas	1
Ecological continuity with other protected areas	9	RAMSAR sites	2
	10	Biological reserves	2
	11	Sites of Biological and Ecological Interest	2
	12	National parks	2
	13	Natural parks	2
	14	Marine protected area	2
Spawning areas / feeding areas, reproduction(synergies)	15	Crustacean spawning grounds	2
	16	Merluccius merluccius spawning grounds	2
	17	P. acame complex spawning grounds	2
	18	Sardina pichardus spawning grounds	2
Fishing stock areas	19	Presence of batoid fishes	2
	20	Presence of chimera fishes	2
	21	Presence of bonefishes	2
	22	Presence of sharkfishes	2
Aquaculture areas	23	Aquaculture plots	1
Regulation of fishing activity	24	Cantonment areas for shrimp fisheries	2
	25	Spatio-temporal closure zones to fishing gear/species	2
Cultural value (educational, recreational, etc.)	26	Coast of Agadir (buffer 2 nautical miles)	1
	27	Coast of Inezgane (buffer 2 nautical miles)	1
	28	Coast of Taghazout (buffer 2 nautical miles)	1
	29	Tamri Mouth-Cap Ghir (buffer 2 nautical miles)	2
	30	Souss-Massa National Park (buffer 2 nautical miles)	2
Tourist activity (nautical sports)	31	Coast of Taghazout (buffer 1 nautical mile from recreational water sports areas)	1
	32	Coast of Agadir (buffer 2 nautical miles from recreational water sports areas)	1
Urbanization pressure / sources of pollution	33	Buffer zone of 5 nautical miles around highest urban pressure areas (in number of inhabitants/ households)	0
Maritime traffic pressure	34	Density of maritime traffic: from 0,5 to 5	1
	35	Density of maritime traffic: >5	0
Value for research and monitoring of coastal risks / climate adaptation projects	36	Buffer zone 5 nautical miles from coastal areas where there are at landslide risks	1
	37	Buffer zone 5 nautical miles from coastal areas where drought-related risks are high	2
Ecological processes (nutrient/upwelling areas, etc)	38	Areas of colder sea surface temperature (below 18,31 degrees Celsuis). Area coincides with Cape Ghir, where a well understood upwelling zone is found.	2

Aim: *To preserve habitats important for the conservation of fishery resources to support artisanal fishing (conservation of ecological functionality).*

- Harmful or conflicting actions
- Potentially conflicting interactions (management measures needed)
- Advantageous

The first column shows the criteria considered, and the second shows the layers of geographic information available to evaluate those criteria. Potentially conflicting interactions are marked with a value of 0 (red) in the matrix, beneficial interactions are marked with a value of 2 (green), and those that are compatible only through the implementation of specific management measures are marked with a value of 1 (yellow).

It is important to note that the relevance of MSP depends on the availability of geographic information to create multiple layers of accessible, relevant, and credible geographic information, the lack of which can be a limiting factor in resources management. For example, to map important fishing habitats, the layer of rock areas that coincides with non-trawlable areas and spawning grounds were both considered. However, it was not possible to obtain detailed regional information on marine biodiversity, habitat cover, or abundance of sensitive species or species of fisheries interest.

The next step of the process involves carrying out a more thorough diagnostic of the selected area, which includes, if necessary, primary data collection or habitat mapping by interpreting satellite marine images. This provides more detailed information for zoning.

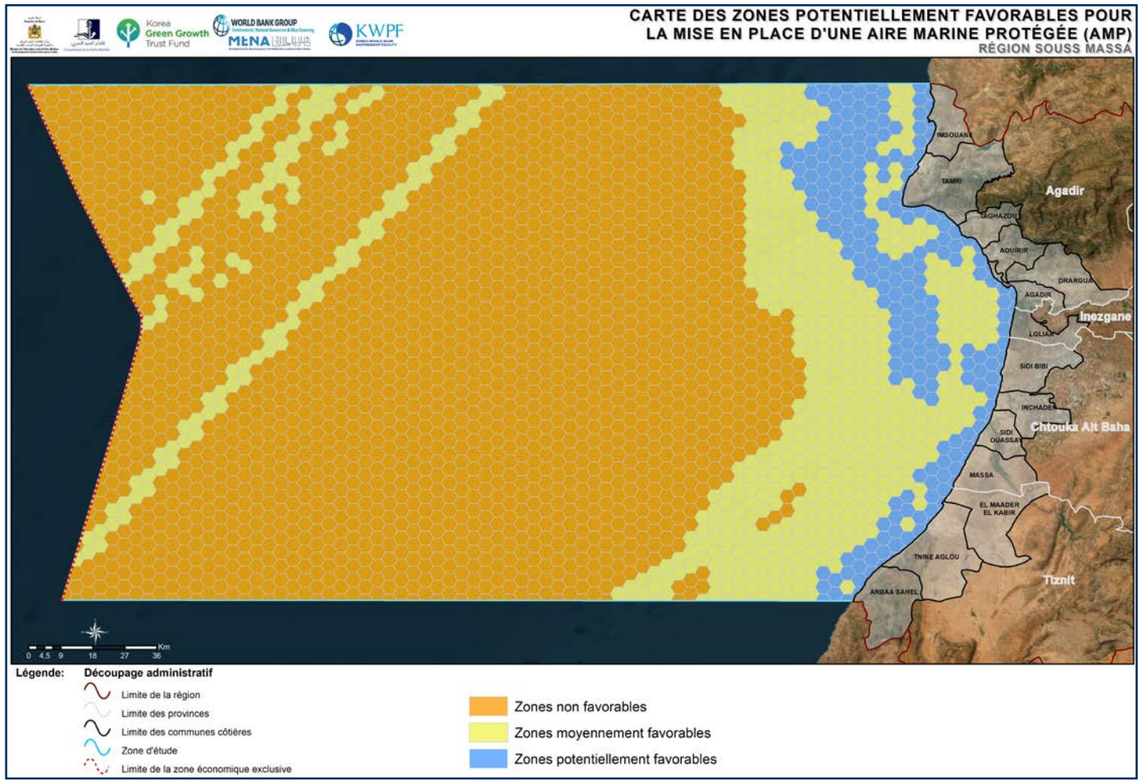
The process then moved on to cultural criteria. Because there is a lack of georeferenced information on sites of cultural importance, points of interest—places with natural, geological, landscape, or cultural value—along the coastal Souss-Massa region were selected based on the literature reviewed.

Similarly, the areas most at risk of urban pressure were identified by drawing a perimeter around urban centers. (This does not mean that there is zero risk outside the area, but a lesser influence is assumed.) Risks related to the density of maritime traffic were assessed according to the intensity of the maritime routes, using data from the Directorate of Ports and the maritime public domain.

Sea surface temperature was taken to be an indirect indicator of the existence of upwelling zones (confirmed by the scientific literature). The remaining parameters did not offer sufficient precision to discriminate areas of value within the Souss-Massa region.

The result of this compatibility analysis was represented in a suitability map, following the application of the data reclassification process related to the optimal site selection criteria for the creation of an MPA-F.

Figure 10: *Suitability map indicating favorable areas for an MPA (World Bank, 2022a).*



The suitability map was prepared using compatibility values for each criterion, and depicting these values using hexagonal cells. Each cell represented four kilometers at their longest point. The size of the cells used should be based on the heterogeneity of the medium and the resolution of the available data.

Finally, an integrated map was constructed whose value was the arithmetic sum of all compatibility values for all criteria in each cell, so that the final map represents the (hypothetically) most favorable areas for the creation of an MPA-F based on the chosen criteria (the blue cells on Figure 10). The yellow cells on the map indicate moderately favorable areas, while orange represents areas that are not favorable.

Based on this exercise, and taking into account the quality and nature of the resulting areas, the most suitable area for creating a new MPA-F was identified as Option C, the area south of Agadir (south of Souss-Massa), taking as extension limits:

- **From north to south**: the current boundaries of the Souss-Massa National Park.
- **At sea**: a minimum of three miles from the current boundaries of the national park (to promote the continuity of the protection of ecologically sensitive and important ecosystems, so supporting the protection of spawning areas of several key species for near and more distant fishing in the area).

The MSP approach made it possible to identify potentially suitable areas for the establishment of an MPA-F on a scientific basis and using available data, while taking into account substantial stakeholder input. Decisions that stem from this process will be based on scientific evidence and an inclusive participatory approach.

Stakeholder involvement is essential when identifying possible areas of conflict and interest for fisheries conservation, especially where geographic information is scarce. To do this, the participatory mapping technique makes it possible to spatially reflect the vision of the actors and to add this information to an integrated GIS.

4

Next steps, recommendations, and a tool to scale up marine spatial planning

4.1 FROM AREA SELECTION TO AN MPA-F

Now that the MSP process has concluded, it falls to the DMP and national stakeholders to continue with the process of developing and implementing policies and management plans for the proposed MPA-F in Agadir. This section includes a proposed roadmap with the key steps to be individually or jointly undertaken to achieve the objectives of an MPA-F. It does not constitute a legal commitment. Rather, its aim is to continue supporting decision-making processes and programs already established within the MSP framework.

The next steps are to:

- **Improve the diagnostic**, including obtaining more detailed information (especially on important habitats for fishing species of interest; the impacts of fishing activities and other human activities; the conservation of important habitats; the suitability for the development of other uses; and the regulations that affect the conservation values and that may influence the establishment of the zoning that will accompany the management measures).
- **Refine the borders of the proposed MPA-F and its zoning**. To do this, it will be necessary to collect data at a more precise scale (local or regional).
- **Create regulation to formally declare the MPA-F (decree).**
- **Develop and implement a management plan based on the identification of conflicts and compatibilities of use** at a more granular scale and allowing for trade-offs to be managed.
- **Deploy a monitoring and evaluation system.**
- **Review and adapt.**

Figure 11 visually illustrates these steps. Once steps 1 to 5 are complete, the planning cycle will be completed. Yet, no plan works perfectly, and lessons learned from the process will likely signal areas that need to be adapted. The best approach is to apply an adaptive management strategy that allows for reiterative planning cycles (Figure 12). All these steps should be done through an MSP approach that considers all uses and how they interact, and are based on inclusive and participatory stakeholder consultations.

