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MUSES Project

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MUSES PROJECT

CASE STUDY COMPARATIVE ANALYSIS
v. 1.1

MUSES DELIVERABLE
D3.5: CASE STUDY COMPARATIVE ANALYSIS

30 April 2018

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LIST OF ACRONIMS

DABI	Drivers, Added Values, Barriers, Impacts
EEZ	Exclusive Economic Zone
EFF	European Fisheries Fund
EIA	Environmental Impact Assessment
EMFF	European Maritime Fisheries Fund
EUSAIR	EU Strategy for the Adriatic and Ionian Macro-Region
FLAG	Fisheries Local Action Group
GHG	Greenhouse Gas
GVA	Gross Value Added
KEQs	Key Evaluation Questions
MPA	Marine Protected Area
MSP	Maritime Spatial Planning
MU	Multi-Use
NGOs	Non-governmental organizations
O&G	Oil and Gas
O&G & RE	Oil & Gas Decommissioning & Renewable energy
O&G & T & A	Oil & Gas Decommissioning & Renewable energy
O&M	Operation and Maintenance
OWF	Offshore Wind Farms
RE & DES	Renewable energy & Desalination
SEA	Strategic Environmental Assessment
SHI & E	Shipping terminal & Green energy
SLO	Societal Licence to Operate
SSE	Shore-Side Electricity
T & A	Tourism & Aquaculture
T & E	Tourism & Environmental Protection
T & F	Tourism & Fisheries
T & H & E	Tourism & UCH & Environmental Protection
T & H	Tourism & UCH
TCTs	Tidal current turbines
TID & E	Tidal energy & Environmental protection
TID & MON	Tidal energy & Environmental monitoring
UCH	Underwater Cultural Heritage
WA & A	Wave energy & Aquaculture
WI & A	Wind energy and Aquaculture
WI & F	Wind energy and Fisheries
WI & T	Wind energy and Tourism
WI &E & T	Wind energy & Environmental Protection & Tourism
WP	Work Package

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SUMMARY: COMPARATIVE ANALYSIS OF CASE STUDIES - OUTCOMES IN SHORT

Outcomes from this report are synthetized by the following four short paragraphs, along with synthesis tables.

Outcomes 1. The MUSES project Work Package (WP) 3 studied the development potential of Multi-use (MU) of the sea in ten case studies across Europe (see Figure 1). MU combinations of two or more uses - already in place, or with potential for implementation, were identified through desk analysis and engagement of local stakeholders. The main results are summarized in the table below.

High heterogeneity of MU across the cases **→ *MU opportunities are locally specific***	
→ 16 combinations in 10 cases	
→ 13 maritime sectors involved	→ Most frequently analysed sectors: tourism, aquaculture and fisheries, followed by environmental protection and offshore wind energy production. → Renewable energy production involved in ten out of sixteen combinations.
→ 5 MU combinations (pairs) considered in more than 1 case	1. Tourism & Fisheries 2. Wind energy & Aquaculture 3. Tourism & Environmental protection 4. Wind energy & Fisheries 5. Tourism & Aquaculture.
→ 3 combinations envisage synergies among three different sectors (MU triplets)	1. Tourism & Environmental protection & UCH 2. Tourism & Environmental protection & Wind energy 3. Tourism & Aquaculture & Oil-Gas decommissioning

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Outcomes 2. Local stakeholders were engaged in scoring exercises, where drivers and barriers to MU were investigated, as well as expected added values (benefits) and possible negative impacts. MU Potential was estimated as the overall balance of drivers and barriers. MU Effect was estimated as the balance of added values and negative impacts. The main results are summarized in the table below.

MU Potential close to zero, MU Effect positive ***→ MU opportunities are still blocked but can be unleashed***	
→ **Drivers** of MU are identified in all the cases. They are scored high in stakeholder opinion, suggesting the existence of good opportunities to widen / develop MU	Main drivers of MU: → Existing strategies and legislation → Existing funds and mechanisms (e.g. EMFF, FLAGs) → Increasing demand for sustainable tourism, green energy, high quality food products → Natural, historical, cultural asset of the coast and the sea → Need for an increase in marine ecosystem conservation
→ **Barriers** to MU are also identified in all cases and also scored generally high → All cases show a **balance between drivers and barriers**	Main barrier to MU: → Lack of national frameworks for MU, lack of harmonization in regulations and procedures, severe regulations, long and risky licensing procedures → Lack of adequate incentives/funding of pilot and scaled up projects → Lack of adequate skills, sector fragmentation, lack of dialogue between the stakeholders, lack of awareness on MU benefits of society at large
→ **MU Effect** across different combinations and cases is scored as (very) positive, with expected added values largely prevailing over possible impacts in the opinion of the stakeholders	Main expected added values of MU: → help in achieving environmental protection objectives → satisfy the need for innovative tourism offers and for green energy supply → help in solving spatial conflicts, exploit synergies between uses in different times (e.g. decommissioning)

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Outcomes 3. Through desk analysis and stakeholder consultation, key elements to develop or strengthen MU in case study areas were identified, together with expected synergies of MU with the Blue Economy and Environmental Protection respectively. Main results are summarized in the table below.

MU: Synergies with the Blue Economy and Environmental Protection	
→ **Key elements to address MU** ❖ MU development / strengthening is considered relevant for all case studies	→ Sharing of resources (vessels, offshore and onshore infrastructures, personnel, services, etc.) is a driver for MU and also an immediate benefit → MU is still poorly considered in Maritime Spatial Plans → Knowledge/technology for MU is available, but experimentation is still needed.
→ **MU and maritime Blue Economy** ❖ MU is expected to generate socio-economic benefits in local areas:	Attractiveness for investors in MU: → job creation or preservation → increase of social awareness on local traditions, cultural heritage, environmental resources and ecological solutions → Attractiveness for investors in MU: new opportunities for revenue, diversification of traditional economic sectors, new high quality products and services, valorisation of the territories
→ **MU and environmental compatibility of maritime activities** ❖ MU is expected to provide environmental benefits	Expected environmental benefits of MU: → biodiversity protection, fish stock recovery, reduction of greenhouse gases (GHGs), environmental education, increased data availability Environmental compatibility of MU could be improved through: → licensing framework, evaluation of MU impacts and benefits, development of common guidelines for MU MU implementation can be supported through: → additional research / experimentation of environmentally friendly solutions → SEA / EIA procedures

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Outcomes 4. Local stakeholders expressed recommendations for actions to be undertaken in order to boost MU development in case study areas. Their input was collected and integrated with evidences from the desk analysis. The recommendations will inform MUSES WP4 Action Plan development. Some synthesized elements of these recommendations are reported in the table below, with reference to the five most common MU combinations considered across the case studies (Tourism & Fisheries, Wind energy & Aquaculture, Tourism & Environmental protection, Wind energy & Fisheries, Tourism & Aquaculture).

Recommendations from case studies ***→ Actions to favour MU development***
Maritime Spatial Planning MU should be explicitly encouraged in marine plans, supporting a shift from a sectoral approach to a MU opportunity planning approach
Legal frameworks MU development would benefit from national / sub-national legal frameworks for MU. Infrastructure related MU can also be promoted through licensing processes. Harmonization of legislation and administrative procedures (at least) at the national level represent a key factor for MU development.
Funding There is no need for new specific funds designed for MU, but focussing and targeting of existing EU regional funds on MU is essential. It is key to sustain MU implementation over time (trough funding), after the pilot phase.
Research "Hard" MU combinations would benefit from some technical improvements and some additional innovative technology. "Soft" MU combinations would need fine tuning of sustainable practices and procedures.
Pilot cases Pilot cases extended over time and full-scale implementation are beneficial for "hard" MU combinations. Transfer of good practices is relevant for "soft" MU combinations.
Dialogue and cooperation Different actors should be involved in open dialogue (economic sectors, governmental institutions, society at large), and different vertical and horizontal dimensions for the dialogue are needed. Physical meetings and occasions for joint discussion and project development are also recommended to facilitate MU implementation.
Education and training These are considered beneficial for MU development across almost all the combinations examined, at least for one of the two sectors involved in the combination
Communication and social awareness These are seen as common needs for all the examined combinations, with different implications, in accordance to the specificities of the single MU combination considered.

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1 INTRODUCTION

1.1 Scope of the report

This document presents the results of the "Case study comparative analysis" carried out in the framework of the Multi-Use in European Seas (MUSES) project's Work Package (WP)3 – Task 3.3.

The goal of MUSES is to show the real opportunities for Multi-Use in European Seas, including the scope for innovation and Blue Growth potential, from a user perspective, and to present practical solutions on how to overcome existing barriers and minimize risks associated with Multi-Use (MU) development. The overall objective of the MUSES project is to develop an Action Plan under WP4 which will facilitate implementation of MU in European Seas, based on innovation and Blue Growth potential.

As a first, fundamental step towards this goal, a definition of MU has been identified as follows:

"In the realm of marine resource utilisation Multi-Use should be understood as the joint use of resources in close geographic proximity. This can involve either a single user or multiple users. It is an umbrella term that covers a multitude of use combinations in the marine realm and represents a radical change from the concept of exclusive resource rights to the inclusive sharing of resources by one or more users."

A user in this context is defined as the individual, group or entity that intentionally benefits from a given resource. If a business creates a separate legal entity to exploit an additional resource, this entity is then considered another user. A use in this context is understood as a distinct and intentional activity through which a direct (e.g. profit) or indirect (e.g. nature conservation) benefit is drawn by one or more users. For the purpose of this definition, a clear distinction is made between different types of uses. A resource in this context is a good or service that represents a value to one or more users. Such a resource can be biotic (e.g. fish stocks) or abiotic (e.g. ocean space) and can be exploited through either direct (e.g. fishing) or indirect (e.g. nature conservation) uses.

Activities under WP3 were ultimately aimed at informing the Action Plan with relevant issues for MU promotion, initial solutions and actions needed to facilitate the implementation of the MU concept, emerging from local contexts, experiences and perceptions.

WP3 considered 10 case studies across Europe, encompassing a wide variety of environmental and socio-economic conditions. Case studies undertook desk analysis and stakeholder engagement and produced 10 separated reports, which were delivered within Task 3.2 (Project Deliverable 3.3 - Case study implementation).

The ten cases are as follows (see Figure 1):

1. Case study 1A - Multi-use space between commercial fisheries and offshore wind farms in Scotland (East Coast of Scotland - North Sea)
2. Case study 1B - Tidal energy development and environmental protection and monitoring (North Coast of Scotland - Inner sound of the Pentland Firth - North Sea)
3. Case study 1C - Multi-use of offshore wind farms with marine aquaculture and fisheries (German North Sea EEZ - North Sea)
4. Case study 2 - Marine renewables and aquaculture Multi-use including the use of marine renewable energy near the point of generation (West Coast of Scotland - Northern Atlantic Sea)

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5. Case study 3A - Development of tourism and fishing in the Southern Atlantic Sea (South Coast of mainland Portugal - Algarve region – Eastern Atlantic Sea)
6. Case study 3B - Development of tourism and fishing in the Southern Atlantic Sea (Azores archipelago – Eastern Atlantic Sea)
7. Case study 4 - Multi-Use for local development focused on energy production, tourism and environment in Swedish waters (Island of Gotland - Baltic Sea)
8. Case study 5 - Offshore wind and mariculture: potentials for multi-use and nutrient remediation in Rødsand 2 (South Coast of Lolland-Falster - Denmark - Baltic Sea)
9. Case study 6 - Coastal and maritime tourism and O&G decommissioning as drivers for potential Multi-use in the Northern Adriatic Sea (Italy - Mediterranean Sea)
10. Case Study 7 - Marine renewable energy sources and desalination, fishing and tourism in the South Aegean: the case of Mykonos Island (Greece - Mediterranean Sea).

