



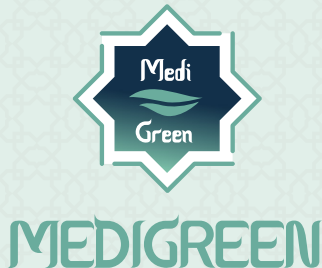
MEDIGREEN
Mediterranean approach
towards a maritime European
Green Deal in MSP

Exploring non-economic values of key marine sectors and nature protection: an MSP approach



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Author/s	<p>AUTH: Papageorgiou Marilena, Seitanidis Socratis, Pozoukidou Georgia, Angelidou Margarita, Bourlia Panagiota, Tzellepi Eleni, Kostopoulou Thenia</p> <p>IEO: Gutiérrez-Ruiz Elena</p> <p>CEREMA: Châles, Fanny</p> <p>IUAV: Brigolin Daniele, Fudoli Alessandra, Carella Fabio, Soffietti Folco, Lucertini Giulia, Maragno Denis (IUAV)</p>
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Exploring non-economic values of key marine sectors and nature protection: an MSP approach



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Index

The MEDIGREEN project	10
Aim and scope of the booklet	11
Key concepts and terms	12
<hr/>	
1. INTRODUCTION	
1.1. The shift to non-economic values and the need to relate them with MSP	14
1.2. Research and Methodology	15
<i>Literature Review</i>	16
<i>Interviews</i>	18
<i>Questionnaire Survey</i>	21
1.3. MSP related non-economic values: the MEDIGREEN approach	23
<hr/>	
2. NATURE PROTECTION	
2.1. Insights from the existing literature	27
2.2. The experts' opinion	29
2.3. General public awareness and perception	32
2.4. Indicative literature	35
2.5. GOOD PRACTICES	
• Torre Guaceto Marine Protected Area	36
• The Ionian National Marine Park and the National Marine Park of South Aegean	40
• Co-Produced Marine Stewardship: Participatory Monitoring of Vulnerable Elasmobranchs in the Algerian Alboran Sea	44
• Reduction of ghost fishing through the recovery of abandoned crab traps in the Boughrara Lagoon	50
<hr/>	
3. FISHERIES	
3.1. Insights from the existing literature	55
3.2. The experts' opinion	58
3.3. General public awareness and perception	60
3.4. Indicative literature	63
3.5. GOOD PRACTICES	
• Ligua franca halieutica among Croatian fishers	66
• Dry-Aged local fish and valorisation of underutilised species through high gastronomy and food education	70
• Amorgorama	76

4. AQUACULTURE	
4.1. Insights from the existing literature	81
4.2. The experts' opinion	83
4.3. General public awareness and perception	86
4.4. Indicative literature	89
4.5. GOOD PRACTICES	
• Valorization of oyster and mussel shells in the Thau lagoon	90
• Plan for Allocated Zones for Aquaculture of Emilia Romagna region "AZA-RER plan"	94
<hr/>	
5. OFFSHORE RENEWABLE ENERGY - ORE	
5.1. Insights from the existing literature	99
5.2. The experts' opinion	101
5.3. General public awareness and perception	104
5.4. Indicative literature	107
5.5. GOOD PRACTICES	
• Innovative solutions for the promotion of marine renewable energies in Galicia and environmental monitoring in the Punta Langosteira experimental site	108
• Cohabitation with fishers in the offshore wind park of Yeu-Noirmoutier	112
<hr/>	
6. A DEEP DIVE INTO THE EXPERTS' PERSPECTIVES: A CROSS-SECTORAL SYNTHESIS	
6.1. Prevailing non-economic values across the key sectors explored	117
6.2. Comparison of the key sectors explored in terms of non-economic values	119
<hr/>	
7. CONCLUSIONS	
7.1. Non-economic values as enablers of the EGD goals	122
7.2. Suggestions for the integration of Non-Economic Values in MSP	122
7.3. Steps Forward - Directions for future Research	125
7.4. Policy recommendations	127
<hr/>	
REFERENCES	129

List of figures

- Figure 1: Affiliation of experts interviewed _18
- Figure 2: Age groups of participants in the questionnaire survey _21
- Figure 3: Survey participants' relation to Nature Protection _22
- Figure 4: Experts' average rating of non-economic values categories for Nature Protection _30
- Figure 5: Relevance of non-economic values to Nature Protection _31
- Figure 6: Top 10 most relevant non-economic values to Nature Protection _31
- Figure 7: Average ratings of non-economic values categories – comparison between Nature Protection and key marine sectors (Fisheries, Aquaculture and ORE) _33
- Figure 8: Public perception of the non-economic values categories embedded in Nature Protection _34
- Figure 9: Experts' average rating of non-economic values categories for Fisheries _58
- Figure 10: Relevance of non-economic values to Fisheries _59
- Figure 11: Top 10 most relevant non-economic values to Fisheries _60
- Figure 12: Public perception of the non-economic values categories embedded in Fisheries _62
- Figure 13: Experts' average rating of non-economic values categories for Aquaculture _84
- Figure 14: Relevance of non-economic values to Aquaculture _85
- Figure 15: Top 10 most relevant non-economic values to Aquaculture _85
- Figure 16: Public perception of the non-economic values categories embedded in Aquaculture _88
- Figure 17: Experts' average rating of non-economic values categories for ORE _102
- Figure 18: Relevance of non-economic values to ORE _103
- Figure 19: Top 10 most relevant non-economic values to ORE _103
- Figure 20: Public perception of the non-economic values categories embedded in ORE _106
- Figure 21: Average rating on non-economic values per MEDIGREEN sectors/topics _119
- Figure 22: Comparison of non-economic values scores – all MEDIGREEN sectors/topics _121

List of tables

- Table 1: Selected articles following search for terms / keywords included in the Journals' title _17
- Table 2: Preliminary list on non-economic values according to the literature review _23
- Table 3: Non-economic values categories from an MSP perspective _25
- Table 4.1: Average rating of non-economic values categories embedded in the MEDIGREEN sectors as assigned by the general public (emphasis on Nature Protection) _33
- Table 4.2: Average rating of non-economic values categories embedded in the MEDIGREEN sectors as assigned by the general public (emphasis on Fisheries) _61
- Table 4.3: Average rating of non-economic values categories embedded in the MEDIGREEN sectors as assigned by the general public (emphasis on Aquaculture) _86
- Table 4.4: Average rating of non-economic values categories embedded in the MEDIGREEN sectors as assigned by the general public (emphasis on ORE) _104
- Table 5: Cross-sectoral evaluation and ranking of non-economic values categories _117
- Table 6: Experts' ranking of non-economic values – cross-sectoral analysis _118
- Table 7: Experts' ranking of non-economic values categories (per sector/topic examined) _120





EXECUTIVE SUMMARY

This Booklet aims at offering a practical conceptual framework to planners and decision-makers on how to identify and integrate the non-economic values into the MSP process and promote, in this way, the objectives of the EGD (European Green Deal).

In this Booklet, non-economic values are understood as benefits, principles, or beliefs that extend beyond purely monetary considerations, although they may also generate economic returns (e.g. recreation).

This Booklet was built using a four-step methodology: **a.** literature review, **b.** structured interviews with 37 experts in Fisheries, Aquaculture, ORE and Nature Protection, **c.** public questionnaire survey (available online and in 5 languages: English, Spanish, French, Italian and Greek), and **d.** selection of good practices of the marine sectors/ topics examined, promoting non-economic values and also the objectives of EGD.

Following extensive literature review, **this Booklet identifies/proposes six (6) categories of non- economic values**, to urge planners and decision-makers in integrating them into MSP and advancing EGD objectives (for more details see section 1.3, Table 3):

- **Ecological & Environmental Values**
- **Social & Community Values**
- **Ethic & Intrinsic Worth Values**
- **Aesthetic & Inspirational Values**
- **Cultural & Heritage Values**
- **Educational & Knowledge Values**

HIGHLIGHTS deriving from the experts interviews and the questionnaire survey with the public

- **Nature protection** consistently received the highest ratings across all value categories from both experts and the public, recognized not only as environmental management but also as a transformative and educational process.
- **Fisheries** ranked highest among the economic sectors for cultural & heritage values, reflecting the sector's deep ties to community identity, traditional ecological knowledge, and maritime heritage (particularly small scale/artisanal fisheries).
- **Aquaculture** received the lowest expert ratings and the highest divergence of ratings across most non-economic value categories, largely due to the heterogeneity of production systems.
- **ORE** faces the most significant societal challenge regarding aesthetic and cultural values, with the highest share of negative public responses.

Integrating non-economic values into MSP is crucial: their absence can generate social resistance and undermine plan effectiveness, while their inclusion, through participatory co-production and adaptive co-management, enhances stakeholder trust and long-term compliance.

The Booklet outlines the possibility of a distinct Mediterranean pathway to the EGD, as the region's civilizational heritage of shared maritime values provides a unique foundation for an MSP approach that places non-economic values at the center of ocean policy reform, including the forthcoming Ocean Act and the revision of the MSP Directive.

Keywords:

MSP (Maritime Spatial Planning)
Non-economic values
Fisheries
Aquaculture
ORE (Offshore Renewable Energy)
Nature Protection



Exploring non-economic values of key marine sectors and nature protection: an MSP approach

The MEDIGREEN project

MEDIGREEN (MEDiterranean approach towards a maritime European GREEN Deal in MSP) is a project that supports the green transition of the Mediterranean Sea. It enhances transnational cooperation in **Maritime Spatial Planning (MSP)**—a formal way of organizing how different activities take place at sea—to help protect the environment while supporting economic development.

The project focuses on three key marine sectors: fisheries, aquaculture, offshore renewable energy, and a cross-cutting thematic: nature protection. It investigates how these sectors may contribute to the **European Green Deal**, which is the EU policy framework for a more sustainable and climate-neutral Europe.

MEDIGREEN promotes cooperation between Mediterranean countries, including both EU and non-EU states. Because the Mediterranean is a semi-enclosed sea with rich biodiversity, strong cultural connections, and complex governance systems, coordinated action is essential. The project encourages collaboration through regional networks such as the Mediterranean MSP Community of Practice (MED-MSP-CoP) and helps countries improve or implement their maritime spatial plans in line with green objectives. By sharing knowledge with other sea regions in Europe, MEDIGREEN contributes to a more unified and sustainable approach to managing Europe's seas for the future.

Aim and scope of the Booklet

This booklet, developed under Task 4.2 of MEDIGREEN, aims to foster a shared understanding of the non-economic values associated with key maritime sectors across the Mediterranean. It is addressed to policymakers, national, regional and local authorities, marine and coastal stakeholders, as well as the wider public. Its purpose is to make visible and comprehensible that moral, social, environmental, cultural, and educational dimensions do not only coexist with nature protection but they are also embedded within economic activities such as fisheries, aquaculture and offshore renewable energy.

A central objective of the booklet is to present a clear and structured typology of non-economic values, that will lead to a practical conceptual framework to planners and decision-makers on how to identify and integrate these values into the MSP process and promote, in this way, the objectives of the EGD.

Current EU policies tend to embed non-economic values as conceptual tools for their present goals. Conventional “blue growth” used to focus on maximising monetary returns from marine sectors like fisheries, aquaculture, and offshore renewable energy (ORE), and has long dominated maritime policy and management. However, this monetary-centric view is now widely regarded as insufficient to address the multifaceted challenges of sustainability and social equity. Notably, generational shifts, climate change, and to some degree poor understanding of technological advancements, are posing a threat to local communities and traditional occupations in the Mediterranean and their cultural and societal impacts. The European Green Deal aims to achieve climate-neutrality in the continent by 2050 through systemic changes. These changes go beyond the existing market-driven mechanisms: *“Systemic sustainability issues cannot be addressed through incremental change, merely focused on making existing systems more efficient. Instead, they require the transformation of those socioeconomic systems that drive environmental degradation”* (European Commission, 2019). EC emphasizes the role of civic engagement, education, and corporate social responsibility in fostering a sustainable future (European Commission, 2020). Thus, it is not surprising that *“...The social dimension of the European Green Deal has moved from the side-lines into the centre of policy debates...”* (ETUI, 2023). The trend of focusing on the non-monetary dimension of policies and tools is applied to the marine space and the Blue Economy, a broad concept that shapes EU marine policies.

Based on the above, the booklet outlines initial steps toward shaping a distinct Mediterranean pathway to the European Green Deal. It also suggests that the role of MSP should not be confined to a strategic instrument that coordinates uses of the sea. It can be an instrument that integrates and safeguards the broader values that define the Mediterranean basin.

The remainder of this booklet is devoted to exploring the relationship between non-economic values and the maritime sectors of fisheries, aquaculture, ORE and of nature protection. It begins by clarifying key concepts before presenting a thorough analysis per sector, drawing on a literature review, as well as perceptions of experts and the general public. The booklet also showcases good practices – for all three key sectors, i.e. fisheries, aquaculture, ORE, as well as for nature protection – that demonstrate how non-economic values contribute to the achievement of the European Green Deal objectives. The Booklet concludes with a synthetic overview on the role of non-economic values in advancing the European Green Deal goals and on strengthening their integration in MSP the MSP process.

Key concepts and terms

Maritime Spatial Planning (MSP) is a process carried out by national authorities, to organize human activities in marine areas. It is essential for managing the use of our seas coherently and to ensure that human activities take place in an efficient, safe and sustainable way (European Commission, n.d.).

The **European Green Deal (EGD)** is the EU's comprehensive strategy to make Europe the first climate-neutral continent by 2050. It aims to transform the EU into a modern, resource-efficient, and competitive economy, ensuring that there will be no net emissions of greenhouse gases and that economic growth is decoupled from resource use, while making the transition just and inclusive for all (European Commission, 2019).

Taking into account the official EU descriptions of the EGD, for the purposes of this research, we interpret the following as **key goals of the EGD**:

- Climate change mitigation
- Adaptation to the climate change effects
- Sustainable seafood production
- Biodiversity and ecosystem protection and restoration
- Blue circular economy
- Zero pollution
- Fair and Just Transition

Ecosystem services are the benefits that people obtain from ecosystems (Millennium Ecosystem Assessment [MEA], 2005), that according to TEEB (The Economics of Ecosystems and Biodiversity, 2010) are “direct and indirect contributions from ecosystems to human well-being”. According to MEA, the Ecosystem Services fall into the following four categories:

- Provisioning services: food (including seafood), raw materials, genetic resources, medicinal resources, energy, etc.
- Regulating services: purification of water and air, climate regulation, carbon sequestration, flood protection, waste decomposition, disturbance regulation, etc.
- Cultural services: spiritual and historical, recreational experiences, science and education, therapeutic services, etc.
- Supporting services: nutrient cycling, primary production, soil formation, habitat provision, etc.

The **Blue Economy**, a broad concept that shapes EU marine policies, provides a framework for sustainable ocean-based economic activities, while ensuring the health of marine ecosystems. According to the European Commission (2021), the blue economy uses the oceans' resources to contribute to achieving the goals of the European Green Deal for a more resilient and climate-neutral European economy, by minimising the environmental impacts.

1. INTRODUCTION

1.1. The shift to non-economic values and the need to relate them with MSP

Value has always been a multi-dimensional concept. By nature, all economic sectors (including the marine ones) are highly associated with both economic (e.g. revenues, jobs, etc) and non-economic values. The Greek philosopher Aristotle, distinguished between intrinsic value (elements valuable for their own sake and not merely for

In this Booklet, **non-economic values** are understood as benefits, principles, or beliefs that extend beyond purely monetary considerations, although they may also generate economic returns (e.g. recreation).

some other reason, like happiness) and instrumental value (elements valuable as a means to some other end, like money). Within modern scholarship, various concepts have arisen to highlight the importance of non-monetary values and the existence of alternative value systems (ex. use value; social and solidarity economy; diverse economy; degrowth, social capital; commons-based resource governance).

Currently, a growing body of literature and policy documents calls for a more integrated framework for ocean governance that moves beyond the focus on economic value and acknowledges the full spectrum of benefits derived from marine ecosystems and activities (IPBES, 2022; EC, 2021; Vardot *et al.*, 2023). Furthermore, policymakers consistently face a need for non-market valuation data to make more informed decisions regarding coastal and marine resources (Pendleton *et al.*, 2007).

Despite the growing consensus on the importance of non-economic values, they remain a vaguely defined concept in research and policymaking. While sectoral studies have explored selected values (e.g. the social significance of small-scale fisheries or the aesthetic concerns related to offshore wind farms), there has been a critical lack of a systematic and synthesised approach to identify and categorise these values across different maritime sectors. This leaves a significant “missing layer” of socio-cultural data that is indispensable for creating innovative and locally acceptable Marine Spatial Plans (Barianaki *et al.*, 2024).

To ensure that non-economic values are effectively communicated and successfully integrated into planning mandates, it is strategically beneficial to employ functional, use-based categories. The most comprehensive recent work on categorizing non-economic values is the **IPBES (2022)** assessment on the “Diverse values and valuation of nature”. The assessment proposes a typology of three overlapping layers: worldviews, broad values, and specific values. Worldviews act as lenses through which individuals and social groups perceive, interpret, and modify the world. They shape broad and specific values and also guide our perspectives on our conceptualization of and relationship with nature, based on underlying value systems – a set of ethical principles and beliefs that drive or guide individual and/or social behavior. Broad values act as overarching moral principles and life goals, such as justice, stewardship, responsibility, and harmony with nature.

At the level of specific values, the IPBES framework distinguishes between three categories: *intrinsic values*, which involve the worth of nature as an end in itself, independent of human judgement, *relational values*, which capture the meaningfulness of human-nature interactions (including concepts like reciprocity, care and a sense of place) and *instrumental values*, which refer to the importance of natural entities and processes as means to a desired human end or to satisfy people’s preferences. Instrumental values are generally considered substitutable and are commonly reflected through provisioning services (such as food, timber or other natural resources).

Nevertheless, while philosophically rigorous, the IPBES framework is quite abstract to be readily grasped by policymakers operating under tight legislative and budget cycles, and by the general public participating in consultations. In section 1.3., this Booklet proposes a set of categories of non-economic values, aiming at a better understanding and – potentially – a greater integration of these values into MSP.

1.2. Research and methodology

The MEDIGREEN booklet is grounded in a holistic, multi-dimensional research methodology that brings together four complementary perspectives in order to build a comprehensive understanding of the intersection between non-economic values and key marine sectors and nature protection. This quadruple approach bridges theoretical knowledge, sectoral expertise, societal perceptions, and practical implementation. Each methodological dimension contributed a distinct layer of

insight. The literature review established the scientific foundations, highlighting the growing importance, opportunities, and transformative potential of the key sectors. Interviews with experts provided critical professional perspectives, revealing how these sectors operate in reality, while also exposing structural challenges and implementation gaps that are often absent from theoretical discussions. The public survey, aiming to understand how the key sectors are socially perceived and experienced, offered insight into citizens’ perceptions and levels of awareness. Finally, the collection of good practices demonstrated that innovative and impactful initiatives already exist, offering inspiration, evidence of feasibility, and a sense of hope and possibility for future action.

Literature review

Having a key goal to explore the type of non-economic values related to the MEDIGREEN sectors/topics (fisheries, aquaculture, ORE, nature protection) a thorough literature review was performed. The review allowed for a better understanding of the concept and its correlation with planning and MSP:

The methodological steps are outlined below:

Step 1: Article search

A systematic series of searches in Google Scholar took place during 2025 to identify relevant peer reviewed articles. This search led to the identification of a total of 237 documents (see Table 1). The key criteria (and keywords) used in this search were:

- the term “non-economic values” appeared anywhere in the text; and
- at least one of the terms fisheries, aquaculture, ORE (or OWF -Offshore Wind Farms) and nature protection appeared in the text;

Step 2: Application of eligibility criteria

To ensure relevance, additional eligibility criteria were applied. Articles were excluded when:

- the term non-economic values was merely mentioned without elaboration (i.e., without explanation or examples);
- the concept of non-economic values was defined, but unrelated to fisheries, aquaculture, or ORE (i.e., only coincidentally mentioned); or
- the study focused exclusively on inland waters (e.g., rivers or lakes) rather than on marine or maritime contexts.

The implementation of these additional criteria resulted in a final list of 38 articles (Table 1), providing useful insight regarding non-economic values related to the MEDIGREEN sectors.

Table 1: Selected articles following search for terms / keywords included in the Journals’ title

Term / Keyword	Selected Articles	Total Articles	Term / Keyword	Selected Articles	Total Articles
Marine	9	22	Sustainability	2	20
Maritime	0	6	Aquaculture	0	2
Ocean	3	6	Fisheries	3	14
Sea	0	4	Planning	2	7
Aquatic	1	2	Ecosystem	3	12
Environment	3	20	Biodiversity	2	12
Environmental	5	60	BioScience	2	13
Energy	2	28	Values	0	6
Energies	1	3	Value	0	0
Total				38	237

Step 3: Purpose-driven review and data extraction

The 38 articles were further categorized either for full review (when non-economic values of fisheries, aquaculture, ORE or nature protection were the main focus) or for keyword extraction only (when relevant values were mentioned but not central to the study).

The main objective of this step was to compile the widest possible range of keywords associated with non-economic values.

Overall, the literature review performed as described above, allowed for:

- The exploration of a wide range of non -economic values associated with nature protection, fisheries, aquaculture and ORE (see sections 2.1, 3.1, 4.1 and 5.1).
- The identification of non -economic values categories and types (from an MSP perspective)

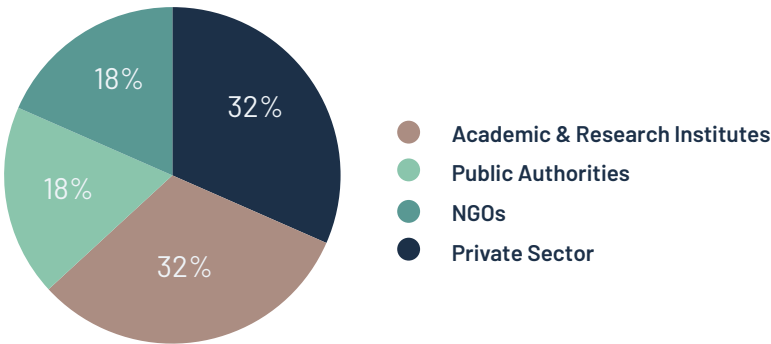
Interviews with experts

Next to the literature review (and the categorisation of non-economic values that were identified – see section 1.3), a series of structured interviews were performed, involving international experts on the MEDIGREEN topics/sectors (i.e. nature protection, fisheries, aquaculture, offshore renewable energy). These interviews aimed at further exploring the nature of the non-economic values embedded in fisheries, aquaculture, ORE and nature protection.

Overall, a multidisciplinary panel of 37 experts- almost equally balanced between the MEDIGREEN sectors/topics-was interviewed by the MEDIGREEN partners (See list in the next page). The respondents’ employment profile was also balanced and captures a variety of organizational backgrounds, with Academic & Research Institutes (32%) and the Private Sector (32%) constituting the primary groups, followed by Public Authorities (18%) and NGOs (18%) (Figure 1). Geographically, the survey had a Mediterranean perspective, with the largest shares of respondents based in Spain, France, Greece and Italy, supplemented by contributions from Croatia, Ireland, and Portugal.

Figure 1

Affiliation of experts interviewed



Interviewees were asked to assign numerical ratings (from –5 to 5) to specific non-economic values (see Table 3) to indicate the extent to which these values are reflected in the practices of the four topics addressed by MEDIGREEN (nature protection, fisheries, aquaculture and ORE) today.

Limitations of the interview survey

In assigning numerical ratings, interviewees faced the challenging task of estimating the overall performance of non-economic values within their sector/ topic of expertise. This task was inherently difficult for two main reasons. First, all sectors – as well as nature protection – include both positive and negative examples in terms of their commitment to, or integration of, non-economic values. Second, each sector encompasses a wide range of activities and applications that differ significantly in their characteristics and impacts (e.g. offshore solar installations relate differently to aesthetic values than wind turbines, while large-scale fisheries differ substantially from small-scale ones in their relationship to cultural values).

To address these limitations, experts were asked to consider the average mode of operation within each sector and to provide an overall assessment based on their general perception, rather than a precise evaluation grounded in the specific characteristics of individual sub-sectors. Moreover, they were asked to provide more comments at the end of the interview.

Nature Protection experts interviewed

- Ricardo Aguilar**, OCEANA, Senior Advisor and Expedition Leader (SPAIN)
- Lydia Alvanou**, Natural Environment and climate Change Agency, Conservation Manager (GREECE)
- Oscar Esparza Alaminos**, WWF Spain, Marine Protected Area Coordinator (SPAIN)
- Giulio Farella**, National Italian Institute for Environmental Protection and Research ISPRA, Researcher (ITALY)
- Martina Hervat**, Public Institution Brijuni National Park, Senior advisor for nature conservation (SLOVENIA)
- Zrinka Jakl**, Association for Nature, Environment and Sustainable Development SUNCE, Head of Nature Conservation Department (CROATIA)
- Charlène Kermagoret**, French Office for Biodiversity, Researcher (FRANCE)
- Andrea Zanella**, ISIG (at the time of interview WWF Italy) (ITALY)

Fisheries experts interviewed

- Joan Alginet Aliau**, FLAG Mar de l'Ebre, Manager (SPAIN)
- Manuel Bellanger**, IFREMER, Researcher in marine economy (FRANCE)
- Joško Božanić**, University of Split, Profesor Emeritus (CROATIA)
- Stefano Kutin**, Regione FVG, Funzionario tecnico specialistico ITALY)

Elena Lalou, Ministry of Environment and Energy, Senior expert at the Directorate of Spatial Planning (GREECE)

Nadia Moalla Gil, Spanish Confederation of Fisheries (CEPESCA), Project and Innovation Manager (SPAIN)

Jorge García Luján, FLAGS Malaga, Technician (SPAIN)

Stavros Giagias, small-scale coastal fisher and fishing tourism operator (GREECE)

Sophie Gourguet, IFREMER, Researcher (FRANCE)

Paolo Sartort, CIBM Livorno, Fisheries Scientist (ITALY)

Aquaculture experts interviewed

Joan Alginet Aliau, FLAG Mar de l'Ebre, Manager (SPAIN)

Céline Jacob, IFREMER, Researcher in marine economy (FRANCE)

Jorge García Luján, FLAGS Malaga, Technician (SPAIN)

Ivan Katavic, Institute of Oceanography and Fisheries (retired), Full University professor in permanent position (CROATIA)

Giorgos Lebesis, Fish culture Farm of Kefallonia, Ichthyologist (GREECE)

Raphaëla Le Gouvello, Independent expert, IUCN expert/ NGO RespectOcean honorary founder and president, Consultant (FRANCE)

Elena Mente, Aristotle University of Thessaloniki, Professor at the School of Veterinary Medicine (GREECE)

Tommaso Petochi, National Italian Institute for Environmental Protection and Research (ISPRA) (ITALY)

Giuseppe Prioli, M.A.R.E. Soc. Coop. arl (ITALY)

Anna Spyropoulou, Hellenic Ministry of Environment and Energy, Senior expert at the Directorate of Spatial Planning (GREECE)

Alexandros Theodorou, Fish culture Farm of Kefallonia, Ichthyologist (GREECE)

ORE experts interviewed

Adeline Bas, IFREMER, Researcher in marine economy (FRANCE)

Yoann Baulaz, France Energies Marines, Researcher (FRANCE)

Zacharoula Kyriazi, MaREI Centre, Sustainability Institute, UCC, Research Fellow (IRELAND/GREECE)

Juan de Dios López Leiva, Wind Energy Business Association, Technical and Industrial Director (SPAIN)

Carlos Martínez Camarero, Deputy Secretary of the Confederation Secretariat for the Environment of CCOO (Comisiones Obreras, «Worker's Commissions/Unions») (SPAIN)

Aaniela Moderini, freelancer, Architect (ITALY)

Rosa Núñez Pardo de Vera, Agency Energy Institute of Galicia-INEGA, Head of the Technical Unit for Planning, Innovation and Projects (SPAIN)

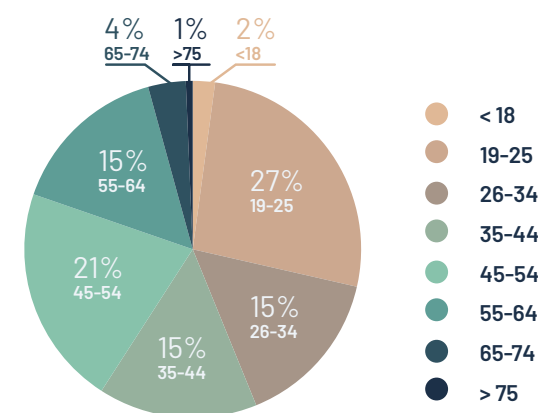
Ivana Prusina Conde, Independent, Environmental consultant (PORTUGAL)

Questionnaire survey

To complete the analysis on the non-economic values embedded in the key marine sectors explored by MEDIGREEN, an online questionnaire survey was also designed, to explore the general perception of the public.