Figure 11: *Steps to strengthen the MSP for the creation of the MPA*

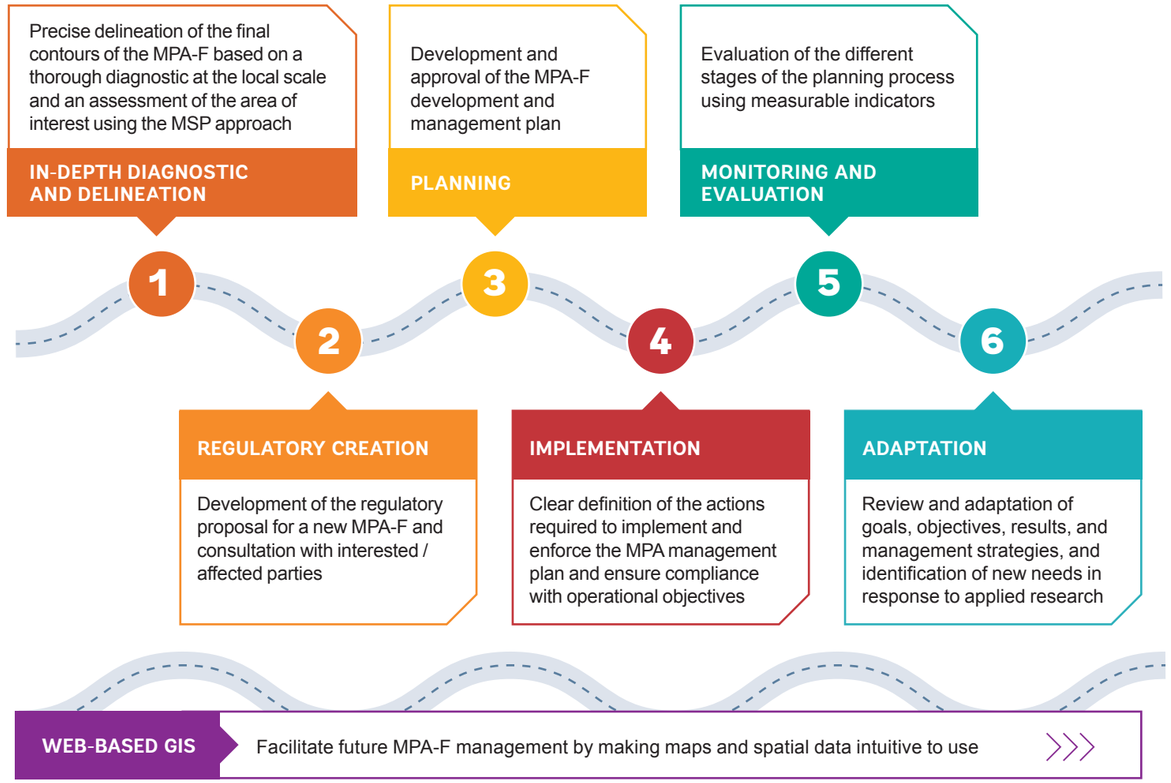


Figure 12: *Adaptive management applied to MSP of the MPA-F (plan to review every five years)*

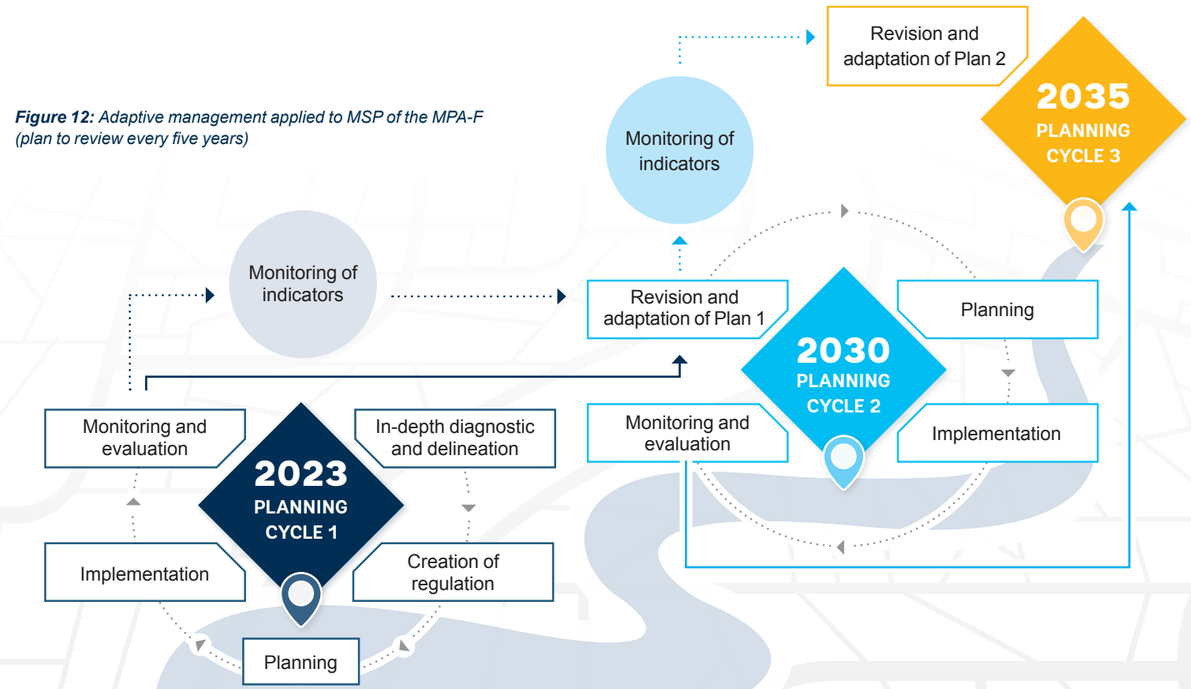


Figure 13: Expected outcomes of each step

IN-DEPTH DIAGNOSTIC AND DELINEATION

- Undertake in-depth knowledge of the territory and baselines
- Precise delineation of the MPA-F boundaries

PLANNING

- MPA-F development and management plan

MONITORING AND EVALUATION

- Implement monitoring system to measure the effectiveness of the plan
- Obtain periodic reports from decision-makers, stakeholders, and the public on the effectiveness of the MPA management plan

1 2 3 4 5 6

REGULATORY CREATION

- Draft regulatory creation of the MPA-F (Law 22-07)
- Issue decree formalizing creation of MPA-F

IMPLEMENTATION

- Establish regulation of activities and uses within the MPA-F
- Set up dialogue with stakeholders and define their roles
- Build the capacity of competent authorities and maritime sectors on MPA-F management and monitoring

ADAPTATION

- Revise and adapt plan to new needs and objectives based on monitoring results

The expected outcomes of the next steps of the process are summarized in Figure 13, while Figure 14 sets out a possible timetable. In parallel with these steps, a web-based GIS tool needs to be developed (Figure 15).

Figure 14: Possible timetable for next steps

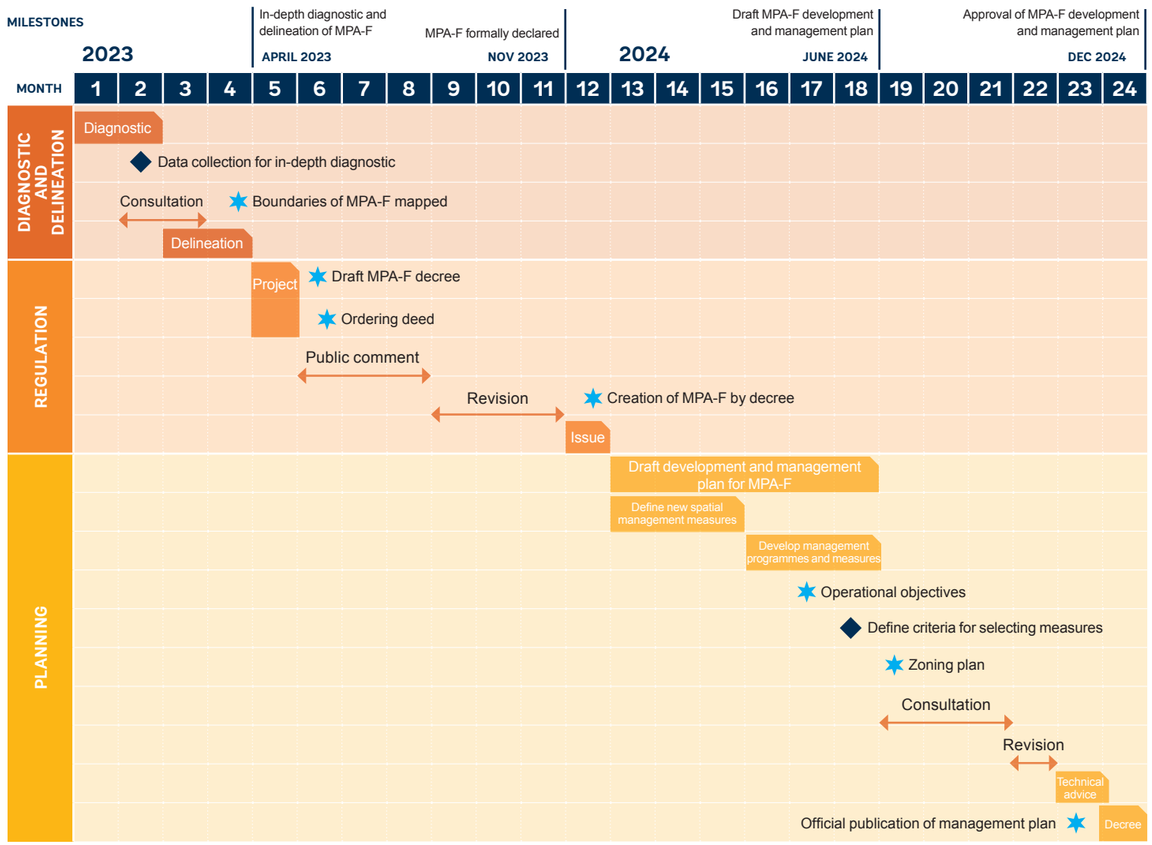


Figure 15: Timetable for management plan application, monitoring and evaluation, and adaptation process.