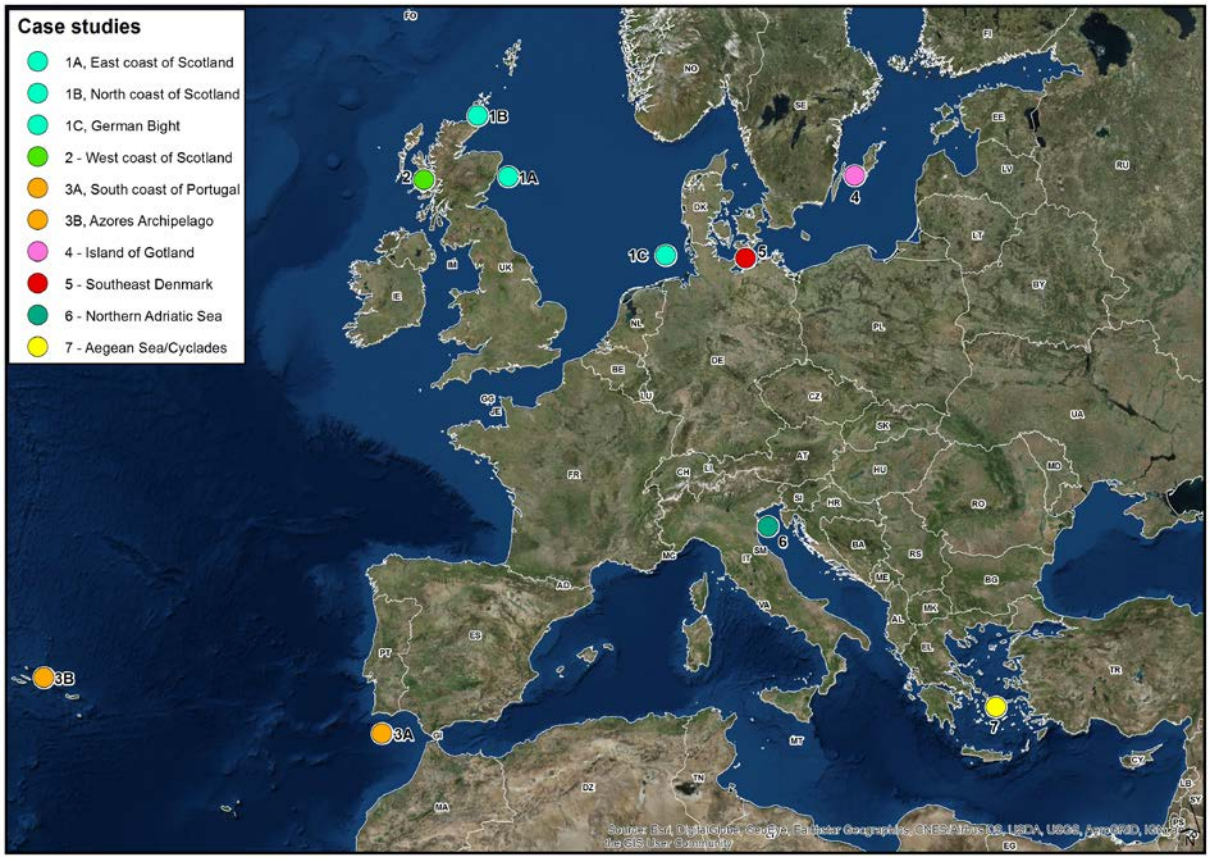

Figure 1 Geographical location of MUSES case studies.

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Case studies were undertaken following a common methodology[1] and ten case study reports were prepared[2], following the same outline.

Some key definitions and methodological steps of case study development are essential for understanding the present report and are therefore summarized in the following paragraph.

1.2 Methodology for case study development

On the basis of desk research and previous projects experience, MUSES case studies were already selected during the preparation of the project proposal, considering the following criteria:

- Geographical representativeness of EU Seas
- Off-shore and near-shore representativeness
- Coverage of different economic sectors of the Blue Growth Strategy
- Consideration of both “hard uses of the sea" by industrial and engineering sectors and “soft uses of the sea”
- Representativeness of different levels of MSP process maturity
- Representativeness of both already implemented MU cases and examples of potential MU cases

When developing the cases, topics to be considered were refined after a first round of consultations with local stakeholders and preliminary desk research.

Despite the cases covering a wide variety of environmental and socio-economic conditions, they are limited in number and certainly cannot encompass all different relevant conditions. Other locations with high potential for MU development or challenges calling for solutions are surely present across European Seas.

For case study development, the following definitions are considered:

- DRIVERS = factors promoting MU
  They are defined as those factors supporting/facilitating/strengthening MU development.
- ADDED VALUES = positive effects/impacts of establishing or strengthening MU
  They are defined as the positive effects of establishing/strengthening MU.
- BARRIERS = factors hindering MU
  They are defined as those factors preventing/negatively affecting MU.
- IMPACTS[3] = negative effects of establishing/strengthening MU.
  They are defined as the cons or the negative effects of implementing/strengthening MU.

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[1] Bocci M., Ramieri E., Castellani C., et al. (2017) Case study methodology, MUSES project. Edinburgh. Available at: https://sites.dundee.ac.uk/muses/wp-content/uploads/sites/70/2017/07/D3.1-WP3-Case-study-methodology-web.pdf

[2] Bocci M., Ramieri E. (coordinators) et al. (2017). Case study implementation, MUSES project. Edinburgh. Available at: https://sites.dundee.ac.uk/muses/wp-content/uploads/sites/70/2018/02/1-Case-Study-Implementation-Introduction.pdf
Single case study reports available at: Case study 1A; Case study 1B; Case study 1C; Case study 2; Case study 3A; Case study 3B; Case study 4; Case study 5; Case study 6; Case Study 7.

[3] Here meant as NEGATIVE impacts.

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- MU POTENTIAL is defined as the degree of opportunity the study area has to develop or strengthen MU.
- MU EFFECT is defined as the overall result or balance of pros and cons of developing MU in the study area.

Case studies were developed through desk research (policy papers, legislative documents, publications, etc.) and stakeholder engagement (interviews, workshops). These two methods were applied across the entire process, which considered five steps:

- **Step 1: MU overview & identification of potentials**. In this step, existing/potential MU combinations were identified, including characterization of MU type, location, legal basis, maturity, etc. Existing / potential advantages of MU, possible extensions, MU scenarios, combination and cooperation modes were explored.
- **Step 2: Identification of MU Drivers, Barriers, Added value, Impacts (MU DABI)**. A catalogue of factors was prepared, named **DABI**: Drivers, Added Values, Barriers, and Impacts. The DABI factors, collected through desk research and interviews, are grouped in several categories (policies, administrative/legal aspects, environmental and socio-economic constrains, technical capacity, etc.).
- **Step 3: Analysis of MU potential**. MU Potential is defined as the degree of opportunity the study area has to develop or strengthen the identified MU combination(s). In this step, drivers and barriers in the DABI catalogue were scored by stakeholders. The relative balance between drivers and barriers identifies the potential for MU development in the study area. Stakeholders attribute a score to each factor of the DABI catalogue. Scores were given as follows: between 0 and + 3 in the case of Drivers; between 0 and -3 in the case of Barriers. MU Potential is evaluated by averaging the average Drivers' score and the average Barriers' score.
- **Step 4: Evaluation of overall MU effect**. MU Effect is defined as the overall result of implementing MU in the area. In this step added value (positive effects) and impacts (negative effects) in the DABI catalogue were scored by stakeholders. The relative balance between added value and impacts identifies the overall MU net effect in the study area. Stakeholders attribute a score to each factor of the DABI catalogue. Scores were given as follows: between 0 and +3 in the case of Added values; between 0 and -3 in the case of Impacts. MU Effect is evaluated by averaging the average Added values' score and the average Impacts' score.
- **Step 5: Analysis of Focus Areas**. Case studies are further evaluated according to common conceptual categories, defined as "Focus Areas". The following three Focus Areas were considered:
    a. **Focus Area 1 "Addressing MU"**: this Focus Area analyses MU development potentialities. It is applied both to cases where MUs of the sea are not developed yet and to cases where MUs are already in place, but where actions are needed in order to fully exploit MU potential.
    b. **Focus Area 2 "Boosting Blue Maritime Economy"**: this Focus Area analyses those aspects of MUs strictly linked to the development of maritime economy. The main objectives here are: to highlight economic added-value of co-use of resources (infrastructures, services, personnel); to identify strategies reducing risks associated with economic development of combined uses; to promote local entrepreneurship

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and create context to favour job creation, broader social aspects and promote economic recovery.

c. **Focus Area 3 "Improving Environmental Compatibility"**: this Focus Area analyses those aspects of MUs linked to the protection of the marine environment and/or minimisation of existing impacts. The main objectives here are (different objectives may suit different case studies): to identify solutions that concentrate marine activities in order to minimize the use of sea space; to identify positive and negative impacts of MU; to identify technical solutions that minimise environmental impacts; to identify win-win solutions triggering both socio-economic development and environmental protection (e.g. sustainable tourism and Marine Protected Areas (MPAs) or small scale fisheries/aquaculture and MPAs).

The Analysis of Focus Areas was implemented by providing answers to a set of **Key Evaluation Questions (KEQs)** listed in the Case study methodology (MUSES deliverable D3.1). Draft answers were prepared on the basis of desk analysis by case study project teams and have been reviewed by stakeholders.

A total of 25 DABI catalogues were compiled across the 10 case studies. Among these, 23 were also scored (only the two catalogues compiled for the combination with Oil and Gas (O&G) decommissioning in case study 6 were not scored).

1.3 Content of the report

This report analyses the results of the 10 case studies through a comparative approach to their key elements. The report is organized as follows:

- **Chapter 2** illustrates **all the combinations** analysed in the ten cases and provides a comparative evaluation of **MU Potential and MU Effect**;
- **Chapter 3** presents a summary of the outcomes of **Focus Area Analysis**, comparing the answers of the KEQs across all case studies;
- **Chapter 4** presents an **integrated analysis of the five most frequently analysed combinations** considered across the case studies: integrated DABI catalogues have been prepared by combining the catalogues of all case studies that addressed the same combination;
- **Chapter 5** proposes a **summary of recommendations** to support MU implementation of the **five most frequently analysed combinations,** integrating suggestions collected from all case studies.

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1.4 Strengths and limitations of outcomes from the comparative analysis

The results presented in this report combine the main outcomes from the 10 case studies from a cross-cutting perspective. Each case developed its evaluation using both desk analysis and stakeholder engagement activities at the local level. The comparative analysis developed for this report capitalises on an extensive base of information collected across the cases, as outlined in Figure 2.

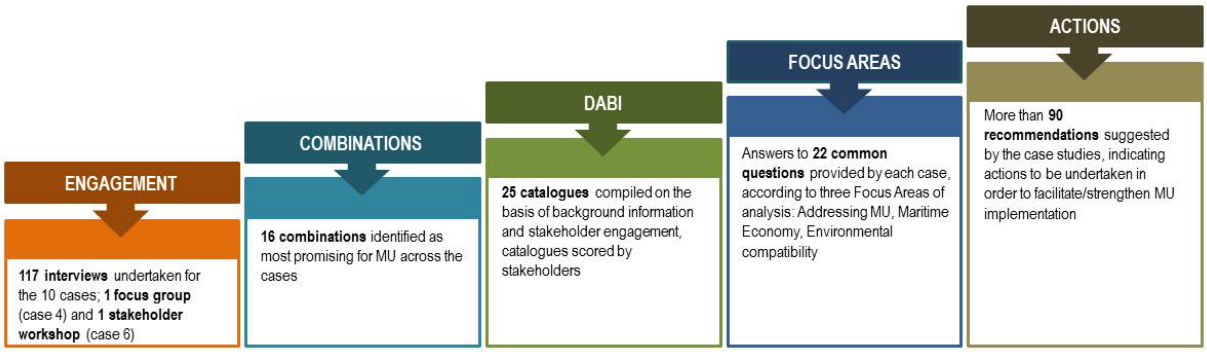

Figure 2 Information base collected across the cases and used in this report.

This bulk of information is quite wide and provides a good basis for the elaboration of integrated results. Such an extended field research about MU opportunities across EU seas gives quite a comprehensive and unique picture of MU development and/or potential at the local level. It analyses and compares in detail drivers and barriers for MU development from concept to practice, as well as expected benefits and possible negative impacts. These elements together constitute a significant complement, from a local perspective, to the outcomes of the Sea Basin Comparison[4] and MU Analysis reports[5], developed under MUSES WP2 and WP4 respectively.

On the other hand, some limitations due to characteristics of the data available should be acknowledged when considering the results of the case study comparative analysis. For example, heterogeneity of data type is an issue: available data derived from different steps of the case study methodology (see section 1.2) are either qualitative (e.g. answers to open questions), semi-quantitative (e.g. answers to Y/N questions) or quantitative (e.g. scores attributed to DABI factors). In this last case, scores represent an individual quantification of DABI factors, assigned according to the stakeholders' specific opinion, knowledge and experience, so that a certain degree of subjectivity is included in the whole scoring process defined in the MUSES methodology. This must be taken into account in the evaluation of results, their integration and interpretation.