The survey aimed at identifying how non-economic values are prioritized by the general public for each marine sector and nature protection. Respondents were asked to assign numerical ratings (from 1 to 5) to categories of non-economic values to indicate the extent to which these values are reflected in the practices of the MEDIGREEN sectors/topics today. To allow for a comparison with the experts' opinion, the non-economic values that were used were the same (i.e. the ones included in Table 3 of section 1.3).

Figure 2
Age groups of participants
in the questionnaire survey

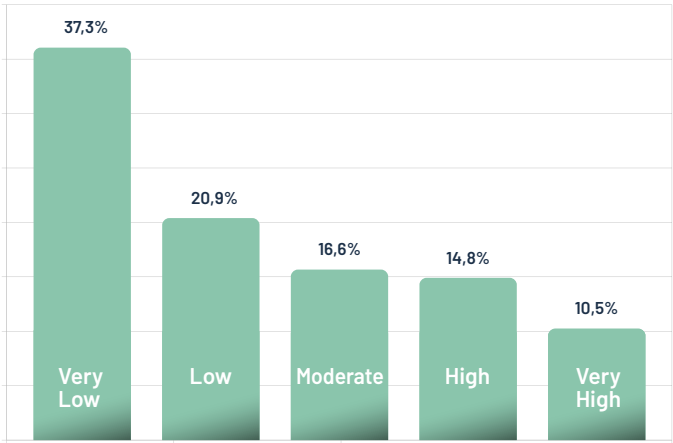


The survey was conducted during the spring period of 2026 and the questionnaire was available in five languages (English, Greek, Spanish, French and Italian). The questionnaire was forwarded in e-mail lists and social media to

various groups (ex. academia, public bodies, associations) across Mediterranean countries. Overall, the questionnaire received a total number of 609 answers – 41% male and 58% female. Geographically, the largest shares of respondents were from Greece, Spain, Croatia, Algeria, Italy and France, supplemented by minor contributions from Libya, Tunisia and Cyprus. The distribution of respondents' age was quite balanced (Figure 4) with the age group 19-25 most represented (26% of the answers).

Since the questionnaire's target group was the general public, respondents' professional relation to the sea was quite low, with 20,9% answering that they have a professional relation or interest and 37,3% rating this relationship with the lowest rate (Figure 3). No correlation was found between the relevance of the respondents with the sea and the ratings given for the non-economic values.

Figure 3
Survey participants' relation to marine professions



Limitations of the Questionnaire Survey

It's important to highlight that many interviewees found the interview really difficult to answer, especially those without a background in ocean/marine sciences. This difficulty originated from the fact that the questionnaire was common between experts and the general public (in the part referring to the non-economic values), to allow for comparable conclusions.

1.3. MSP related non-economic values: the MEDIGREEN approach

The extensive literature review (described in section 1.2.1.) resulted in a preliminary and comprehensive set of 76 keywords of non-economic values (see Table 2).

Table 2: Preliminary list of non-economic values according to the literature review

Aesthetic appreciation	Food security	Recycling
Aesthetic inspiration	Flood protection	Reduction in extreme weather
Aesthetic value of traditional fishing boats or coastal practices	Habitat preservation	Research opportunities
Artificial reef effects	Habitat restoration	Respect for life cycles
Animal welfare	Indigenous & local knowledge	Respect for nature
Biodiversity conservation/ maintenance	Interconnectedness of human-animal well-being	Responsibility towards future generations
Carbon capture	Intergenerational continuity	Rituals and festivals
Citizen participation in knowledge	Intergenerational equity	Scientific and experiential education
Climate change mitigation	Intrinsic value of marine species and ecosystems	Scientific knowledge & monitoring
Climate regulation	Intrinsic worth of non-human life	Scenic beauty
Coastal erosion protection	Inspiration for art	Seascape heritage
Co-creation of knowledge	Job security and local welfare	Sense of place
Collective identity	Knowledge preservation (traditional and scientific)	Sense of belonging
Community empowerment	Landscape identity	Social cohesion
Community participation/ engagement	Livelihood support	Species protection
Community identity (emerging and traditional)	Local participation	Spiritual connection
Community resilience	Marine spatial stewardship	Spiritual enrichment
Cultural heritage	Mental and physical wellbeing	Stewardship
Decomposition of wastes	Moral responsibility	Symbolic meaning of renewable energy
Ecosystem balance	Nutrient cycling (filter-feeding species)	Therapeutic seascapes
Ecosystem resilience	Ocean literacy	Traditional songs
Ecotourism	Outdoor sports	Tranquillity
Enjoyment	Participatory and transdisciplinary research	Transfer of traditional ecological knowledge
Environmental awareness	Raising awareness about sustainability	Participatory and transdisciplinary research
Ethical responsibility toward nature	Recreation	Water quality protection
Ethical stewardship		

The preliminary list of keywords of non-economic values was further assessed internally – among the MEDIGREEN partners – aiming at making it shorter and more cohesive. Keywords that were conceptually similar (e.g. “sense of place” and “place attachment”) were systematically merged, and redundant or overlapping keywords were removed. The refined keywords were then re-organised and grouped into six (6) categories, as presented in Table 3.

This pragmatic categorization translates complex theoretical concepts into understandable language, which better fits to the context of policy communication and public engagement. Additionally, this categorization is more applicable to the MSP process. The intricate nature of MSP necessitates a multi-sectoral and interdisciplinary approach, drawing on diverse scientific fields and numerous supporting sectoral studies. Rather than focusing on conceptual depth, motivations and meaning of the term values, this typology aligns with the specialized expertise of individual experts or supporting institutions of the MEDIGREEN project –for example, an environmental agency assessing ecological integrity or a cultural heritage body assessing historical sites—thereby facilitating clear task allocation, targeted impact assessment, and robust evaluation, which are useful for the MSP process.

The discussion regarding the non-economic values that is presented next, is organized per topic/sector of the MEDIGREEN project. This structure was chosen to allow readers and sectoral experts for more comprehensive reading according to their topic of interest.

The objective of this in-depth analysis is to provide guidelines and recommendations for the systematic promotion of non-economic values within MSP and across sectors, that will allow to meet the EGD objectives.

Table 3: Non-economic values categories from an MSP perspective

Categories	Non-economic values
 Ecological and Environmental values	<ul style="list-style-type: none">• Climate change mitigation• Climate change adaptation• Habitat preservation & restoration• Water quality & recycling• Sustainable alimentation
 Social and Community values	<ul style="list-style-type: none">• Community identity & belonging• Community resilience/ social cohesion• Participation & empowerment/ marine citizenship• Community well-being (livelihoods, welfare)• Ocean literacy• Leisure and recreation opportunities
 Ethical and Intrinsic values	<ul style="list-style-type: none">• Stewardship & moral responsibility• Spiritual connection & enrichment• Intrinsic worth of marine species and ecosystems• Psychological and physical health• Inter-generational equity
 Aesthetic and Inspirational values	<ul style="list-style-type: none">• Landscape identity/character• Seascape heritage• Inspiration for art & creativity• Symbolic meanings of nature & renewable energy
 Cultural and Heritage values	<ul style="list-style-type: none">• Indigenous and local coastal practices• Traditional culture and art (e.g. rituals, poetry, songs)• Traditional ecological knowledge
 Educational and Knowledge values	<ul style="list-style-type: none">• Educational & Knowledge Values• Participatory research & co-creation of knowledge• Scientific monitoring & research opportunities• Recreation & ecotourism as learning

2. NATURE PROTECTION

2.1. Insights from the existing literature

The scientific community has increasingly recognized that policy decisions based solely on market values have underpinned the current environmental crisis. While economic indicators like “total fish catch” or “tourism expenditure” are easily measured, they often overlook the profound, non-monetary ways nature contributes to human well-being and the stability of our planet (Kageyama *et al.*, 2025). Protecting the environment is not subject to financial calculation; it is an investment in our identity, our health, and our moral duty. Contemporary approaches recognize the central and pervasive role that culture plays in defining all links between people and nature and emphasize the role of indigenous and local knowledge in understanding these links (Diaz *et al.* 2018).

At the most fundamental level, environmental protection safeguards the **“life-support values”** that underpin all other human experiences (Himes *et al.*, 2023). These values include the essential biophysical processes—such as nutrient cycling, primary production, and carbon sequestration—that maintain the stability of the biosphere (Himes *et al.*, 2023; Marcos *et al.*, 2021). Protected areas act as vital reservoirs for biodiversity, preventing local extinctions and allowing ecosystems to recover to a more complex, structured state. This complexity fosters **“resilience”**, providing a buffer against environmental fluctuations and extreme events driven by climate change (Marcos *et al.*, 2021). By maintaining healthy ecosystems, we secure the planetary boundaries that allow life—and by extension, humanity—to persist (Piccolo, 2017).

For many communities, nature is not just a resource; it is a constituent part of their **identity**. Environmental protection preserves relational values derived from

long-standing traditions and cultural heritage, such as the Japanese concept of *fūdo*, which describes the inseparable relationship between people and their local environment (Himes *et al.*, 2023). When we protect a specific landscape or seascape, we are protecting the stories and place-based meanings that bind generations together, ensuring that cultural sovereignty and the unique identity of local populations remain intact (Pegorelli *et al.*, 2024; Rodrigues *et al.*, 2022).

There is an “objective good” in nature that exists independently of its usefulness to humans (Piccolo, 2017). This **intrinsic value** asserts that species and ecosystems have a right to exist regardless of whether they provide a service to us (Himes *et al.*, 2023). Closely linked to this is the aesthetic value of the environment—the sense of awe and “aesthetic pleasure” we feel when encountering pristine rocky shores, vibrant coral reefs, or charismatic marine life. These experiences of beauty are often described as non-negotiable and are essential for a **fulfilled human life** (Rodrigues *et al.*, 2022). By protecting the environment, we safeguard the magnificence and legacy of life’s evolution and the diverse forms of life that inspire human artistic and emotional expression.

Environmental protection is a powerful tool for fostering **social cohesion** and public health. Research shows that interacting with natural spaces significantly improves both **mental and physical health**, clearing the mind and providing perspective on life (Rodrigues *et al.*, 2022). Protected areas serve as common grounds where people can **strengthen social bonds** through shared recreational activities like diving, bird watching, or simply enjoying the seascape. Including diverse stakeholders in the management of these areas can mitigate social conflicts and ensure “epistemic justice” by recognizing various ways of knowing and valuing the world (Marcos *et al.*, 2021; Rodrigues *et al.*, 2022). Healthy environments thus act as the “glue” that holds communities together and supports social networks.

For many, the environment is a place of spiritual renewal and moral responsibility. This “Earth ethic” views humans not as conquerors of the sea, but as plain members and citizens of a broader biotic community (Piccolo, 2017). Protecting nature is seen as a **moral obligation to future generations and to the biosphere itself**. Spiritual connections to nature are often expressed through a sense of being part of something greater than oneself (Rodrigues *et al.*, 2022). These ethical frameworks emphasize virtues such as **care, stewardship, and reciprocity**, suggesting that our well-being is deeply tied to how we fulfil our duty to take care of the sea (Himes *et al.*, 2023).

Finally, protected environments are indispensable “laboratories” for **scientific research and education**. They provide essential “reference conditions” —sites that

remain relatively undisturbed— which scientists use to understand how ecosystems function and how to manage them properly (Marcos *et al.*, 2021). The high scientific interest associated with protected areas drives research that expands our knowledge of everything from genetic diversity to global climate patterns. Beyond formal science, these areas play a critical role in **environmental education and ocean literacy, enhancing public awareness** and fostering a “biophilic” attitude in children and adults alike (Marcos *et al.*, 2021; Rodrigues *et al.*, 2022). By protecting the environment, we preserve the very information we need to solve future sustainability challenges.

2.2. The experts’ opinion

A set of eight (8) European experts were interviewed, having an expertise in Nature Protection (see section 1.2.2. For the experts and the methodology). Nature Protection was the area in which the interviewees’ ratings showed the highest level of consensus in terms of contribution to non-economic values. According to these experts, Nature Protection stands out, compared to all other MEDIGREEN sectors (Fisheries, Aquaculture and ORE) as having an holistic embrace of non-economic values (see Figure 4).

Figure 4 presents the average ratings of non-economic value per category: a scoring scale was used, from -5 when the contribution of nature protection to the value is considered highly negative, and +5 when it is considered highly positive. “Educational and Knowledge values”, was the highest ranked category, scoring 4.5. Interestingly, “Educational and Knowledge values” were rated even higher than the “Ecological and Environmental values” embedded in nature protection (rating 4.1). This indicates that experts perceive Nature Protection not merely as an environmental management objective and tool, but mostly as a transformative process with the potential to educate and influence society.

Figure 4
Experts' average rating of non-economic values categories for Nature Protection

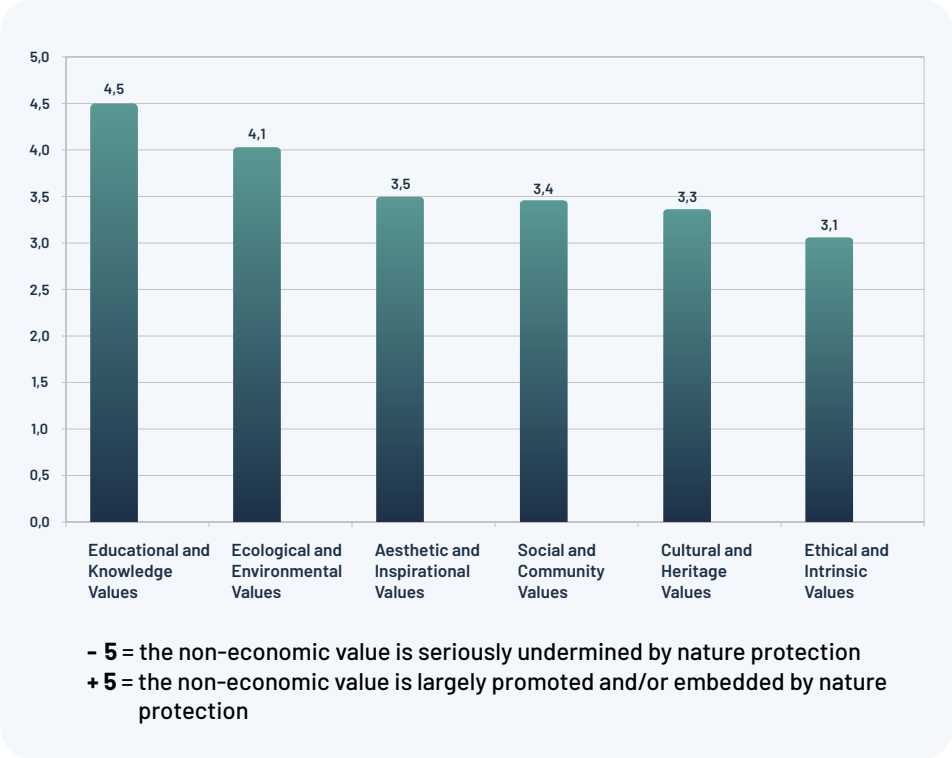


Figure 5 offers a visual representation of the level of relevance of non-economic values to Nature Protection. Figure 6 presents the top ten (10) most relevant non-economic values, according to the experts' view. All experts assigned a perfect score of 5.0 to "Habitat preservation & restoration", which is the highest rating for a single type of value recorded in this survey. This is followed by "Scientific monitoring & research opportunities" and "Knowledge preservation (scientific & traditional)", both having a rating of 4.8 and by "Landscape identity/character" (4.4). According to the interviewees, Nature Protection was the only MEDIGREEN topic, which significantly promotes the value "Intrinsic Worth of Marine Species and Ecosystems" (3.6).

Figure 5
Relevance of non-economic values to Nature Protection

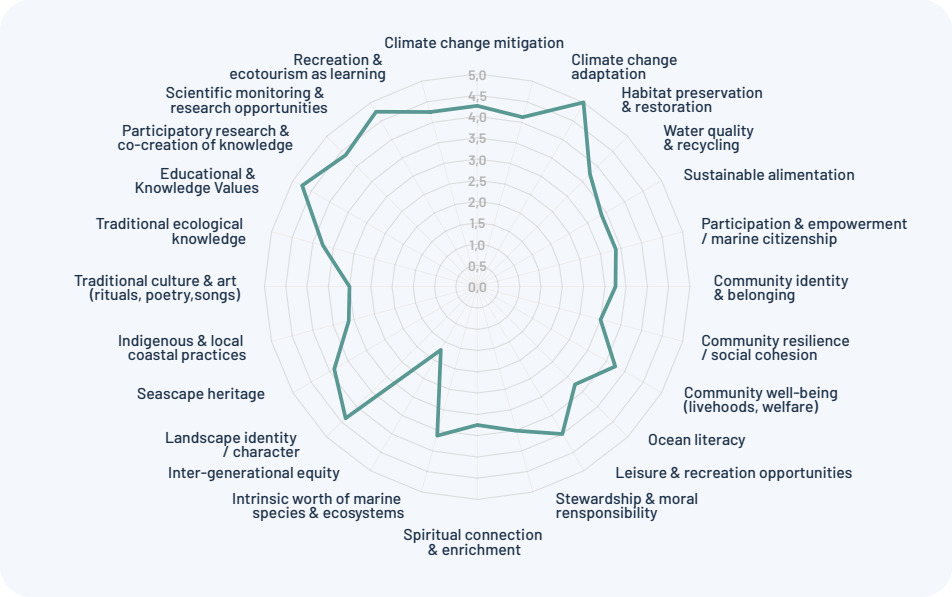
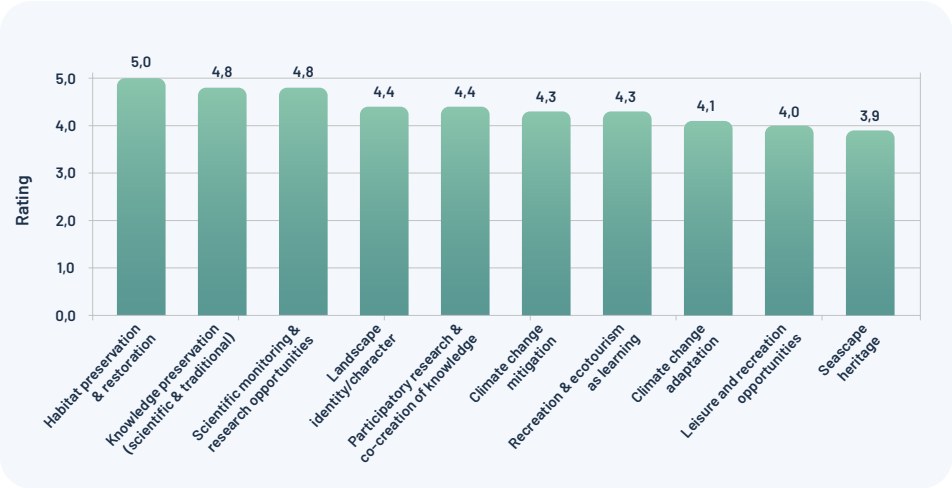


Figure 6
Top 10 most relevant non-economic values to Nature Protection



2.3. General public awareness and perception

Nature Protection received consistently the highest scores for non-economic values from the general public (see section 1.2 for details on the questionnaire survey), highlighting a particularly strong societal appreciation for marine ecosystem conservation, which is consistent with the experts’ view. Respondents perceived Nature Protection not only as a mechanism for safeguarding ecosystems and biodiversity, but also as a process that strongly promotes broader social, ethical, aesthetic, cultural, and educational values – to a greater extent than any of the sectors examined (Fisheries, Aquaculture, and ORE).

“Educational and Knowledge values” received the highest score of the entire survey, reaching an average of 4.61 on the Likert scale (1-5). Importantly, this category also demonstrated the strongest consensus among respondents, presenting the lowest standard deviation in the questionnaire (SD = 0.72). This finding suggests that public recognition of the educational role of marine ecosystems conservation is both exceptionally strong and widely shared across respondents.

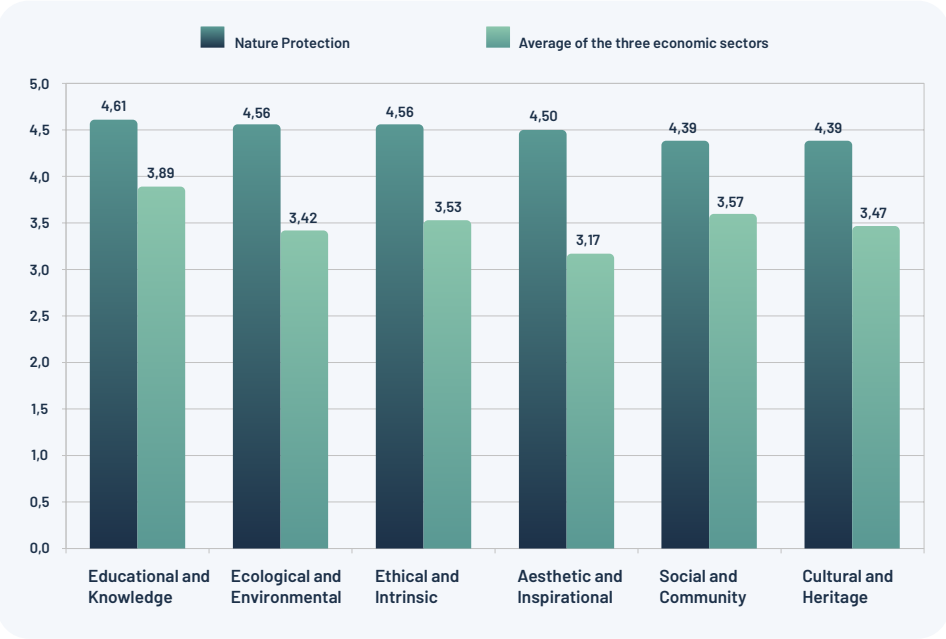
Interestingly, “Educational and Knowledge values” was rated by the general public slightly higher than the “Ecological and Environmental values” of Nature Protection (4.56) – which was also observed in the experts’ evaluation. This indicates a consensus between experts and the public on the benefits of Nature Protection. Both of them perceive Nature Protection as an educative process with the capacity of transforming the society, rather than as a process of environmental protection.

Compared to the ratings that the other three marine sectors received, Nature Protection consistently scored substantially higher in every value category. The largest difference was observed in “Aesthetic and Inspirational values”, where Nature Protection scored 4.50 compared to 3.17 of the key sectors’ average (Table 4.1 and Figure 7).

Table 4.1.: Average rating of non-economic values categories embedded in the MEDIGREEN sectors as assigned by the general public
Scoring scale (1 to 5): 1 = strong negative relation and 5 = strong positive relation

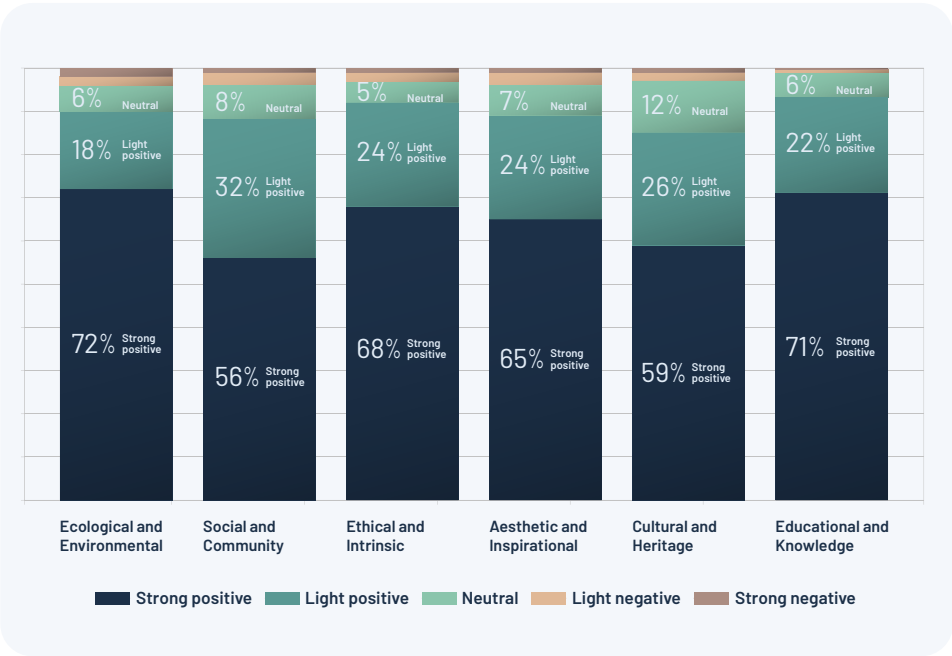
	Nature Protection	Fisheries	Aquaculture	ORE	Average of the three economic sectors
Ecological and Environmental values	4.56	3.36	3.41	3.50	3.42
Social and community values	4.39	3.96	3.47	3.27	3.57
Ethical and Intrinsic	4.56	3.72	3.42	3.45	3.53
Aesthetic and Inspirational values	4.50	3.57	2.99	2.95	3.17
Cultural and heritage values	4.39	4.17	3.31	2.93	3.47
Educational and knowledge values	4.61	4.14	3.81	3.73	3.89

Figure 7
Average ratings of non-economic values categories – comparison between Nature Protection and key marine sectors (Fisheries, Aquaculture and ORE)



According to the majority of the respondents, Nature Protection has a strong positive contribution to all the non-economic value categories (Figure 8), followed by “light positive” and “neutral”, while the sum of the answers “light negative” and “negative”, correspond to less than 4% of the answers.