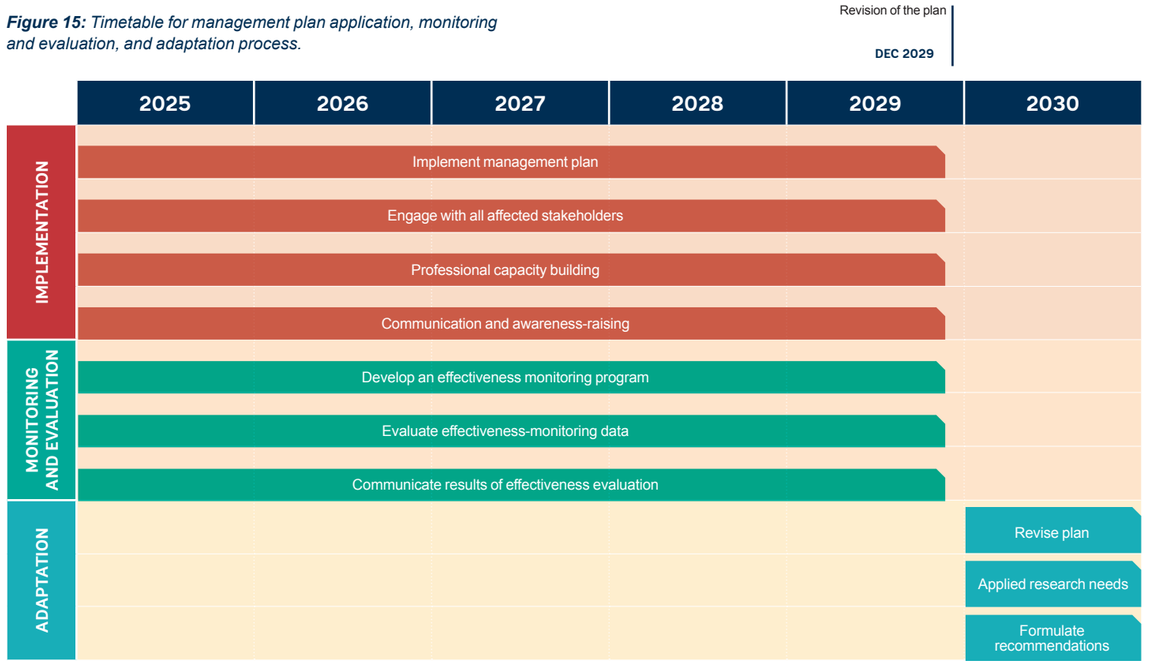
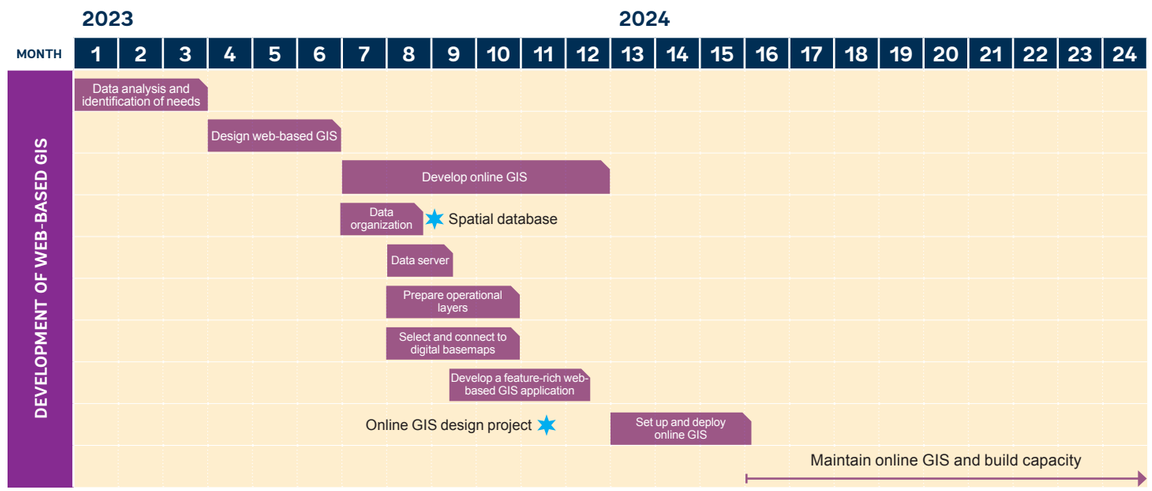


Figure 16: Possible timetable for development of web-based GIS.

WEB-BASED GIS

Facilitate future MPA-F management by making maps and spatial data intuitive to use



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4.2. RECOMMENDATIONS

This section summarizes key recommendations stemming from this knowledge-building exercise to support the DPM and relevant stakeholders in moving forward with the steps above.

4.2.1. Data gaps that need to be filled

A detailed diagnostic of the MPA-F should include an accurate assessment of the initial situation (baseline state) of the biotic, physical, and socioeconomic environment of the area, as well as the applicable legal framework.

The data and information collection exercise was hindered by data availability and accessibility. The TA overcame this lack of data at both national and regional levels by using global datasets and data published in scientific papers. An extensive analysis of information gaps was also carried out.

Data gaps are important to consider, especially when it comes to starting an MSP process that shall be evidence-based. The fact that gaps have been identified is proof of transparency and a sound process. A gap analysis enables priorities for obtaining new data to be identified. These priorities can be integrated into the management plan by working with institutions and research programs to generate the needed knowledge and increase capacity and support better decision-making in future. MSP decisions need to be guided by good-quality baseline data, especially in situations where displacement occurs. This baseline data should include information on current and future activities and externalities. The World Bank provides a useful publication addressing this specific issue (World Bank, 2022i). The TA's gap analysis exercise identified the following information gaps:

- **Oceanographic data and marine habitat coverage**. Although some data has been obtained, the level of precision (detail of scale) is low. In this sense, it has been possible to obtain data on the cover of rocky bottoms, but these contain little information on associated biodiversity and need to be updated, as indicated by INRH representatives during the workshops.
- **Landform modeling (bathymetry) at a detailed scale**. Access to detailed and continuous bathymetric information would be of great help in predicting the behavior of ocean currents, the dynamics of nutrient movement, and vulnerability to climate change due to wave height.
- **Maritime transport networks**. Access to this type of information is normally restricted. However, detailed knowledge of shipping routes and the intensity of maritime traffic will allow zoning to be refined, prioritizing traffic in the most important areas, regulating it in the most sensitive areas, for example by speed limits, and promoting measures to prevent impacts on wildlife and the most sensitive ecosystems.
- **Energy transport networks and marine communications**. The compilation of nautical charts can be included to obtain the most relevant data for the management of transport, energy, and communication networks in relation to this and other MPA-Fs in the future.
- **Presence of marine wildlife**. Increasing knowledge of areas important for refuge, feeding, and breeding, both for economically important and threatened marine species, is essential for making decisions on the best location for MPAs. Although it is difficult to establish these boundaries in the marine environment, certain areas such as spawning grounds or migration routes are particularly important.
- **Carbon sequestration areas and zones vulnerable to climate change**. Climate change mitigation and adaptation is a cross-cutting issue that must be considered for the sustainable development of all activities related to the Blue Economy. Having data for spatial planning that considers areas of particular importance for mitigation and areas at risk allows planning to occur with an adaptive vision. The vulnerability of the MPA-F and its natural habitats to climate change should be studied and adaptation based on nature-based solutions should be integrated into the management plan.
- **Energy exploration areas**. Energy exploration in Morocco's Atlantic area represents one of the major threats to conservation. In the current global energy context, knowing where these areas are located and the risk that these activities may pose is important to ensure the future conservation of the MPA-F and avoid the impacts derived from energy exploitation.
- **Fishing areas and allocation of fishing gear by area**. There is a need to further refine the distribution of fishing areas and gear used in each area, particularly for the recommendation of management measures leading to the regulation of practices that endanger conservation. The information available on this subject on the pilot site is very limited.
- **Upwelling zones and nutrient concentration**. Although there are several studies on upwelling zones on the Atlantic coast, geographical information to better locate these areas is limited. It is necessary to understand the generation of nutrient concentration models and chemical parameters that make it possible to protect areas particularly important for the subsistence of the food chain that allows the renewal of fish stocks.
- **Impact zones (for example, pollution, eutrophication, appearance of plastic waste)**. The location of impacts is also important for planning MPA-F management measures. In this sense, it would be useful to establish collaborations with universities and research centers to obtain georeferenced information from studies carried out to locate waste and points of contamination on the Atlantic coast. Although some studies exist, in general data are not available.

It is highly advisable to involve stakeholders in data collection. This helps to ensure that participation includes all social groups and sectors (private, public, government, NGO, fisheries, and others) and is equitable, especially when it comes to the involvement of women. Early and ongoing stakeholder analysis will serve to identify interested parties outside government as well as underrepresented groups.

Strengthening the role of l'Observatoire Régional de l'Environnement et du Développement Durable (OREDD, the Regional Observatory for Environment and Sustainable Development) will also support the generation, accessibility, and management of important knowledge.

4.2.2. Recommendations for the development and management plan

The development and management plan should describe the physical and biological components of the protected area, its socioeconomic environment, immediate and long-term protection objectives, development and management strategy and programs, monitoring and control mechanisms, as well as environmental impact indicators and estimates of financial needs on a five-year basis. It should set out specific measures and restrictions to ensure the conservation of the protected area, as well as the areas in which fishing, aquaculture, tourism, or other activities are authorized.

Before its approval, the draft development and management plan should be submitted to the local authorities, the administrations concerned, and relevant civil society associations.

The approach to MPA management should be an adaptive one, with successive planning cycles involving monitoring and evaluation, a detailed diagnostic, and redefining general goals, programs, and management measures after each cycle is completed, followed by new official rules if needed.

The MSP approach should be used as a key tool to ensure sustainability and resilience in the future development of the coastal cluster in the Souss-Massa region.