Moreover, our definition of MU Potential and MU Effect and scoring methodology themselves could also be a possible source of uncertainty. For example, the average driver score and the average barrier score are not responsive to differences in the total number of drivers and total number of barriers identified. If the two groups happen to have very different number of factors they would

[4] Przedrzymirska J., De Pellegrin D., Barbanti A. et al. (2018). MUSES WP2 Final report, MUSES project. Edinburgh.

[5] Lukic I., Schultz-Zehden A., Onwona Ansong J. et al. (2018). Multi-Use Analysis, MUSES project. Edinburgh.

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weight the same regardless in the MU Potential calculation. Notice about this occurrence is provided across this report.

Due to the inhomogeneity in typology of available data, outcomes from each of the steps of case study implementation need to be analysed according to a specific approach (e.g. individuation of common key concepts, computation of average values for given indicators, etc.). In addition, heterogeneity across cases should be considered, e.g. number of interviews performed and number of factors included in the DABI catalogues, etc. Moreover, when aggregating cases, for example by combination, the number of data available (e.g. scored DABI factors from interviews) may vary, since the various cases performed different numbers of interviews.

With these constraints in mind, we are confident that the principal outcomes of comparative analysis, which are also summarized at the beginning of each chapter, are well based and robust. For the different steps of analysis, we also provide in the following chapters some detailed results which might be more affected by uncertainty, due to limitations in scope, time and effort of case study implementation, and should therefore be considered with appropriate caution.

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2 OVERVIEW OF MU COMBINATIONS

In this chapter, an overview of the MU combinations across the ten case studies is provided. Combinations are described and compared considering the maritime sectors involved, the geographic distribution and the results from MU Potential and MU Effect evaluation. A summary of the main outcomes from this part of the comparative analysis is given in the box below.

Summary

MU combinations in case studies

The ten case studies identified and evaluated **sixteen MU combinations** in total.

A **high degree of heterogeneity and local specificity** in terms of combinations considered is shown across the cases: 11 combinations are considered by single cases and **only five combinations are relevant for more than one case**.

The most frequently analysed pair combinations are:
1. Tourism & Fisheries
2. Wind energy & Aquaculture
3. Tourism & Environmental protection
4. Wind energy & Fisheries
5. Tourism & Aquaculture.

Some cases identified **MU combinations involving three sectors** (MU triplet): Tourism & Environmental protection in combination with UCH or Wind energy; Tourism & Aquaculture in combination with O&G decommissioning.

A **total of 13 maritime sectors** were considered across the cases for MU combinations. Tourism, aquaculture and wind energy show the higher degree of flexibility towards MU in the case studies, being engaged in a larger number of different combinations. Tourism, aquaculture and fisheries, followed by environmental protection and wind energy production were the sectors considered by the higher number of case studies.

Renewable energy production at sea—either addressing a specific source (wind, wave or tide) or interpreted in a more general sense—is considered in 10 out of the 16 combinations explored.

At present, a **generally low MU potential** for the various combinations across the cases was estimated by the MUSES project approach (scored DABI catalogues based on stakeholder opinion). This situation results from a **balance between drivers and barriers to MU**. **Almost all the cases showed high average drivers scores**, suggesting a strong need to develop MU. However, the same cases showed also generally high barrier scores. Working towards the **removal of the main barriers** would lead to the creation of conditions favourable for the development of MU in the case study areas.

The case studies revealed **a general positive attitude of local stakeholders towards MU: MU Effect** analysed across different combinations and different case studies **was estimated as positive** almost in all cases, with expected benefits of MU (Added values) largely prevailing on possible impacts in the opinion of the stakeholders.

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Out of the 10 case studies, 16 different combinations have been identified as relevant for their study area and are analysed through desk analysis and stakeholder engagement. These combinations are either already implemented or have potential to be possibly developed in the future in the case study areas. Most of these combinations involve two sectors (MU pairs), while three combinations envisage the synergy among three different sectors in the same marine space (MU triplet).

The 16 combinations identified across the cases are the following:

1. Offshore Wind Energy & Fisheries (WI & F)
2. *Offshore Wind Energy & Aquaculture (WI & A)*
3. Offshore Wind Energy & Tourism (WI & T)
4. Offshore Wind Energy & Environmental Protection & Tourism (WI & E & T)
5. Wave Energy & Aquaculture (WA & A)
6. Tidal Energy & Environmental Protection (TID & E)
7. Tidal Energy & Environmental Monitoring (TID & MON)
8. Tourism & Fisheries (T & F)
9. Tourism & Aquaculture (T & A)
10. Tourism & Environmental Protection (T & E)
11. Tourism & UCH (T & H)
12. Tourism & UCH & Environmental Protection (T & H & E)
13. Oil & Gas Decommissioning & Tourism & Aquaculture (O&G & T & A)
14. Oil & Gas Decommissioning & Renewable Energy (O&G & RE)
15. Renewable Energy & Desalination (RE & DES)
16. Shipping Terminal & Green Energy (SHI & E).

A brief description of the combinations and their distribution across case studies is reported in the paragraph below. The distribution of combinations in single case studies is summarized in Table 1.

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	North Sea basin			Atlantic basin			Baltic Sea basin		Mediterranean basin	
Case study number	1A	1B	1C	2	3A	3B	4	5	6	7
Case study area	North coast of Scotland	East Coast of Scotland	Southern coast	Northern Atlantic Sea	South coast of mainland Portugal	Azores Archipelago	Island of Gotland - Sweden	Southern Denmark	Northern Adriatic Sea	Aegean Sea
Wind energy & Fisheries	x		x							
Wind energy & Aquaculture			x				x	x		
Wind energy & Tourism							x			
Wind energy & Environmental Protection & Tourism								x		
Wave energy & Aquaculture				x						
Tidal energy & Environmental protection		x								
Tidal energy & Environmental monitoring		x								
Tourism & Fisheries					x	x			x	x
Tourism & Aquaculture					x				x	
Tourism & Environmental Protection					x	x			x	
Tourism & UCH									x	
Tourism & UCH & Environmental Protection						x				
Oil & gas & Tourism & Aquaculture									x	
Oil & gas & Renewable energy									x	
Renewable energy & Desalination										x
Shipping terminal & Green energy generation				x						

Table 1 Comparative framework of combinations explored across the 10 case studies.

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2.1 MU combinations and their distribution across case studies


1. Offshore Wind Energy & Fisheries is a MU combination between offshore wind farms (OWFs) and commercial fisheries. Two case studies explored this combination (Figure 7), both located in the North Sea (1A - East coast of Scotland, 1C - Southern coast of the North Sea). Wind farms with fixed foundations in combination with commercial fisheries (mobile and static gears) represent the main focus of case study 1A, while results are directly transferable to emerging floating offshore wind and hybrid platform markets. Wind farms with fixed foundations are also considered in case study 1C, in the German North Sea where the offshore wind energy sector is reported as a relatively new sector, poised to become one of the major sectors vying for space due to its exponential expansion in the recent decade. The two sectors compete for space since they both seek access to locations which share the same physical characteristics (examples of scallop dredging and *Nephrops* trawling were explored).


2. Offshore Wind Energy & Aquaculture envisages the MU combination between OWFs and different types of aquaculture (shellfish, finfish, seaweed). Three case studies, located in the North Sea (1C, Southern coast of North Sea) and in the Baltic Sea (Island of Gotland- case study 4, and Southern Denmark - case study 5) addressed this combination (1C: aquaculture in general; 4 and 5: mussels/seaweeds). According to the North Sea experience, offshore aquaculture installations within the priority area for OWFs might be implemented through (i) the direct attachment of installations like cages or long-lines to OWF turbine foundations or through (ii) the co-location of aquaculture installations within the security zone of the OWF. The first option however was assessed as neither not possible for the wind farms currently in operation, nor for those already licenced because complex engineering adjustments are needed already in the planning phase to accommodate an extra load within safety margins. Similarly, case study 5 implies co-location with existing wind farms (sharing space, equipment, services) rather than infrastructural integration. Case study 4 (Island of Gotland) considers the idea of using the existing piles of the wind park to attach longlines for mussel farms.


3. Offshore Wind Energy & Tourism involves the possibility to develop touristic activities in or around OWFs. This combination, which was addressed by one case study located in the Baltic Sea (Island of Gotland, case study 4) considers various creative examples: creating artificial grounds for seals, boat tours that include information on renewable energy systems, or even making art at the monopiles, potentially in combination with light and/or water shows. Recreational fishing boat tours to the wind farm was also considered,

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though further research is needed to explore the possible negative effects of noise generated by OWFs to large fishes.

4. Offshore Wind Energy & Tourism & Environmental Protection was considered as MU triplet in case study 5 (Southern Denmark), where touristic activities in and around OWFs could include diving and environmental education initiatives. The establishment of artificial reefs within the Rødsand 2 wind park, might recreate marine environments that have otherwise been eliminated in the process of stone dredging over the past centuries, thus encouraging new settlements of various marine species and increasing biodiversity, supporting this new form of tourism.

5. Wave Energy & Aquaculture was investigated in case study 2 (Northern Atlantic Sea), where MU has already been implemented (commercial use) in Mingary Bay (Scotland) and further development of MU is envisaged by stakeholders. A special focus was given to salmon farming in combination with wave energy infrastructures, although a large potential also exists for mussel farms, in line with the general policy directions for the aquaculture sector.

6. Tidal Energy & Environmental Protection was investigated in case study 1B. Tidal current turbines (TCTs) and environmental protection areas can be co-located in order to maximize spatial efficiency, whenever significant adverse environmental impacts, and/or impacts on the local and regional economies can be excluded, or advantageous environmental, economic and social synergies can be shown. Environmental protection areas can include different regimes of protection encompassing Spatial protected areas (SPAs), Special Areas of Conservation (SACs), Marine Protected Areas (MPAs), Sites of Special Scientific Interest (SSSIs), and locally designated sites.

7. Tidal Energy & Environmental Monitoring was investigated in case study 1B and explores the potential for integrating various types of monitoring equipment such as passive acoustic, sonar, audio and visual on a MU platform, and co-locating such equipment on TCT structures.

8. Tourism & Fisheries was described in four case studies, two of them located in the Eastern Atlantic Sea basin (case studies 3A and 3B, south coast of mainland Portugal and the Azores respectively) and two in the Mediterranean Sea basin (case study 6, Northern Adriatic Sea, and case study 7, Aegean Sea). In all of these case studies, this combination is described through “Pescatourism”, which can be generally defined as the boarding of people, which are not part of the crew, on small scale fishing boats for recreational and cultural scopes. Professional small scale fishers play a central role in promoting and educating tourists on the environmental, socio-cultural and economic values of coastal areas by showing fishing techniques, narrating and

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storytelling, as well as offering or cooking local food on board. Pescatourism must not be confused with “recreational fishing” or “angling” or “sport fishing” which do not involve operators, know-how, and boats of professional fisheries.


9. Tourism & Aquaculture was explored in two case studies, one located in the Southern coast of Portugal (case study 3A) and the other located in the Northern Adriatic Sea (case study 6). In the Southern Atlantic case study, aquaculture facilities are used as potential touristic attractions where recreational activities including diving are developed. Different alternative or integrated ways to combine aquaculture and tourism have been identified for the Mediterranean case study area: boarding of people on aquaculture vessels to visit sea farms and learn aquaculture techniques for educative and recreational purposes; sport fishing tourism (mainly angling) next to mussel aquaculture plants which commonly function as attractive marine areas for a number of fish species; diving/snorkelling tourism, which could be practiced next to aquaculture farms, where a rich fauna can be observed. Finally, this MU was further explored in combination with O&G decommissioning in the same Mediterranean case study (see point 13 of this list).


10. Tourism & Environmental Protection was addressed by three case studies located in the Eastern Atlantic Basin (3A and 3B) and in the Mediterranean (case study 6). It consists of the development of touristic activities (mainly diving) inside designated MPAs, managed with the goal to preserve natural resources. It is also seen as an opportunity to expand the protection of the marine environment, while at the same time developing socio-economic activities, with advantages for both sectors. The implementation would require the establishment of links between tour operators, touristic service providers, institutions and associations involved in the field of marine protection, with possible expected mutual advantages. Especially according to the results of case study 6, this MU could be promoted also through a connection with the related environmental/naturalistic touristic activities on land (e.g. land-based facilities dealing with protection and recovery of specific marine species).