Figure 8
Public perception of the non-economic values categories embedded in Nature Protection



2.4. Indicative literature

Non-economic values and nature protection

Díaz, S., Pascual, U., Stenseke, M., Martín-López, B., Watson, R. T., Molnár, Z., ... & Shirayama, Y. (2018). Assessing nature's contributions to people. *Science*, 359(6373), 270-272. DOI: 10.1126/science.aap8826

Himes, A., Muraca, B., Anderson, C. B., Athayde, S., Beery, T., Cantú-Fernández, M., González-Jiménez, D., Gould, R. K., Hejnowicz, A. P., Kenter, J., Lenzi, D., Murali, R., Pascual, U., Raymond, C., Ring, A., Russo, K., Samakov, A., Stålhammar, S., Thorén, H., & Zent, E. (2023). Why nature matters: A systematic review of intrinsic, instrumental, and relational values. *BioScience*, 74(1), 141–286. <https://doi.org/10.1093/biosci/biad109>.

Kageyama, S., Blandon, A., & Blasiak, R. (2025). Exploring the diverse values local people associate with marine protected areas and the implications for sustainable ocean management. *Ocean and Coastal Management*, 261, 107523. <https://doi.org/10.1016/j.ocecoaman.2024.107523>.

Marcos, C., Díaz, D., Fietz, K., Forcada, A., Ford, A., García-Charton, J. A., Goñi, R., Lenfant, P., Mallol, S., Mouillot, D., Pérez-Marcos, M., Puebla, O., Manel, S., & Pérez-Ruzafa, A. (2021). Reviewing the ecosystem services, societal goods, and benefits of marine protected areas. *Frontiers in Marine Science*, 8, 613819. <https://doi.org/10.3389/fmars.2021.613819>.

Pegorelli, C., De Andres, M., García-Onetti, J., Rayo, S., & García-Sanabria, J. (2024). Marine protected areas as socio-economic systems: a method for defining socio-economic criteria in marine planning. *Frontiers in Marine Science*, 11, 1358950. <https://doi.org/10.3389/fmars.2024.1358950>.

Piccolo, J. J. (2017). Intrinsic values in nature: Objective good or simply half of an unhelpful dichotomy? *Journal for Nature Conservation*, 37, 8–11. <https://doi.org/10.1016/j.jnc.2017.02.007>.

Rodrigues, J. G., Villasante, S., & Pinto, I. S. (2022). Non-material nature's contributions to people from a marine protected area support multiple dimensions of human well-being. *Sustainability Science*, 17, 793–808. <https://doi.org/10.1007/s11625-021-01021-x>

2.5. GOOD PRACTICES
FOR NATURE PROTECTION

Torre Guaceto Marine Protected Area*



Torre Guaceto MPA. Iuav after Natura 2000.

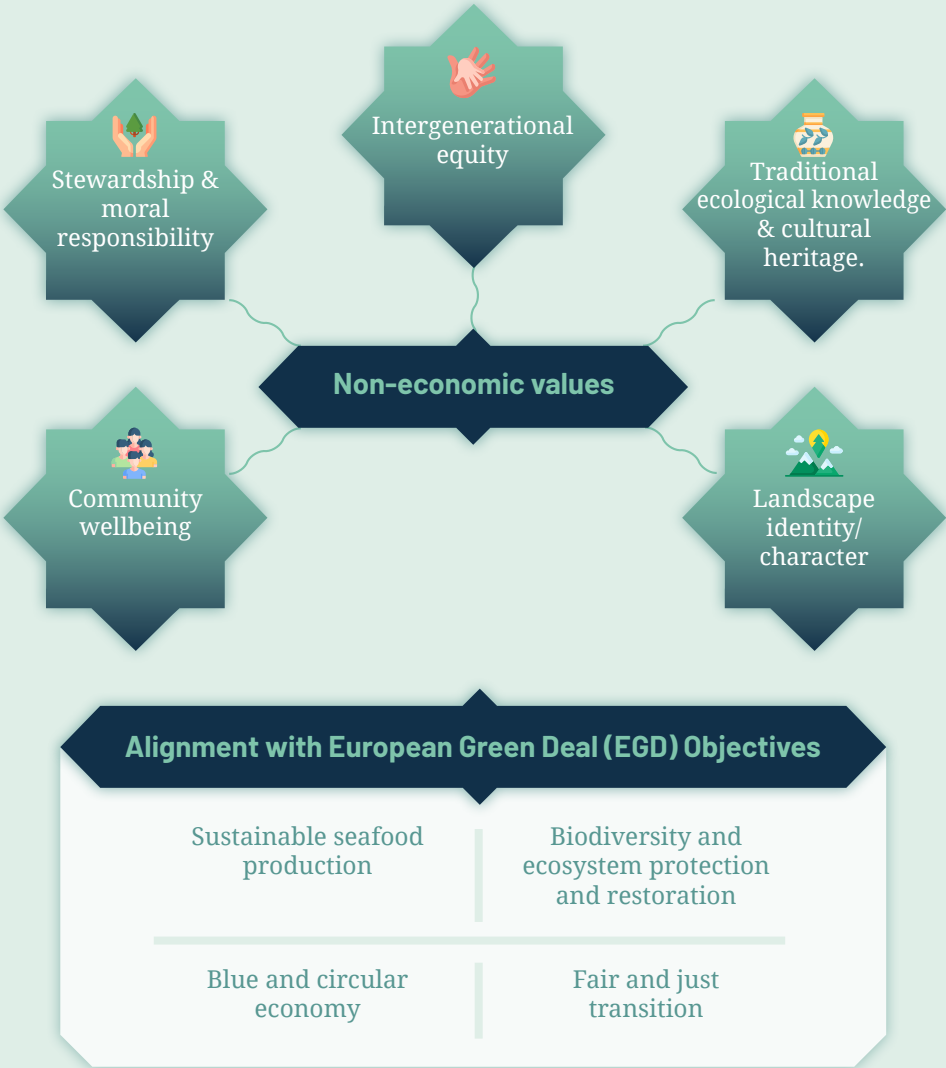
Location and geographical details

Torre Guaceto Marine Protected Area is located on the Adriatic coast of Apulia (Figure 1), in the Province of Brindisi, southern Italy. Established by Ministerial Decree on 4 December 1991, it covers about 2,227 ha along 8 km of coastline, extending to the 50 m bathymetric line. Its seabed includes Posidonia oceanica meadows, coralligenous formations, rocky communities, and soft-bottom habitats. The adjacent State Nature Reserve covers about 1,100 ha, with coastal dunes, Mediterranean scrub, and a wetland of international importance. The area holds SCI, ZPS, and Ramsar designations. A key environmental pressure is the salinisation of the freshwater table caused by intensive agricultural extraction, making compatible land management a central governance issue.

Timeframe of implementation

The MPA was established in 1991, with effective management beginning around 2001. The co-management protocol with local artisanal fishers and EMAS certification were both launched in 2005. Environmental accounting was carried out between 2015 and 2018.

*Authors: Daniele Brigolin (As. Professor, IUAV), Folco Sofietti (PhD student, IUAV), Alessandra Fudoli (Research Fellow, IUAV), and Martina Bocci, (research consultant, CORILA).



General Information

Nature and overall objective(s) of the Practice

Torre Guaceto is a leading Mediterranean example of integrated marine conservation and adaptive co-management. Its objective is to conserve biodiversity and natural capital while fostering sustainable socio-economic development. The 2013 Piano di Gestione prioritises Natura 2000 habitat conservation, protection of ZPS and Ramsar-designated areas, and active management of the wetland freshwater-saltwater balance. Environmental accounting estimated the MPA's natural capital at about €36 million, with annual ecosystem service flows of around €7 million. Con-

servation measures include mooring buoys to prevent anchor damage and water quality monitoring with ARPA Puglia.

Socially, Torre Guaceto pioneered a fishing co-management protocol in 2005. Catches within the MPA stabilised at around 35–40 kg per 1,000 m of net, compared with about 10 kg outside, while the value of a fishing day inside was roughly double. Fishers who had initially opposed the MPA became key advocates as ecological recovery translated into larger fish and higher prices.

Innovative Aspects:

Torre Guaceto's most innovative feature is the integration of science-based adaptive co-management with bottom-up community engagement. Its fishing co-management model created a virtuous cycle in which ecological recovery produced tangible economic benefits, strengthened trust, and sharply reduced poaching, described as an economy of belonging grounded in shared values and long-term stewardship. EMAS certification enabled more systematic management of environmental pressures, while emergy-based natural capital accounting provided a replicable method for quantifying ecological and economic value.

Achieved Outcomes and lessons learnt

Fish biomass and species diversity increased, while co-management stabilised catch-per-unit effort at nearly four times that of adjacent unprotected waters. Scientific monitoring in 2025 confirmed good ecological status for coralligenous habitats and Posidonia meadows. The co-management model transformed conflict into cooperation, with fishers becoming active stewards. A key lesson is that successful MPA governance requires long-term investment in dialogue, transparency, and shared decision-making.

Relationship with MSP:

Torre Guaceto offers important lessons for maritime spatial planning. Zoning should reflect ecological value, not only legal status. In 2025, the MPA proposed a revised zonation scheme based on scientific monitoring, illustrating how adaptive governance can directly inform spatial planning aligned with biodiversity objectives.

Transferability

The Torre Guaceto model is transferable to other small- and medium-sized MPAs, especially where artisanal fishing communities are present. Key enabling conditions include management continuity, participatory investment, scientific partnerships, and supportive regulatory frameworks.

Governance and participation

Managing authority and governance mechanisms

Torre Guaceto is managed by the Consorzio di Gestione Torre Guaceto, established in 2000, bringing together the municipalities of Brindisi and Carovigno and WWF Italy. It is responsible for both the marine area and the adjacent terrestrial reserve. The EMAS system, certified in 2005, formalised monitoring, responsibilities, and continuous improvement.

Monitoring and adaptive mechanisms

Monitoring covers habitat parameters, faunal indices, and water quality using standardised ISPRA indices, most recently under the AMPower project (2025). Bi-monthly meetings between researchers, managers, and fishers review results and adjust the co-management protocol, ensuring governance remains evidence-driven and adaptive.

Stakeholder participation

Fishers are involved directly in decisions on gear, effort, and spatial management, and contribute to compliance monitoring. Educational programmes engage schools, tourists, and residents, while community-managed facilities and branded local products strengthen links between conservation and livelihoods.

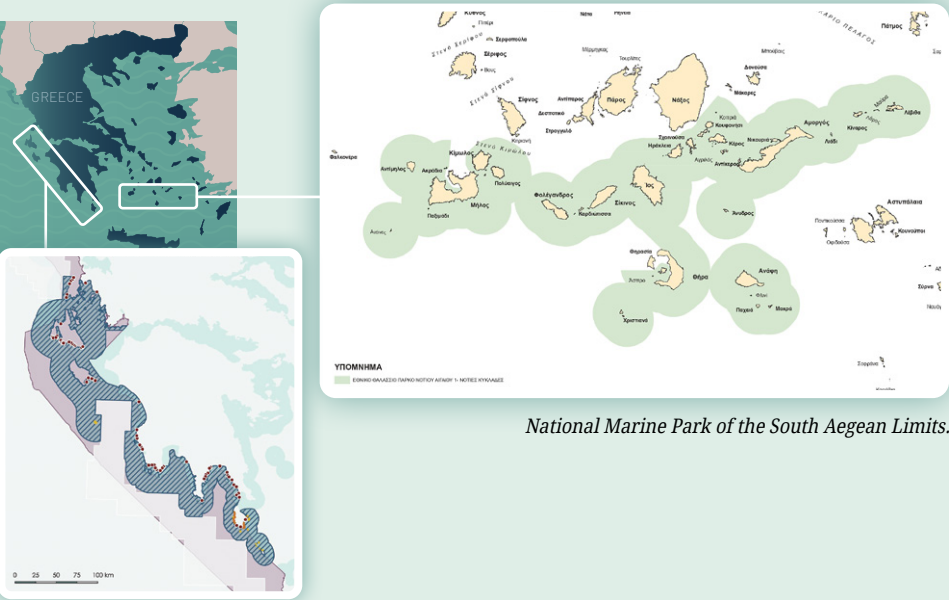
Social awareness and acceptance

Social acceptance evolved gradually over two decades. Initially the MPA faced hostility and functioned as a paper park. Through sustained dialogue, participatory governance, and tangible economic benefits, it progressively gained legitimacy. Torre Guaceto demonstrates that social acceptance is not a precondition for conservation, but an outcome of transparent, inclusive, and continuous governance.

Supporting Documentation

- Official site of Riserva di Torre Guaceto (<https://www.riservaditorreguaceto.it/index.php/it/>)
- Consorzio di Gestione Torre Guaceto, & Ministero dell'Ambiente e della Tutela del Territorio e del Mare. (2013). Piano di gestione della Riserva naturale dello Stato di Torre Guaceto. Gazzetta Ufficiale della Repubblica Italiana, *Serie Generale*, 226 (Suppl. Ordinario n. 67/L).
- Mancini, I., Azzola, A., Oddenino, M., Cesarato, G., & Montefalcone, M. (2025). Progetto AMPower: Relazione finale, ottobre 2025. Area Marina Protetta Torre Guaceto. Laboratorio di Ecologia del Paesaggio Marino, DiSTAV, Università degli Studi di Genova, Greenpeace, & Blue Marine Foundation.
- Manfredi, F., & Tarantino, C. (2021). Dalla sostenibilità ambientale all'economia dell'appartenenza: Il caso del Consorzio di Gestione di Torre Guaceto. In *Rinascere sostenibili*. Egea.

The Ionian National Marine Park and the National Marine Park of South Aegean*



National Marine Park of the South Aegean Limits.

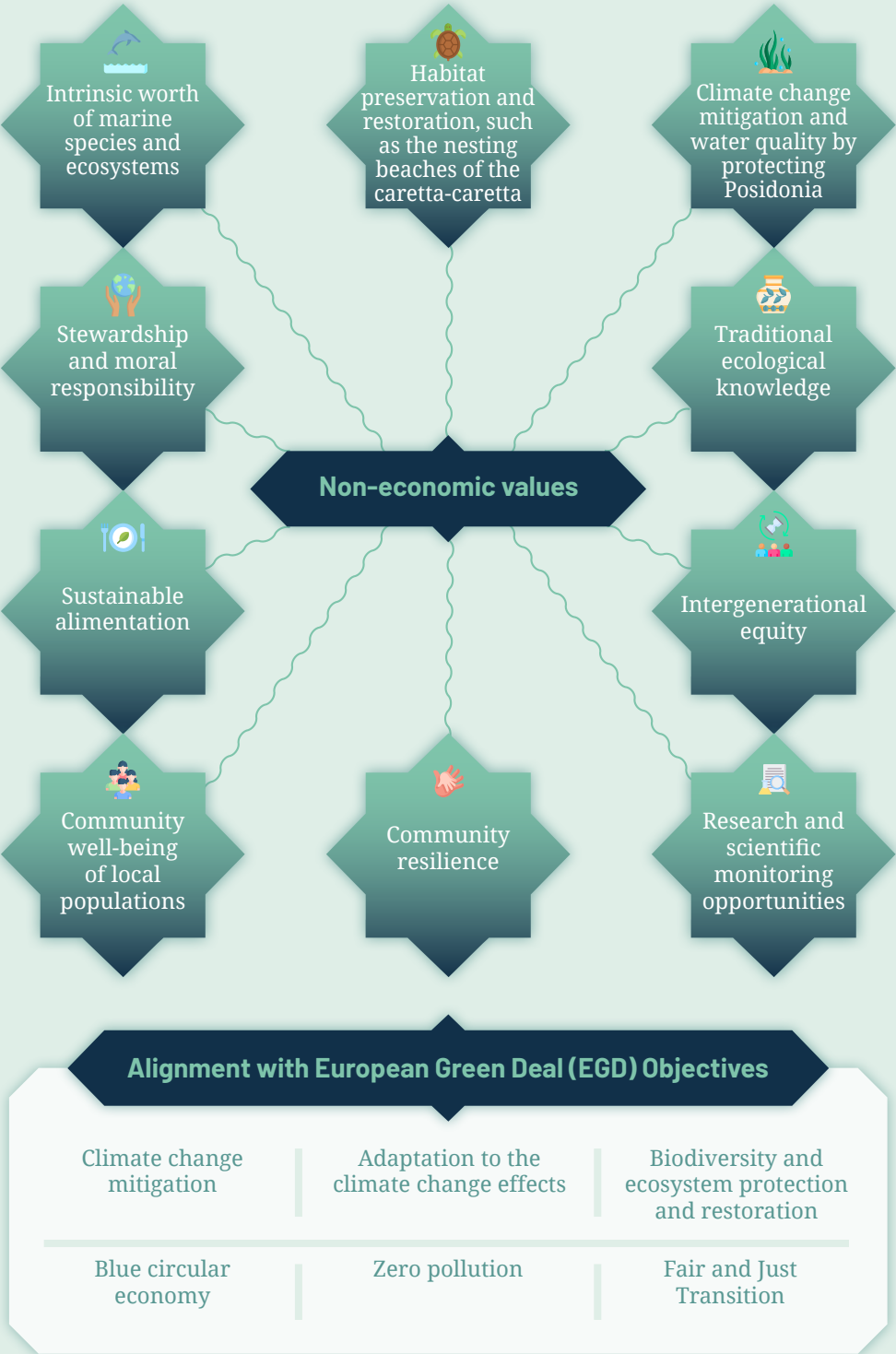
Location and geographical details

The Ionian National Marine Park and the National Marine Park of the South Aegean are both located within Greece’s territorial waters, except for the Ionian Park, that also incorporate a small part of the Greek Exclusive Economic Zone. The Ionian Park extends across the territorial waters of the Ionian Sea, from the area north of Lefkada to Antikythera, to Cape Tainaro and nearby coastal areas. The South Aegean Park lies in the central-southern Aegean, within the Cyclades archipelago, covering marine and coastal areas around islands such as Milos, Ios, Santorini and surrounding islets.

Timeframe of implementation

The initiative for the Marine Parks was launched in June 2024. The Special Environmental Studies were formally approved on December 2024. The process is pending.

* Authors: Panagiota Bourlia (Junior Researcher, AUTH) and Socratis Seitanidis, (Associate Senior Researcher, AUTH), Greece.



General Information

Nature and overall objectives of the Practice

The practice is implemented under the Greek legal framework for environmental protection (Law 1650/1986 amended by 3937/2011 and 4685/2020). As National Parks are legally recognised entities, the initiative constitutes the institutional designation and management of protected areas. It aims to document the ecological and scientific value of the Ionian and South Aegean archipelagos, and ensure the protection and management of its valuable ecosystems and species.

Innovative Aspects

The practice consolidates fragmented Natura 2000 sites into a coherent marine park – it represents an implementation-level innovation, shifting from site and species-based protection towards ecosystem-based marine spatial governance.

Achieved Outcomes and lessons learnt

The outcomes of the practice cannot be evaluated, as it has not been implemented yet. The Presidential Decree establishing the two (2) national marine parks is pending.

Relationship with MSP

Once official, the National Marine Parks will be fully integrated into the relevant Maritime Spatial Plans of Greece (ΘΧΕ2 and ΘΧΕ4). Following a Special Environmental Study, detailed uses and planning measures will be set for the sustainable management and the protection of the marine areas the National Parks cover.

Transferability

This practice can be implemented in sensitive marine areas, with fragmented and small-sized protected areas, and with intense marine traffic and tourism development.

Governance and participation

Managing authority and governance mechanisms

The parks will be managed through the locally existing regional Management Unit of Natural Environment and Climate Change Agency (NECCA / OFYPEKA), which is a state agency supervised by the Greek Ministry of Environment and Energy, responsible for the management of protected areas in Greece.

Monitoring and adaptive mechanisms

The practice includes a structured monitoring system to evaluate the Management Plan using output and effectiveness indicators to track implementation and assess the impact on species and habitats, using the BACI (Before-After-Control-Impact) method. It incorporates mechanisms for review and adaptation. A mid-term evaluation is scheduled for the second year and a final assessment for the fifth year of implementation. The Plan will be revised every 5 years to integrate new scientific data, environmental changes and synergies with other projects, ensuring it remains up to date.

Stakeholder participation

The Special Environmental Studies underwent a two-month public consultation, held online via the Ministry's website, from July 21 to September 22, 2025. A total of 85 comments were submitted for the Ionian Park and a total of 105 for the South Aegean Park, coming from environmental organisations, institutional stakeholders and private individuals.

Social awareness and acceptance

Based on consultation feedback, social awareness and acceptance appear mixed. While NGOs and scientific actors recognise the Parks' non-economic values, the wider public –especially local professionals– focuses on practical concerns (e.g. implications for fisheries). Regarding the awareness of the European Green Deal goals served, it seems to be limited. Local discussions and municipal feedback focus mainly on implementation details and local concerns.

Supporting Documentation

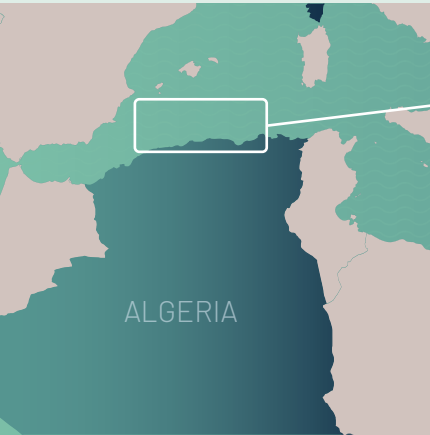
IONIAN National Marine Park

- Special Environmental Study of the Ionian National Marine Park
- Public consultation-Ionian National Marine Park
- Special Environmental Study of the Ionian National Marine Park - proposed land uses per zone category
- Map of the Ionian National Marine Park

SOUTH AEGEAN SEA National Marine Park

- Special Environmental Study of the National Marine Park of the South Aegean
- Public consultation-National Marine Park of the South Aegean
- Special Environmental Study of the South Aegean National Marine Park - proposed land uses per zone category
- Maps of the National Marine Park of the South Aegean

Co-Produced Marine Stewardship: Participatory Monitoring of Vulnerable Elasmobranchs in the Algerian Alboran Sea*



Algerian Alboran Sea

Spatial distribution of fishing traits in the Algerian Alboran Sea

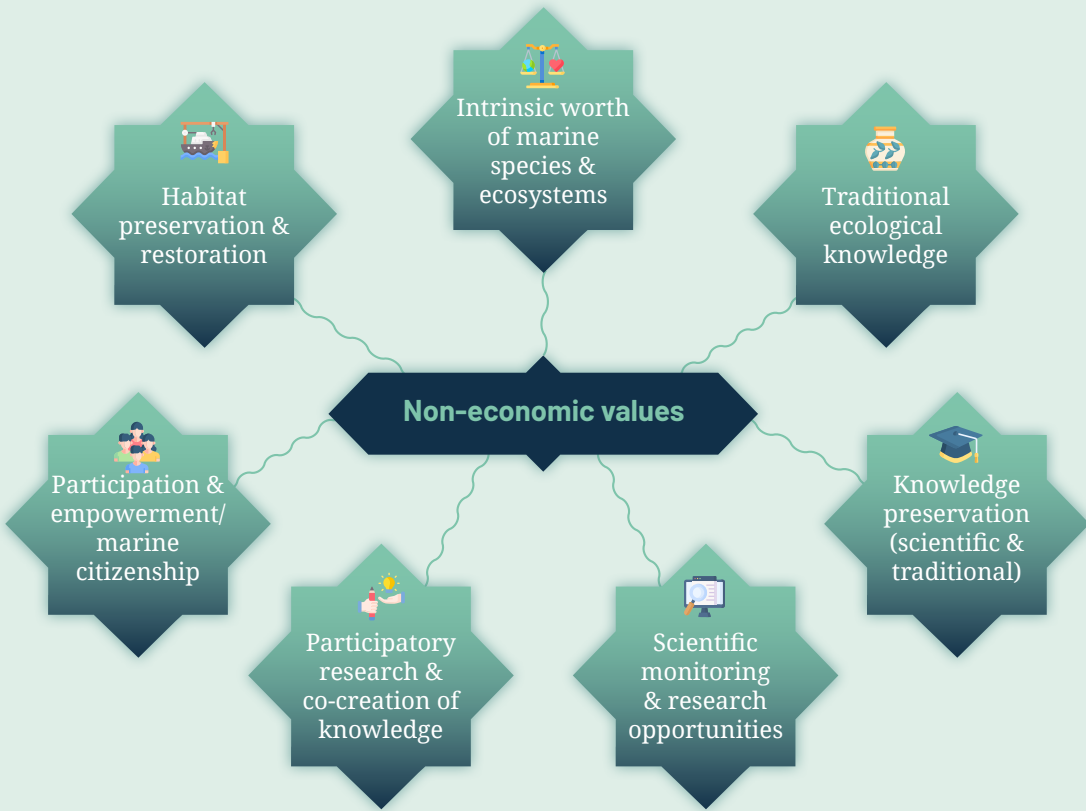
Location and geographical details

Western Algeria – Alboran Sea (between longitudes 001°00’–002°12’ W), focusing on the fishing ports of Ghazouet and Beni Saf. The practice covers coastal and offshore waters (20–700 m depth) within the Algerian part of the Alboran Sea.

Timeframe of implementation

February 2020 – September 2021 (22 months)
Extension phase requested:
March 2022 – November 2022

* Author: Samir Bachouche, Researcher at the National Centre for Fisheries and Aquaculture Development (CINDRA), Algeria.



General Information

Nature and overall objective(s) of the Practice

This practice was implemented under the MAVA Species Project and led by the National Centre for Research and Development of Fisheries and Aquaculture (CNRDPA). It is a participatory scientific initiative designed to **improve knowledge and management of vulnerable elasmobranch species** (sharks, rays and chimaeras) in the Algerian Alboran Sea.

The primary objective was to:

- Inventory elasmobranch species,
- Map their spatiotemporal distribution,
- Assess fishing impacts across all fleet segments,
- Develop management and protection measures for vulnerable species.

A central innovation of the practice was the direct integration of fishermen into scientific data collection through structured self-sampling, questionnaires and onboard observation.

The initiative documented 26 elasmobranch species over 22 months, including vulnerable and emblematic species such as:

- *Cetorhinus maximus* (Basking shark),
- *Mobula mobular* (Devil ray),
- *Alopias vulpinus* (Thresher shark),
- *Hexanchus griseus* (Six-gill shark).

Data were collected through:

1. Onboard scientific observers,
2. Fisher self-sampling (small-scale, trawlers and longliners),
3. Landing site monitoring,
4. Structured questionnaires,
5. Dedicated scientific trawl surveys.

Innovative Aspects

This practice stands out because it:

- Shifted fishermen from “data subjects” to co-producers of knowledge.
- Combined formal scientific campaigns with community-based monitoring.
- Built a structured database for future MSP integration.
- Addressed a major knowledge gap in the southern Alboran basin.

The project demonstrated that participatory monitoring can function effectively in contexts where scientific resources are limited.

Achieved Outcomes and lessons learned

Achievements

- 26 species recorded (10 rays, 15 sharks, 1 chimaera)
- Identification of gear-specific impacts (trawls, gillnets, longlines).
- Development of abundance indicators.
- Increased awareness among fishermen about vulnerable species.
- Foundation for a fisheries management plan.

Lessons Learned

- Trust-building is essential before implementing co-monitoring.
- Financial transparency and timely compensation are critical (delays reduced cooperation in 2021)
- Fisher ecological knowledge significantly complements scientific surveys.

Relationship with MSP

Although Algeria does not yet have a fully institutionalized MSP framework, this practice directly supports future MSP by:

- Providing spatialized biodiversity data,
- Identifying interaction hotspots between fishing gears and vulnerable species,
- Informing zoning decisions (seasonal closures, gear restrictions),
- Supporting ecosystem-based fisheries management.
- It constitutes a bottom-up MSP-enabling mechanism.