RECOMMENDATIONS FOR ZONING

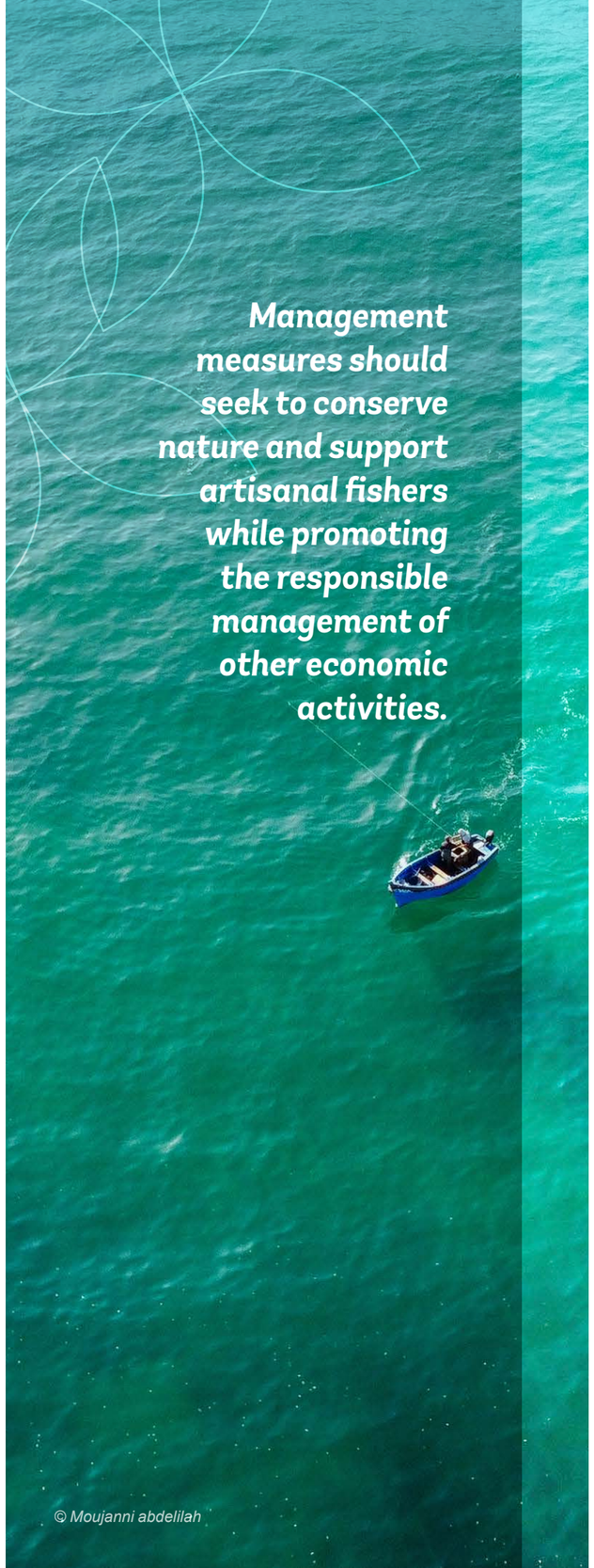
Based on geographic information layers such as coverage of sensitive areas, spawning and breeding areas important for species of commercial interest, and other information related to the natural environment and use regulation, new spatial delimitation layers should be created using GIS tools and based on established zoning criteria. The following activities will support this process:

- **Develop geographical information** with local or regional precision.
- **Collaborate with the authors of relevant scientific studies**, especially those that contribute to mapping values of interest (natural habitats, breeding grounds, carbon sequestration areas, and so on).
- **Conduct participatory workshops** for the preparation of the zoning proposal.
- **Clearly delineate areas using GIS**, indicating coordinates if possible. This information can be used to mark areas in situ if necessary.
- **Define the specific zoning of the MPA-F to be created** considering different zones categories (Table 4). It is not necessary to include all zone categories, but rather those that contribute to the management of the MPA-F according to its objectives.

Table 4: *Zoning categories applied to marine protected areas (IUCN, 2018)*

ZONE NAME	OBJECTIVES AND CHARACTERIZATION
Preservation zone	Preservation of the natural integrity and values of the MPA-F, generally undisturbed by human activities. All entry is prohibited, except in an emergency, with the exception of authorized scientific research that cannot be carried out elsewhere.
Buffer zone	Surrounding area outside the boundaries of the MPA-F in which activities that mitigate the disturbances caused by the various human activities must be monitored and controlled in order to prevent disturbances or alterations within the boundaries of the MPA-F.
Habitats protection zone	Sensitive conservation areas within the MPA-F that need to be protected and managed. Potentially damaging activities are generally not allowed in this zone.
Conservation zone	Sensitive conservation areas within the MPA-F that need to be protected and managed, but that allow for reasonable use (education, research).
Restoration zone	Intervention areas intended for partial or total recovery of the structure, function, and composition of an ecosystem according to management objectives. These areas have been altered by human or natural action but have been earmarked for restoration of natural habitats or ecosystems.
General use zone	The least restrictive of all the zones, this provides opportunities for reasonable use, including navigation and trawling, to ensure the conservation of MPA-F areas.

Zoning can be adapted according to the objectives and needs identified in the diagnostic. For example, the general use zone can be better defined as a fishing area in which specific species can be fished using specified fishing gear and only at certain times of the year. A public use zone can also be delimited for the development of tourist and nautical activities. Navigation zones can be delimited, as well as conservation zones or no-fishing zones if needed to guarantee the protection of sensitive habitats and ensure the renewal of stocks.



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GENERAL USE ZONE ACTIVITIES

Management measures should seek to conserve nature and support artisanal fishers while promoting the responsible management of other economic activities. A selection of sector- and activity-specific management measures are outlined below.

Fishing

The following could support the promotion and regulation of fishing activities:

- Compile measures to protect existing species, focusing on fishing gear, fishing techniques, and catch size.
- Support and maintain co-management strategies to channel technical and financial assistance to support initiatives within the protected area.
- Develop protocols to minimize the impacts of the activity and avoid incidental catch (ghost fishing).
- Explore opportunities to develop initiatives such as innovative start-ups to turn fishing-gear waste into business opportunities for women and younger generations.

Aquaculture

The MPA-F could include designated aquaculture areas, the boundaries of which should be clearly communicated within the MPA-F. The species farmed and aquaculture techniques used should be diversified. Collaborations that allow innovation in this sector should be supported.

Tourism

As with fishing and aquaculture, tourism activities should be promoted and regulated within the MPA-F and subject to the study of the MPA-F's carrying capacity for tourism activities, considering other activities carried out in the same zone, particularly those involving the use of boats. Tourism opportunities based on conservation in protected areas (ecotourism) should be explored.

Heritage

In line with national legislation, recommendations concerning cultural heritage should be followed. Areas for the protection of emerging and underwater cultural heritage should be demarcated and studied.

4.2.3. Recommendations for monitoring and evaluation

A robust monitoring and evaluation plan is based on a system of measurable indicators that has been associated with identified objectives. Global monitoring and evaluation cycles of five years are suggested, although some metrics may require a shorter period.

Involving communities and other relevant stakeholders in monitoring the management plan, collecting data and information, and proposing corrective measures in case of non-compliance will raise awareness and promote a sense of ownership while supporting ongoing monitoring and evaluation efforts. Further activities that support effective monitoring and evaluation include:

- **Promote national capacity development.** Assess whether the management plan contributes to the sustainable development of small-scale fisheries and conservation, and whether the capacity to achieve this has been strengthened.
- **Promote inclusion**, especially of marginalized groups such as women, the youth, and artisanal fishers.

4.2.4. Recommendations for a web-based GIS system

The data and related GIS developed through this TA are hosted by the DPM, which will serve as an incubator for an open-source, web-based GIS to be developed and implemented by the DPM. This GIS will be a powerful tool, making data and information useful and accessible to authorities as well as stakeholders and the public.

Increased awareness across all spheres of the importance of GIS for MSP and other potential applications—together with a core of GIS experts (at central and regional level) that are trained in the use of GIS, online GIS systems based on the client-server network, and spatial databases—will support the rollout an efficient, open-source, web-based GIS. After the identified information gaps have been closed or narrowed, a GIS system would benefit from:

- **A database that uses open-source software** such as PostgreSQL and PostGIS.
- **An open-source server that meets the type of service required**, the desired characteristics of the database, and the required level of interoperability. There are various open-source server options such as GeoServer, MapServer, and QGIS server.
- **Dynamic operational layers that are extracted from the GIS database** and displayed at run time at a specified scale and resolution.
- **A spatial data visualization window** that gives users the option to submit a query, do simple analysis, and even download data.
- **Tools to visualize and analyze the results.** These include functionality to classify and map results, to execute statistical summaries, to generate tabular reports and diagrams, and so on.

4.3. A TOOL TO SCALE UP MARINE SPATIAL PLANNING

A methodological guide has been developed for stakeholders, bringing together lessons learned and making available all acquired knowledge from the experience in Agadir. This guide will be a driving tool for the Government of Morocco, working through the DPM, to create MPAs using an MSP (see Figure 1 on page 3).

The methodological guide presents the comprehensive steps and tasks required to implement an MSP approach to create an MPA-F, including five key steps:

- Step 1: Preliminary consultation process for acceptability of site selection
- Step 2: Identification and mobilization of funding sources
- Step 3: Pre-planning of the MSP process for the creation of a new MPA
- Step 4: Collection of data and information for spatial diagnostic
- Step 5: Data analysis for diagnostic and selection of the optimal area.

The proposed approach is consistent with the World Bank guidance note, “Marine Spatial Planning for a Resilient and Inclusive Blue Economy” (World Bank, 2022f).

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5 Conclusions

As part of the Government of Morocco’s Blue Economy program, and to support the artisanal fishing sector, the DPM is committed to establishing MPA-Fs, designed to be a tool for simultaneously regulating fishing efforts and protecting threatened species and ecologically sensitive areas. To address these goals in multiuse coastal environments, MSP offers an appropriate framework within which MPAs can be developed, both strategically (planning as a political tool) and from a spatial point of view (planning as a technical tool). MSP addresses multiple human uses, their cumulative impacts, and their interactive effects. It allows an integrated and spatial analysis of all the components of the ecosystem, helping to identify potential conflicts and synergies and to locate them in the territory.

In the context of the World Bank TA, knowledge and capacity-building exercises focused on the steps required for DPM to initiate the MSP process for the creation of an MPA-F in the pilot site of Agadir. This exercise can now be replicated in other Moroccan marine areas.