11. Tourism & Underwater Cultural Heritage (UCH) was addressed by case study 6, for the area of the Northern Adriatic Sea (Mediterranean Sea basin). It involves the touristic exploitation of UCH sites, especially through diving activities, with the aim of valorising and safeguarding the cultural heritage from the current concrete risk of looting and damaging. This combination was also considered, in addition with environmental protection, in the MU triplet described here below.

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12. Tourism & Underwater Cultural Heritage (UCH) & Environmental Protection was explored in case study 3B, for the Azores Archipelago. It is characterized by touristic and recreational activities developed in UCH sites, where environmental measures are also established. According to this combination, UCH benefits from the conservation management measures of environmental protection areas with tourism benefits from both sectors.

13. Oil & Gas Decommissioning & Tourism & Aquaculture was explored in the case study 6 (Mediterranean Sea basin) which specifically took into consideration the projected decommissioning of 21 platforms by 2021-2022 in the Adriatic Sea (8 in the case study area), and therefore the need to identify potential re-uses of the dismissed infrastructures. The combination refers to a decommissioned O&G platform re-used to support recreational activities (e.g. diving, recreational fishing, environmental education, marinas, gastronomic experience) and functioning as structural and/or logistical support for aquaculture installations.

14. Oil & Gas Decommissioning & Renewable Energy was again explored in the case study 6 (see previous point) and relies on the same driver of platform decommissioning. In this case, decommissioned platforms can be used for supporting renewable energy devices such as wave energy devices, wind energy, and solar panels.

15. Renewable Energy & Desalination was addressed by case study 7, in the Mediterranean Sea basin (Aegean Sea). The main focus of the Greek case study was to examine the possibility of installing offshore marine renewable energy and desalination platforms (i.e. energy production and desalinated water production), considering that the island of Mykonos has increased energy needs as well as high quality freshwater demands during the high touristic season. The island has unique sustainable sources (wind, solar, wave) that could supply renewable energy systems.

16. Renewable Energy & Shipping Terminals was investigated in case study 2 (Northern Atlantic Sea). The MU involves the generation of green energy from marine renewable sources (offshore wind, wave and tide), its transmission to a port substation and the potential of energy being used to cover the energy requirements of the port, in addition to other benefits e.g. GHG reductions and human health benefits. The potential of the energy used to power auxiliary engines of berthed vessels (shore-side electricity (SSE)) was also investigated.

As outlined in Figure 3, there is a high degree of heterogeneity among the cases in terms of combinations considered with only few combinations relevant for 2-4 cases. Tourism & Fisheries is the most represented combination (4 cases, Figure 4), followed by Tourism & Environmental Protection (3 cases, Figure 5) and Wind Energy & Aquaculture (3 cases, Figure 6), Wind Energy &

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Fisheries (2 cases, Figure 7) and Tourism and Aquaculture (2 cases, Figure 8). The remaining 7 combinations were separately considered in 7 different case studies.

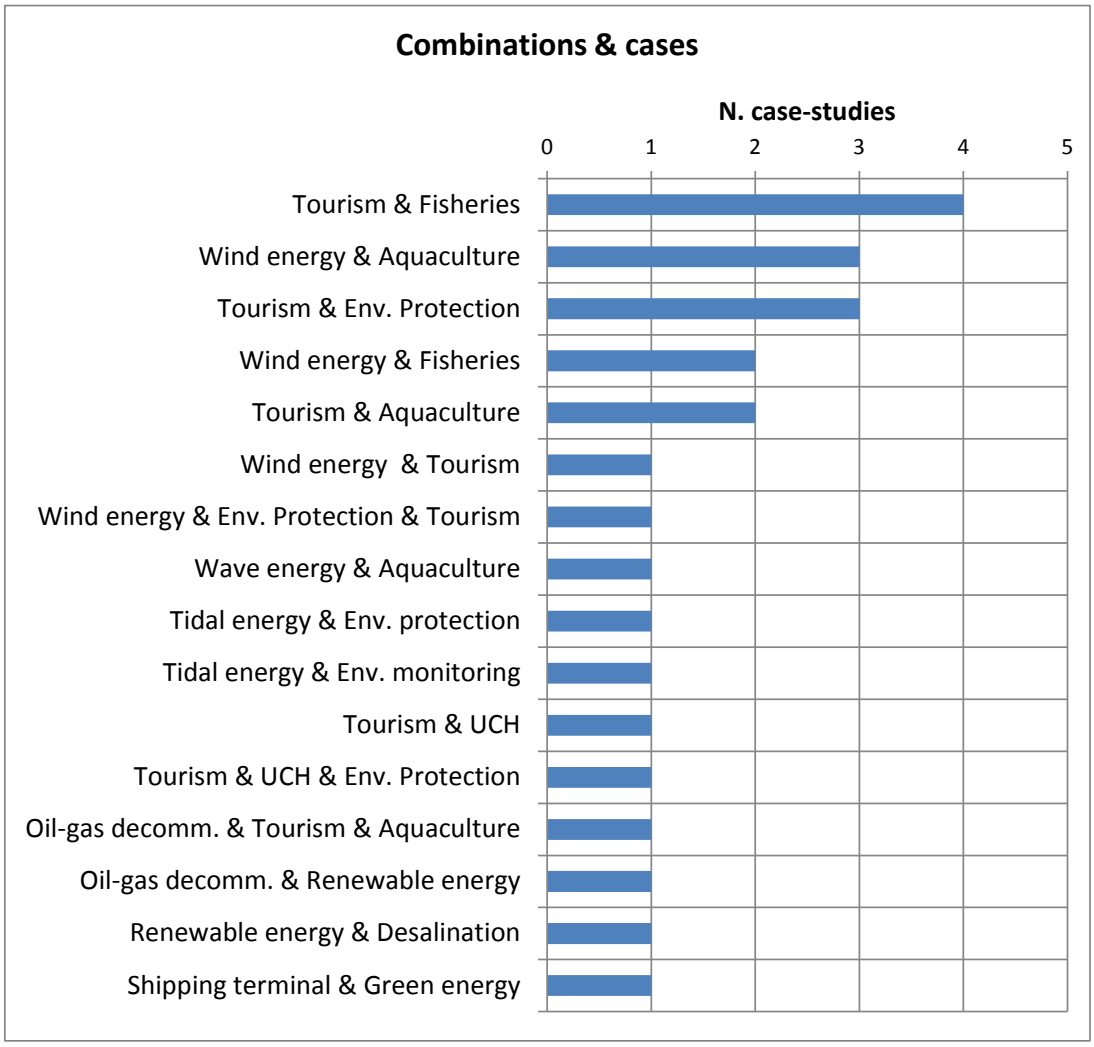

Figure 3 Combinations explored across the 10 case studies.

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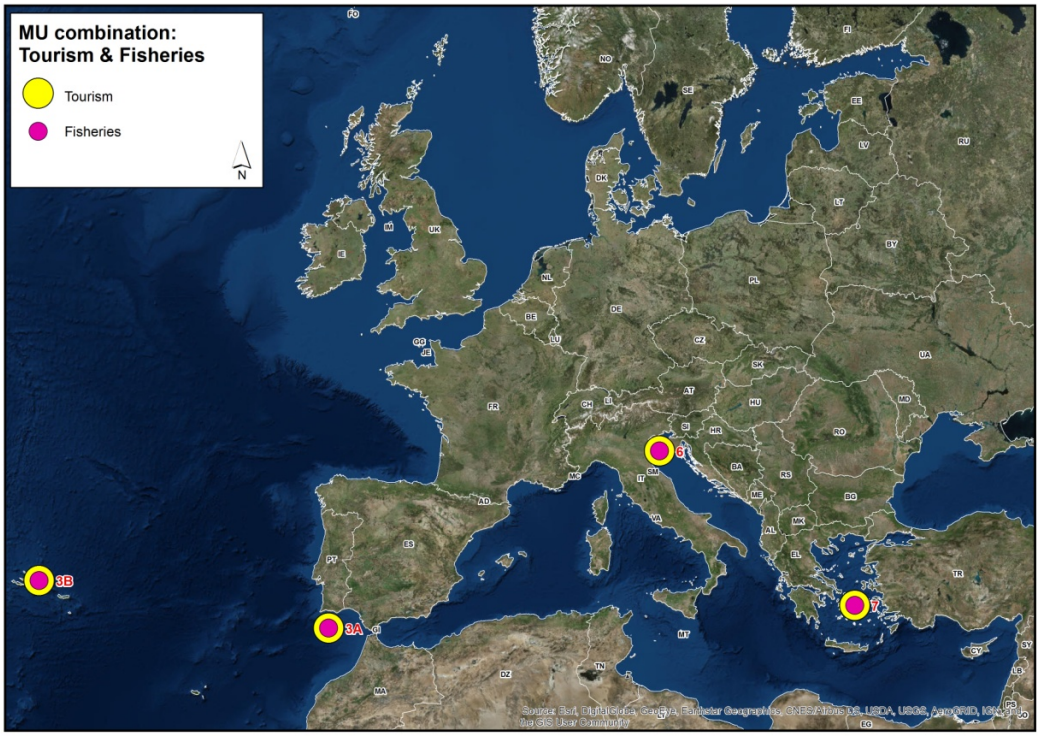

Figure 4 Case studies which analysed the MU combination of Tourism & Fisheries.

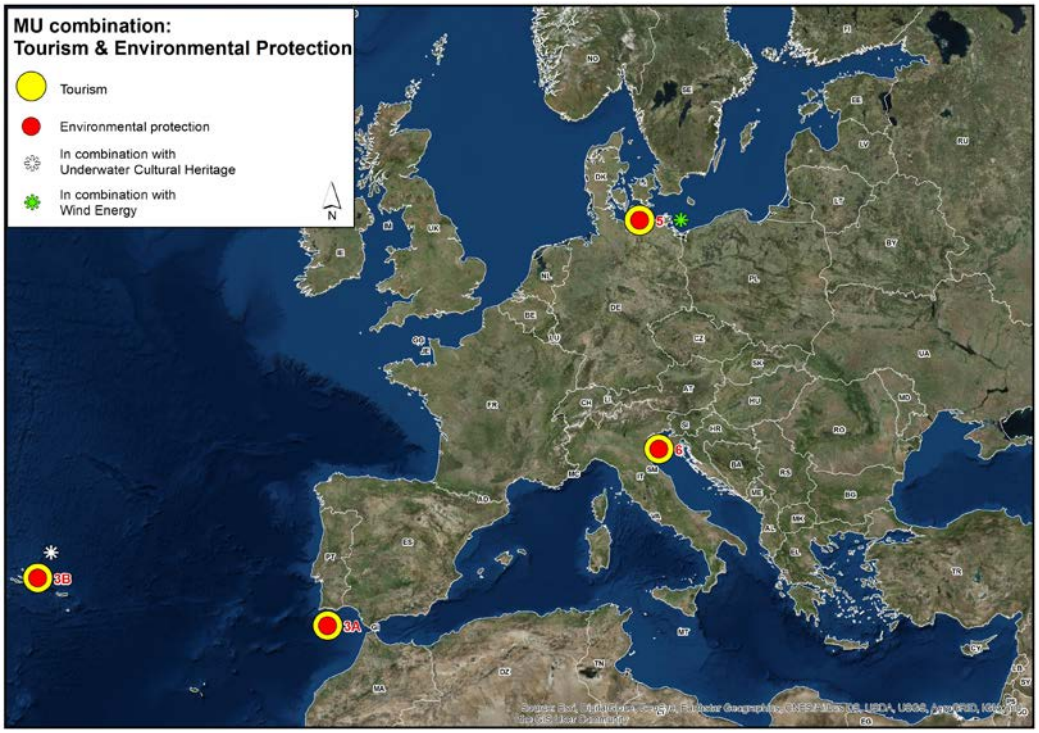

Figure 5 Case studies which analysed the MU combination Tourism & Environmental Protection. The MU triplets Tourism & Environmental Protection & UCH and Tourism & Environmental Protection & Wind Energy are both shown in the map.