Transferability

This practice is highly transferable to:

- Mediterranean countries with limited monitoring capacity,
- Small-scale fisheries contexts,
- Regions seeking to enhance social acceptance of conservation measures.

Its key transferable components are:

- Fisher self-sampling protocols,
- Multi-approach monitoring design,
- Co-production governance model.

Governance and participation

Managing authority and governance mechanisms

The initiative was led by CNRDPA in partnership with local fisheries authorities and supported by the MAVA Foundation under SPA/RAC framework.

Scientific coordinators supervised:

- Onboard sampling,
- Data validation,
- Database development.

Local fishers were formally selected to represent different gear types (small -scale, trawlers, longliners), ensuring coverage of all operational segments.

Monitoring and adaptive mechanisms

Monitoring relied on:

- Monthly embarkations,
- Continuous landing site sampling,
- Structured questionnaires (~100 conducted)
- Two scientific trawl campaigns (2019 & 2021)

The design allowed adaptive adjustments in sampling intensity and gear coverage.

Stakeholder participation

Participation was direct and operational:

- Fishermen performed auto-sampling,
- Data were shared back with fishing communities,
- Scientific results were discussed locally.

This participatory approach enhanced transparency and ownership. This reciprocal knowledge exchange strengthened ownership and reduced potential resistance to conservation initiatives.

Social awareness and acceptance

The practice increased awareness of:

- The ecological vulnerability of elasmobranchs,
- The intrinsic value of sharks and rays,
- The need for precautionary management.

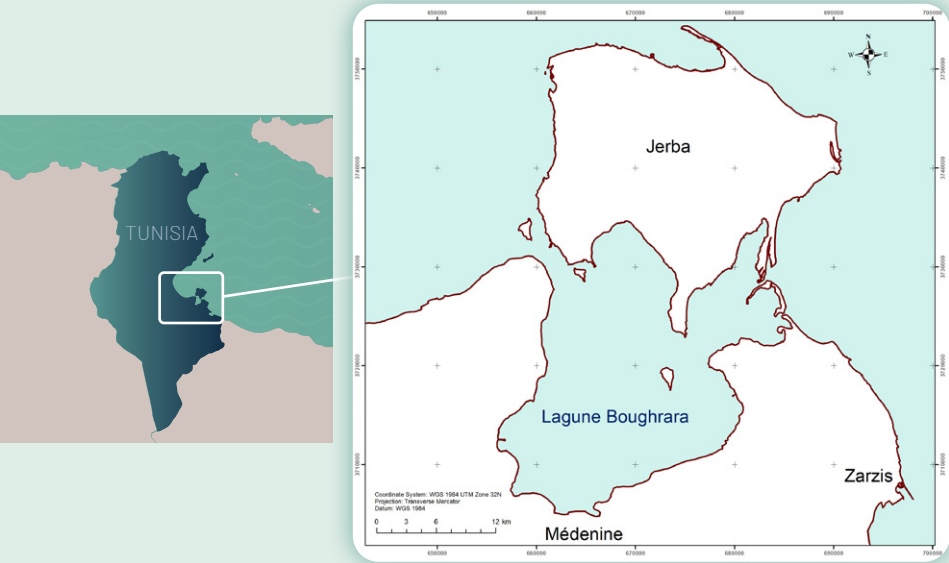
Rather than imposing conservation measures, the initiative fostered co-responsibility, improving long-term acceptance of potential spatial or gear restrictions. The initiative increased the social feasibility of future MSP measures.

Supporting Documentation

- Final Report: *Contribution à l'inventaire, l'estimation de l'abondance et la mise en évidence de l'impact de la pêche (tous segments confondus) sur les Élasmodontes dans le golf de Ghazaouet (mer d'Alboran – Ouest Algérie)*
- SPA/RAC – MAVA Species Project framework
- <https://www.togetherforthemed.org/our-action/species-knowledge/>



Reduction of ghost fishing through the recovery of abandoned crab traps in the Boughrara Lagoon*



Boughrara Lagoon in southeastern Tunisia

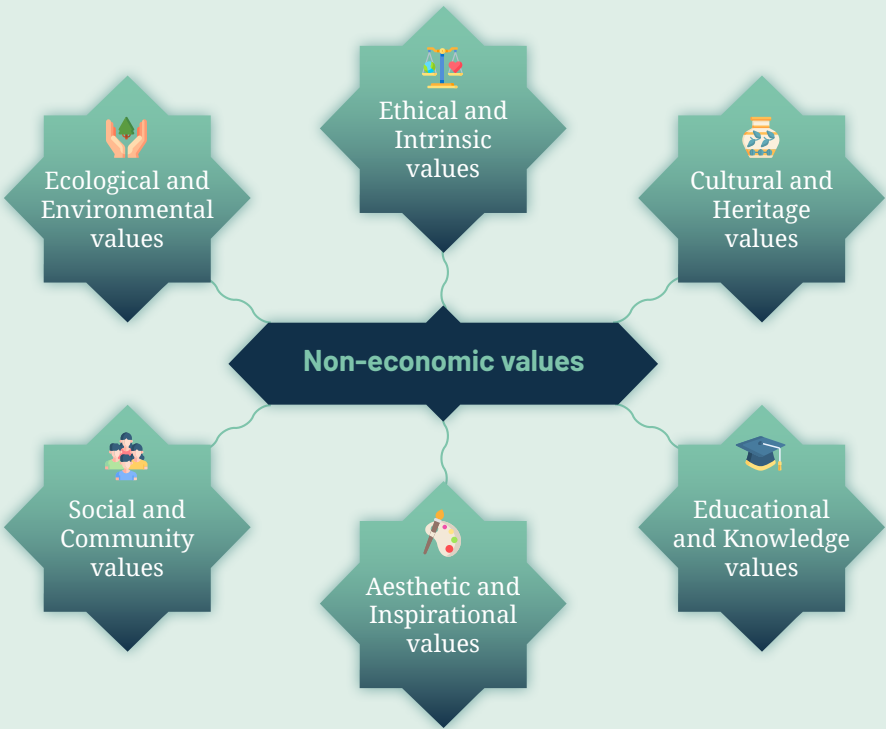
Location and geographical details

The project covers coastal and lagoon marine areas within Tunisian national waters, with a specific focus on the Boughrara Lagoon in southeastern Tunisia. This area is characterized by intensive small-scale fishing activities, particularly the use of crab traps, and is highly exposed to the impacts of abandoned, lost, or discarded fishing gear.

Timeframe of implementation

The project began in February 2024 and is ongoing, with an expected end date in July 2026.

* Authors: Lobna Boudaya, Asst. Professor at the University of Sfax, Tunisia. Lassad Neifar, Professor at the University of Sfax, Tunisia.



Alignment with European Green Deal (EGD) Objectives

Biodiversity protection: the recovery of abandoned crab traps reduces ghost fishing, protects marine biodiversity and limits physical degradation of lagoon habitats, directly supporting ecosystems restoration goals	Circular economy: the repair and reuse of recovered traps promote circular economy principles and more sustainable resource use within small scale fisheries	Sustainable food systems: the reduction of unaccounted fishing mortality supports sustainable fisheries and long term food security
Zero pollution: by removing marine litter, the practice contributes to Zero pollution ambitions and improves water quality	Climate adaptation: healthier lagoon ecosystems enhance ecological resilience to climate change	Just and environmentally sound transition

General Information

Nature and overall objective(s) of the Practice

The CRAB project is a field-based initiative aimed at reducing the environmental impacts of abandoned crab traps in the Boughrara Lagoon, southeastern Tunisia. Implemented with small-scale fishers, researchers, and local stakeholders, it focuses on mitigating ghost fishing, reducing marine litter, and protecting lagoon ecosystems while supporting sustainable fisheries. It also seeks to reduce fishing mortality from lost traps, limit damage to benthic habitats, improve water quality, and strengthen responsible fishing practices.

Innovative Aspects

The project uses a participatory approach where fishers help identify and recover ghost gear, repair traps, and develop solutions. It also promotes a circular approach to gear management repairing and reusing traps to reduce waste and prevent future ghost fishing, while linking ecological monitoring with awareness and capacity-building. In addition, the project has developed a smartphone-based application that enables fishers and stakeholders to geolocate and report abandoned or lost traps at sea, facilitating their recovery and improving the monitoring and management of ghost gear.

Achieved Outcomes and lessons learned

The practice led to a measurable reduction in ghost fishing risk and visible improvements in habitat cleanliness. The involvement of fishers increased awareness of the ecological impacts of lost gear and strengthened trust between stakeholders. However, some challenges were identified. Gear loss remains partly linked to external factors such as weather conditions, navigation constraints, and fishing intensity. In addition, recovery operations are time- and resource-intensive. A key lesson learned is that ghost fishing mitigation requires continuous efforts rather than one-off interventions. Long-term success depends on sustained engagement, incentives for fishers, and integration into broader management strategies.

Relationship with MSP

The practice generates spatially explicit knowledge that can support future MSP initiatives. In addition, the active involvement of fishers and local stakeholders is consistent with MSP requirements for participatory governance and stakeholder engagement.

Transferability

This practice's core features, such as the involvement of small-scale fishers, the integration of local ecological knowledge with scientific monitoring, and the recovery, repair, and reuse of fishing gear, can be adapted to different socio-ecological settings. The approach requires limited technological investment and relies primarily

on stakeholder engagement and operational coordination, making it suitable for regions with varying institutional and financial capacities. Furthermore, the practice can be extended to other fishing gears and sectors.

Governance and participation

Managing authority and governance mechanisms

Governance is based on a participatory approach that promotes cooperation between scientists, fishery authority and fishers in the identification, recovery, repair, and management of abandoned blue crab traps. Regular coordination meetings, training sessions, and field activities facilitate decision-making, knowledge exchange, and the implementation of project actions.

Monitoring and adaptive mechanisms

Progress and effectiveness are tracked through indicators such as the number of abandoned traps recovered, the quantity of gear repaired and reused areas covered, observed reductions in ghost fishing risk, and feedback from fishers. Regular field assessments, ecological monitoring and reporting activities support adaptive management. Results from monitoring are used to adjust recovery strategies, identify priority intervention areas, and refine awareness and prevention measures.

Stakeholder participation

Fishers were engaged from the early stages through direct consultations, informal meetings, and joint field activities. Their local ecological knowledge contributed to identifying hotspots of abandoned gear, understanding seasonal fishing patterns, and assessing gear interactions.

Social awareness and acceptance

The practice has been well accepted by local stakeholders and the wider fishing community. Awareness-raising activities, training sessions, and outreach events have helped communicate the environmental, social, and economic benefits of reducing ghost fishing. The project highlights not only biodiversity conservation and ecosystem health but also the potential for reducing gear losses, improving fishing efficiency, promoting circular use of fishing gear through repair and reuse, and strengthening the involvement of fishers in sustainable fisheries management.

Supporting Documentation

- <https://www.facebook.com/share/1C5FcQ2j4f/>
- Margot Dentan, «La Méditerranée au défi de l'arrivée de nouvelles espèces. L'exemple de la prolifération de crabes bleus en France et en Tunisie», Géoconfluences, Mars 2026. <https://geoconfluences.ens-lyon.fr/informations-scientifiques/dossiers-regionaux/lamediterranee-une-geographie-paradoxe/articles-scientifiques/la-mediterranee-au-defi-de-larrivee-de-nouvelles-especes-crabes-bleus-france-tunisie>

3. FISHERIES

3.1. Insights from the existing literature

Fisheries provide far more to society than what traditional economic measures can capture. While commercial value and market prices are easily quantified, the non-economic benefits of fishing—encompassing ecological preservation, cultural heritage, aesthetic appreciation, social cohesion, ethical considerations, and educational opportunities—represent profound and often irreplaceable contributions to human wellbeing and environmental stewardship. The literature on the non-economic values of fisheries focuses on small-scale and artisanal fisheries – not in the large-scale industrial fisheries.

Fisheries ecosystems play a critical role in maintaining **ecological balance and environmental health** that extends beyond their economic utility. The preservation of fish populations and aquatic habitats represents an intrinsic environmental value that communities increasingly recognize as worthy of protection for its own sake (Cole & Moksnes, 2016; Ignatius *et al.*, 2019). Indigenous and local communities particularly demonstrate deep understanding of the ecological interconnectedness of marine systems, valuing sustainable fishing practices not merely as resource management but as a responsibility to **maintain ecosystem integrity for future generations** (Vave *et al.*, 2024). Research shows that fishers often voluntarily limit their catches to protect fish stocks, demonstrating a commitment to **stewardship of natural resources** driven by values beyond profit (Britton, 2014; Fitzpatrick, 2014). These communities recognize that commercial fishermen who “just come to take and do not give back” threaten the ecological foundation on which all other values depend, thereby making **environmental consciousness** a foundational non-economic value in sustainable fisheries (Vave *et al.*, 2024).

For many communities, fishing represents a **centuries-old tradition** connecting present generations to ancestral knowledge, practices, and relationships with the natural world (Liu *et al.*, 2019). The act of fishing itself



carries cultural meaning — it is not simply a means to obtain food or recreation but a repository of cultural identity and heritage, shaping a **strong sense of place and community belonging** (Quiroga, 2025; Britton, 2014). Organized fishing communities and similar organizations preserve traditions, while helping the maintenance of fish stocks among others. While these values are non-monetary in nature, they may nonetheless generate tangible economic relevance: the preservation of cultural fishing infrastructure and heritage has been shown to **enhance consumer utility and willingness to pay for seafood products**, demonstrating the practical implications of integrating non-economic values into fisheries management (Quiroga, 2025).

The aesthetic dimension of fisheries—the beauty of natural landscapes, waterscapes, and the fishing experience itself—provides **inspiration and spiritual renewal** that enriches human life immeasurably (Acott and Urquhart, 2014; Liu *et al.*, 2019). Fishing communities report that **enjoyment of nature and relaxation** constitute central elements of the fishing experience, with the natural setting inseparable from the activity itself (Liu *et al.*, 2019). The visual and sensory dimensions of being on water, observing wildlife, and experiencing pristine ecosystems provide aesthetic value that contributes directly to **human wellbeing** (Acott *et al.*, 2018). This aesthetic appreciation is not merely passive observation but an active engagement with natural beauty that **inspires conservation ethics** and personal transformation. The natural environment associated with fishing locations—their scenic qualities, seasonal variations, and ecological character—provides inspirational value that cannot be substituted by artificial or constructed alternatives (Satumanatpan and Kanongdate, 2025).

Fisheries encompass a wide range of intangible, non-material benefits that are poorly captured by conventional economic valuation, yet are fundamental to identity formation, social cohesion, and cultural continuity. Fishing serves as a powerful mechanism for **building and strengthening social bonds across multiple scales**—from intimate family relationships to broader community networks (Liu *et al.*, 2019; Vave *et al.*, 2024). Interactions between parents and children, friendships among fellow anglers, and participation in fishing-related organizations create **social capital** that extends far beyond the fishing activity itself. These social connections maintain and transmit **local ecological knowledge** while simultaneously building **resilience** through strengthened social networks (Satumanatpan and Kanongdate, 2025). Membership in fishing organizations such as the New Jersey Federation of Fishermen and Norwegian Salmon Rivers creates **socially and politically active communities** that advocate for environmental protection and sustainable management (Pomeroy *et al.*, 2015; Liu *et al.*, 2019). Similarly, culturally salient or keystone species

may hold symbolic importance that persists independently of their current economic or harvest value, significantly contributing to **community identity and continuity** (Noble *et al.*, 2018). The communal aspects of fishing—sharing experiences, building trust, and collective stewardship—generate **social cohesion** that strengthens communities and enables collective action on environmental and governance issues (Malinauskaite *et al.*, 2021).

Fishing embodies ethical principles regarding humanity's relationship with nature and moral responsibilities toward non-human species and future generations. These practices reflect and cultivate existence and bequest values, which reflect ethical commitments to species persistence and **intergenerational responsibility** (Ressurreição *et al.*, 2012; Satumanatpan and Kanongdate, 2025). Many fishing communities express spiritual dimensions of their practice—a sense of connection to natural forces, respect for fish as sentient beings, and recognition of human dependence on ecological systems. These ethical and spiritual values motivate **conservation behaviors** and inform management preferences independent of economic incentives. Research indicates that people hold “pluralistic values towards complex goods” like biodiversity, with many of these values operating at ethical and spiritual rather than economic registers (Acott *et al.*, 2018; Ressurreição *et al.*, 2012). These values are particularly pronounced in indigenous and small-scale fishing communities, where spiritual and religious values shape ethical relationships with coastal resources.

Fisheries communities serve as repositories and transmitters of **ecological knowledge** that cannot be obtained through formal education or scientific literature alone (Mackinson and Wilson, 2014; Noble *et al.*, 2018). Local and indigenous fishers possess detailed, intergenerational understanding of fish behavior, habitat requirements, ecological relationships, and sustainable harvesting practices developed through centuries of direct observation and adaptive management. This tacit ecological knowledge, transmitted through fishing activities and community membership, represents an educational value of immense importance for environmental management and conservation strategy development. Fishing also provides direct **environmental education**, connecting participants—particularly children—to ecological systems, species identification, and habitat awareness in ways that formal schooling cannot replicate (Liu *et al.*, 2019; Pellowe and Leslie, 2021). Organizations dedicated to fishing simultaneously function as educational institutions, preserving and transmitting knowledge about natural systems while cultivating environmentally literate citizens capable of informed participation in environmental governance and conservation decisions.

3.2. The experts’ opinion

Ten (10) European experts in Fisheries were interviewed (see section 1.2. for the experts and the methodology). Experts’ view on the non-economic values of Fisheries is balanced. In most cases, Fisheries were assessed by the experts as an economic sector embedding and promoting more non-economic values than Aquaculture and ORE. Figure 9 presents the average ratings of non-economic value categories. The category “Cultural and Heritage values”, was the highest ranked category of non-economic values of Fisheries, scoring 3.6. This is the highest ranking for “Cultural and Heritage values” among the rest of the MEDIGREEN topics/sectors (Nature Protection, Aquaculture and ORE). It is followed by “Educational & Knowledge values” (3.2), “Social & Community values” (3.1) and “Aesthetic & Inspirational values” (3.1).

Figure 9
Experts’ average rating of non-economic values categories for Fisheries

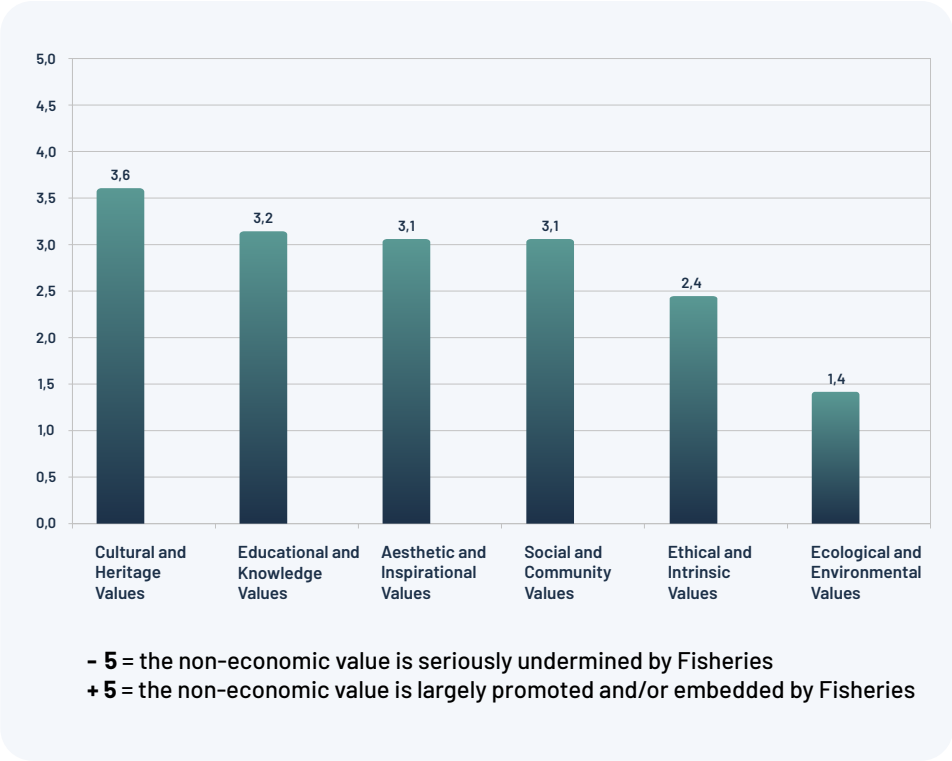


Figure 10 offers a visual presentation of non-economic values categories for Fisheries and Figure 11 presents their top ten rating according to experts. While literature on the non-economic values of Fisheries focuses on good practices which might be beneficial for the ecosystems (like communities voluntarily limiting their catches to protect fish stocks or catch-and-release fishing – see section 3.1), the experts assigned an average of 1.0 for “habitat preservation & restoration”, taking into account their overall view of how the sector operates. Fisheries present the highest ratings across all sectors for “community identity & belonging” (3.9), “indigenous and local coastal practices” (3.7) and “traditional culture and art” (3.3), while they have the lowest score across all other sectors for climate change adaptation (0.2).

Figure 10
Relevance of non-economic values to Fisheries

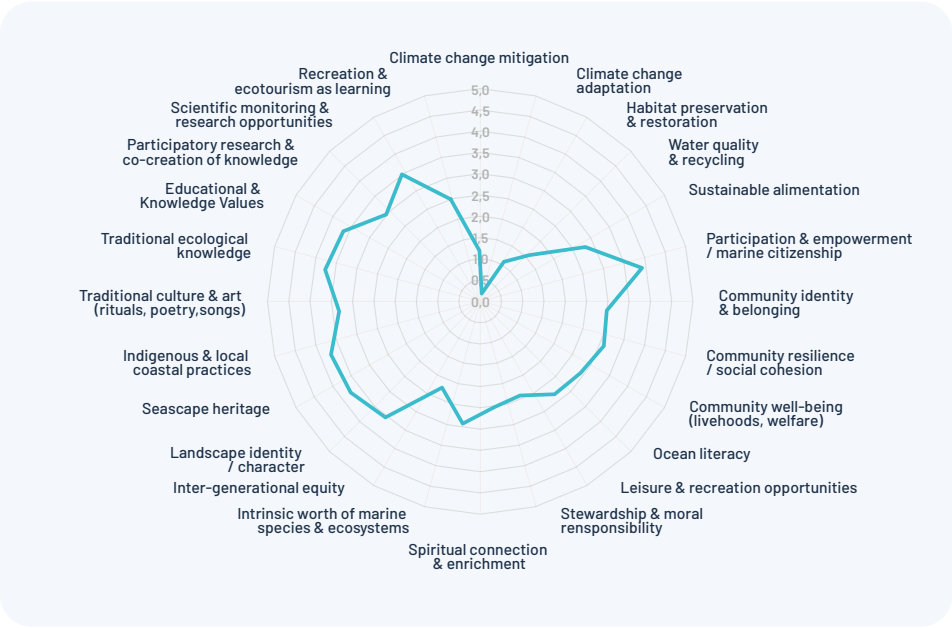
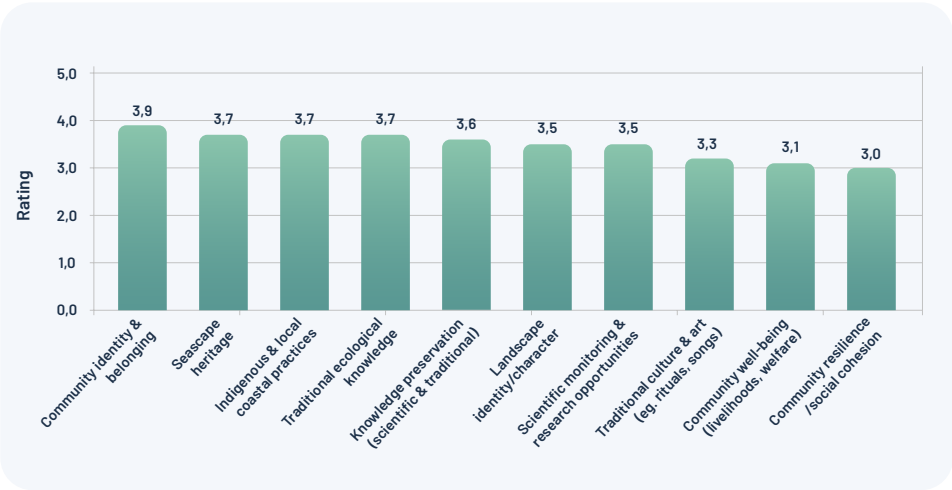


Figure 11
Top 10 most relevant non-economic values to Fisheries



3.3. General public awareness and perception

In the public awareness survey (see section 1.2. for details on the methodology), Fisheries emerged as the key sector most strongly associated with social, cultural, and community-related non-economic values (Table 4.1). Compared to Aquaculture and ORE, Fisheries received higher ratings across almost all categories of values, only exception being the “Ecological & Environmental values” of Fisheries (rated at 3.36), which - contrary to the experts’ opinion - is lower than the rate corresponding to Aquaculture and ORE.

Among the evaluated categories, “Cultural & Heritage values” received the highest score for Fisheries, reaching an average of 4.17 on the Likert scale (1-5). This is the highest score of non-economic values recorded among the sectors/topics examined in MEDIGREEN and highlights the extent to which Fisheries are perceived not merely as an economic activity, but also as an important component of cultural continuity, maritime tradition, and regional heritage.

Table 4.2.: Average rating of non-economic values categories embedded in Fisheries as assigned by the general public- comparison with the other MEDIGREEN topics
Scoring scale (1 to 5): 1 = strong negative relation and 5 = strong positive relation

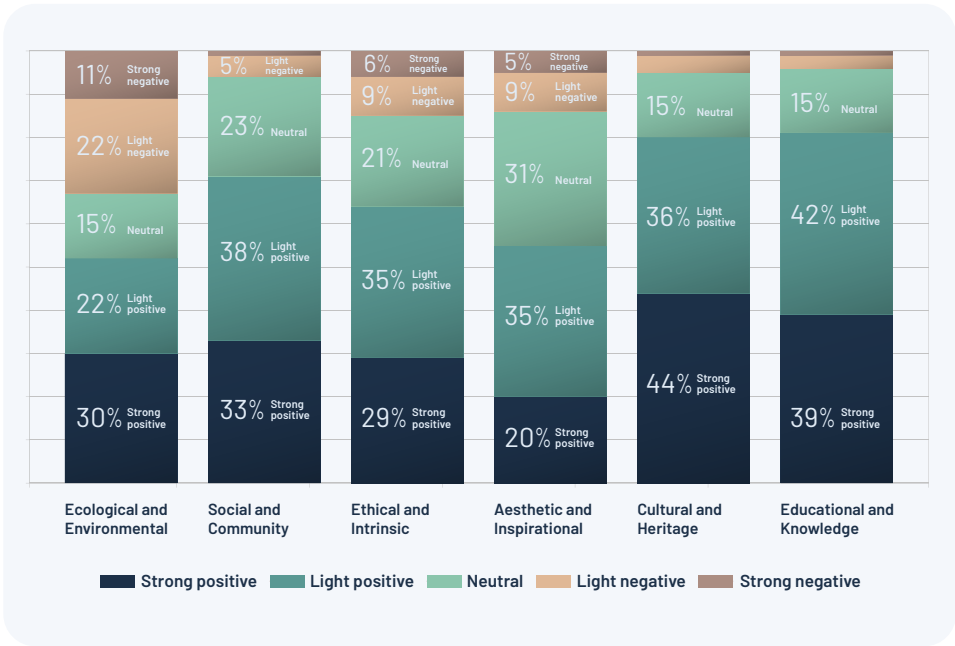
	Nature Protection	Fisheries	Aquaculture	ORE	Average of the three economic sectors
Ecological and Environmental values	4.56	3.36	3.41	3.50	3.42
Social and community values	4.39	3.96	3.47	3.27	3.57
Ethical and Intrinsic	4.56	3.72	3.42	3.45	3.53
Aesthetic and Inspirational values	4.50	3.57	2.99	2.95	3.17
Cultural and heritage values	4.39	4.17	3.31	2.93	3.47
Educational and knowledge values	4.61	4.14	3.81	3.73	3.89

Fisheries also scored particularly high in “Educational & Knowledge values” (4.14) and “Social & Community values” (3.96). They appear to retain a strong human and place-based dimension in public perception, while experts’ opinions seem to take more into account the large-scale industry that relates to the sector. Nevertheless, in comparison with the other sectors, the results indicate a broader recognition, shared by both experts and the public, of the unique societal and cultural role of fisheries within coastal and maritime regions.