An MSP diagnostic was conducted in the Agadir Bay based on the spatial analysis of available biophysical and socioeconomic data as well as the analyses of conflicts and compatibilities between various uses (for example fisheries, transport tourism, and energy). This has been conducted to identify the best location to create an MPA-F. To finalize the creation of the MPA-F, the TA assisted in defining an operational roadmap with a proposed timeline, providing key steps for DPM to continue strengthening the MSP process by applying a series of recommendations. These recommendations will allow DPM to deepen the diagnostic to create the MPA-F (by decree) based on a finalized zoning; develop and implement the management plan; and deploy a monitoring and evaluation system that allows for adaptive management. A web-based open source GIS system will allow sharing information among the stakeholders platform built during the MSP process.

The knowledge-building process was based on a strong participatory approach, involving diverse stakeholders including all relevant sectors and artisanal fishers around DPM as well as academics, NGOs, private sector through a series of consultations, virtual meetings, and workshops at all stages of the process.

Based on the key findings and lessons learned from this MSP knowledge-building process, it is clear that the MSP represents an opportunity for Morocco to improve the sustainable planning of its marine and coastal areas, particularly to balance the need to develop sustainable artisanal fisheries in synergy with other sectors and to conserve fishery resources.

To capture all acquired knowledge, a methodological guide has been designed to strengthen the MSP capacities of all stakeholders in the fisheries and other marine and coastal sectors. The guide’s main objective is to detail a methodological approach and a set of simple and appropriate tools and methods, to help lead, guide, and optimize the MSP process in support of the creation of MPAs in Morocco. This links the main stages of the MSP process in the Agadir Bay exercise with international literature guides. The methodological approach has been adapted to the sociocultural context of the region and includes five main stages with several tasks, carried out with a participatory and inclusive approach. This tool will be critical for DPM to apply and replicate the MSP approach in other marine areas to set up new MPAs for fisheries management purposes. The leadership of DPM has been instrumental in advancing the MSP learning process and will be key to developing this further, which will require the coordination of a wide range of national, regional, and local authorities.

The growing interest in the participatory MSP process is clear: demonstrating their enthusiasm for the process, stakeholders—and particularly fishers—already recommended exploring the creation of other MPA-Fs in the Agadir area (in other words, in Imessouane).

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Appendix

APPENDIX 1: THE MAIN ENVIRONMENTAL CONDITIONS AND USES IN THE AGADIR PILOT SITE

After the pilot site was chosen in consultation with all stakeholders, the geographical scope of the work was defined, accounting for the administrative boundaries of the coastal municipalities of the Souss-Massa region and the limits of Morocco's exclusive economic zone.

The Souss-Massa region covers 53,789 square kilometers and has nearly 2.7 million inhabitants, with an average population density of about 49.8 inhabitants per square kilometer. It represents 7.57 percent of Morocco's national territory. Its 180 kilometer (km) Atlantic coast runs from the rural communes of Imessouane in the north to Arbaa Sahel in the south. This coastal zone is an important regional socioeconomic center due to its demographic and economic weight, as well as its geography.

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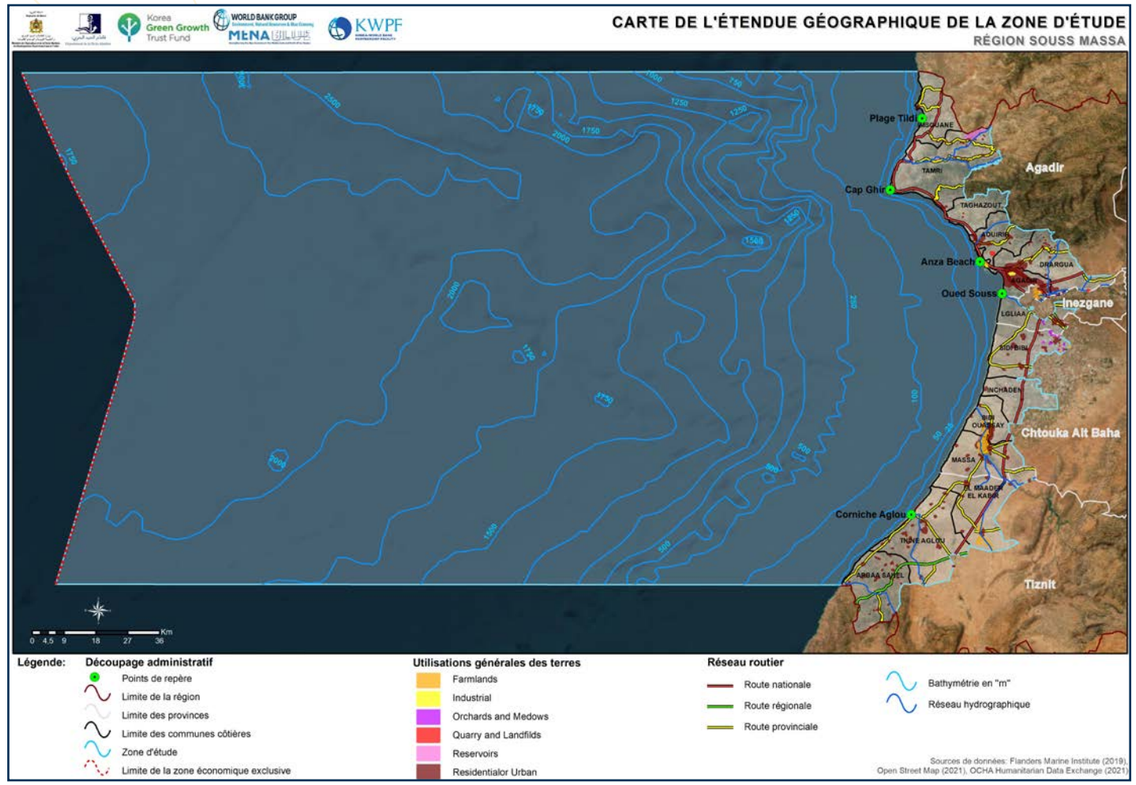
Figure 17: *Geographic extent of the study area: the Souss-Massa region (World Bank, 2022a)*



There are several fishing sites scattered along the Souss-Massa coast. These access points to regional fishery resources are of different sizes. The region is rich in biotopes of great ecological interest, specifically the Argan forest, dunes, wetlands, steppes, and coastal cliffs. Souss-Massa National Park, which extends from the mouth of the Oued Souss to Aglou, represents a management tool for the preservation of natural resources and the promotion of ecotourism on the coast.

The port of Agadir accounts for 98 percent of the region's total production. The fish-processing industry is located mainly in Agadir, producing mainly for export. Sixty percent of Moroccan seafood exports are made by Souss-Massa companies.

OCEANOGRAPHIC CONDITIONS

Influenced by the Atlas Mountains, the Atlantic Ocean, and the climatic conditions of the Sahara, the Souss-Massa region is characterized by an arid to semi-arid climate. The prevailing winds in the coastal region are from the west-northwest to the west, favorable for the generation of aeolian dunes. The coastal region is exposed to relatively energetic waves from the north Atlantic. The waves and sediments have changed since the Agadir port was built.

Figure 18: *Prevailing winds and wave heights in the Souss-Massa region (World Bank, 2022a)*

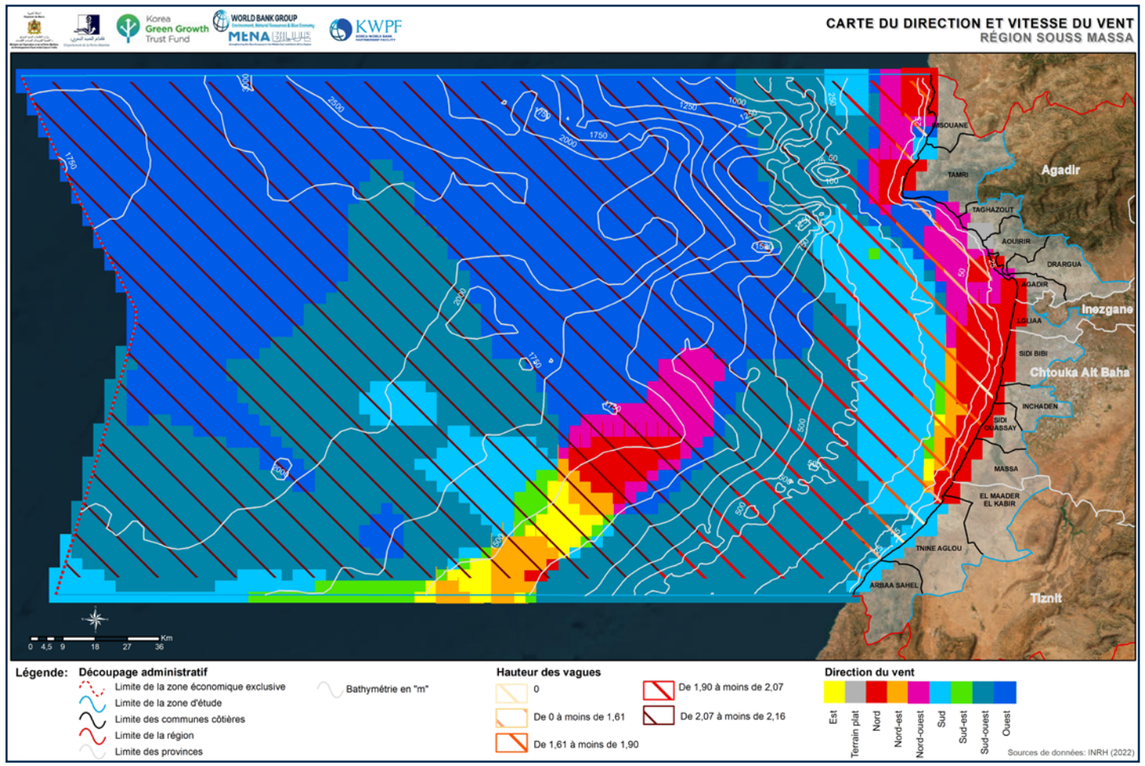
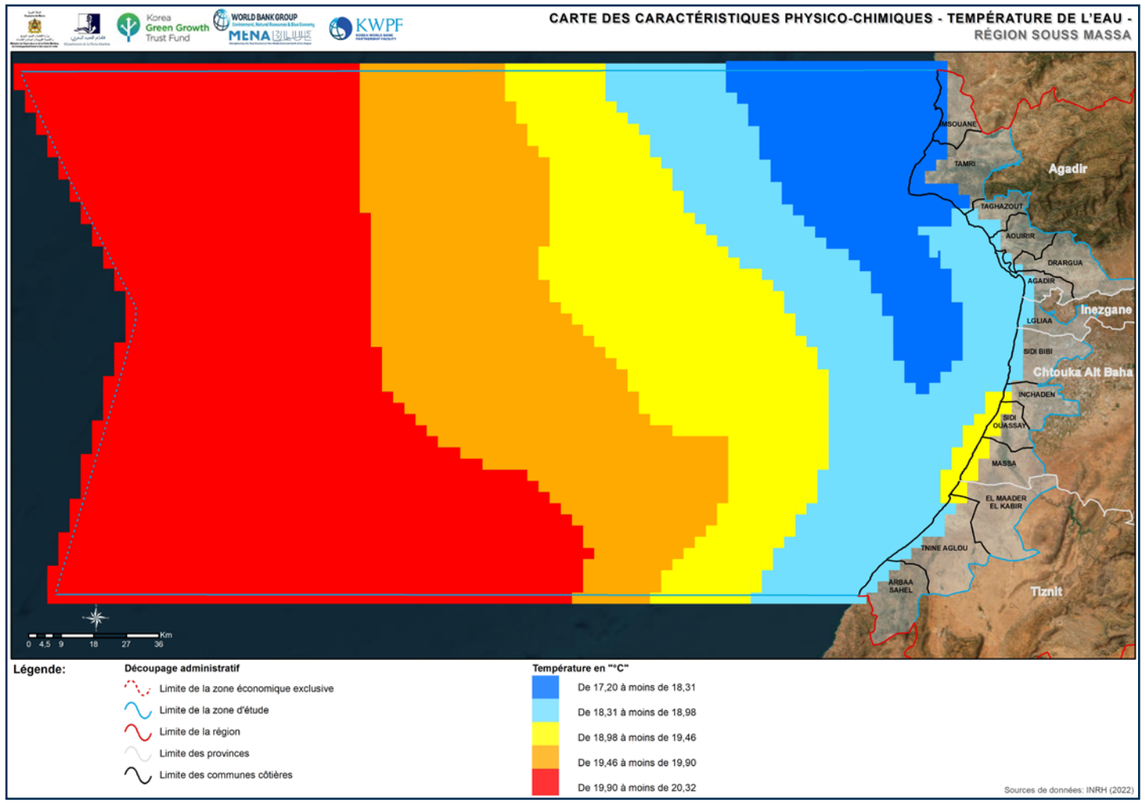