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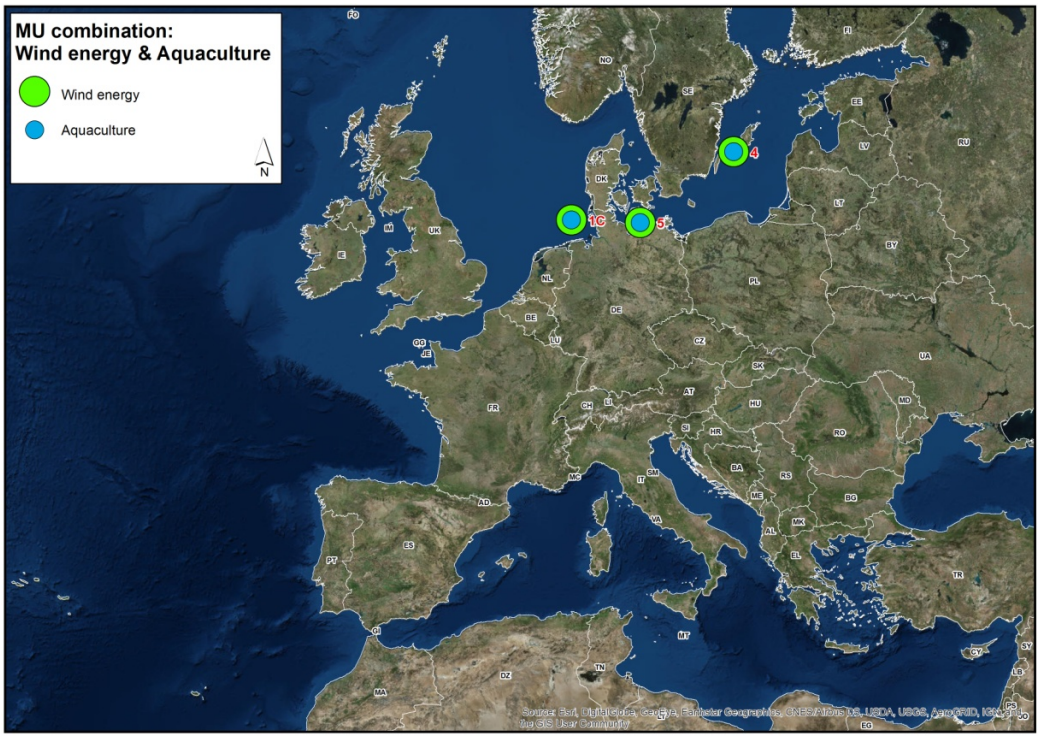

Figure 6 Case studies which analysed the MU combination of Wind Energy & Aquaculture.

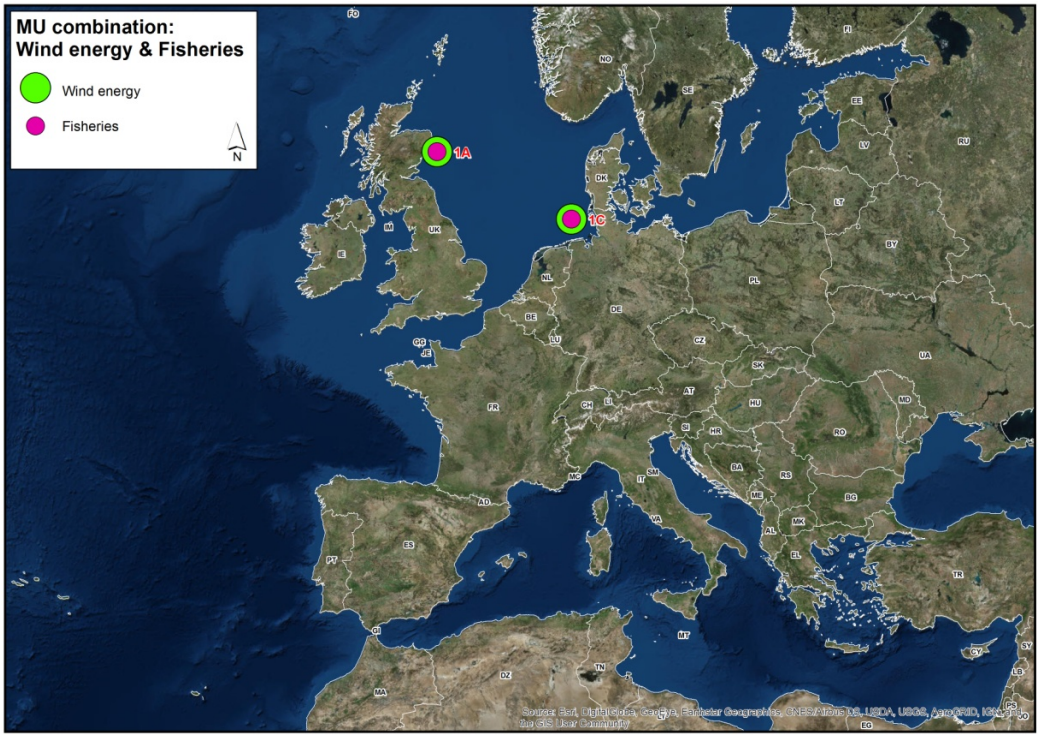

Figure 7 Case studies which analysed the MU combination of Wind Energy & Fisheries.

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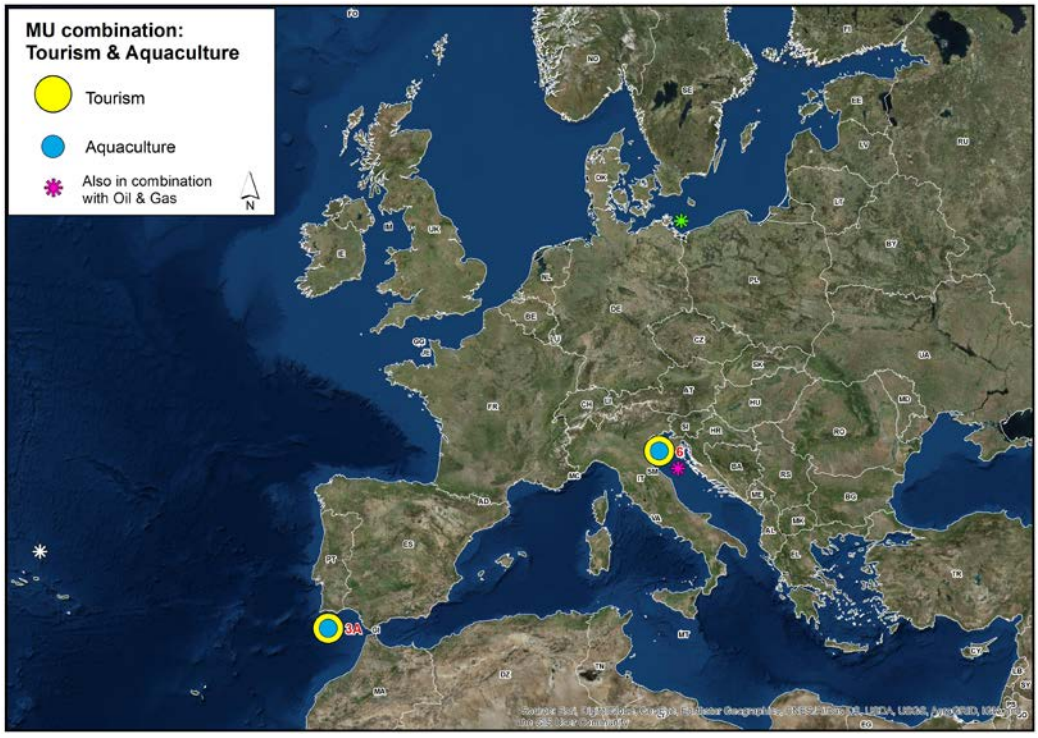

Figure 8 Case studies which analysed the MU combination of Tourism & Aquaculture. MU triplet Tourism & Aquaculture & Oil/Gas Decommissioning is shown in the same map.

2.2 Maritime sectors involved in MU combinations

A total of 13 sectors have been identified in the MU combinations examined in case studies. They include economic maritime sectors, as well as other uses of the sea (e.g. environmental protection and preservation of UCH sites). These sectors are all considered to have some potential for MU development in the European marine areas:

1. Offshore Wind Energy
2. Offshore Wave Energy
3. Offshore Tide Energy
4. Renewable Energy (general term)
5. Tourism
6. Environmental Protection
7. Environmental Monitoring
8. Fisheries
9. Aquaculture
10. Underwater Cultural Heritage (UCH)
11. Desalination
12. Maritime Transport (shipping terminal)
13. Oil & Gas Decommissioning

The analysis of sectors (Table 2 and Figure 9) shows that tourism, aquaculture and fisheries are analysed in the highest number of case studies. The six cases considering aquaculture are distributed in all sea basins, the six case studies considering fisheries are located in the Mediterranean, in the

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Atlantic and in the North Sea, and the six case studies considering tourism are located in the Atlantic, Baltic and Mediterranean basins.

Besides these three sectors, environmental protection is well represented and relevant for MU in five cases belonging to four basins (Mediterranean, Atlantic, Baltic and North Sea).

Offshore wind energy is considered in four case studies, all located in the Northern Europe (North Sea and Baltic Sea basins).

Renewable energy production - considered in general, without specification whether wind, wave, solar or tide - is addressed by three Atlantic and Mediterranean cases studies. In case study 2 (combination with shipping terminals), the authors consider the mid-to-long-term development of green energy from offshore wind, wave, and tide to cover the energy requirements of the port. GHG reductions and promotion of human-health are also considered. In case study 6 (combination with O&G decommissioning), the potential development of wind, solar, wave or tide sources was considered, being aware that no offshore facilities for renewable energy production currently exist in the study area, except for solar panels or mini wind propellers which produce energy to the existing platforms. Finally, in case study 7 (combination with a desalination plant), the main focus was on OWFs, while also wave and solar sources were considered, on the basis of the characteristics of the area and on existing pre-feasibility studies.

The other sectors considered in MU combinations at case study level are: UCH (two case studies in the Atlantic and in the Mediterranean), offshore wave energy, offshore tidal energy, O&G decommissioning, desalination, maritime transport and environmental monitoring (all analysed in single case studies).

Finally, it is interesting to note that 10 of the 16 overall combinations include the production of renewable energy at sea, either addressing a specific source (offshore wind, wave or tide) or considering it in a more general sense.

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	North Sea			Atlantic Sea			Baltic Sea		Mediterranean Sea	
	1A	1B	1C	2	3A	3B	4	5	6	7
wind energy	x		x				x	x		
wave energy				x						
Tidal energy		x								
Renewable energy				x					x	x
Oil and gas									x	
Tourism					x	x	x	x	x	x
Fisheries	x		x		x	x			x	x
Aquaculture			x	x	x		x	x	x	
UCH						x			x	
Desalination										x
Maritime transport				x						
Environmental protection		x			x	x		x	x	
Environmental monitoring		x								

Table 2 Sectors considered for MU in the case studies.