The most common reply regarding Fisheries is the “strong positive” relation between the sector and “Cultural and Heritage values” (44%), followed by the “light positive” relationship with “Educational and Knowledge values” (42%). Similarly, the categories of “Social and Community values” and of “Ethical & Intrinsic values” received largely favourable evaluations. Positive responses (light and strong positive combined) account for over two-thirds of responses in both categories (Figure 12).

Figure 12

Public perception of the non-economic values categories embedded in Nature Protection



3.4. Indicative literature

Non-economic values and fisheries

Acott, T. G., Johnson, D. S., Stacey, N., & Urquhart, J. (2018). Reflections on social wellbeing and the values of small-scale fisheries: Implications for research, policy and management. In D. S. Johnson, T. G. Acott, N. Stacey, & J. Urquhart (Eds.), *Social wellbeing and the values of small-scale fisheries* (pp. 317–332). Springer. https://doi.org/10.1007/978-3-319-60750-4_14

Acott, T. G., & Urquhart, J. (2014). Sense of place and socio-cultural values in fishing communities along the English Channel. In J. Urquhart, T. G. Acott, D. Symes, & M. Zhao (Eds.), *Social issues in sustainable fisheries management* (pp. 257–277). Springer. https://doi.org/10.1007/978-94-007-7911-2_14

Britton, E. (2014). Ghost boats and human freight: The social wellbeing impacts of the salmon ban on Lough Foyle's fishing communities. In J. Urquhart, T. G. Acott, D. Symes, & M. Zhao (Eds.), *Social issues in sustainable fisheries management* (pp. 143–164). Springer. https://doi.org/10.1007/978-94-007-7911-2_8

Cole, S. G., & Moksnes, P.-O. (2016). Valuing multiple eelgrass ecosystem services in Sweden: Fish production and uptake of carbon and nitrogen. *Frontiers in Marine Science*, 2, 121. <https://doi.org/10.3389/fmars.2015.00121>

Fitzpatrick, M. (2014). From boom and bust to local stewardship: A governance benchmark for Celtic Sea fisheries management. In J. Urquhart, T. G. Acott, D. Symes, & M. Zhao (Eds.), *Social issues in sustainable fisheries management* (pp. 43–63). Springer. https://doi.org/10.1007/978-94-007-7911-2_3

Ignatius, S., Delaney, A., & Haapasaari, P. (2019). Socio-cultural values as a dimension of fisheries governance: The cases of Baltic salmon and herring. *Environmental Science & Policy*, 94, 1–8. <https://doi.org/10.1016/j.envsci.2018.12.024>

Liu, Y., Bailey, J. L., & Davidsen, J. G. (2019). Social-cultural ecosystem services of sea trout recreational fishing in Norway. *Frontiers in Marine Science*, 6, 178. <https://doi.org/10.3389/fmars.2019.00178>

Mackinson, S., & Wilson, D. C. K. (2014). Building bridges among scientists and fishermen with participatory action research. In J. Urquhart, T. G. Acott, D. Symes, & M. Zhao (Eds.), *Social issues in sustainable fisheries management* (pp. 121–139). Springer. https://doi.org/10.1007/978-94-007-7911-2_7

Malinauskaite, L., Cook, D., Davíðsdóttir, B., & Ögmundardóttir, H. (2021). Socio-cultural valuation of whale ecosystem services in Skjálfandi Bay, Iceland. *Ecological Economics*, 180, 106867. <https://doi.org/10.1016/j.ecolecon.2020.106867>

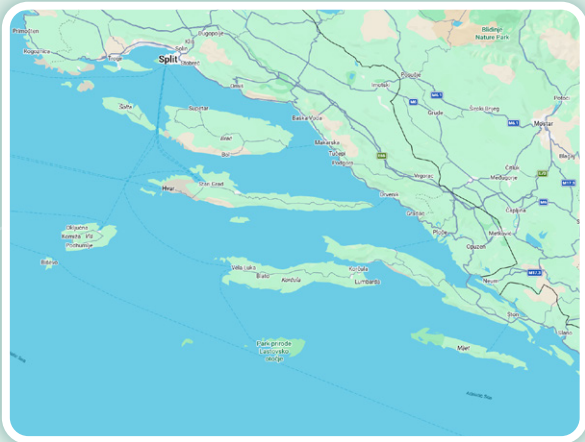
Noble, M. M., Fulton, C. J., & Pittock, J. (2018). Looking beyond fishing: Conservation of keystone freshwater species to support a diversity of socio-economic values. *Aquatic Conservation: Marine and Freshwater Ecosystems*, 28(6), 1–10. <https://doi.org/10.1002/aqc.2974>

- Pellowe, K. E., & Leslie, H. M. (2021). Ecosystem service lens reveals diverse community values of small-scale fisheries. *Ambio*, 50, 586–600. <https://doi.org/10.1007/s13280-020-01405-w>
- Pomeroy, C., Hall-Arber, M., & Conway, F. (2015). Power and perspective: Fisheries and the ocean commons beset by demands of development. *Marine Policy*, 61, 339–346. <https://doi.org/10.1016/j.marpol.2014.11.016>
- Quiroga, E. (2025). Beyond fishing: The value of maritime cultural heritage in Germany. *Marine Policy*, 182, 106845. <https://doi.org/10.1016/j.marpol.2025.106845>
- Ressurreição, A., Zarzycki, T., Kaiser, M., Edwards-Jones, G., Dentinho, T. P., Santos, R. S., & Gibbons, J. (2012). Towards an ecosystem approach for understanding public values concerning marine biodiversity loss. *Marine Ecology Progress Series*, 467, 15–28. <https://doi.org/10.3384/meps09967>
- Satumanatpan, S., & Kanongdate, K. (2025). Ethical value of coastal resources as implicit driver for conservation: Insights into artisanal fishers' perceptions. *Sustainability*, 17(17), 7649. <https://doi.org/10.3390/su17177649>



3.5. GOOD PRACTICES FOR FISHERIES

Ligua franca halieutica among Croatian fishers*



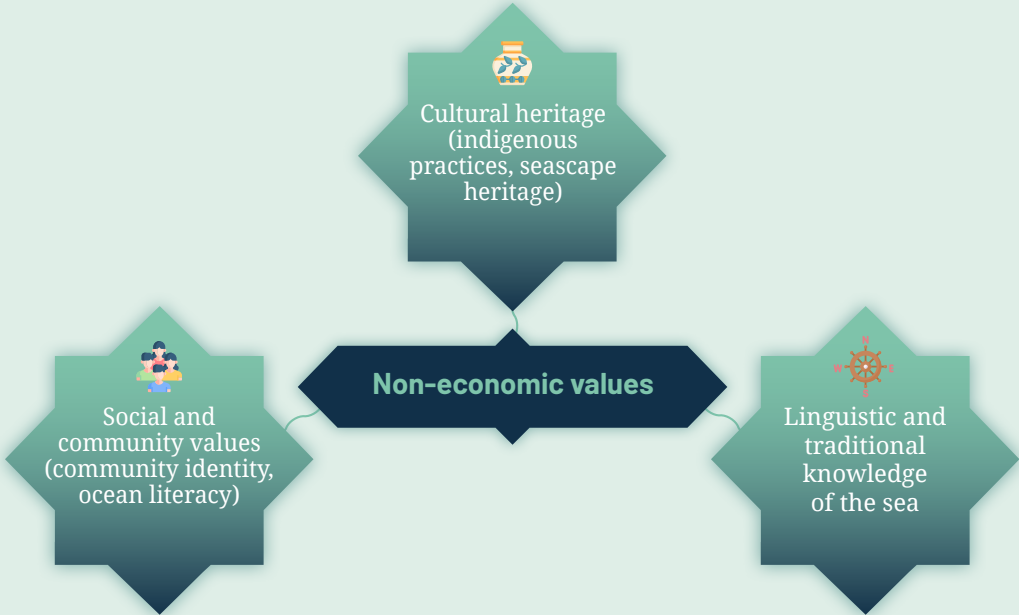
Source: google.com/maps

Location and geographical details

The initiative focuses on the maritime cultural landscape of the town of Komiža on the island of Vis and the wider Vis archipelago in the central Adriatic Sea (Croatia), particularly the traditional fishing grounds historically used by the fishermen of Komiža. These include coastal and offshore waters around Vis, Biševo, Svetac, Brusnik and Jabuka, as well as the open-sea fishing grounds around the island of Palagruža, located roughly midway between the Croatian and Italian coasts.

Timeframe of implementation

The initiative builds on long-term research and cultural activities carried out within the programme Ars Halieutica – Cultural Institutions for Research into the Experience of Living with the Sea, launched in Komiža in the early 1990s. The programme has been implemented continuously for more than three decades through research, publications, educational activities and cultural initiatives focused on the maritime heritage of the island of Vis and the wider Adriatic region, led by Professor Joško Božanić and the Ars Halieutica association.



General Information

Nature and overall objective(s) of the Practice

The practice applies linguistic research to reveal cultural and knowledge-based values embedded in fishing communities. It is a long-term cultural and research initiative documenting and preserving the maritime linguistic heritage of the fishing community of Komiža on the island of Vis (Croatia).

* Authors: Marina Markovic, Senior Project Manager UNEP/MAP – PAP/RAC (Split, Croatia).

Innovative Aspects

The initiative highlights not only local heritage, but also the wider Mediterranean cultural connections embedded in maritime language and traditional fishing knowledge. By analysing maritime vocabulary, it demonstrates how language can serve as evidence of long-standing connections among Mediterranean seafarers.

Achieved Outcomes and lessons learnt

The initiative promoted the maritime heritage of the Komiža fishing community and raised awareness of its cultural significance within the wider Mediterranean context. It contributed to recognising the role of fishing communities in preserving intangible maritime heritage and traditional knowledge.

Many elements of this vocabulary correspond to a wider Mediterranean *lingua franca* shared across several languages, including Portuguese, Spanish, Catalan, Provençal, Italian/Venetian, French, Maltese, Greek, Turkish and Arabic dialects. These similarities reflect centuries of interaction among Mediterranean sailors and fishermen, who developed common terminology that enabled communication and cooperation at sea despite linguistic differences.

The programme has contributed to the recognition of elements of this maritime heritage, including the traditional fishing vessel from Komiža, the *gajeta falkuša*, as well as the island's dialect, which have been inscribed in the Register of Cultural Goods of the Republic of Croatia maintained by the Ministry of Culture and Media.

Challenge is the gradual decline in the everyday use of traditional terminology due to social and economic changes. This underlines the importance of documentation, education and cultural initiatives to ensure that this knowledge is preserved and transmitted to future generations.

Relationship with MSP

This practice has not been directly included in the Croatian MSP process, but offers a perspective on the fisheries sector that tends to be overlooked when sectors are considered in isolation. The practice could fuel Integrated approaches such as MSP and Integrated Coastal Zone Management (ICZM) to recognise these cross-sector values.

Transferability

The approach can be applied in other coastal regions where traditional maritime knowledge and language remain embedded in fishing communities. Similar initiatives could support the broader understanding of a common Mediterranean maritime heritage.

Governance and participation

Managing authority and governance mechanisms

The initiative was developed through the research and cultural activities of Professor Joško Božanić and the Ars Halieutica programme in Komiža.

Monitoring and adaptive mechanisms

No formal monitoring system has been established. However, ongoing research conducted through the programme has provided continuous documentation and interpretation of maritime terminology and cultural practice.

Stakeholder participation

The programme has relied on collaboration between researchers, local cultural organisations and members of the fishing community who contributed knowledge, terminology and oral traditions.

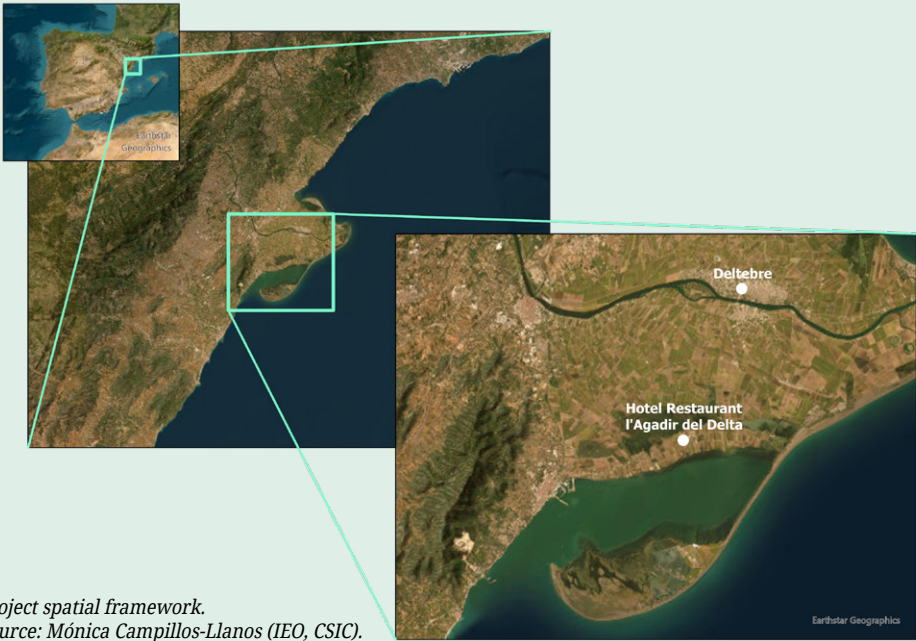
Social awareness and acceptance

The initiative has contributed to raising public awareness of maritime heritage at local and international levels. Cultural activities linked to the programme have attracted attention to the heritage of Komiža and the Vis archipelago and helped communicate the cultural and knowledge-based values of traditional fisheries to a wider public.

Supporting Documentation

- J. Božanić (2007). *Lingua Franca in the Dalmatian fishing and nautical terminology*. Wessex Institute of Technology Conference. Repairs and Maintenance of Heritage Architecture X, Prag 4 – 7.7.2007. pp. 11 – 22
- J. Božanić (1997). *Lingua Franca*. Književni krug, Split
- J. Božanić (2011). *Lingua Halieutica*. Ribarski jezik Komiže. [*Lingua Halieutica. The Fishermen's Language of Komiža*] Književni krug, Split
- *Lingua halieutica* – Joško Božanić <https://spasimobisevo.org/lingua-halieutica/>

Dry-Aged Local Fish and Valorisation of Underutilised Species through High Gastronomy and Food Education*



Location and geographical details

Location: Town of Poble Nou del Delta (Amposta Municipality), Montsià county, Tarragona (Catalonia, Spain)

Marine area concerned: Local fisheries linked to La Ràpita fishing port and the surrounding coastal/bay area in the Ebro Delta.

Timeframe of implementation

The initiative started in 2024, and is ongoing.

* Authors: Author: Joan Alginet Aliau-Grup d'Accio, local Terres de l'Ebre. Spain.

Non-economic values



Cultural and gastronomic heritage: Valorisation of local fish species and traditional fishing identity through innovative cuisine.



Educational value and healthy lifestyles: Awareness-raising activities with schools to promote healthy eating and knowledge of local species.



Territorial identity and community pride: Positioning local fish in high-end gastronomy and strengthening the reputation of the local fishing sector.



Environmental awareness and sustainability culture: Whole-fish utilisation (e.g., marine charcuterie products) to reduce waste and promote responsible consumption.

Alignment with European Green Deal (EGD) Objectives

Circular economy: Full use of fish products and reduction of food waste through value-added processing.

Sustainable food systems: Promotion of local, seasonal fish consumption and diversification towards underutilised species.

Climate action and energy efficiency: Energy-saving measures and renewable energy use (photovoltaic installation).

Resource efficiency: Improved preservation techniques reducing reliance on ice and optimising storage conditions.

General Information

Nature and overall objectives of the Practice

This is a productive business initiative in the gastronomy sector, aimed at promoting local fisheries and increasing the value of underutilised fish species landed in the local fish market.

The main objective is to elevate local fish products through innovative culinary techniques, particularly dry-ageing fish, a method traditionally used for meat, to enhance flavour and texture while creating higher added value.

Overall, the practice seeks to:

- Strengthen the link between gastronomy and local fisheries,
- Increase recognition of lesser-known species,
- Promote sustainable consumption patterns,
- Reinforce the local fishing identity within the territory.

Innovative Aspects

The most innovative elements include:

- Introduction of dry-aged fish techniques in the local context.
- Development of marine charcuterie products to valorise less commercially attractive species.
- Integration of sustainability, innovation and education within a single hospitality initiative.
- Creation of a visible open-kitchen concept that enhances transparency and awareness among consumers.

Achieved Outcomes and lessons learnt

The practice has successfully implemented the planned investments, including visible ageing fridges, upgraded kitchen facilities and improved customer experience spaces.

It has increased the visibility of local fish through:

- Culinary innovation,
- Public presentations and professional events,
- School outreach activities, to promote knowledge about local fish species and healthier eating habits.
- Media and gastronomy sector engagement.

A key lesson learned is that gastronomic innovation combined with storytelling, transparency and education significantly strengthens social awareness and acceptance of sustainable seafood practices.

Relationship with MSP

The practice does not directly modify/interact with MSP frameworks. However, it indirectly supports MSP objectives by promoting sustainable use of local fishery resources without increasing spatial pressure on marine areas. It reinforces sustainable coastal economic activities aligned with balanced marine resource use.

Transferability

This practice is transferable to other coastal regions provided that:

- There is access to local fisheries,
- There is interest from the hospitality sector,
- Educational and communication networks are available.

Replicable elements include:

- Valorisation of underutilised species,
- Circular economy approaches in gastronomy,
- Integration of food education with local blue economy strategies.

Governance and participation

Managing authority and governance mechanisms

The initiative was developed and implemented by a private company (Poble Nou Resort S.L.), with support from the local fisheries sector and within the framework of FLAG funding.

Monitoring and adaptive mechanisms

The establishment operates under sustainability standards (including environmental certification and renewable energy use), suggesting an internal commitment to continuous environmental improvement.

Stakeholder participation

Participation occurred through:

- Collaboration with fisheries representatives,
- Engagement with educational institutions,
- Collaboration with gastronomy professionals.

Social awareness and acceptance

Social awareness has been promoted through:

- Visible kitchen and ageing equipment,
- Communication via website and social media,
- School activities,
- Public talks and professional events.

While no quantified perception data is provided, the practice clearly aims to increase public understanding of:

- a) the non-economic values of local fisheries (heritage, sustainability, identity), and
- b) the contribution to sustainable food systems aligned with the European Green Deal.

Supporting Documentation

Website: <https://www.hotelalgadirdelta.com/restaurante/>

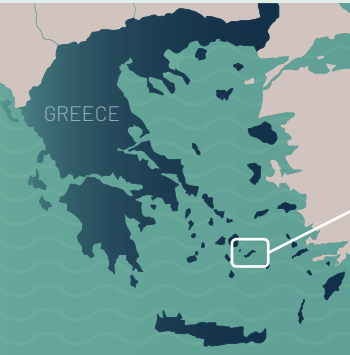
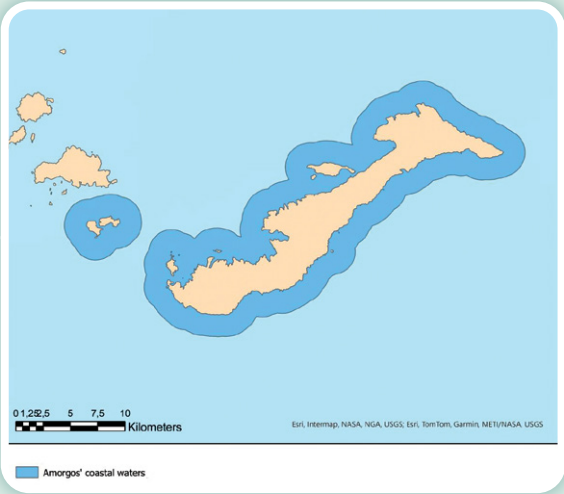
Instagram: <https://www.instagram.com/hotelalgadirdeldelta?igsh=ZjhwcztrdmZpeDJs>



Project pictures.
Source: Hotel Algadir Delta.



Amorgorama*



Source: google.com/maps

Location and geographical details

Amorgorama is based on the island of Amorgos, in the Cyclades island complex in the South Aegean Region, in Greece. The project covers the coastal marine areas surrounding Amorgos, focusing particularly on the northern beaches and coastal zones.

Timeframe of implementation

The initiative was funded in 2019 and first implemented in 2021, following thorough planning since 2015. In 2025 the Greek government enacted the official designation of Amorgos' proposed Fishing Restricted Areas. The project is still ongoing, with plans for continued implementation.

* Authors: Panagiota Bourlia (Junior Researcher, AUTH and Socratis Seitaniadis, (Associate Senior Researcher, AUTH) Greece.

Non-economic values



Alignment with European Green Deal (EGD) Objectives



General Information

Nature and overall objectives of the Practice

Amorgorama is a community-led initiative launched by the Professional Fishery Association of Amorgos. It started as a bottom-up practice and evolved into a structured conservation proposal supported by scientific institutions and national authorities.

It aims to develop a sustainable approach to tackle the increasing plastic pollution and overfishing in the Aegean Sea. The four axes of the programme are:

- Seasonal fishing pauses during crucial reproductive months (April-May).
- Coastal clean-up missions during this period.
- Transition to sustainable fishing gear.
- Establishment of Marine Protected Areas along Amorgos' coastline.

Innovative Aspects

While the practice is being incorporated into national fisheries management structures, the local fishers' association remains the central actor in its implementation and management, ensuring decision-making remains community led.

Achieved Outcomes and lessons learnt

By combining community leadership, institutional regulation, and multi-stakeholder collaboration, Amorgorama shows how local communities can protect both environmental and cultural heritage while addressing economic needs.

Relationship with MSP

Amorgorama project promotes sustainable fisheries management, ecosystem protection, natural and cultural heritage preservation and the creation of Marine Protected Areas, providing relevant feedback to the ongoing process of developing the current Maritime Spatial Plans.

Transferability

Amorgorama has gained international recognition, fostering peer-to-peer learning with other fishing communities, such as the Gökova Fishers Association in Turkey. This initiative could be implemented in areas where sustainable fishing needs to take place.

Governance and participation

Managing authority and governance mechanisms

The practice was initiated by the Professional Fishing Association of Amorgos, later developing partnerships with academic institutions, environmental NGOs and the

Ministry of Rural Development and Food. Collaboration with the Ministry facilitated Amorgorama's integration into the formal regulatory framework, shaping a hybrid governance model that combines bottom-up leadership with institutional recognition.

Monitoring and adaptive mechanisms

Amorgorama's progress is tracked through scientific monitoring of fish populations and Posidonia meadows by the Agricultural University of Athens, documentation of beach-cleaning missions and transparent reporting to supporters. Adaptive measures, such as seasonal fishing pauses and the gradual adoption of sustainable fishing gear, combined with collaboration with authorities and NGOs, ensure the project evolves based on monitoring results and new information.

Stakeholder participation

The Amorgorama idea originated from locals and has evolved into a continuous collaboration. From the beginning, the initiative was open to multi-level cooperation, gradually involving environmental organizations, scientific actors, local and national authorities. Furthermore, the establishment of a crowdfunding mechanism allows citizens worldwide to support fishers in pausing fishing activities and cleaning Amorgos' coasts instead.

Social awareness and acceptance

Since the initiative was conceived and designed by local fishers, the measures are perceived as mutually agreed actions, rather than forced restrictions. This has fostered a sense of ownership within the community, resulting in strong social acceptance. Media coverage has raised awareness of the initiative's non-economic values.

Supporting Documentation

- Official website of the initiative (<https://www.amorgorama.com/el/>)
- AMORGORAMA'S OUTCOMES 2021 (video)
- AMORGORAMA - Community led conservation in Greece (video)
- Amorgorama's Crowdfunding (<https://fundrazr.com/amorgorama2021>)
- Article: A Greek Fisher-Led Initiative Setting a New Standard in Marine Conservation (<https://www.greeknewsagenda.gr/amorgorama-marine-conservation/>)
- Article: Amorgorama: A Fisher-Led Movement to Revive a Greek Island (<https://reviveourocean.org/stories/amorgorama/>)
- "Global recognition for the initiative of Amorgos fishermen at the UN Conference" (<https://reviveourocean.org/stories/amorgorama/>)



4. AQUACULTURE

4.1. Insights from the existing literature

Beyond its vital role in global **food security**, marine aquaculture provides a diverse array of non-economic benefits that are essential for the health of our oceans and the well-being of coastal communities. Recognizing these values—ranging from environmental restoration to the preservation of cultural heritage—is crucial for policymakers to foster an industry that is both socially acceptable and ecologically sustainable (Alleway *et al.*, 2019; Ciliberti *et al.*, 2024).

Aquaculture acts as a powerful tool for **ecosystem restoration and environmental regulation**, often providing services similar to those of natural habitats, when it is properly managed using an ecosystem-based approach. Filter-feeding organisms, such as oysters and mussels, naturally improve **water clarity** by removing excess nutrients and particulates, which helps combat eutrophication in coastal waters (Alleway *et al.*, 2019; Gentry *et al.*, 2020; Lopes and Videira, 2013). Furthermore, seaweed and bivalve cultivation can serve as significant **carbon sinks**, sequestering carbon dioxide and potentially mitigating local effects of ocean acidification (Alleway *et al.*, 2019; Gentry *et al.*, 2020). Beyond water quality, aquaculture infrastructure provides **artificial habitats** that support a high diversity of wild marine life, acting as “stepping stones” for species migration and increasing the abundance of local fish populations through organic enrichment and structural complexity (Alleway *et al.*, 2019; Gentry *et al.*, 2020).

Marine aquaculture is deeply rooted in socio-ecological history, maintaining a **spiritual and physical connection to the sea** that has existed for millennia in cultures ranging from ancient China to indigenous Hawaii and Aboriginal Australia (Alleway *et al.*, 2019). In modern contexts, aquaculture supports the **“working waterfront” identity**, preserving the traditional maritime heritage of coastal towns that have faced declines in wild fisheries. These activities foster a strong **sense of place and local pride**, as communities often identify with the high-quality, “place-branded”

products they produce for the world (D'Anna & Murray, 2015; Krause et al., 2020). By aligning modern industry with ancestral practices, aquaculture can allow traditional custodians to maintain customary access to marine resources and preserve their way of life (Alleway et al., 2019).