Figure 19: *Annual average value of sea surface temperatures (World Bank, 2022a)*

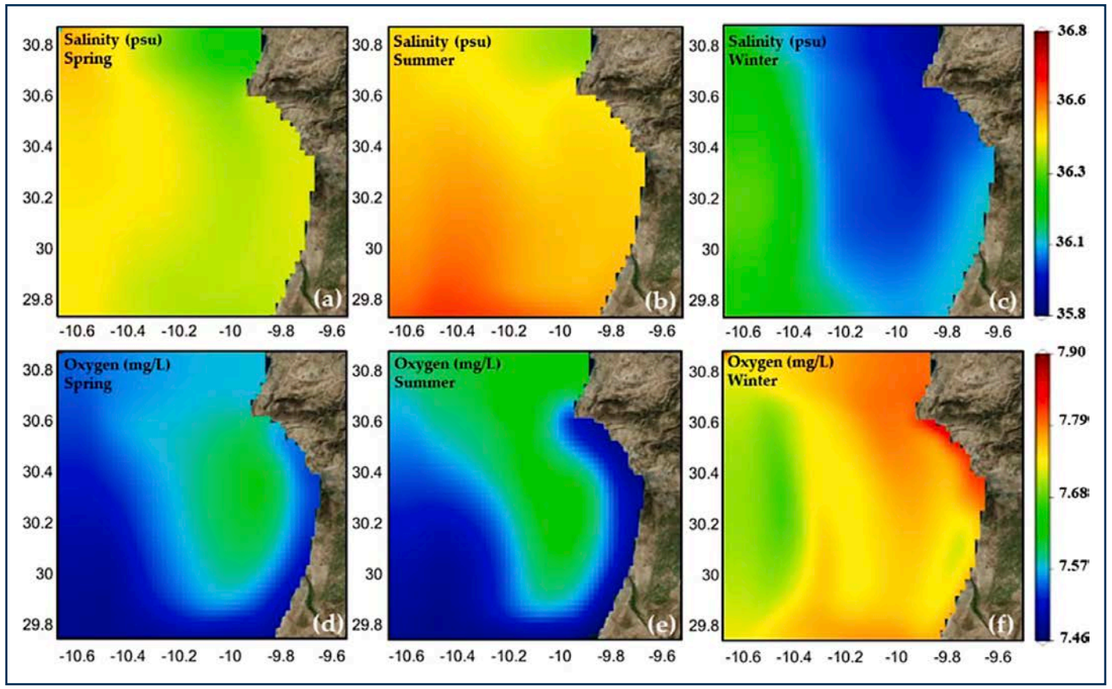


Regarding ocean circulation, there is an important pattern of upwelling in the region. The prevailing currents fall within the Canary current system. The concavity of its coastline and the influence of the Atlas Mountains mean the region is characterized by a permanent outcrop of highly productive algae and zooplankton.

This important oceanographic pattern is closely linked to sea surface temperature. Figure 19 shows the annual mean surface temperature in the region: the blue (colder) waters arise from the north area, generating seasonal upwellings.

Sea surface salinity increases as the distance offshore increases. Surface dissolved oxygen is unevenly distributed, with higher concentrations in the north in spring and summer, according to simulations. In winter, dissolved oxygen concentrations decrease as the distance from the coastal region increases, as shown in Figure 20.

Figure 20: *Sea surface salinity and surface dissolved oxygen (World Bank, 2022a)*



The technical advisory documentation captures the spatial distribution of important nutrients such as nitrate, phosphate, and silicate. Nutrient availability appears to be the main factor controlling the distribution of phytoplankton in Morocco's Atlantic coastal waters, where upwellings are high. High nutrient availability promotes phytoplankton primary productivity, which plays a key role in ecosystem processes and forms the basis of many aquatic food webs. This, in turn, supports important fisheries resources.

Since ancient times, this coast has been the seat of a highly active hydro-sedimentary dynamic, which has been severely affected by the various port and tourist facilities installed in the region. Today, it is subject to a very complex hydrodynamic regime as structures (such as ports, breakwaters, and jetties) and waves have disrupted the evolution of the coast.

The proximity of the ocean, the influence of the cold Canary current, and the mountain barrier formed by the Anti-Atlas help to protect the coast from the semi-arid to arid winds of Souss-Massa, generating a mild climate. This creates favorable conditions for the development of activities in sectors other than fisheries, such as tourism in coastal and marine areas.

WATER RESOURCES

The region's water resources include surface water, dams, and groundwater resources. Renewable surface resources are estimated at 131 and 418 million cubic meters in the Massa and Souss basins, respectively. Seven reservoirs are installed in the basin, with a total capacity of 639.99 million cubic meters. These reservoirs support several economic and social benefits in the region. Irrigated agriculture in the Souss-Massa region, for example, produces more than half of Morocco's citrus fruit and vegetables.

The diverse geographical, geological, and climatic features of the Souss-Massa river basin play an important role in the availability of water resources, which in turn affect a range of agricultural and other water-related activities. About 645 million cubic meters per year of groundwater (renewable and non-renewable aquifers) are currently used in the region.

Most of the region's groundwater resources are fully exploited (water levels decreased by between 0.5 to 2.5 meters per year over the past four decades), and some aquifers are overexploited, resulting in lower groundwater levels, water-supply scarcity, and saltwater intrusion in coastal areas.

The diverse geographical, geological, and climatic features of the Souss-Massa river basin play an important role in the availability of water resources, *which in turn affect a range of agricultural and other water-related activities.*

MARINE HABITATS AND BIODIVERSITY

Morocco's great diversity of ecosystems is due to its a wide range of climatic and physiographic regions. Marine and coastal ecosystems, wetlands, caves, and other types of natural habitats act as a repository for a wealth of biodiversity, including many species of conservation importance. As noted earlier, the Moroccan marine domain has physical-chemical and biogeographical properties that create floral and faunal richness in its two coastal regions.

As far as coastal ecosystems are concerned, some lagoons and estuaries provide a brackish and protected environment. They provide critical habitats for many species that reside there permanently or use them as breeding and rearing grounds. The main aquatic environments of the coastal strip are lakes, estuaries, dam reservoirs, streams, and springs. Caves are a particular ecotype of wetlands. There are several dozen caves in Morocco, some of which are coastal, both on the Mediterranean and Atlantic coasts.

Coastal wetlands offer a complex mosaic of habitats, characterized by beach areas, coastal areas with cliffs and rocky plains, as well as open bays, as is the case of the coast of Agadir. Wetlands play a particularly important role as spawning grounds for many fish species, with a high proportion of endemic species linked to coastal wetlands, river mouths, and inland waters.

The Moroccan maritime space is also characterized by the passage of many migratory species such as bluefin tuna and several species of marine mammals, giving the country its share of responsibility in the management of an international biodiversity heritage. With Morocco at the crossroads of several Eurasian bird migration routes, these rich and diverse environments also play an important role as a stopover and feeding area for millions of migratory birds.

In terms of marine resources, the Moroccan coasts are rich and diverse with 7,825 species reported in its waters, including 7,136 animal species and 689 plant species. The real number is certainly much higher. Different sources of fish species, coming from both the Atlantic Ocean and the Mediterranean Sea, are mixed in this area due to ocean currents, and contribute to the movement of larvae, algae, and benthic and pelagic species.

Marine flora represents about 670 species, dominated mainly by the algae Rhodophyceae (303 species), followed by phaeophyceae (99 taxa), chlorophyceae (87 species), and cyanophyceae (12 different forms). In addition to these benthic algae, about 200 species of phytoplankton have been found in the coastal areas of Morocco, mainly along the Atlantic coast. Among algae, only one species, Gelidium sesquipedale, is exploited for the agar industry. Despite the scientific research that has been conducted on the Moroccan coast, little is known about some species, even if they have been relatively well studied in other regions. It is estimated that about 154 species of algae present in Morocco could be of economic use.