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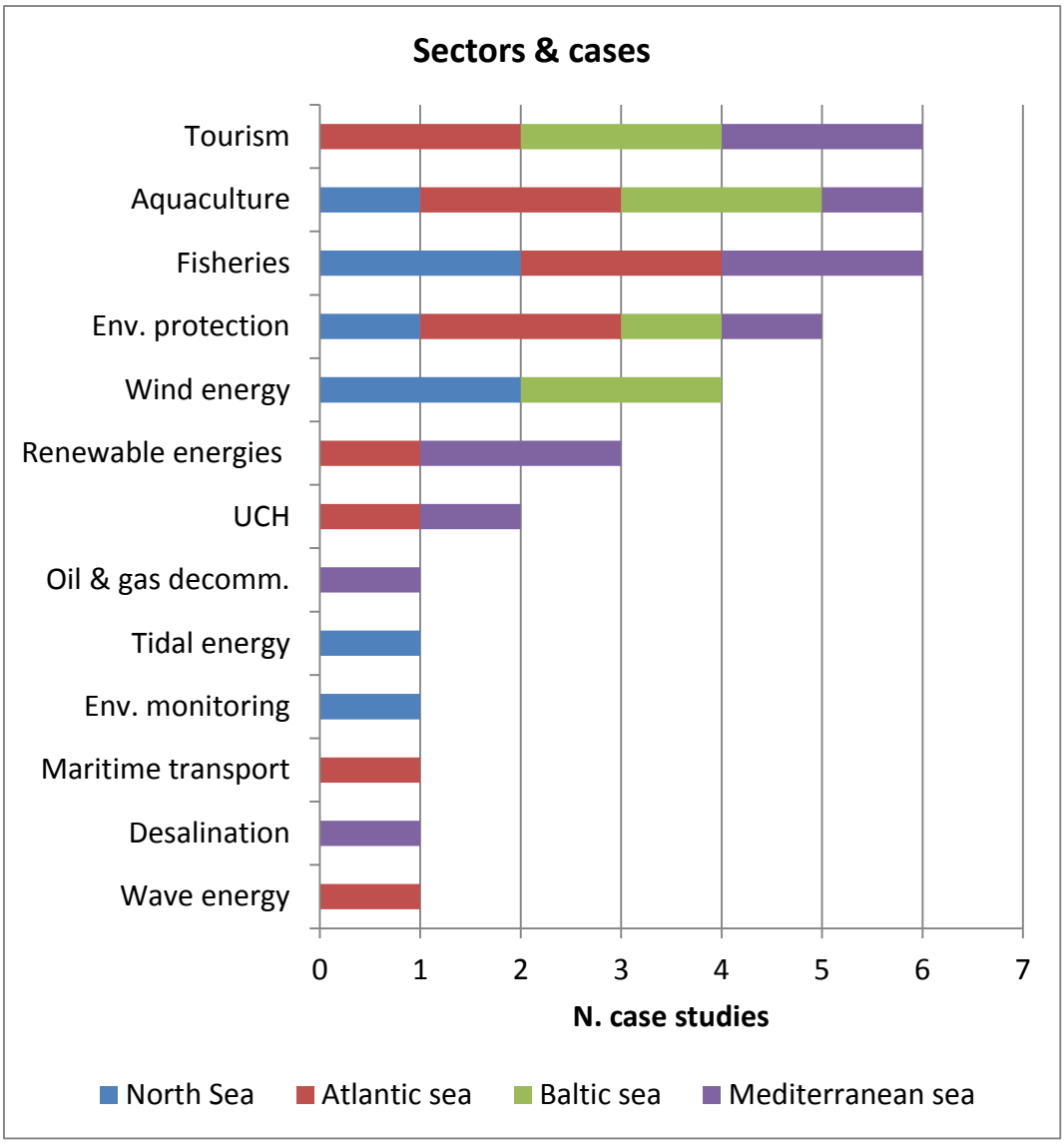

Figure 9 Sectors considered for MU in case studies.

Figure 10 and Figure 11 illustrate how the 13 sectors are combined across different MU combinations. Tourism, aquaculture and wind energy are among the most recurrent sectors in MU combinations considered across case studies.

Tourism was included in six different combinations (with wind energy, environmental protection, fisheries, aquaculture, UCH, O&G decommissioning) and it appears as the most adaptable sector, with potential for development in MU focused in the southern Atlantic and in the Mediterranean Sea. In the Baltic Sea, the combinations involving tourism are linked to the wind energy sector.

Aquaculture was considered in four different combinations (with offshore wind energy, wave energy, tourism and O&G decommissioning) of four case studies. The generic term “Aquaculture” includes cultivation of different species (fish, mussels or algae), according to the environmental characteristics of each case study area. For the North Sea case study (1C), no detail on preferred species is given since marine aquaculture does not yet exist in the German EEZ, even if a wealth of studies and

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projects investigating the suitability of candidate species and necessary engineering solution have been carried out since year 2000. For the Atlantic case study (2), a special focus was given to salmon farming in combination with wave energy infrastructures, even if a large potential also exists for mussel farms, in line with the general policy directions for the aquaculture sector. For the Baltic Sea case studies (4 and 5), the most promising typologies of aquaculture are long-lines for mussel farms, potentially used for fodder for poultry of fish farms. Algae cultivation was also considered interesting for the site, due to a great potential for uptake of nutrients. Algae cultivation was also considered interesting for the site, due to a great potential for uptake of nutrients. In the South coast of mainland Portugal (3A), the aquaculture sector, potentially combined with tourism, includes fish, mussel and algae aquaculture. For the Mediterranean case study (6), a specific focus was given to mussel aquaculture which is the most developed typology currently present along the Northern Adriatic coast.

As for aquaculture, wind energy was also considered in four combinations, together with fisheries, aquaculture, tourism and environmental protection.

	Wind energy	Wave energy	Tidal energy	Renew. energy (general)	Oil & Gas	Tourism	Fisheries	Aquacult.	UCH	Desalin.	Maritime transport	Env. protection	Env.Monitoring
Wind energy						4, 5	1A, 1C	1C, 4, 5				5	
Wave energy								2					
Tidal energy												1B	1B
Renew. energy (general)					6					7	2		
Oil & Gas						6		6					
Tourism							3A, 3B, 6, 7	3A, 6	3B, 6			3A, 3B, 6, 5	
Fisheries													
Aquacult.													
UCH												3B	
Desalin.													
Maritime transport													
Env. protection													
Env.Monitoring													

Figure 10 Sectors considered in case study MU combinations.

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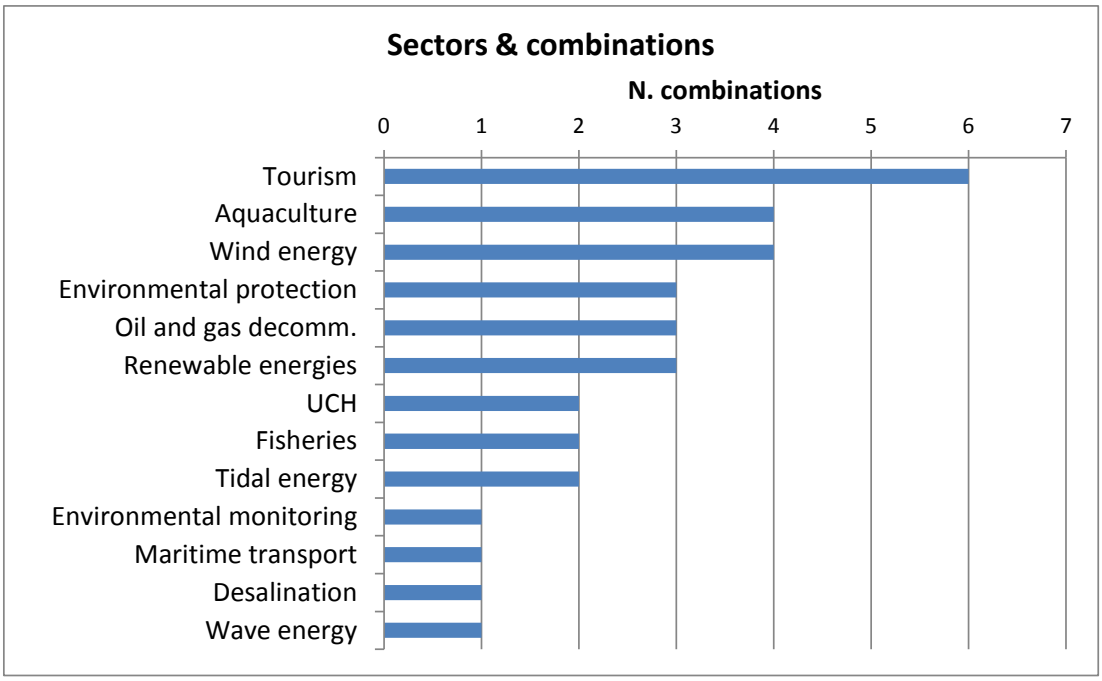

Figure 11 Number of combinations explored for each sector in case studies.

2.3 Comparative analysis of MU Potential and MU Effect across case studies

Resulting estimations of MU Potential and MU Effect (as defined in paragraph 1.2 concerning the methodology for case study implementation) per combination in the case studies are presented in the following two sections.

2.3.1 MU Potential

The MU Potential estimated for all the combinations considered in all cases studies (Figure 12) shows quite similar and generally low values, ranging between -0.4 and +0.4. Values for MU Potential resulted very close to 0 in several cases. About a half of the DABI catalogues are associated with a positive value of MU Potential and the other half with a negative one.

Such results are determined by a general condition of balance between the average score of drivers and that of barriers. In all the cases, these two categories of factors are both scored quite high (drivers: between 0.4 and 2.5; barriers: between -0.7 and -2.5). Only in the case study 4 (Offshore Wind & Aquaculture; Offshore Wind & Tourism), the average score for drivers is lower than 1 (0.4 and 0.6 respectively in the two combinations considered).

This overall low MU Potential is most likely linked to the low degree of implementation of MU in the study areas (and in the EU seas in general). Most case studies considered potential MU combinations, with only some examples of real application which still need to be widened and strengthened. In addition, being that these values are estimated by stakeholders' perception, there might be a general tendency to balance pros and cons of a new opportunity.

For these reasons, the case study analysis reveals a generally low potential for MU across EU seas, due to the balance between drivers and barriers. However, the generally high average driver scores

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across the cases suggest the existence of opportunities to develop MU. Working towards removing the main barriers can lead to the creation of conditions favourable for the development of MU.

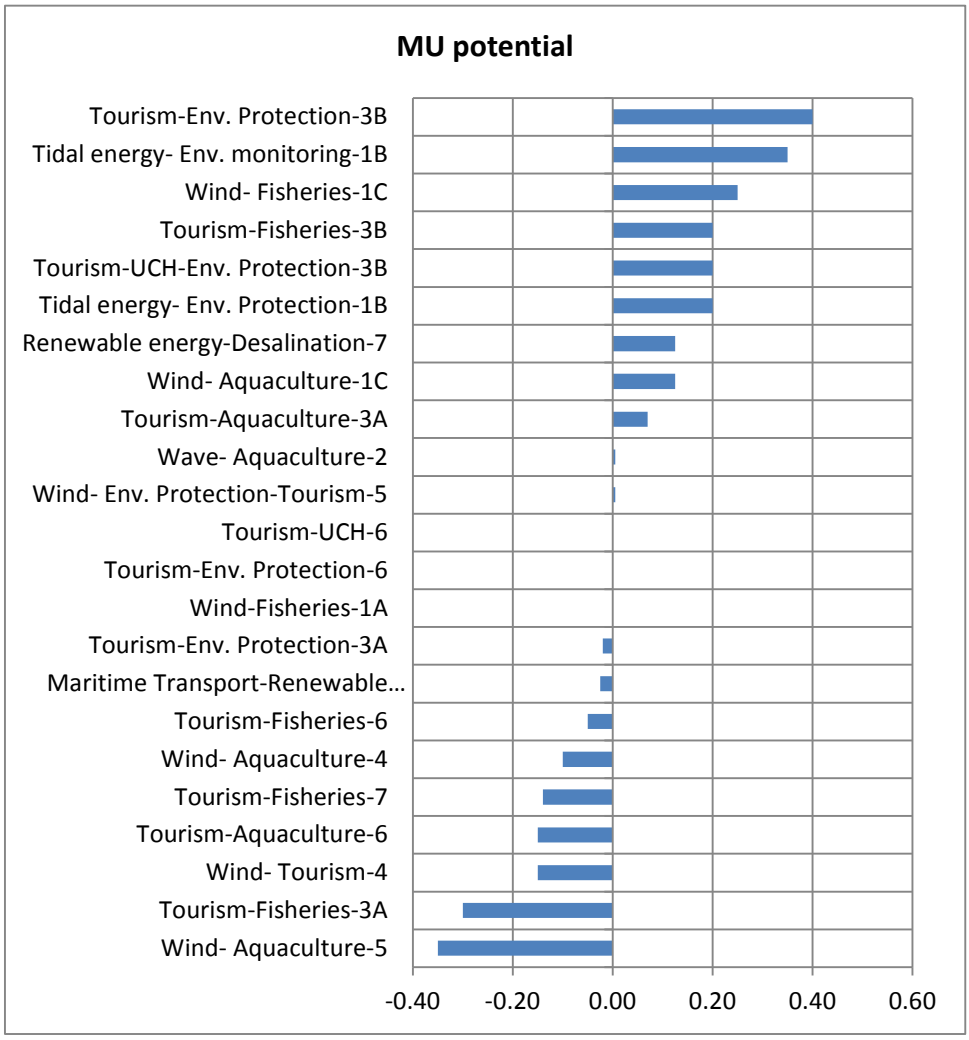

Figure 12 MU Potential across combinations and case studies (combinations are presented from the highest potential to the lowest potential)

The combinations analysed in two or more case studies (WI&F, WI&A, T&F, T&A, T&E) show a certain degree of variability of MU Potential with (slightly) positive and (slightly) negative values assigned from different cases for the same combination (Figure 13). This is due to the specificities of the local contexts, as discussed and detailed in chapter 4, concerning the integrated DABI catalogue for the most frequent combinations.