Aquaculture can shape seascapes in ways that influence scenic quality and sense of place, contributing to the aesthetic character and visual identity of seascapes. Research shows that while some residents express concerns regarding the visual impact of farming gear, others view the presence of a “working sea” as **an inspirational symbol of sustainable productivity** and community vitality (D'Anna and Murray, 2015; Krause et al., 2020). Traditional forms of aquaculture (i.e. “lagoon culture” in the Mediterranean) are integrated into coastal landscapes and seascapes, forming part of the **visual identity of coastal regions**. Recent research in oyster cultivation (Schultz et al. 2026) shows that residents expressed clear preferences for methods that minimize impacts on coastal aesthetics and recreational activities. Low-impact cultivation methods including bottom (free planting) and open tray cultivation are favoured. An increasing number of sustainable aquaculture methods are being implemented to promote the circular economy and zero pollution, as well as to help preserve aquatic ecosystems, including low-trophic aquaculture and integrated multi-trophic aquaculture.

Aquaculture serves as a critical anchor for **rural communities**, providing year-round employment that incentivizes young people to remain in their home regions rather than migrating to urban centres (Johnson et al., 2019; Krause et al., 2020). This industry enhances **social resilience** by diversifying local economies and supporting essential community infrastructure, such as schools and health services (Johnson et al., 2019). Furthermore, aquaculture has proven to be a vehicle for **gender equity**, offering significant employment and empowerment opportunities for women in both pre- and post-harvest activities, particularly in remote areas (Alleway et al., 2019). By building **social capital through trust and networking**, successful aquaculture operations strengthen the social fabric and demographic balance of isolated coastal zones (Johnson et al., 2019; Krause et al., 2020).

Modern aquaculture is increasingly alarmed by ethical reflections that recognize farmed **fish as sentient beings with intrinsic value** and dignity rather than mere human instruments. This perspective mandates a commitment to **animal welfare**, ensuring that farmed species have the right to live in suitable environments that allow for natural behaviors and minimize stress and pain (Ciliberti et al., 2024). Ethical aquaculture also embraces the principle of social justice, advocating for responsible business practices that ensure fair access to resources and protect the

rights of future generations. By integrating these values, the industry can foster **consumer trust** and promote a global food system based on moral responsibility and environmental stewardship (Ciliberti et al., 2024).

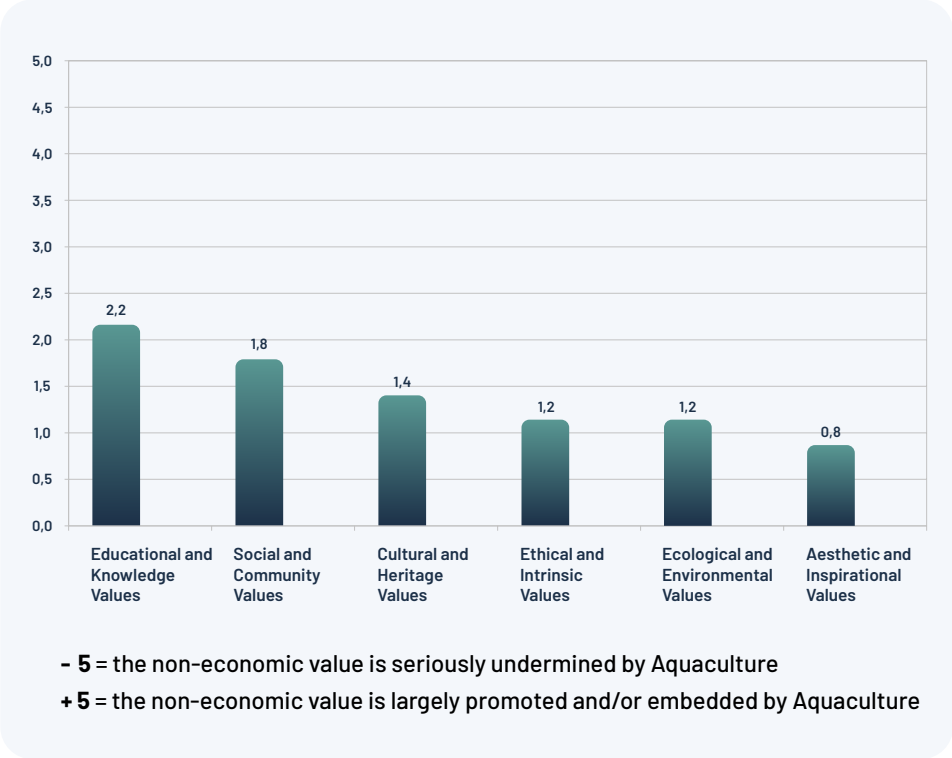
Aquaculture operations serve as **living laboratories**, facilitating both formal and informal education through partnerships between industry, schools, and research institutions (Alleway et al., 2019; Johnson et al., 2019). They provide essential **vocational training and specialized skills** that are passed down through generations or acquired through “on-the-job” learning, enhancing a community’s collective knowledge of marine biology and sustainable technology (Alleway et al., 2019; Johnson et al., 2019; Krause et al., 2020). Public engagement and information sharing during the planning of farms also promote informed decision-making and a deeper societal understanding of the ecological links between food production and ocean health. Through these educational exchanges, aquaculture builds the human capacity necessary to navigate the complex challenges of climate change and marine conservation. (Alleway et al., 2019; Gentry et al., 2020).

4.2. The experts’ opinion

A set of eleven (11) European experts were interviewed, having an expertise in Aquaculture (see section 1.2. for the experts and the methodology). Compared to the other sectors examined in the MEDIGREEN project, the experts’ views showed the greatest level of disagreement in the assessment of the non-economic values relevant to Aquaculture, with “water quality and recycling” emerging as the most polarizing non-economic value. This may be attributed to the diversity of aquaculture production systems (e.g. fish and mussel farming, fed and unfed systems, algal production), which made it difficult for experts to provide a generalized evaluation of the sector’s non-economic values. Compared to the other sectors, Aquaculture received the lowest ratings from experts across all categories of non-economic values, with scores ranging from 0.8 for “Aesthetic & Inspirational values” to 2.2 for “Educational & Knowledge values” (Figure13).

Figure 13

Experts’ average rating of non-economic values categories for Aquaculture



The scores assigned to the non-economic values of Aquaculture vary widely (Figure 15); however, their maximum ratings remain low compared to the other sectors. Aquaculture ranks second across all sectors in the value ‘sustainable alimentation’, with an average score of 2.8, which is also the second-highest score within this sector (Figure 14). The highest-rated non-economic value for Aquaculture is ‘scientific monitoring & research opportunities’ (2.9), although this remains the lowest corresponding score among all sectors. Contrary to the existing literature, which emphasizes the benefits of oyster, mussel, and seaweed aquaculture for water quality and recycling, experts rated the overall sector lowest on this value (0.3), most probably having in mind fish farming, that corresponds to the highest production. Similarly, low scores were observed for “Social and Community values” and for “Ethical and Intrinsic values”, such as ‘traditional culture and art’ (0.4) and ‘spiritual connection & enrichment’ (0.4).

Figure 14

Relevance of non-economic values to Aquaculture

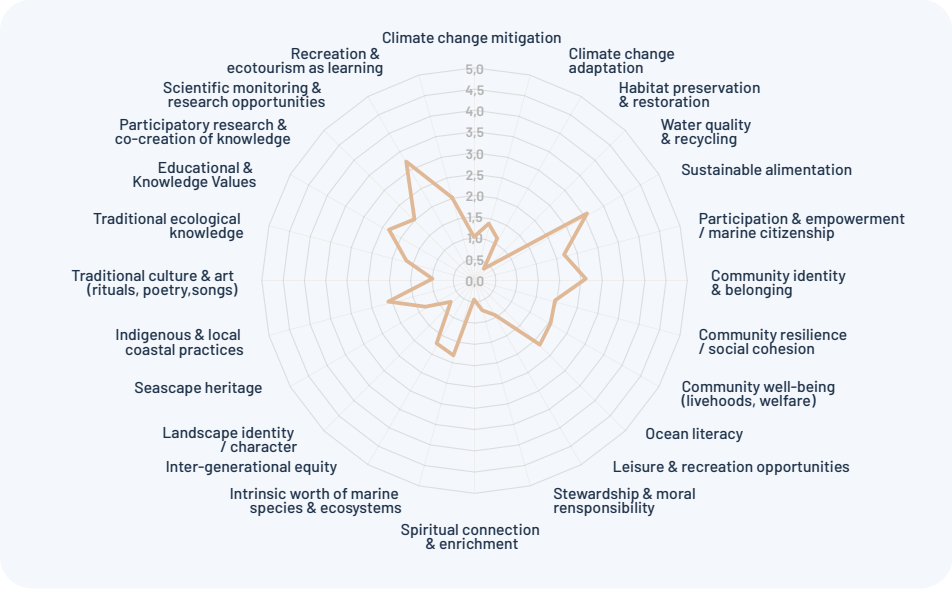
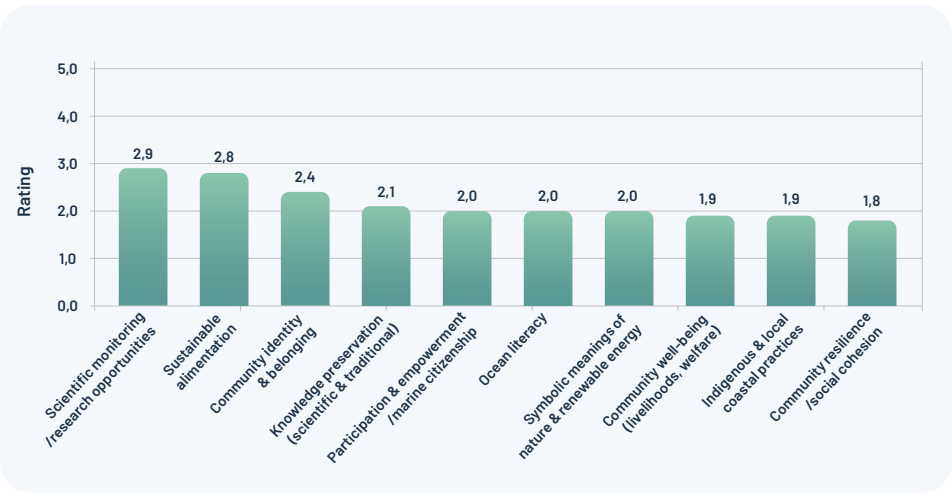


Figure 15

Top 10 most relevant non-economic values to Aquaculture



4.3. General public awareness and perception

In the general public survey (see section 1.2. for details on the methodology), Aquaculture received overall low and relatively balanced evaluations across the different non-economic value categories (Table 4.3). The results indicate that public perceptions of Aquaculture appear to be shaped primarily by its productive and developmental role, rather than by strong emotional, cultural, or symbolic associations. Aquaculture’s ratings are lower than the average of the three key topics examined, across all categories of non-economic values; in other terms, the public’s perception is that Aquaculture embeds less non-economic values than Fisheries, ORE and Nature Protection (Figure 12).

Table 4.3.: Average rating of non-economic values categories embedded in Aquaculture as assigned by the general public- comparison with the other MEDIGREEN topics
Scoring scale (1 to 5): 1 = strong negative relation and 5 = strong positive relation

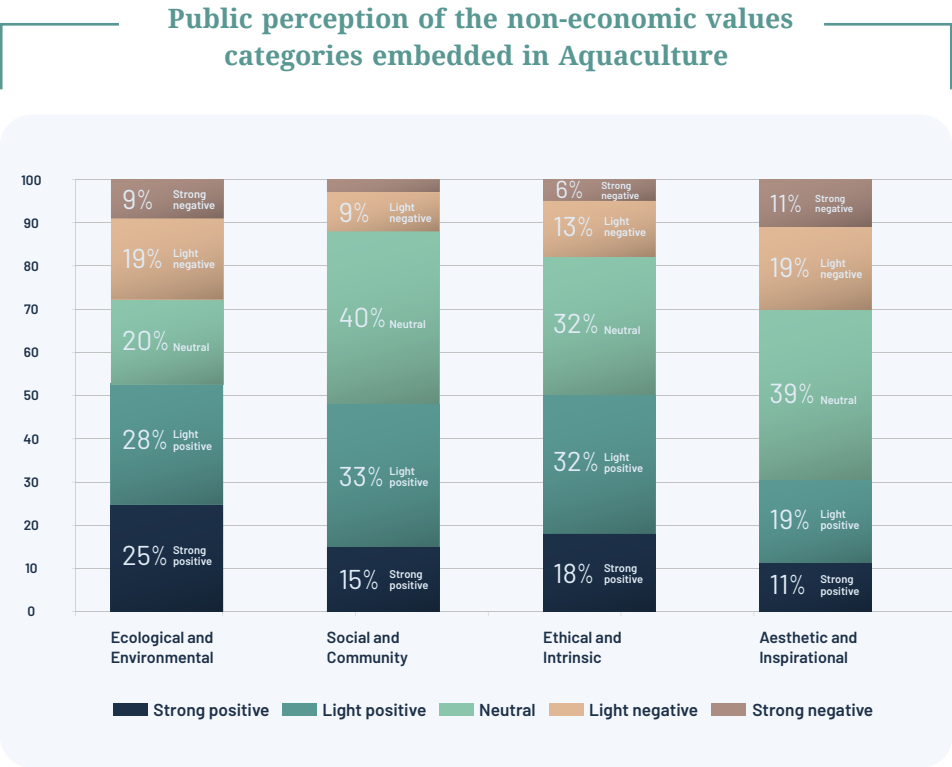
	Nature Protection	Fisheries	Aquaculture	ORE	Average of the three economic sectors
Ecological and Environmental values	4.56	3.36	3.41	3.50	3.42
Social and community values	4.39	3.96	3.47	3.27	3.57
Ethical and Intrinsic	4.56	3.72	3.42	3.45	3.53
Aesthetic and Inspirational values	4.50	3.57	2.99	2.95	3.17
Cultural and heritage values	4.39	4.17	3.31	2.93	3.47
Educational and knowledge values	4.61	4.14	3.81	3.73	3.89

Among all evaluated dimensions, “Educational & Knowledge values” received the highest score for Aquaculture, reaching an average of 3.81 on the Likert scale (1–5). This suggests that respondents acknowledge Aquaculture as a sector associated with innovation, scientific development, and the generation of specialised marine knowledge, while its lowest score is recorded in “Aesthetic & Inspirational values” (2.99).

Compared to the experts’ assessments, public evaluations remained generally balanced. Experts assigned lower scores than the public to Aquaculture across most non-economic dimensions, particularly regarding ecological, ethical and aesthetic values. This difference likely reflects the fact that experts have more accurate knowledge of the sector and thus place greater emphasis on environmental impacts and spatial conflicts associated with intensive aquaculture production systems.

Positive responses on the “Aesthetic and Inspirational values” and on the “Social and Community values” of Aquaculture received less than 50% of the answers (Figure 16). Negative responses on the “Aesthetic and Inspirational values” of Aquaculture reached 30%. In particular, Aquaculture was evaluated as a sector not promoting “Aesthetic and Inspirational values” (along with ORE, that received the lowest score in this type of value). Regarding the neutral responses, they received between 20%–40% of the responses.

Figure 16



4.4. Indicative literature

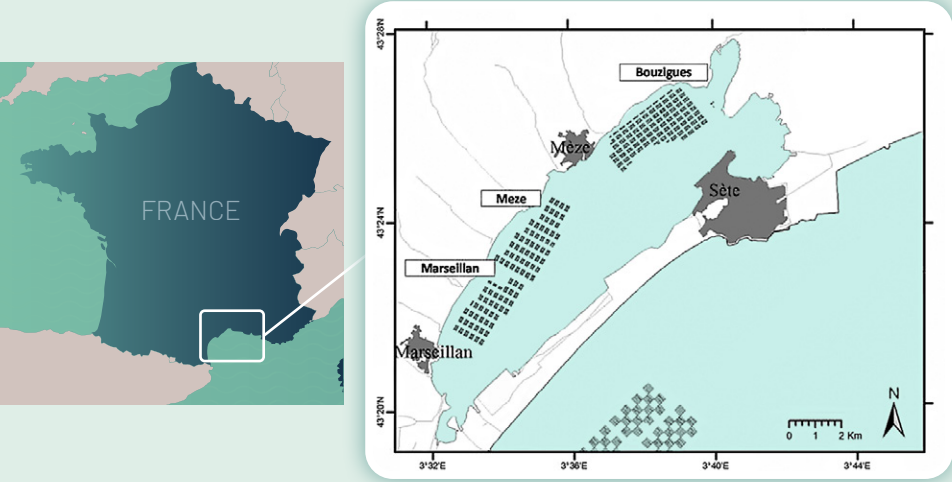
Non-economic values and nature protection

- Alleway, H. K., Gillies, C. L., Bishop, M. J., Gentry, R. R., Theuerkauf, S. J., & Jones, R. (2019). The ecosystem services of marine aquaculture: Valuing benefits to people and nature. *BioScience*, 69(1), 59–68. <https://doi.org/10.1093/biosci/biy137>,
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- D'Anna, L. M., & Murray, G. D. (2015). Perceptions of shellfish aquaculture in British Columbia and implications for well-being in marine social-ecological systems. *Ecology and Society*, 20(1), 57. <https://doi.org/10.5751/ES-07319-200157>.
- Gentry, R. R., Alleway, H. K., Bishop, M. J., Gillies, C. L., Waters, T., & Jones, R. (2020). Exploring the potential for marine aquaculture to contribute to ecosystem services. *Reviews in Aquaculture*, 12(2), 499–512. <https://doi.org/10.1111/raq.12328>.
- Johnson, T. R., Beard, K., Brady, D. C., Byron, C. J., Cleaver, C., Duffy, K., Keeney, N., Kimble, M., Miller, M., Moeykens, S., Teisl, M., van Walsum, G. P., & Yuan, J. (2019). A social-ecological system framework for marine aquaculture research. *Sustainability*, 11(9), 2522. <https://doi.org/10.3390/su11092522>.
- Krause, G., Billing, S.-L., Dennis, J., Grant, J., Fanning, L., Filgueira, R., Miller, M., Pérez Agúndez, J. A., Stybel, N., Stead, S. M., & Wawrzynski, W. (2020). Visualizing the social in aquaculture: How social dimension components illustrate the effects of aquaculture across geographic scales. *Marine Policy*, 118, 103985. <https://doi.org/10.1016/j.marpol.2020.103985>.
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- Schultz, K. M., Scyphers, S. B., Hughes, A. R., Kimbro, D. L., Kirk, S., & Grabowski, J. H. (2026). Coastal resident's perceptions and attitudes of the visual impacts of oyster aquaculture cultivation methods along the Atlantic coast of the US. *Ocean & Coastal Management*, 271, 107951. <https://doi.org/10.1016/j.ocecoaman.2025.107951>



3.5. GOOD PRACTICES FOR AQUACULTURE

Valorization of oyster and mussel shells in the Thau lagoon*



The Thau lagoon with the three shellfish farming areas.
Source: Lagarde, F. (2018). *Écologie de la reproduction de l’huître Crassostrea gigas en lagune méditerranéenne* (Doctoral dissertation, Université Sorbonne).

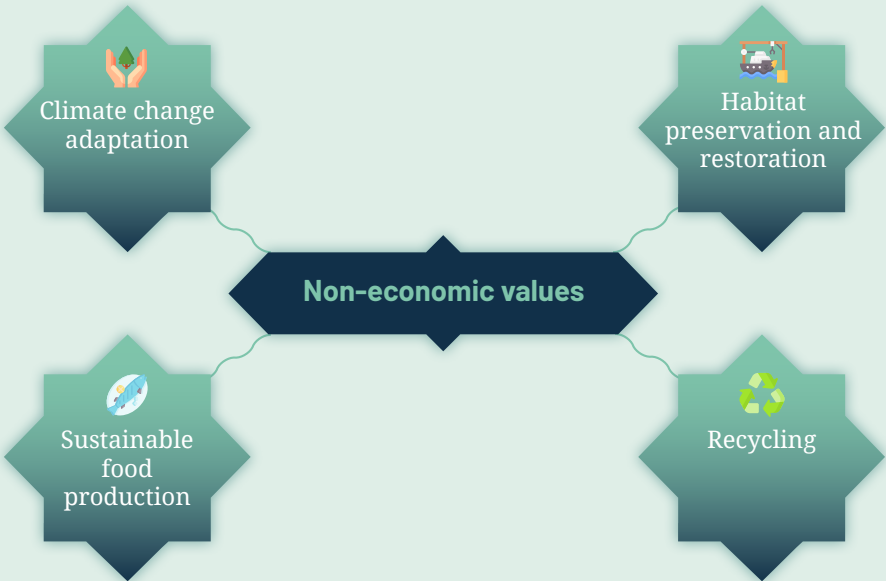
Location and geographical details

This practice is located in the Thau lagoon, in the French Mediterranean region Occitanie.

Timeframe of implementation

The initiative started in 2021 and ended in 2022 and can be considered a pilot project. The technology underlying this practice (called Geocorail) is still active today with new projects underway.

* Author: Fanny Châles, Project Officer (CEREMA). France.



Alignment with European Green Deal (EGD) Objectives

Biodiversity and ecosystem restoration, as the Geocorail functions as an artificial reef, promoting the colonization of microfauna, algae, and shellfish, & the formation of micro-habitats	Climate change mitigation, by reducing material transport and infrastructure reinforcement needs, such as quay stabilization
Zero pollution, by reducing shell waste and limiting the use of concrete or rockfill with higher environmental impact	Fair and just transition, by lowering the costs of shell waste treatment for aquaculture professionals
Sustainable seafood production, since the Geocorail is made from oyster and mussel shells	Blue circular economy, through shell waste valorization into Geocorail
Climate change adaptation, by reducing coastal erosion	

General Information

Nature and overall objective(s) of the Practice

The practice consists in the valorization of oyster and mussel shells from the local shellfish sector by recycling them into an underwater aggregate called “Geocorail”. Produced through a low-voltage underwater electrolysis process, Geocorail forms a “natural rock” from mineral salts and sediments. The recycled shells come from both natural losses, broken or non-compliant shells, and size sorting. As part of the 2021-2022 Thau lagoon pilot project, 350 tons of Geocorail were submerged in gabions for about one year.

The Geocorail can be used as:

- artificial reefs, to reactivate the ecological function of natural nursery habitats that have been altered by coastal development and artificialization;
- mattresses to protect quay walls from scouring and corrosion;
- submerged breakwater solution, to protect coastlines from erosion, acting by dissipating wave energy before it reaches the shore.

Innovative Aspects

Before the Thau pilot project, the local shell waste was partly recycled into concrete for roads, with low added value. The Geocorail initiative can be considered innovative and provides an environmentally responsible alternative to traditional concrete-based materials used to reinforce shorelines, create artificial reefs, or build submerged structures to combat coastal erosion, while also promoting marine biodiversity.

Achieved Outcomes and lessons learnt

The Geocorail process is patented, has been in use for several years through successful experiments, and exported internationally. Partnerships have also been established with public bodies such as Cerema. Although the Thau project was a pilot initiative, the technology continues to expand through new applications and partnerships, including ongoing work by Seacure in the Marennes-Oléron oyster farming area (French Atlantic *façade*). The practice appears promising, but large-scale validation and independent data are still needed.

Relationship with MSP

Today, Geocorail practices are not formally embedded within MSP documents or processes, although they contribute to MSP goals, through sustainable aquaculture with co-benefits for ecosystem restoration, coastal resilience and pollution reduction, applying circular economy principles.

Transferability

This practice can be easily replicated in other marine environments, since the Geocorail can be formed on any type of metal support, enabling the development of solutions tailored to the specific constraints of each environment and site.

Governance and participation

Managing authority and governance mechanisms

The Geocorail technology was initially developed and patented by the French private company Seacure. Its deployment in coastal areas such as Thau lagoon involved notably municipalities, State services (granting environmental and maritime occupation permits), public expertise bodies like Cerema, and aquaculture committees. The technical implementation is mainly handled by Seacure, while maintenance falls to the public authority owning the infrastructure. The Geocorail governance operates within existing coastal and maritime frameworks through permits and contracts, and remains public-private, decentralized, and case-specific.

Monitoring and adaptive mechanisms

Geocorail does not currently have a standardized national or regional framework for monitoring and adaptive management. While technical adaptation is possible, governance adaptation remains dependent on existing marine regulatory processes.

Stakeholder participation

There is no clear record of a dedicated public consultation process explicitly for the Geocorail practice or a specific project in the official documentation or press available online.

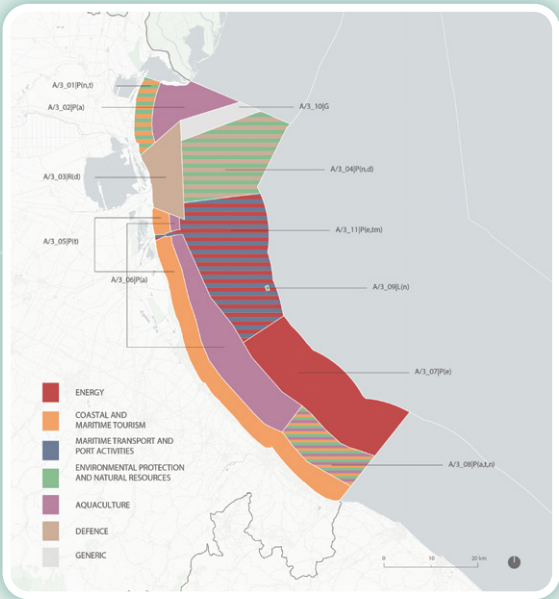
Social awareness and acceptance

The practice was communicated to the public as an ecological innovation, and local stakeholders appear to have responded positively (e.g., elected officials involved in events). Nevertheless, there is limited evidence of broad public engagement, structured participation, or explicit linkage of the practice to EGD objectives according to available information.

Supporting Documentation

- Website of “Coqui Thau” <https://coquithau.com/production/>
- “Géocorail déploie un procédé innovant pour recycler les déchets coquillés conchylicoles du bassin de Thau” <https://www.seacure.fr>
- “Géocorail déploie un procédé innovant pour recycler les déchets coquillés conchylicoles du bassin de Thau” <https://www.latribune.fr/economie/environnement/2021-05-06/geocorail-deploie-un-procede-innovant-pour-recycler-les-dechets-coquilles-conchylicoles-du-bassin-de-thau-884126.html>
- CEREMA, “Une belle histoire de partenariat... avec Geocorail” <https://www.cerema.fr/fr/innovation-recherche/institut-carnot-clim-adapt/belle-histoire-partenariat-geocorail>
- Pole MER, “Vers une ingénierie côtière régénérative et circulaire” <https://www.pole-mer-bretagne-atlantique.com/agenda-actualites/focus-adherent-seacurer-geocorailr>

Plan for Allocated Zones for Aquaculture of Emilia Romagna region (AZA-RER plan)*



N. Italian MSP Plan - Area A/3 with main prioritised uses, including aquaculture, in purple.

Location and geographical details

Marine waters within the 12 NM of Emilia Romagna region, Italy. (sub-area A/3 defined by Ministerial Decree n. 237 of 25/09/2024 adopting the Maritime Spatial Plan for the Adriatic area).

Timeframe of implementation

Designing the plan started in January 2025 and Strategic Environmental Assessment of the plan is expected to take place within 2026.