Moroccan marine fauna is mainly composed of three zoological groups: mollusks, arthropods, and vertebrates. The arthropod group is diverse, with 1,925 species of crustaceans, representing 27.16 percent of the total species. This is followed by mollusks, especially gastropods and lamellibranchs (1,596 species, 22.54 percent) and vertebrates, especially fish (1,145 species, 16.17 percent). These three taxa constitute more than 60 percent of all marine fauna on the Moroccan coast, with the rest divided between protozoa (551 species, 7.17 percent), coelenterata (438 species, 6.14 percent), lophophores (399 species, 5.63 percent), and annelids, especially polychaetas (351 species, 4.95 percent) and sponges (303 species, 4.32 percent)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In terms of marine resources, the Moroccan coasts are rich and diverse *with 7,825 species reported in its waters, including 7,136 animal species and 689 plant species.*

Figure 21: *Breakdown of zoological groups in Morocco's marine environment*

Data for appendix figure

Crustaceans	5%
Mollusks	24%
Vertebrates	17%
Protozoa	8%
Coelenterata	6%
Lophophores	6%
Annelids - polychaetes	5%
Annelids - sponges	5%

There is little information on the conservation status of many species considered important for biodiversity conservation and the ecosystem services it provides. Given the importance of this area to fisheries resources, the diagnostic report produced through this TA identifies aquaculture and recreational activities as potential threats to the conservation of important groups of species and their habitats in the Agadir pilot site.

Other human pressures at the pilot site include industrial activities and coastal development. Dredging activities and pollution discharge cause significant disturbances that threaten to alter the ecological balance on which the conservation of this biodiversity depends. In addition, the presence of plastics and microplastics has not been sufficiently studied. There is sufficient information to affirm that the region is under significant pressure caused by several activities, mainly tourism, industry, fishing, and urbanization. MSP will allow for a sustainable cohabitation zoning of these activities, including MPAs.


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FISHERIES

Morocco's marine fisheries sector has an annual production of over one million tons (including sardines, cephalopods, tuna, and other species). Approximately 93 percent of this production is provided by 465 (334 active) deep-sea fishing vessels, 2,498 (1,800 active) coastal fishing vessels, and more than 17,000 small vessels. Landings are facilitated by a total of 39 fishing ports and points equipped for small-scale fisheries in remote areas. As previously mentioned, the stocks of more than 15 species are overexploited beyond their maximum sustainable yield, in particular Mediterranean swordfish, red seabream, meagre, hake, sardinella, and pink shrimp.

Small pelagic fishing occupies an important place in Morocco's fishing sector. It covers the entire Moroccan, Atlantic, and Mediterranean continental shelf, and targets the main pelagic resources composed of sardines (Sardina pilchardus), mackerel (Scomber colias), anchovies (Engraulis encrasicolus), horse mackerel (Trachurus trachurus and Trachurus trecae), and sardinella species (Sardinella aurita and Sardinella maderensis). The exploitation of these resources, which constitute the bulk of the fishing potential of the Moroccan exclusive economic zone, is carried out in three major fishing areas, including the central Atlantic.

During recent years, more than one million tons of small pelagic species have been caught annually by three main types of fleets: inshore seiners; pelagic trawlers equipped with refrigerated sea water systems and pelagic freezer trawlers; and, in a very limited way, the artisanal fishing fleet.

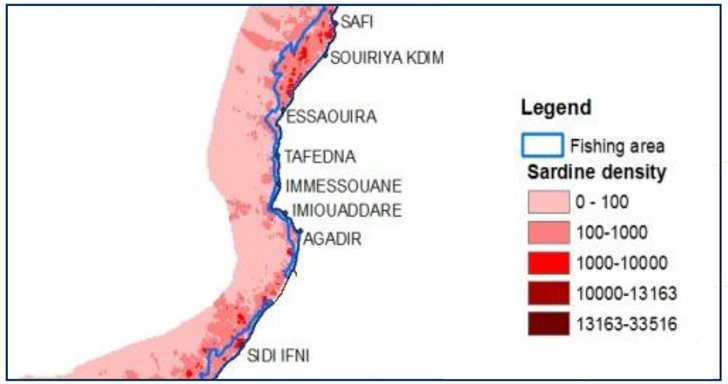

Figure 22: *Average spatial distribution of sardines and fishing zones of the small-scale fleet (Adapted from Oumarous et al. 2016)*

Official statistics indicate an annual average of 20,372 active domestic vessels, in addition to foreign vessels operating under fisheries agreements.

Small-scale fishing is a more sustainable option in many ways. The use of MPAs may be a powerful tool to ensure a stable level of catches and profits.

In 2021, 1.2 million tons of small pelagic species were landed. The catch was mainly sardine (70 percent), followed by mackerel (19 percent) and horse mackerel (7 percent), with other species, including anchovies, accounting for only 3 percent. These catches are mainly made by inshore seiners (40 percent) and refrigerated sea water trawlers (37 percent).

Most of the catch comes from the southern zone (57 percent) and the central zone (36 percent).

In this context, the region of Agadir is the leading fishing post at the national level due to the added value generated. The sector's contribution to national GDP averages around 30 percent. The Port of Agadir is in the fourth position in Morocco in terms of landings, with nearly 83,000 tons, and the first position in terms of production in value, with more than 3,700 million Moroccan dirham (about US$365 million) (DPM, 2021). Agadir is one of the top five Moroccan cities for processing, with 96 processing units (DPM, 2021).

The choice of optimal areas for the development of fish farming activity should be based on ***productive, ecological, and social characteristics.***

AQUACULTURE

Aquaculture activities in Morocco began in the 1950s with the launch of shellfish farming in the Oualidia lagoon. By the end of 2017, aquaculture produced about 600 tons of product from 21 aquaculture farms, mainly focused on oyster production. Oyster production is primarily destined for the domestic market and hotel and restaurant markets. Seaweed—increasingly used in food, cosmetic, and agricultural industries as animal feed and fertilizer—is part of the national panorama of aquaculture production and is produced in the Marchica lagoon to supply the algae processing sector.

The choice of optimal areas for the development of fish farming activity should be based on productive, ecological, and social characteristics. These should facilitate aquaculture operations, considering the context of the African continent. The choice of a site for a fish farm is crucial because it influences the farm's economic viability by affecting operating costs, production levels, mortality of aquaculture products, and the overall profitability of the aquaculture facility. Therefore, the choice of suitable areas for the development of this activity affects both the success and sustainability of the resulting enterprise.

In the Souss-Massa region, a recent study shows a strong consistency between the estimated area and the actual area resulting from ANDA's aquaculture development plan, with a value of 69 hectares for the first and 75 hectares for the second (the difference of 6 hectares being due to the geomorphology of the coast and natural coastal shelters) which have a positive impact on the environment for the development of aquaculture (Taji et al., 2022). These areas can attract investors, although they are part of an already established aquaculture development plan.

Depending on the coastal geomorphological aspect and productivity indicators, the area belonging to the pilot site is suitable for aquaculture activity. The first general feature of the area is its exposure to wind and waves. A site exposed to high energy will involve higher initial investments in cages, higher maintenance costs, and involve higher risks, resulting in higher production costs. On the other hand, a sheltered and protected site will be less exposed to waves and currents, so reducing maintenance and costs. Modeling data that helps analyze wave conditions using boundary conditions; bathymetric data; wind; and current fields—such as the data presented above—is useful in identifying optimal areas for aquaculture developments. It is also important to consider seasonal variability in oceanographic conditions.

Located between 29.91 degrees and 30.94 degrees longitude, the learning site area runs alongside the municipalities of Tiznit, Chtouka Aït Baha, Inezgane Aït Melloul, and Agadir Ida Outanane and divided into two zones totaling about 69 hectares (40 hectares and 29 hectares), with a width not exceeding six kilometers. The width of the continental shelf is limited: within four kilometers the ocean reaches a depth of 60 meters, characterized by a very steep slope.