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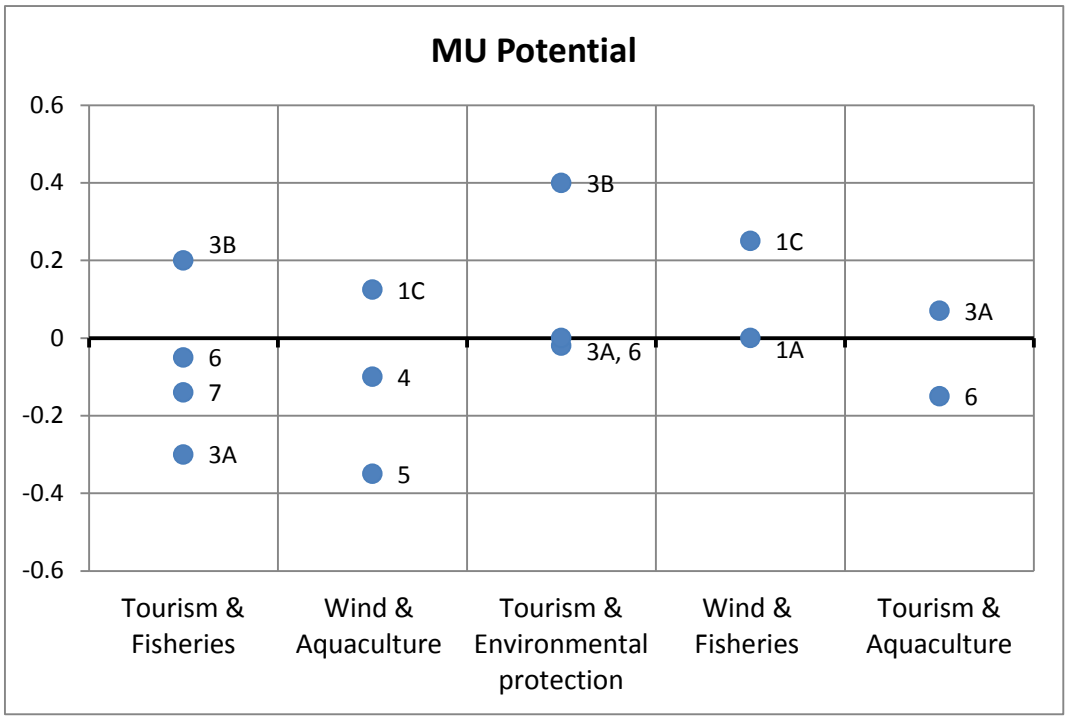

Figure 13 MU Potential for combinations addressed by two or more case studies.

2.3.2 MU Effect

MU Effect (Figure 14) analysed across different combinations and different case studies was mostly estimated as positive, with only two cases where negative impacts slightly prevail upon added values in stakeholders' opinion. MU overall effects range from -0.2 to 2.1.

This pattern might be partially determined by the general tendency of the stakeholders to envisage mostly the benefits of a new—and poorly known—approach to the use of the sea, instead of the negative impacts. This is again related with the scarce experience of implementation of MU in EU seas (e.g. deployed pilots).

Despite the balance between drivers and barriers generally shown by all combinations, there is a common agreement of stakeholders across the cases to considered MU as beneficial, if / once implemented. Facilitating MU development, by boosting the drivers and removing the barriers, could release MU potential and allow exploitation of MU benefits and opportunities in the study areas.

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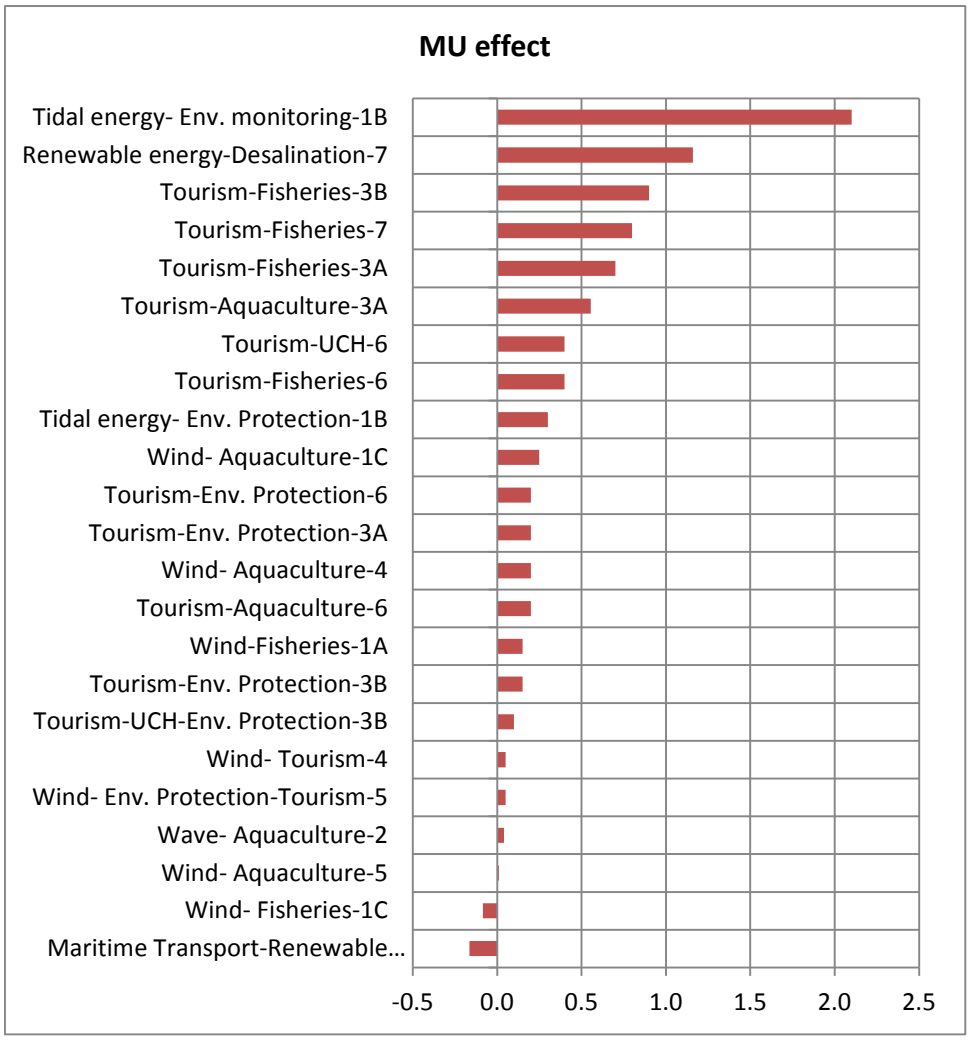

Figure 14 MU Effect across combinations and case studies (combinations are presented from the highest effect to the lowest effect).

The highest positive MU Effect (2.1) was calculated for the combination between Tidal Energy and Environmental Monitoring explored in case 1B. Many added values across a diverse array of categories were identified while no negative impacts associated with the MU combination were found, neither from the desk analysis nor from stakeholder engagement. This combination also has one of the highest positive scores for MU potential, hence showing an overall high opportunity of development. Unfortunately, it was addressed only by a single case study and hence comparative considerations cannot be proposed.

The second highest MU Effect is associated with the combination between Renewable Energy and Desalination investigated in case study 7 (Mediterranean Basin- Aegean Sea) obtained a high value for MU Effect (1.2). Also in this case, no negative impacts were identified against several added values, the most important ones related to the simultaneous energy and water autonomy of Mykonos Island, Greece, as well as to the possibility for green energy export when Mykonos will be connected to the central national electricity grid. Also in this case, comparative considerations cannot be proposed, because the combination was explored in only one case study.

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Negative values of MU Effect instead refer to the combination between Wind Energy and Fisheries for the case study 1C and to the combination between Shipping Terminals and Renewable Energy for the case study 2.

The most negative value of MU Effect (-0.2) relates to the combination between Shipping Terminals and Renewable Energy. Few but important societal and environmental negative impacts (average score -2.6) are identified and weighted more than a larger array of positive added values (average score 2.3) related to economic, societal, environmental and technical issues. The combination is also characterised by a negative MU potential, probably resulting from a relatively high number of "perceived barriers", which were taken into the account in the calculations. However, since this combination was assessed only in one case study, no comparative considerations can be proposed substantiating this conclusion.

The combinations analysed in two or more case studies (WI&F, WI&A, T&F, T&A, T&E) show almost positive average values, with similar assessments among most cases (Figure 15). However, a given degree of variability is present due the specificities of the local contexts, as discussed and detailed in chapter 4 concerning the integrated DABI catalogue for the most frequently analysed combinations.

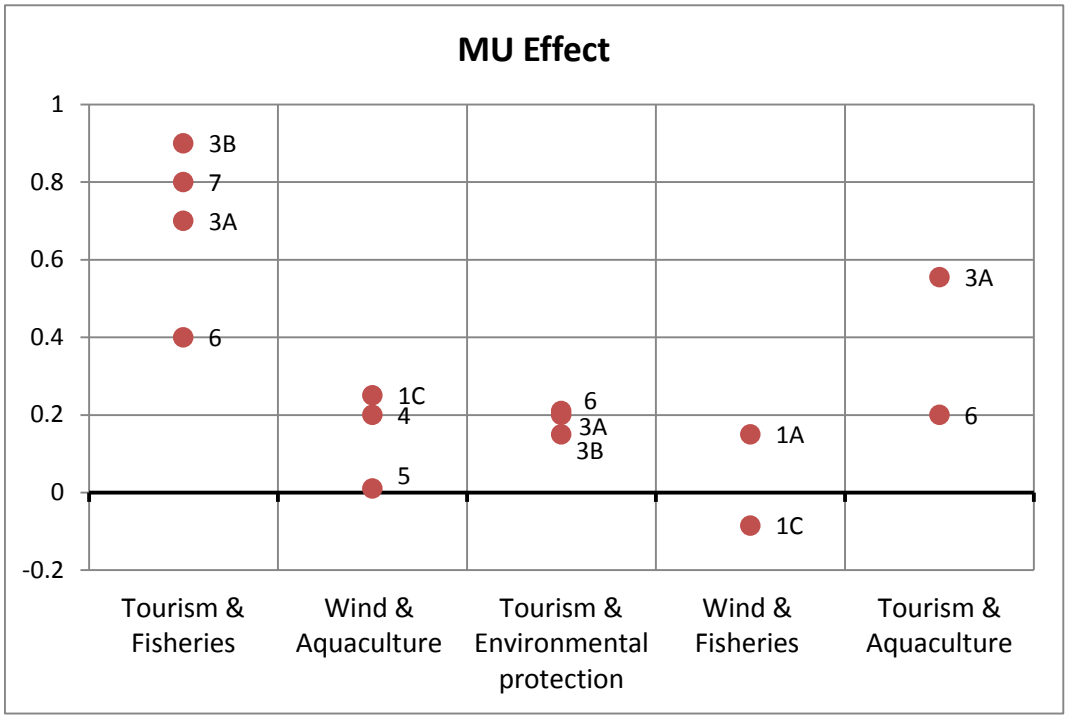

Figure 15 MU Effect across combinations addressed by two or more case studies.

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3 ANALYSIS OF FOCUS AREAS

All cases evaluated MU opportunities in their study area by analysing three common conceptual categories, defined as "Focus Areas" (see MUSES deliverable D3.1 for the complete case study methodology). The three focus areas included Focus Area 1 on "Addressing MU", Focus Area 2 on "Boosting Blue Maritime Economy", and Focus Area 3 on "Improving Environmental Compatibility". Focus Areas analysis was performed by answering a number of "Key evaluations Questions" (KEQs) identified at an earlier stage, and by involving stakeholders in discussion and answering process. Each case provided a set of answers to the common list of 22 KEQs. A comparative analysis of the answers provided in case study reports is given in this chapter, on the basis of a semi-quantitative analysis of the available information. A summary of outcomes is provided in the box below.

The comparative analysis considered the results from both "closed questions" (YES or NO answers) and open answers provided across the case studies. Simplification of the original answers was needed and the original case study reports should be consulted in order to get more precise and detailed insights regarding each single case. It is worth noting that not all cases answered to all closed and open questions.