* Authors: Daniele Brigolin (As. Professor, IUAV), Folco Sofietti (PhD student, IUAV), Alessandra Fudoli (Research Fellow, IUAV), and Martina Bocci, (research consultant, CORILA).

Non-economic values

Marine and coastal shellfish aquaculture are recognized to provide a range of ecosystem services (see Pacifico et al., 2024). Part of these are linked to non-economic values, such as:



The AZA-RER plan includes a qualitative description of the ecosystem services provided by shellfish aquaculture, and a quantitative assessment of biophysical processes related to nutrient sequestration by the bivalves (regulation service).

Alignment with European Green Deal (EGD) Objectives

The practice is aligned with EGD goals along three different axes:

Decarbonization of the sector (climate change mitigation), through an analysis of the emissions related to mussel production and commercialization, which is based on an LCA technique and is used to compare different zoning alternatives

Biodiversity protection, by assessing the potential interactions of aquaculture on the environment, and including environmental sustainability as a macro-criteria within the analysis supporting the zoning process

Climate resilience of aquaculture, through an analysis of the sites more exposed to marine heat waves based on existing operational oceanography data

Increased energy efficiency through the use of renewable energy sources

Blue circular economy, by supporting actions aimed at encouraging the recycling of waste products, and ensuring the proper disposal of waste

General Information

Nature and overall objective(s) of the Practice

The plan is being implemented by Emilia Romagna region Food, Agriculture and Fisheries service with the scientific support of Iuav University of Venice and CNR-Ismar. It receives technical support through a project co-financed by the regional funds of EMFAF program. The overall objective of the plan is responding to the GFCM resolution on allocated zones for aquaculture – AZA (Resolution GFCM/36/2012/1) in the regional waters of Emilia Romagna.

Innovative Aspects

AZA plans represent sectorial instruments which need to be approved by the regions. In Italy no plan has been implemented as yet, and only in another coastal region (Sardinia) the plan is at an advanced stage of development.

Non-monetary values

The plan concretely contributes to the maintenance and possibly the growth of a traditional sector, which is exposed to multiple threats from climate change to competition of seafood products coming from abroad. The plans contribute to job maintenance and creation in coastal areas, benefitting local communities, supporting generational turnover and sustaining cultural heritage and traditions of the coastal part of the region.

Achieved Outcomes and lessons learnt

The practice was successful in terms of using the open data made available by operational oceanography and the scientific tools (aquaculture-environment interactions models, MSP-data mapping and analysis tools). The practice showcased the need for moving to an effective PES (payment for ecosystem services) framework.

Relationship with MSP

The AZA-RER plan is aligned with measure NAZ_MIS/44 of the Italian national MSP plan for the Adriatic basin, which deals with “Developing, adopting, and implementing AZA plans at the regional scale, and align them with MSP plans”. The AZA-RER plan takes into consideration the provisions of the Adriatic MSP and focuses on the sub area A/3.

Transferability

The practice has the potential to be transferred to other Italian coastal regions and, after the appropriate checks on the institutional framework and division of competences between state and the regions, also to other countries located within the Mediterranean Sea basin, which are subjected to the GFCM resolution on AZA.

Governance and participation

Managing authority and governance mechanisms

The Regional office of Emilia Romagna for faunal resources is the authority responsible for the adoption of the AZA-RER plan and for its implementation. The Regional office of Emilia Romagna for environmental evaluation is responsible for the SEA procedure.

Monitoring and adaptive mechanisms

The SEA includes process indicators which can track the effectiveness of the practice. Even though the instrument will need a revision there is not a specific timeline for it at the moment (definition of cycle duration).

Stakeholder participation

The practice involved, up to now, two consultations with stakeholders of the aquaculture sector (public bodies, producers associations, research and academia, representatives from other maritime sectors). Bilateral consultations were also carried out with key stakeholders. Next steps will involve a third moment of stakeholders consultation, and the public consultation which will be carried out within the SER.

Social awareness and acceptance

At the moment, there is no information on the social acceptance of this practice, since it has not been implemented as yet. Carrying capacity must be assessed along multiple dimensions (see McKindsey et al., 2006) in order to verify social licensing of the aquaculture activities.

Supporting Documentation

- Mazzotta, M., Bocci, M., Cahís I Reixach, E., Fudoli, A., Menegon, S., Sottoriva, S., Rampoldi, S., Brigolin, D., 2025. Operational oceanography and msp data supporting AZA planning: the case study of Emilia-Romagna region. Poster presentation at Aquaculture Europe Conference, 22-25 September 2025 Valencia (Spain). <https://aquaeas.org/Meeting/AE2025>
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5. OFFSHORE RENEWABLE ENERGY - ORE

5.1. Insights from the existing literature

Offshore Renewable Energy (ORE) is a key sector for the green transition. ORE embeds values that resonate beyond market prices and kilowatt-hours. For both the general public and policymakers, understanding these non-economic values is essential for fostering societal acceptability and achieving a truly just transition.

The most direct non-economic contribution of ORE is its role in **climate change mitigation** and the pursuit of net-zero CO₂ emissions to meet EGD goals and UN Sustainable Development Goals (SDG 7) (Brink, 2024; Elsner, 2019). Beyond carbon reduction, ORE infrastructure could serve as a catalyst for biodiversity enhancement through the **artificial reef effect**, where turbine foundations provide new habitats and substrates for colonization by benthic organisms and fish (Haslett *et al.*, 2018; Virtanen *et al.*, 2022). Furthermore, the creation of safety zones around offshore wind farms can act as **no-take zones**, offering de facto protection for marine species from commercial fishing pressures and contributing to ecological modernization (Haslett *et al.*, 2018; Virtanen *et al.*, 2022). By integrating ecological impact avoidance criteria into MSP, ORE projects can be designed to minimize disturbances to sensitive migration corridors and nesting areas, effectively balancing energy production with nature conservation (Virtanen *et al.*, 2022).

Offshore energy projects are deeply intertwined with the cultural identity and heritage of coastal communities who have long-standing ties to the sea (Howley & Korein, 2024). Certain sea spaces are filled with symbolic

meaning and place attachment and viewed as a vital part of a community's identity (Howley and Korein, 2024; Künneke *et al.*, 2015). ORE development requires a careful value sensitive design approach to protect underwater historic resources, (eg. spiritual burial grounds, which hold significant meaning for indigenous tribes). For many, the transition to wind or tidal power becomes a **new cultural symbol of modernity and a commitment to a clean energy future**, reinforcing the prestige of states as they showcase technological progress (Al-Saidi, 2020).

The visual presence of ORE is a primary factor in community acceptance, which is often linked to how visible or intrusive such structures appear in the coastal environment. While most perceive turbines as a **disruption to pristine seascape**, others find inspirational value in these structures as **landmarks of progress, modernity, human ingenuity and environmental stewardship** (Howley & Korein, 2024; Virtanen *et al.*, 2022). Innovative bio-inspired designs—drawing from the aerodynamics of bird wings or the efficiency of palm leaves—offer a way to harmonize functionality with aesthetic appeal, potentially reducing noise pollution and increasing visual harmony. By focusing on the visual quality and unity of wind parks, developers can turn these sites into tourist attractions and icons of grandeur that symbolize a society's forward-thinking capabilities (Howley and Korein, 2024; Oosterlaken, 2015).

ORE projects often trigger community involvement and the renovation of the social contract between the state and its citizens. Through **community benefit arrangements**, ORE can provide collective outcome favourability by funding local infrastructure, education, and energy bill reductions, thereby enhancing overall human **well-being** (Howley and Korein, 2024; Walker *et al.*, 2014). The development of innovation ecosystems allows diverse stakeholders — from local small enterprises to multinational developers — to engage in future sensemaking, ensuring that project goals align with broader societal needs rather than just corporate self-interest (Brink, 2024). When processes are fair and transparent, ORE can foster **trust** and legitimacy, turning potential opposition into long-term **support for sustainable growth** (Howley and Korein, 2024).

ORE implementation **raises fundamental questions of energy justice**, including distributional (i.e. whether the benefits and burdens of energy projects are distributed fairly and equitably) and procedural justice (i.e. how decision-makers engage communities) (Howley and Korein, 2024). By prioritizing equity and fairness over simple cost-benefit ratios, ORE transitions can address historical marginalization and ensure that the burdens and benefits of new technologies are distributed in a way that respects the rights of all members of society. A key intrinsic value of ORE is **intergenerational justice**, as our current energy choices directly impact the en-

vironmental safety and resource availability for future generations (Künneke *et al.*, 2015; Oosterlaken, 2015).

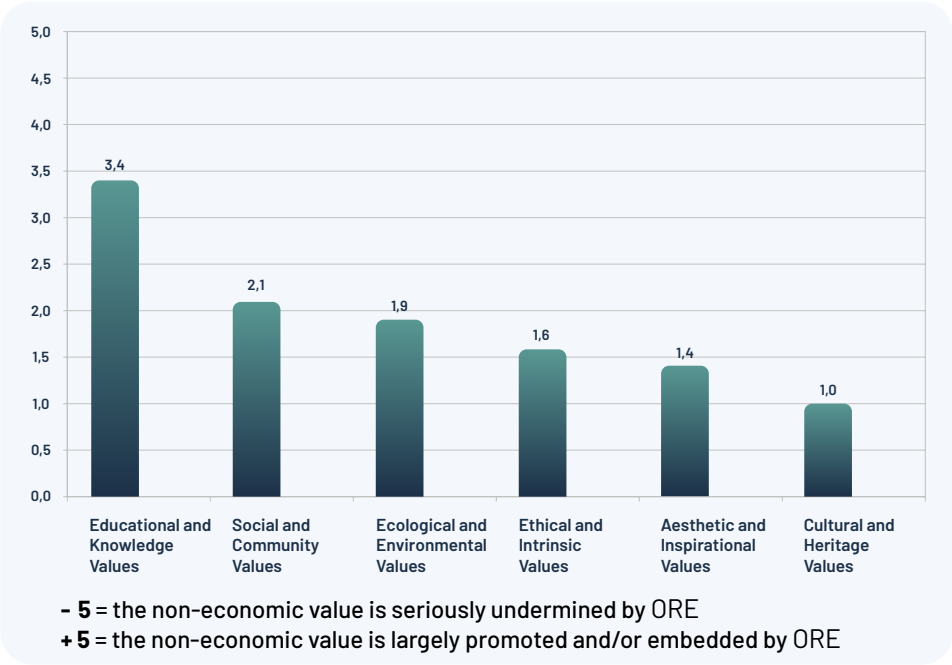
The deployment of ORE serves as a global laboratory, facilitating a **cumulative gain in scientific knowledge and biological research** (Haslett *et al.*, 2018). ORE projects are capital and knowledge-intensive investments, drawing upon and mobilizing global expertise. Every project provides opportunities for knowledge transfer through international consultancy and collaborative innovation, enhancing our understanding of marine social-ecological systems. ORE also carries significant **educational value**, as wind and tidal parks can become sites for public learning about renewable technology, climate resilience, and nature-inspired design (Regassa *et al.*, 2023). This continuous loop of sensemaking and learning allows policymakers and practitioners to adapt their strategies based on real-world evidence, ensuring that the energy transition remains an evolving, knowledge-driven process that benefits society as a whole (Brink, 2024).

5.2. The experts' opinion

A set of eight (8) European experts with expertise in ORE were interviewed. There was a relatively high disagreement between the respondents (average standard deviation of rating 1.8), with the highest consensus of experts on the fact that traditional culture and art (e.g. rituals, poetry, songs) is irrelevant to the sector (score 0.1). Figure 17 presents the average ratings of non-economic value categories. The category "Educational and Knowledge values", was the highest ranked category of non-economic values of ORE, scoring 3.4 in a likert scale from -5 to +5. This is followed by "Social and Community values" (2.1), while "Ecological and Environmental values" were ranked in the third place with an average of 1.9.

Figure 17

Experts' average rating of non-economic values categories for ORE



The results for Offshore Renewable Energy (ORE) in non-economic values show a high divergence of scores (Figure 18). While ORE is highly valued for its role in climate change mitigation (rating 3.6) and regarding ocean literacy (3.6) and symbolic meanings of nature and of renewable energy (3.1 – the highest rating across all sectors examined), it is perceived by the experts as the only sector demoting non-economic values. Experts expressed concerns regarding the sector’s impact on coastal aesthetics, resulting in a negative average of -0.5 for “landscape identity/character”. Similarly, side works and interventions required for ORE installations are perceived to disrupt spiritual connections to the sea, as evidenced by a score of -0.3 for “spiritual connection & enrichment”. The divergence of these findings indicates that while ORE is essential for the advancement of European Green Deal, its practice is challenged by aesthetic disruptions.

The ten (10) highest-rated non-economic values can be seen on Figure 19. “Scientific monitoring and research opportunities” received the highest rating (4.2), which is the second-highest of all sectors after Nature Protection (4.8). Similarly, ORE has the second-highest rating in the non-economic values of ‘climate change mitigation’ (3.6), ‘recreation & ecotourism as learning’ (3.4), ‘participatory research & co-creation of knowledge’ (3.2), just after the corresponding rating of Nature Protection.

Figure 18

Relevance of non-economic values to ORE

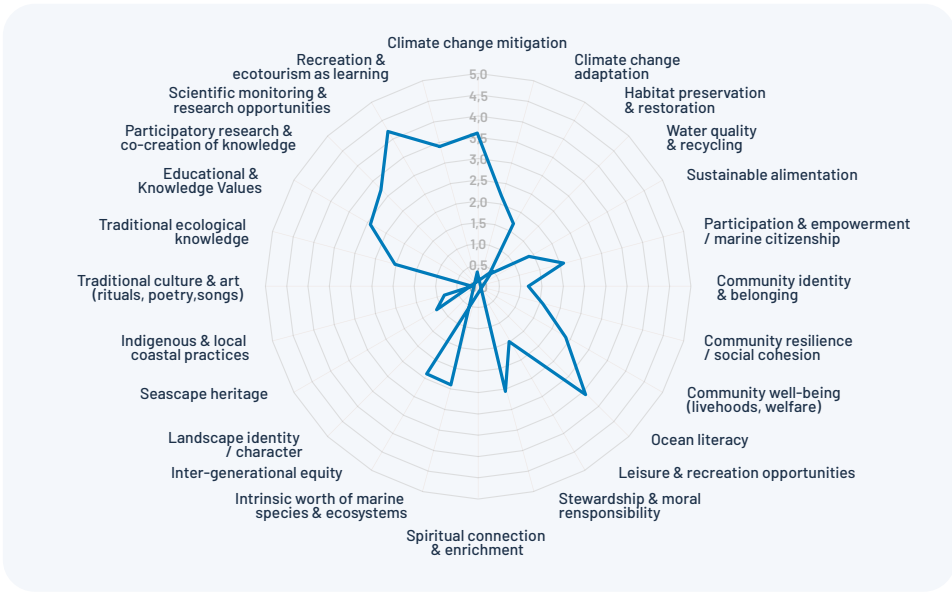
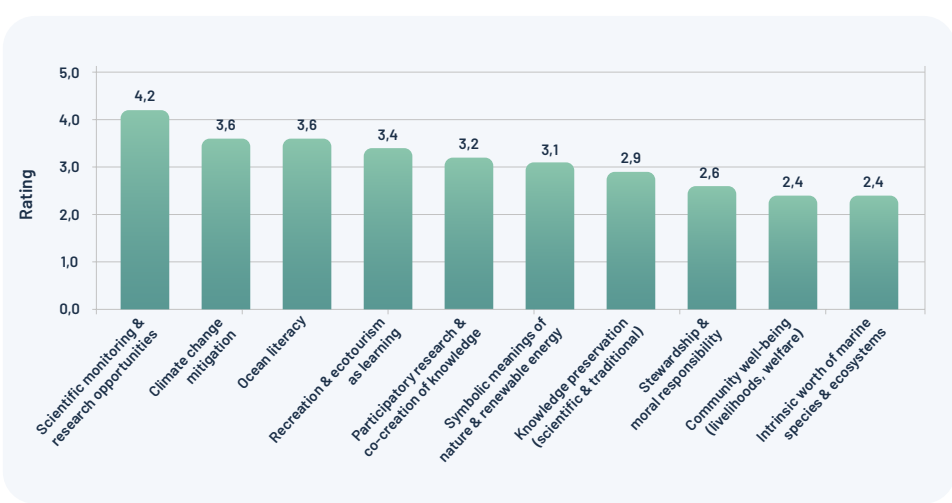


Figure 19

Top 10 most relevant non-economic values to ORE



5.3. General public awareness and perception

In the public awareness survey (see section 1.2. for details on the methodology), ORE received overall moderate to low evaluations across the non-economic value categories compared to Fisheries, Aquaculture and Nature Protection (Table 4.4). The only value rated higher than the average of the other three topics was “Ecological and Environmental values”. Experts appear to recognise ORE primarily through its role in energy transition, technological progress, and sustainable development, rather than through social, cultural, or aesthetic associations with the marine environment.

Table 4.4.: Average rating of non-economic values categories embedded in ORE as assigned by the general public- comparison with the other MEDIGREEN topics
Scoring scale (1 to 5): 1 = strong negative relation and 5 = strong positive relation

	Nature Protection	Fisheries	Aquaculture	ORE	Average of the three economic sectors
Ecological and Environmental values	4.56	3.36	3.41	3.50	3.42
Social and community values	4.39	3.96	3.47	3.27	3.57
Ethical and Intrinsic	4.56	3.72	3.42	3.45	3.53
Aesthetic and Inspirational values	4.50	3.57	2.99	2.95	3.17
Cultural and heritage values	4.39	4.17	3.31	2.93	3.47
Educational and knowledge values	4.61	4.14	3.81	3.73	3.89

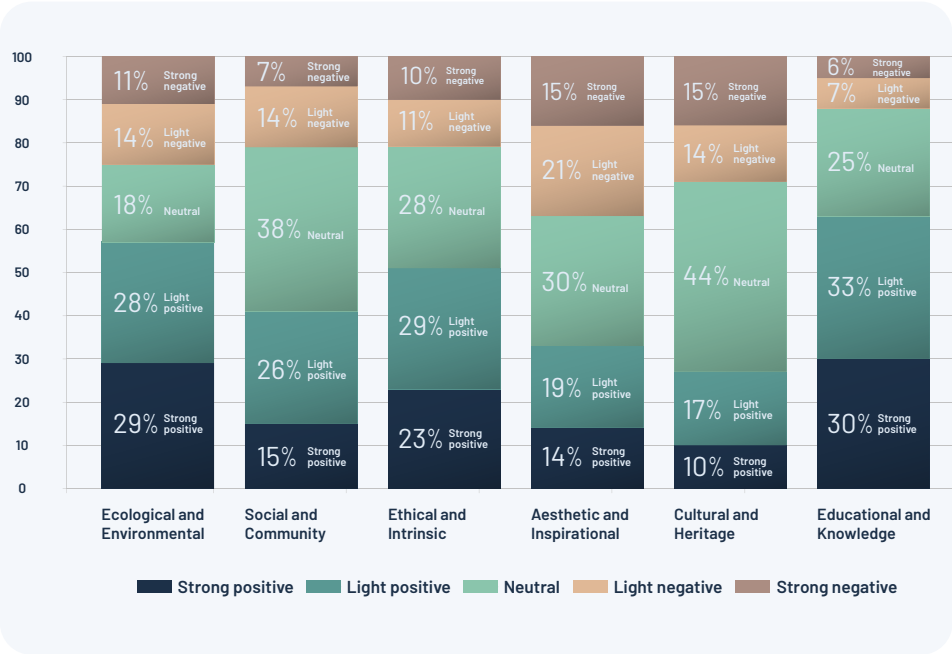
Among all evaluated dimensions, “Educational & Knowledge values” received the highest score for ORE, with an average of 3.73 on the Likert scale (1-5). Nevertheless, this is the lowest rating attributed to “Educational & Knowledge values” compared to all the sectors/topics examined. ORE holds the lowest average rating of all non-economic values in public perception, but holds a higher rating than Fisheries and Aquaculture in “Ecological & Environmental values” (3.41).

Compared to the other sectors, ORE is perceived as disconnected from traditional maritime activities and heritage values. “Cultural & Heritage values” for ORE have an average score of 2.93, which is the lowest rating attributed on the survey and it is followed by ORE’s score on “Aesthetic & Inspirational values” (2.95).

The highest percentages of negative ratings throughout the survey, were recorded for ORE and their “Aesthetic and Aspirational values” (36% of the experts assigned a negative score). “Light negative” relation was selected by 21% of the experts and “strong negative” relation corresponded to 15% of the answers (Figure 20). “Cultural & Heritage values” received a total 29% of the answers. ORE’s most positive responses were on “Educational and Knowledge values” (63%) and “Ecological and Environmental values” (57%).

Overall, the findings portray ORE as a sector associated primarily with innovation, sustainability transition, and future economic development, but one that has not yet established a strong social or cultural embeddedness within public perception. Within the MEDIGREEN framework, these results underline the importance of information campaigns, to strengthen public understanding, and participatory planning with transparent communication, and socially inclusive governance approaches to improve the societal approval of ORE investments.

Figure 23
Public perception of the non-economic values categories embedded in ORE



5.4. Indicative literature

Non-economic values and ORE

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- Walker, B. J. A., Wiersma, B., & Bailey, E. (2014). Community benefits, framing and the social acceptance of offshore wind farms: An experimental study in England. *Energy Research & Social Science*, 3, 46–54. <https://doi.org/10.1016/j.erss.2014.07.003>



3.5. GOOD PRACTICES FOR ORE

Innovative solutions for the promotion of marine renewable energies in Galicia and environmental monitoring in the Punta Langosteira experimental site (INNOMAR)*



Localisation of the offshore wind farm of Yeu-Noirmoutier.
Source: <https://iles-yeu-noirmoutier.eoliennes-mer.fr/origines-parc/>

Location and geographical details

INNOMAR will be carried out within the MRE test site located in the Galician coast in Punta Langosteira, close to the Outer Port of A Coruña.

Timeframe of implementation

The innovative public procurement tender will take place between March and June 2026, using the competitive dialogue procedure. This will enable the best solutions to be found from energy, environmental and socio-economic points of view. The project will be developed from September 2026 till December 2029.

Non-economic values



INNOMAR will generate significant **environmental, scientific and social value** beyond its economic impact. The project will **support climate action** and the **energy transition** by promoting renewable marine energies while ensuring continuous environmental monitoring and **biodiversity protection**.



Through advanced data collection and an open-access platform, INNOMAR will strengthen scientific knowledge, **transparency and collaboration among public authorities, research institutions and industry**. It will also foster **sustainable coexistence between marine renewable infrastructure and traditional maritime activities**, such as fishing, contributing to responsible marine governance and long-term environmental resilience.

Alignment with European Green Deal (EGD) Objectives

Climate change mitigation: by supporting the deployment of renewable marine energy technologies and reducing dependence on fossil fuels.

Adaptation to climate change effects: through continuous monitoring of metocean conditions, improving understanding of climate-related changes in marine environments.

Biodiversity and ecosystem protection and restoration: via integrated environmental monitoring systems that enable evidence-based management and minimisation of impacts.

Zero pollution: by generating high-quality environmental data to detect, prevent and mitigate potential pressures on marine ecosystems.

Blue circular economy: by fostering innovation and sustainable use of marine resources, supporting emerging blue economy sectors.

Fair and just transition: by promoting collaboration between stakeholders and facilitating coexistence with traditional sectors such as fisheries.

* Author: Rosa Nunez Pardo de Vera – Axencia Instituto Enerxético de Galicia (Inegia).

General Information

Nature and overall objective(s) of the Practice

INNOMAR, led by the Energy Agency of Galicia (INEGA), is a public innovation project to design and deploy a sensorised multi-connector floating platform at the Punta Langosteira test site. It will enable testing and grid connection of marine renewable devices, especially wave energy, under real conditions, while integrating environmental monitoring. The project aims to support sustainable deployment, reduce conflicts with existing uses, and help grow the blue economy by lowering barriers for innovation.

Innovative Aspects

INNOMAR combines renewable energy testing, environmental monitoring, and data management in one platform. It enables energy export and real-time ocean observation through integrated sensors, offering an innovative model for sustainable marine energy. Public innovation procurement also promotes market-driven solutions by encouraging new technologies not yet commercially available.

Achieved Outcomes and lessons learnt

As the project is currently in its implementation phase, final outcomes are still pending.

Relationship with MSP

INNOMAR is aligned with Spain's Maritime Spatial Planning, within designated marine renewable energy areas. It contributes to MSP implementation by deploying infrastructure in a pre-identified area, ensuring compatibility with environmental protection and other maritime uses.

Transferability

The project provides a replicable model for combining renewable energy testing infrastructure with integrated environmental monitoring. This approach can be adapted to other coastal regions seeking to develop offshore renewable energy sustainably.

Similarly, the use of public innovation procurement as a governance tool can be transferred to other contexts to accelerate innovation while managing risks in emerging sectors.

Governance and participation

Managing authority and governance mechanisms

INNOMAR is led by INEGA, a regional public body under the Xunta de Galicia responsible for energy planning and promotion. INEGA acts as contracting authority and oversees coordination, implementation and supervision.

The project is co-financed by the Spanish Ministry of Science, Innovation and Universities through the Public Innovation Procurement support line, within the FEDER Programme 2021-2027. An external technical office will support project management, monitoring and coordination.

The governance model combines public leadership with competitive procurement procedures, ensuring transparency, technical quality and compliance with EU requirements.

Monitoring and adaptive mechanisms

The project includes technical, administrative and financial monitoring systems based on milestones, deliverables and performance indicators.

In addition, the environmental monitoring system embedded in the platform will generate continuous data on metocean conditions and biodiversity. This will enable adaptive management, allowing operational adjustments if potential impacts or challenges are detected.

Stakeholder participation

INNOMAR is located within an operational marine renewable test site already considered in national maritime spatial planning. Previous strategic consultations have taken place at national level.

During project preparation, engagement with key stakeholders—such as port authorities and fisheries representatives—has been promoted to ensure transparency and compatibility with existing maritime uses.

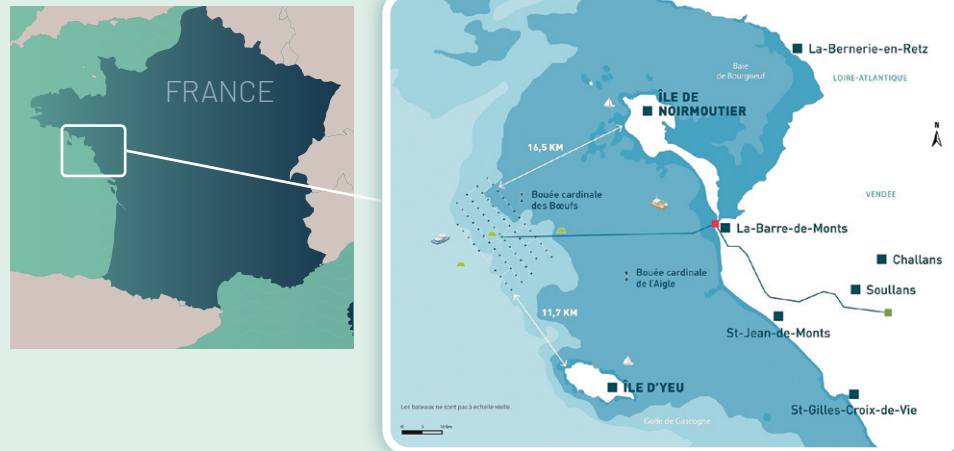
Social awareness and acceptance

Through its environmental focus and alignment with European sustainability goals, INNOMAR is expected to contribute positively to public awareness of marine renewable energy and its environmental benefits.