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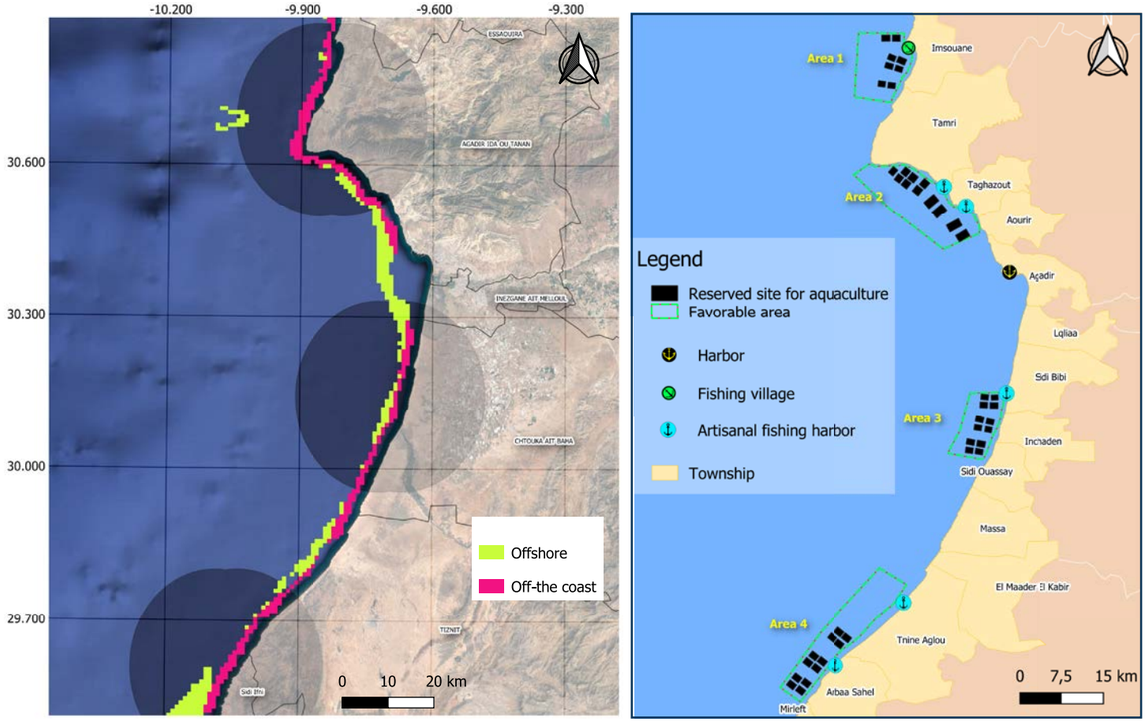
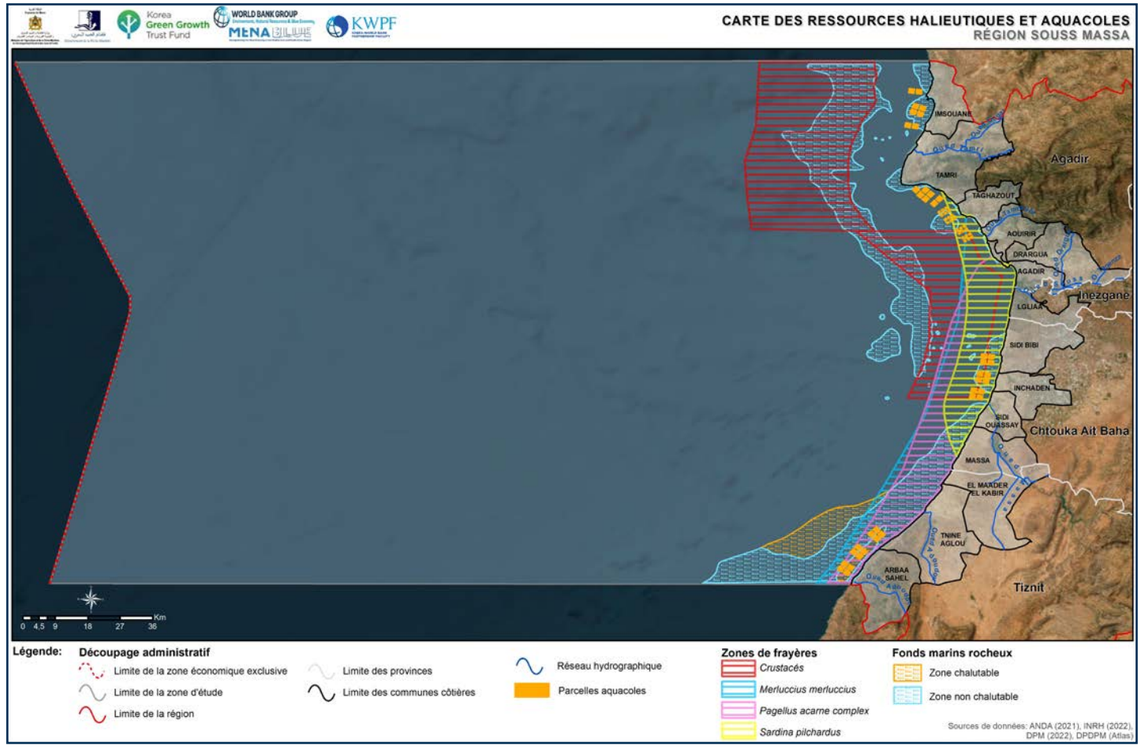
Figure 23: *Areas for aquaculture comparing the adequacy model (a) and ANDA (b). (Taji et al. 2022.)*



a b

Figure 24: *Key areas for the development of fisheries and aquaculture resources at the site (World Bank, 2022a)*



This data indicates that ANDA's aquaculture sector development plan covers the entire area included in the pilot site, with a high percentage of offshore sites. This highlights the potential of our study area for the development of aquaculture activities. However, to ensure sustainable development, it is necessary to minimize the impact on other ocean activities and the environment, in accordance with the objectives of the Halieutis Strategy.

This data indicates that ANDA's aquaculture sector development plan *covers the entire area included in the pilot site, with a high percentage of offshore sites.*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Areas of importance for spawning commercial species and aquaculture development areas, based on ANDA data, are indicated above. As capture fisheries have reached a production plateau, marine aquaculture of fish and shellfish has become a valid option to fill the protein gap. However, one of the main constraints for the aquaculture production sector is the availability of space. In many coastal areas, competition with other marine activities is already strong.

Environmental protection through the creation of new MPAs must factor into the equation. The selection of sites for the creation of new MPAs must also be compatible and integrated with potential economic activities that are sustainable and in harmony with their conservation objectives, such as aquaculture.

ANDA has established two aquaculture training farms in Ras El Ma and Immiouaddar to support the capacity building of smallholders. Practical training will be provided to artisans, in particular young entrepreneurs and members of cooperatives in these regions (DPM, 2020). Activities related to the integration of women in the aquaculture sector are being developed in this area. To this end, a project called AQUAFEMMES will run to 2023 to provide training in all aspects of aquaculture. Women's cooperatives will also receive support (DPM, 2020).

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COASTAL AND MARINE PROTECTED AREAS

Morocco currently has 10 national parks, including Sous-Massa National Park (1991), Al Hoceima National Park (2004), Talassemtane National Park (2004), Ifrane National Park (2004), Haut Atlas Oriental National Park (2004), and Khénifra National Park (2008). Souss-Massa, and Al Hoceima have maritime sections.

Six protection types are present within the geographical framework of the pilot site. They include coastal and marine areas important for conservation: a national park, a nature park, a biosphere reserve, two sites of biological and ecological importance, two RAMSAR sites, and an MPA.

Figure 25: *Protected areas already present in the pilot study area (World Bank, 2022a)*

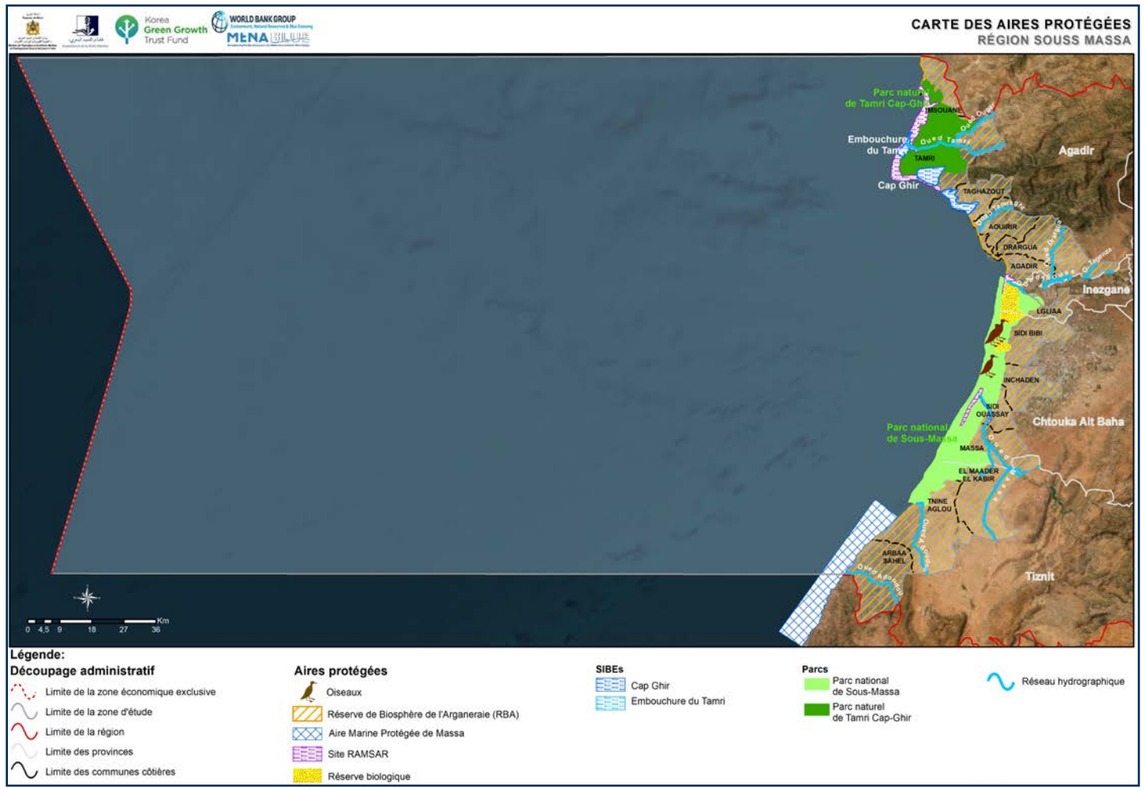

Table 5 sets out details of these coastal and marine protected areas.

Table 5: *Coastal and marine protected areas in the pilot study zone*

CATEGORY	NAME	EXTENT (HECTARES)	YEAR OF CREATION	NAME
National park	Souss-Massa	46,700	1991	Rare and endemic species Three integral reserves Two Ramsar sites (independent of the two Ramsar sites noted below) Important zone of bird migration
Biosphere reserve	Arganeraie	2,499,970	1988	Argan forests and their ecosystems Important associated socioeconomic development (argan oil production)
National park	Tamri Cap Ghir	29,600	2014	Variety of coastal landscapes with great biodiversity Two sites of biological and ecological importance Wetlands
Sites of biological and ecological importance	Tamri Estuary	920	1995	Coastal cliffs Mouths of oueds (wadis) with exceptional ornithological and herpetological populations
	Cape Ghir	4,510	1995	Exuberant plant formations with a high-quality landscape
Ramsar site	Cape Ghir-Imsouane	6,800	2019	Site of nesting and wintering of many birds The rate of endemism exceeds 30 percent in some terrestrial habitats
	Wetlands of Souss-Massa	2,800	2005	Variety of coastal habitats Site of nesting and wintering of many birds
Marine protected area	Massa	24,200	2014	Marine protected area to preserve artisanal fishery

Marine conservation is a national priority, as part of the sustainability axis of the Halieutis strategy, but there are reasons beyond biodiversity conservation for the creation of MPAs, including the maintenance of viable small-scale fisheries. By protecting habitats, MPAs preserve vital marine processes including photosynthesis, the maintenance of food chains, the movement of nutrients, the degradation of pollutants, and the conservation of biological diversity and productivity.

Anthropogenic pressures affecting the Souss-Massa region come from both maritime activities (such as overfishing, port activities and maritime transport, and the extraction of marine aggregates) and activities on land, including upstream in the watershed (such as forestry, agriculture, industry, tourism, sand extraction, and seawater desalination).

In addition to the concentration of these anthropogenic pressures, Morocco's coasts are strongly affected by climate change, including the rise of sea levels and major biogeochemical changes that impacts environmental biodiversity and biological productivity.