Supporting Documentation

- Instituto Enerxético de Galicia (INEGA), INE-2026-0001: Proxecto Innomar: Solucións innovadoras para o impulso en Galicia das enerxías renovables mariñas e da monitorización medioambiental na zona experimental de Punta Langosteira
- Instituto Enerxético de Galicia (INEGA) Proxecto Innomar: Solucións innovadoras para o impulso en Galicia das enerxías renovables mariñas e da monitorización medioambiental na zona experimental de Punta Langosteira <https://www.contratosdegalicia.gal/licitacion?OP=50&N=827361&lang=gl>
- Instituto Enerxético de Galicia (INEGA) INEGA presenta la CPI INNOMAR que impulsará las energías renovables marinas desde Punta Langosteira <https://www.inega.gal/es/noticias/inega-presenta-la-cpi-innomar-que-impulsara-las-energias-renovables-marinas-desde-punta>
- Instituto Enerxético de Galicia (INEGA) Siete empresas optan a participar en el primer prototipo flotante que monitorizará la energía generada por las olas y corrientes de Punta Langosteira <https://www.inega.gal/es/noticias/siete-empresas-optan-participar-en-el-primer-prototipo-flotante-que-monitorizara-la>

Cohabitation with fishers in the offshore wind farm of Yeu-Noirmoutier*



Localisation of the offshore wind farm of Yeu-Noirmoutier.
Source: <https://iles-yeu-noirmoutier.eoliennes-mer.fr/origines-parc/>

Location and geographical details

The practice focuses on the offshore wind (OW) farm of Yeu-Noirmoutier, composed of 61 fixed turbines, located in the French region Pays de la Loire (Atlantic façade) and currently in operation.

Timeframe of implementation

This practice focuses on the 2014-2018 consultation phase with professional fishers for the OW farm of Yeu-Noirmoutier, right after the attribution of the park and in parallel with environmental and feasibility studies.

* Author: Fanny Châles, Project Officer (CEREMA).

Non-economic values



The non-economic values relevant to this practice include “participation & empowerment”, “community well-being”, “equity” and “indigenous and local practices”, linked to coexistence with traditional livelihoods and cultural attachment to fishing areas.

Alignment with European Green Deal (EGD) Objectives

Fair and just transition, by ensuring that fishers are heard, that impacts on their livelihoods are well considered and their activity can be maintained in adequate conditions;

Sustainable blue economy, by integrating local knowledge into MSP, reducing conflicts of use, and enabling the coexistence of OW projects with long-term fishing activities.

General Information

Nature and overall objective(s) of the Practice

This initiative aimed to establish a consultation approach with professional fishers to guarantee coexistence between fisheries and OW activities in the Yeu-Noirmoutier farm, an area dominated by coastal artisanal fishing.

Fishers were involved early through public debate and targeted consultations with representatives and committees. This led to concrete adaptations facilitating fishing activities within the OW farm, including:

- reducing turbine rows from eight to five,
- aligning turbines to create wider navigation corridors,
- optimizing cable placement,
- organizing construction in blocks with flexible fishing access coordinated through daily communication and agreed safety procedures.

Professional fishers can cross the park if they respect safety distances (500 meters) around sub-stations, operating vessels and foundations. These measures preserve access to at least 30% of the park for fishing and include financial compensation of 60% of maximum revenue in affected areas.

Innovative Aspects:

Innovative aspects include the early involvement of fishers from the park's design phase (2014), beyond the formal public debate (2015). This led to concrete modifications in the wind farm (see previous paragraph) and to a formal coexistence framework. The approach has helped maintain long-term stakeholder engagement, over ten years after the project began.

Achieved Outcomes and lessons learnt

The concertation can be considered successful, since fishers' input led to concrete design and operational changes enabling partial coexistence between fishing and OW activities.

However, limitations remain in fully quantifying and addressing long-term socio-economic impacts on fishers, alongside early concerns about transparency and governance of the consultation process.

Early, continuous engagement, combined with clear governance and impact monitoring, appears to be essential to build trust and ensure durable coexistence.

Relationship with MSP:

This practice reflects the French MSP approach of multi-use, conflict mitigation and iterative governance, where MSP sets the spatial and strategic framework for the use of the sea, and concertation provides the social and operational mechanisms needed to make co-existence workable in practice. It also reflects the importance given to public participation more broadly in the French MSP processes (consultations, public debates, etc).

Transferability

Consultation with fishers has strong potential for replication and adaptation in other contexts. While cultural expectations, legal frameworks, hydrographic conditions and local fisheries specificities may differ (requiring for instance different approaches on turbine adjustments, operational timing or access corridors for fishers), the core principle of early and continuous concertation can be widely applied.

Governance and participation

Managing authority and governance mechanisms

- Fishers were involved from the early design phase of the Yeu-Noirmoutier ORE farm, on the initiative of the project developers (EMYN consortium), in coordination with French regulatory authorities;
- The developers (EMYN) organize the consultation process with fishers before and during construction;
- Local authorities and regulatory bodies ensure compliance with legal and MSP requirements.

Monitoring and adaptive mechanisms

Structured stakeholder committees involving fishers, formal agreements defining fishing conditions in the park, and transparent reporting to keep fishers informed and involved allow for adjustments across the planning, construction, and operational phases to improve coexistence.

Stakeholder participation

A structured consultation process was implemented for the Yeu-Noirmoutier OW farm, including a 2015 public debate and a 2018 public inquiry, followed by additional consultations to ensure transparency and stakeholder input. Fishers and civil society (e.g., local communities and environmental associations) were involved before key decisions (i.e., authorizations and environmental approvals) were made. Information was shared according to French procedural requirements, although some stakeholders called for even greater transparency.

Social awareness and acceptance

Based on reports from the National Commission of Public Debate, the consultation process was generally well-understood and positively perceived by directly involved stakeholders, including fishers. However, awareness of this process remains mostly limited to those directly engaged, making it difficult to assess how widely the general public is aware of this practice and its results.

Supporting Documentation

- Eoliennes en mer, "Cohabitation avec les pêcheurs" <https://iles-yeu-noirmoutier.eoliennes-mer.fr/cohabitation-pecheurs/>
- CNDP (2015), Bilan du débat public – projet de parc éolien en mer des îles d'Yeu et de Noirmoutier, 2 mai – 7 août 2015.

6. A DEEP DIVE INTO THE EXPERTS' VIEWS: A CROSS-SECTORAL ANALYSIS

6.1. Prevailing non-economic values across the key sectors explored

The analysis included in sections 2, 3, 4 and 5, reveals significant sectoral divergences and areas of cross-disciplinary consensus, while in many cases they notably vary compared to the relevant literature.

Table 5: Cross-sectoral evaluation and ranking of non-economic values categories

Categories of non-economic values	Overall rating (across Nature Protection, Fisheries, Aquaculture and ORE) (scale -5 to +5)
Educational & Knowledge Values	3.2
Social & Community Values	2.6
Cultural & Heritage Values	2.3
Aesthetic & Inspirational Values	2.2
Ecological & Environmental Values	2.1
Ethical & Intrinsic Values	2

Table 6: Experts’ ranking of non-economic values – cross-sectoral analysis

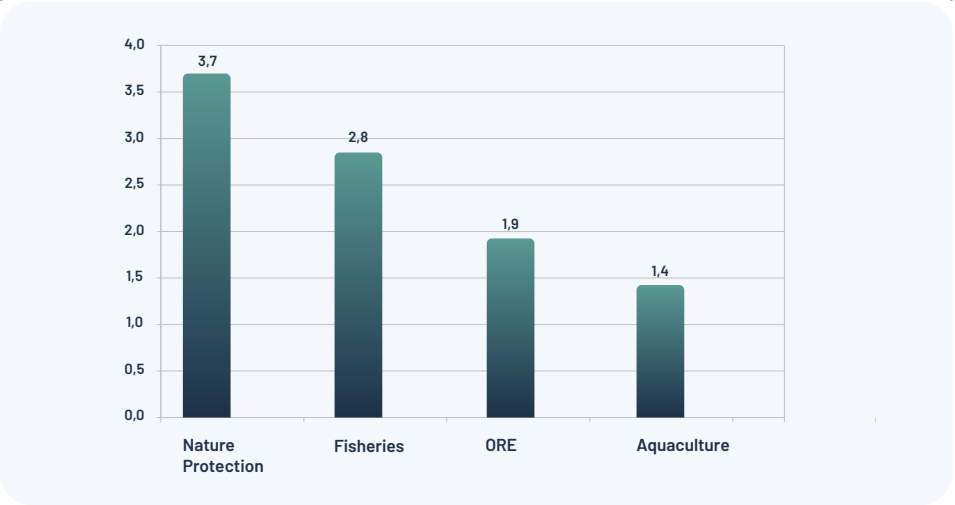
Non-economic values	Overall rating (across Nature Protection, Fisheries, Aquaculture and ORE) (scale -5 to +5)
Scientific monitoring & research opportunities	3.8
Participatory research & co-creation of knowledge	3.0
Ocean literacy	2.9
Recreation & ecotourism as learning	2.9
Community well-being (livelihoods, welfare)	2.7
Sustainable alimentation	2.7
Traditional ecological knowledge	2.7
Community identity & belonging	2.7
Intrinsic worth of marine species and ecosystems	2.6
Participation & empowerment/ marine citizenship	2.6
Climate change mitigation	2.4
Seascape heritage	2.4
Indigenous and local coastal practices	2.3
Community resilience/ social cohesion	2.3
Stewardship & moral responsibility	2.2
Leisure and recreation opportunities	2.2
Inspiration for art & creativity	2.2
Habitat preservation & restoration	2.1
Symbolic meanings of nature & renewable energy	2.0
Inter-generational equity	2.0
Landscape identity/character	1.9
Traditional culture and art (eg. rituals, poetry, songs)	1.9
Climate change adaptation	1.8
Psychological and physical health	1.8
Water quality & recycling	1.4
Spiritual connection & enrichment	1.4

A prominent finding across the entire expert group is the high degree of agreement regarding the **educational & knowledge potential** of the examined marine sectors (Fisheries, Aquaculture and ORE) and of Nature Protection (Table 5). This dimension achieved the highest overall average score of 3.2. Specifically, “scientific monitoring & research opportunities” emerged as the most rated value of this dimension with an average of 3.8 (Table 6), reflecting the role of these sectors as living laboratories for understanding marine socio-ecological systems. This dimension of values also showed a consensus among experts from different fields that maritime activities are drivers of knowledge and scientific advancement.

6.2. Comparison of the key sectors explored in terms of non-economic values

According to the experts, Nature Protection stands out as the sector entailing the highest degree of non-economic values with an average rating of 3.7 (Figure 21), followed by Fisheries (2.8), ORE (1.9), and Aquaculture (1.4).

Figure 21
Average rating of non-economic values
per MEDIGREEN sectors/topics



As seen in Table 7 there is substantial variation across sectors, with **Nature Protection** consistently achieving the highest scores in almost all categories. **Fisheries** show a more balanced profile, with moderate to high scores across most categories. Notably, “Cultural & Heritage values” (3.6 - first rank) and “Educational & Knowledge values” (3.2) stand out, reflecting the sector’s strong ties to tradition, local knowledge, and community-based practices (see Section 3). **Aquaculture** is the sector with the highest divergence of answers and records the lowest scores overall, particularly in “Aesthetic & Inspirational values” (0.8) and “Ecological & Environmental values” (1.2), suggesting an overall limited integration of non-economic considerations, with slightly higher scores only on educational aspects (2.2). **Offshore Renewable Energy** occupies an intermediate position but with notable inconsistencies. It scores relatively high in “Educational & Knowledge values” (3.4) and “Ecological & Environmental values” (1.9), holding the second highest ratings, but other dimensions such as “Cultural & Heritage values” (1.0) and “Aesthetic and Inspirational values” (1.4) remain low.

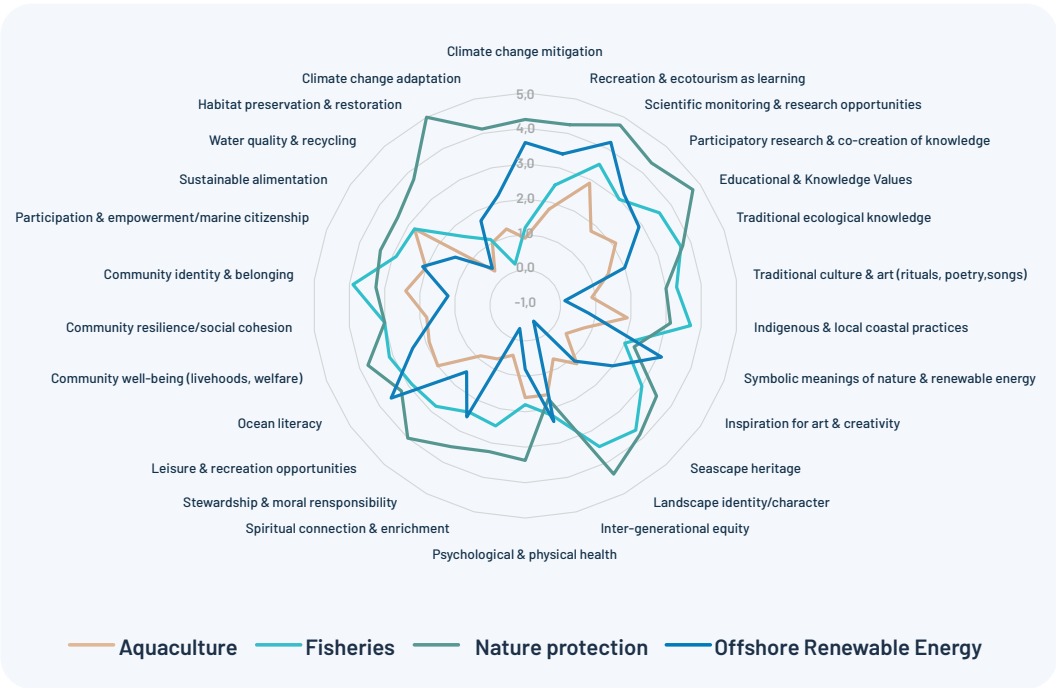
Table 7: Experts’ ranking of non-economic values categories per MEDIGREEN sectors/topics

Categories of non-economic values	Nature Protection	Fisheries	Aquaculture	ORE
Ecological and Environmental values	4.1	1.4	1.2	1.9
Social and community values	3.4	3.1	1.8	2.1
Ethical and Intrinsic	3.1	2.4	1.2	1.6
Aesthetic and Inspirational values	3.5	3.1	0.8	1.4
Cultural and heritage values	3.3	3.6	1.4	1.0
Educational and knowledge values	4.5	3.2	2.2	3.4

A comparison of non-economic values’ scores across the four sectors/topics examined is presented in Figure 22. The areas where sectoral non-economic values lie outside the ‘green circle’ of Nature Protection, represent domains in which key sectors (Fisheries, Aquaculture, and ORE) demonstrate comparative advantages over Nature Protection. This is because these sectors appear to integrate and commit to non-economic values more effectively—not necessarily according to the literature, but based on the experts’ view of how the sectors operate in reality. These areas therefore constitute fields where EU policies could prioritize and reinforce good practices within the key sectors, rather than focusing primarily on environmental

protection measures (ex. community identity and belonging is better supported by good practices of Fisheries). Conversely, where the gap between the ‘green circle’ and the next inner ring is large, there is a clear need for stronger policy support for Nature Protection in order to achieve non-economic values and meet the objectives of the European Green Deal (ex. The upper left quadrant of the circle that relates mostly to environmental and ecological non-economic values).

Figure 22
Comparison of non-economic values scores - all MEDIGREEN sectors/topics



7. CONCLUSIONS

7.1. Non-economic values as enablers of the EGD goals

The European Green Deal (EGD) is an EU's ambitious policy framework, aiming at climate neutrality by 2050 through systemic transformation – not mere incremental efficiency gains. Its seven (7) core goals as operationalized in this Booklet (climate change mitigation, adaptation to climate change effects, sustainable sea-food production, biodiversity and ecosystem protection and restoration, blue circular economy, zero pollution, and fair and just transition) are conventionally pursued through regulatory instruments, market mechanisms, and technological investment. An argument from the MEDIGREEN research, empirically supported by the literature review and expert interviews, is that **non-economic values do not simply coexist with EGD goals, rather they actively enable and reinforce each of them.** The good-practice cases presented (for Nature Protection, Fisheries, Aquaculture and ORE) demonstrate that fostering non-economic values may directly advance the EGD objectives and furthermore, promote the systemic transformation needed for a green transition. Ultimately, they may also improve and facilitate social acceptance of key marine sectors.

7.2 Suggestions for the integration of non-economic values in MSP

Maritime Spatial Planning is the formal process through which EU Member States organize human activities at sea. Directive 2014/89/EU established a common framework requiring that plans balance ecological, economic, and social objectives while also ensuring that they are developed through participatory processes engaging the public and relevant stakeholders (European Parliament and Council, 2014). In practice, however, plans have historically privileged quantifiable, economic criteria – zoning for energy, shipping lanes, fisheries quotas – over the harder-to-measure non-economic dimensions.

The MEDIGREEN research provides empirical grounds that support the fact that it is salient to correct this imbalance. The absence of non-economic values in planning processes generates social resistance, reduces compliance, and ultimately undermines the plans' own objectives. Conversely, our estimation is that embedding non-economic values— whether through participatory co-production of knowledge (as in the Boughrara ghost-fishing project in Tunisia or the Algerian elasmobranch monitoring), through recognition of cultural heritage (as in the Komiža lingua franca halieutica initiative in Croatia), or through adaptive co-management rooted in stewardship (as in Torre Guaceto in Italy)— plans can gain stakeholder trust and long-term effectiveness. Some specific suggestions for operationalizing the integration of non-economic values in the MSP process could include the following:

- Integrate non-economic value assessments into MSP processes, using the MEDIGREEN typology/categories (**ecological and environmental; social and community; ethical and intrinsic; aesthetic and inspirational; cultural and heritage; educational and knowledge**) as a structured framework for stakeholder consultations and analyses. This is particularly applicable for Member-States currently revising plans in response to EGD targets for ORE deployment and marine protected area (MPA) expansion. A relatively easy way to accomplish this is by adding these values in digital platforms created for MSP consultation.
- Design MSP stakeholder engagement processes to facilitate consensus through shared values, not only through interest-based negotiation. Planners could surface non-economic values early in the process, enabling the identification of common ground (e.g. across fishing communities, environmental NGOs, energy developers, and local authorities). Using common non-economic values as a consensus-building tool between the citizens' initiatives and investors, requires information campaigns about the non-economic values of the investment, as the awareness survey shows that the general public is often unaware of specific non-economic values of the sectors (like the artificial reef effect of ORE and the water filtration produced in bivalve aquaculture).
- Develop sector-specific policies for small-scale and artisanal fisheries that explicitly recognize their non-economic contributions to cultural heritage, traditional ecological knowledge, community identity, and intergenerational equity. These values could be protected by MSP

zoning and compensated where spatial restrictions are imposed, as an expression of the fair and just transition principle. Examples like the Komiža lingua franca initiative, demonstrate that linguistic and ethnographic documentation of maritime communities generates spatially relevant knowledge – this can inform MSP decisions on the boundaries and uses of marine areas.

- Address ORE aesthetics proactively, as well as coexistence of activities (e.g. fisheries) in ORE parks. Member-States with active or planned offshore wind development should commission seascape impact assessments that go beyond visual impact studies to include cultural heritage, sense of place, and community identity dimensions. Participatory design processes – following the model of the Yeu-Noirmoutier cohabitation framework – should be a compulsory practice, with early engagement of local communities (e.g. fishers) and coastal residents before spatial decisions are finalized.
- Treat aquaculture development according to the production type. Plans for shellfish and seaweed aquaculture – which the literature and good practices demonstrate to carry high ecological, circular economy, and community identity values – should be approached differently from intensive, fed-species farming, with tailored spatial allocation, governance, and value-communication strategies. Maritime Spatial Plans should apply different zoning and management provisions to fish, shellfish, and seaweed aquaculture, reflecting their distinct environmental impacts, spatial requirements, and compatibility with other marine uses.
- Strengthen and enhance the visibility of non-economic values related to nature (and nature protection), which received the highest ratings in the survey from both experts and the general public and should therefore be preserved, as well as systematically integrated into policies, plans, and regulations.

7.3. Steps forward – Directions for future research

The MEDIGREEN project has opened –as much as it has answered– research questions. Several avenues are particularly pressing for the scientific community.

Highlighting and promoting the non-economic values embedded within marine sectors and the marine ecosystems, is highly important because:

a. social acceptance raises when non-economic values are in place (especially in marine sectors receiving opposition)

b. non-economic values may directly promote the European Green Deal objectives.

First, integrating non-economic values into MSP presupposes research tools that can handle non-numeric, qualitative, and relational data alongside quantitative indicators. Despite the growing consensus on the importance of non-economic values, they remain a vaguely defined concept in research and policymaking. While sectoral studies have explored selected values (e.g. the social significance of small-scale fisheries or the aesthetic concerns related to offshore wind farms), a systematic and synthesised framework for identifying and categorising socio-cultural values across maritime sectors has been largely absent.

This Booklet addresses that research gap by providing an integrated categorisation of values and demonstrating their relevance for MSP. In doing so, it contributes a previously missing layer of socio-cultural information that is essential for developing innovative, context-sensitive and socially acceptable Maritime Spatial Plans (Barianaki *et al.*, 2024). Moreover, by foregrounding values that are often overlooked in conventional planning approaches, it responds to the long-standing scientific preference for quantitative indicators, which tends to privilege values that can be expressed in monetary or numerical terms.

Future research can build upon this framework by extending its application to additional maritime economic sectors, such as shipping and maritime transport, and by further refining and elaborating the values proposed here to capture sector-specific and place-based socio-cultural dimensions. The development of composite, mixed-method frameworks for non-economic value assessment, influenced/getting inspiration by participatory mapping, narrative analysis and the inclusion of non-economic values in SWOT analysis— can promote the operationalization of an MSP model and narratives which takes into consideration these values. Non-economic values, if properly analysed and presented, can support decision-makers, both in choices and in consensus-building.

Second, the sectoral coverage of the present research must be deepened.

- The aquaculture analysis revealed the highest level of expert disagreement among all sectors, largely because Aquaculture encompasses highly heterogeneous production systems, which differ fundamentally in their ecological footprints, spatial requirements, and community relations, making a unified non-economic value assessment is methodologically problematic. Future research should disaggregate Aquaculture by production type, with dedicated analyses of low-trophic aquaculture, like bivalve and seaweed (likely to score high on ecological and circular economy values) versus intensive fed-species farming (likely to present different profiles).
- Fisheries research should systematically distinguish between large-scale industrial fisheries and small-scale or artisanal fisheries (which dominate the good-practice literature on cultural, educational, and ethical values).
- ORE aesthetics require dedicated investigation. The negative expert rating for landscape identity and character (−0.5) and the highest percentage of negative public responses for aesthetic and inspirational values (36%) represent a genuine societal obstacle to the energy transition that cannot be dismissed as mere NIMBYism (“NIMBY” = “not in my backyard”). Research into participatory governance of ORE projects, seascape visual assessment methodologies, and the cultural re-framing of ORE installations as heritage-compatible infrastructure is needed to bridge the gap between ORE’s central role in the EGD and its current social embeddedness deficit.

Third, “Educational and Knowledge values”, rated highest across all sectors and all methodological lenses, deserve sustained attention. The finding that both experts and the public consent that not only marine sectors, but also Nature Protection, primarily offers educational and transformative values – rather than solely ecological and environmental ones – is potentially one of the most actionable results of this MEDIGREEN study. It suggests intensifying the cooperation between environmental and educational policies and actions. Ocean literacy programmes, participatory science initiatives, and traditional knowledge documentation projects may be among the highest-leverage interventions for building the social foundations of a Mediterranean Green Deal. Further research on the design and evaluation of such programs is needed.

Fourth, further research could examine the potential of a MSP-Mediterranean style, i.e. a type of MSP at which common non-economic values across the Member-States (and beyond) are a core defining feature, serving transnational cooperation. The Mediterranean Sea is a singular case in global ocean governance. More than any other sea, it has for millennia functioned as a shared resource connecting civilisations (“mare nostrum”), transferring knowledge, and forging common values among coastal peoples across three continents. The lingua franca documented by the Komiža initiative – a shared maritime vocabulary spanning Croatian, Italian, Greek, Arabic, and other languages, born of centuries of seafarer interaction – is emblematic of a deeper Mediterranean commonality: the sea as a common space of cultural convergence rather than merely economic competition.

This historical and cultural specificity has direct implications for how MSP could be conceived in the Mediterranean context. While northern and central European countries’ governance and economies have been shaped by protestantism, capitalist market logics, and industrial-scale resource extraction, which enhanced economic values, Mediterranean coastal cultures had a different path in history that helped to better preserve non-economic values. Those values survive in the practices and perceptions documented throughout this Booklet.

7.4. Policy recommendations

The following recommendations are addressed to EU institutions, Member-States, and regional bodies with competence in MSP, blue economy governance, and EGD implementation. They draw on the findings of the quadruple analysis and are intended to be actionable within the current policy cycle, including the forthcoming Ocean Act and revision of the MSP Directive.

- Revise the MSP Directive to explicitly require the identification and consideration of non-economic values as part of national planning processes, alongside existing requirements for ecosystem-based approaches. The forthcoming Ocean Act (expected in 2027) should translate this requirement into binding criteria that complement quantitative assessments with non-numeric, qualitative indicators of cultural, educational, aesthetic, and ethical values.
- Develop EU-level guidance on non-economic value frameworks for MSP, building on the typology proposed by MEDIGREEN and aligned with the IPBES diverse values framework (2022). Such guidance could

be integrated into the EMFAF funding conditions for MSP-related projects.

- Mainstream non-economic values in EGD sectoral strategies. The Farm to Fork Strategy, the EU Biodiversity Strategy for 2030, and the Off-shore Renewable Energy Strategy should explicitly acknowledge how certain non-economic values (ex. community identity, stewardship, cultural heritage, and educational values) support their implementation, particularly in securing social acceptance for new spatial designations such as marine protected areas and ORE zones.
- Support the development of non-economic value indicators within the EU Blue Economy Observatory and the Marine Strategy Framework Directive's monitoring frameworks. Currently, the Blue Economy Report focuses almost exclusively on economic output metrics. A complementary non-economic dashboard would provide the evidence base for a (non-economic) value-informed achievement of EGD goals.
- Strengthen ocean literacy as a cross-cutting priority within the European Ocean Pact. Given the finding that educational and knowledge values are the most highly rated dimension across all sectors by experts and the public, ocean literacy investment – in schools, through MPAs, and via participatory science platforms – represents a high-return intervention for building the social foundations of maritime sustainability.

The Mediterranean Sea has always been more than an economic resource. It is a civilizational commons, shaped over millennia by shared values, languages, and ways of living together with the sea. The MEDIGREEN research has shown that these non-economic values are not nostalgic remnants of a pre-modern past: they are living, empirically measurable dimensions of how Mediterranean communities currently understand, use, and care for their maritime space. A Mediterranean pathway to the European Green Deal – one that gives these values a central role in Maritime policies and MSP – can offer a sustainable pathway.

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