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Summary

Focus Areas

Focus Area 1 - Addressing MU. MU development or strengthening was identified as relevant in all case studies areas, MU is expected to contribute to achieving environmental protection objectives, to satisfy the need for innovative tourism and for green energy supply. In some cases, MU could help solve spatial conflicts (mitigation measures in particularly crowded sea areas). In other contexts, the temporal dimension of MU is relevant (two or more uses can benefit from the same marine space, in different times: e.g. O&G decommissioned platforms). Sharing of resource is both a motivation for developing MU and an immediate benefit: the most suitable resources to be shared are vessels, personnel, landing sites or ports, offshore infrastructures and services (monitoring, safety, etc.). At the moment, MU is poorly considered within MSP and this might restrict its development. Land-based activities and infrastructure are relevant for MU development (e.g. grid connection, road networks, touristic facilities, waste management sites, etc.). Although the needed knowledge/technology for the development or strengthening of MU was assessed as generally available, the need for further technological innovation or for market-ready showcase installations or even for pilot projects and for dissemination of good practices was pointed out by all case studies.

Focus Area 2 - Boosting Maritime Blue Economy. All case studies positively assessed the expected capacity of MU of bringing about socio-economic added values, particularly in terms of job creation or retention in local areas. Increase of social awareness on local traditions, cultural heritage, environmental resources and ecological solutions, and boost of local economies (through the promotion of parallel economic activities, development of related services on land and Blue Growth) were also highlighted as expected benefits. Specific elements of attractiveness for investors were identified: new opportunities for revenue deriving both from diversification of traditional economic sectors and from development of parallel economies; introduction of new high quality products; valorisation of natural, cultural and socio-economic aspects of the territories. Insufficient dialogue among stakeholders was highlighted in almost all cases as a key limitation to MU development. The need for further cooperation was identified in all cases. Several conditions were identified in order to create an environment favourable to MU such as the development of visions and strategies encompassing MU and accompanied by measures that lower investment risks, including MU in MPS processes, implementing scalable demonstration projects, disseminating successful cases and promoting testing sites.

Focus Area 3 - Improving Environmental Compatibility. MU is able to provide a series of environmental benefits that enhance biodiversity protection, contribute to fish stock recovery, reduce GHG emissions, improve environmental education, increased data availability, etc. MU could also contribute to the reduction of environmental impacts of maritime activities. To do so, increased public awareness about benefits of MU is a key factor. In addition, several actions are needed such as targeting MU of existing funds, inter-sectorial dialogue and stakeholder engagement including exchange of good practices, actions to improve the licensing framework which ensures that environmental issues are addressed, realisation of studies evaluating impacts and benefits, development of common guidelines for MU implementation. Additional research on environmental friendly MU technology is still needed including scalability and deployment in deeper and more exposed locations for “hard” MU combinations and to improve environmental sustainability of certain maritime activities for “soft” MU (also through sharing of good practices). SEA and EIA procedure could support MU implementation in several local contexts.

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3.1 Focus Area 1 "Addressing MU"

This Focus Area analyses potentialities of MU development. It is applied both to cases where MUs of marine space are not developed yet and to cases where MUs are already in place, but actions are needed in order to fully exploit MU potential.

This Focus Area was explored through KEQs, as reported in the following sub-sections.

3.1.1 Relevance of MU

Is it possible to establish / widen / strengthen MU in the case study area? (Y/N) For which MU combination in particular? What needs would MU satisfy?

In all the cases, the analysis confirms the possibility to establish/widen/strengthen MU in the marine areas (Figure 16), indicating that there is room and interest towards MU development. Where already implemented, MU is still at its initial stage.

The possibility to satisfy some specific demands at local levels through MU was also highlighted (Figure 17), namely:

- contributing to achieving environmental protection objectives, including eutrophication reduction (1B, 4, 5, 6);
- satisfy the increased need for innovative tourism, especially focused on a sustainable and responsible tourism (3B, 5, 6);
- satisfy the increasing need for green energy supply was suggested in three case studies (1B, 2, 7). Progression towards the achievement of legislated renewable energy deployment targets was specifically expressed, as well as the improvement of energy supply to rural communities or to aquaculture facilities;
- synergies among different sectors to reduce costs, increase response to sea food demand (especially high quality and local sea food, harvested with sustainable practices), and strengthen the local economy, especially through diversification of traditional activities were also highlighted as needs that MU could satisfy.

3.1.2 Saving sea space

Is space availability an issue for MU development / strengthening in the case study area at present? (Y/N)? Will space availability become an issue for your area in the future? For what elements is space currently / could become an issue?

Space availability is considered an issue for the development of MU only in some of the local contexts (4 cases) (Figure 16), mainly due to the presence of conflicts between economic activities. For example, in the Northern Coast of Scotland (1B), the majority of stakeholders suggested that space availability is currently an issue as the study area hosts considerable vessel traffic, through the commercial shipping and tourism industries. This vessel traffic is likely to increase due to operation and maintenance (O&M) vessels servicing TCT arrays. In the German North Sea case study (1C), marine space is an issue especially regarding the combination between wind energy and fisheries, since both sectors compete for space, seeking similar characteristics. As for the Northern Adriatic Sea (case study 6), though the tourism driven combinations explored in this case study were not aimed to solve the existing conflicts, the presence of a strongly “crowded” area was commonly assessed as a driver to develop new initiatives for MU. Furthermore, the need to consider and specify MU in the framework of the on-going MSP process in the area was expressed.

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3.1.3 Sharing resources

What would be the most important resources to be shared between uses (infrastructures, services, personnel, etc.)?

Sharing of resources represents an essential motivation and an immediate benefit for MU. The most relevant shared resources among uses firstly are (Figure 17) vessels, followed by human resources and landing sites or ports, as well as offshore infrastructures (including wind energy infrastructures and O&G platforms) and services (including monitoring, surveillance activities).

Are there MU combinations and potentials that will share the same resources but in different times (e.g. reuse of an infrastructure after the end of its first life and original scope)? (Y/N). What are they?

The possibility of sharing the same resources but in different times is relevant in 5 case studies (Figure 16). The following situations are relevant:

- O&G platforms: clearly, the use of the same resource (i.e. the offshore platforms) in different times represents the main driver for the combinations explored in the Northern Adriatic Sea (case study 6) involving O&G decommissioning. The opportunity of re-using these platforms in combination with aquaculture, tourism and renewable energy was investigated.
- Fishing vessels: case studies 3A and 3B assessed in this way the activities of pescatourism, since fishing vessels (single-use infrastructure) can be adapted and used for touristic activities when they are underused for their primary activity, hence combating the seasonality of coastal tourism.
- Windfarm infrastructures: sharing resources in different times could involve the foundations of the wind turbines after their commercial lifetime, creating the opportunity for MUs with other sectors (e.g. aquaculture, environmental protection). This concept was expressed in case study 4 and (though assessed as unlikely) in case study 5.

3.1.4 Maritime Spatial Planning

Are existing and/or potential MUs taken into account within the existing or under developing Maritime Spatial Plans? (Y/N)

MU is already taken into account in the MSP process in only 4 case studies (Figure 16), three of them located in the North Sea and the other one in the Northern Atlantic Sea. For the North Sea, even if MSP does not explicitly mention MU, minimisation of conflicts and maximisation of synergies are basic concepts of national marine plans, local or sectoral plans. However, MSP must be mature in order to identify and amalgamate lessons learned. Examples of plans encouraging MU (case studies 1A and 1B) in Scotland are the National Marine Plan, Pilot Pentland Firth and Orkney Waters Marine Spatial Plan, Clyde and Shetland plans, as well as Scotland marine legislation. Similarly, in the North Atlantic case study (2), the potential of co-location of aquaculture with marine renewable energy can benefit from several planning documents such as the UK's multi-annual national plan for the development of aquaculture, the draft Welsh National Marine Plan and the National Renewables Infrastructure Plan. In the other European basins (Baltic Sea, Eastern Atlantic and Mediterranean), case study reports evidenced a less mature MSP process, stressing: (i) the lack of a regional MSP (Azores), (ii) the absence of MU in sectoral plans (Aegean Sea), (iii) the presence of only recommendations from earlier projects (Baltic); (iv) the presence of initial MSP-related activities, including national Guidelines to develop MSP (Northern Adriatic). However, on-going projects

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including MU in their analysis are mentioned as stimulus for a development of MSP toward MU concepts.

3.1.5 Land-based activities

How are MUs connected or related to land-based activities?

MU is linked or related to several land-based activities and can benefit from already existing infrastructures and services. Need for energy transportation from sea to land and for grid connection are relevant in most cases. The combinations involved are those considering offshore renewable energy production, especially considering case study 1B (tidal source), case study 2 (wave source), and case studies 6 and 7 (not specific source of energy). Similarly, the presence of a port providing services either for aquaculture (e.g. case study 2) or for electricity connection (e.g. case studies 1B, 1C, 6) emerged in this cross –study analysis. Other land infrastructures and services, which are more combination-specific (including road networks, electricity cables, touristic facilities, waste management sites) were highlighted. The presence of inland touristic itineraries and touristic attractions, creating new connection opportunities between touristic experiences at sea (e.g. diving or boat trip) and on land (naturalistic paths, museums, research centres) emerged from two case studies which explored different combinations with tourism in the Baltic and Mediterranean Sea basins (case studies 5 and 6).

3.1.6 Technology

Is the needed knowledge and technology for MU development/strengthening in the case study area already available (Y/N)? What is the level of maturity of available knowledge? What is the level of readiness of available technology? Are there still research needs?

Though the needed knowledge/technology for the development or strengthening of MU was assessed as generally available, the need for further technological innovation or for market-ready showcase installations or even for pilot projects and for dissemination of good practices is stressed in all 10 case studies. Technology was not considered available only for case studies 3B, 4 and 5 for those combinations involving offshore expansion of aquaculture or the creation of artificial reefs. On the contrary, for "soft" MUs, involving for example different combinations with tourism, no advanced technology is generally required, even if positive development towards MU implementation could result from innovative technological solutions suggested by stakeholders.

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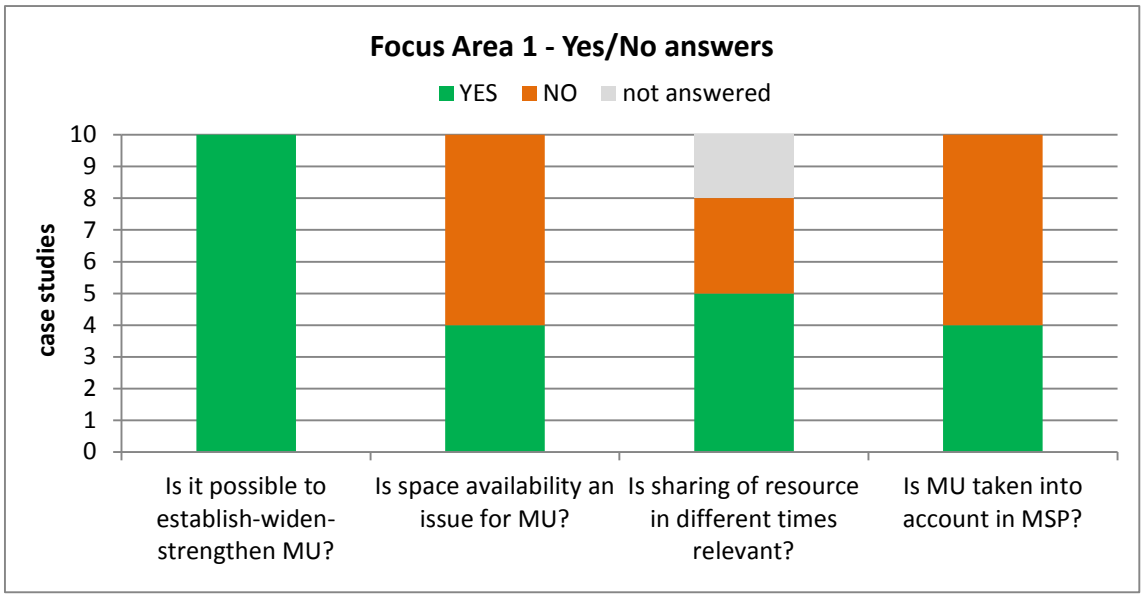

Figure 16 Number of Yes/No answers for questions of Focus Area 1.

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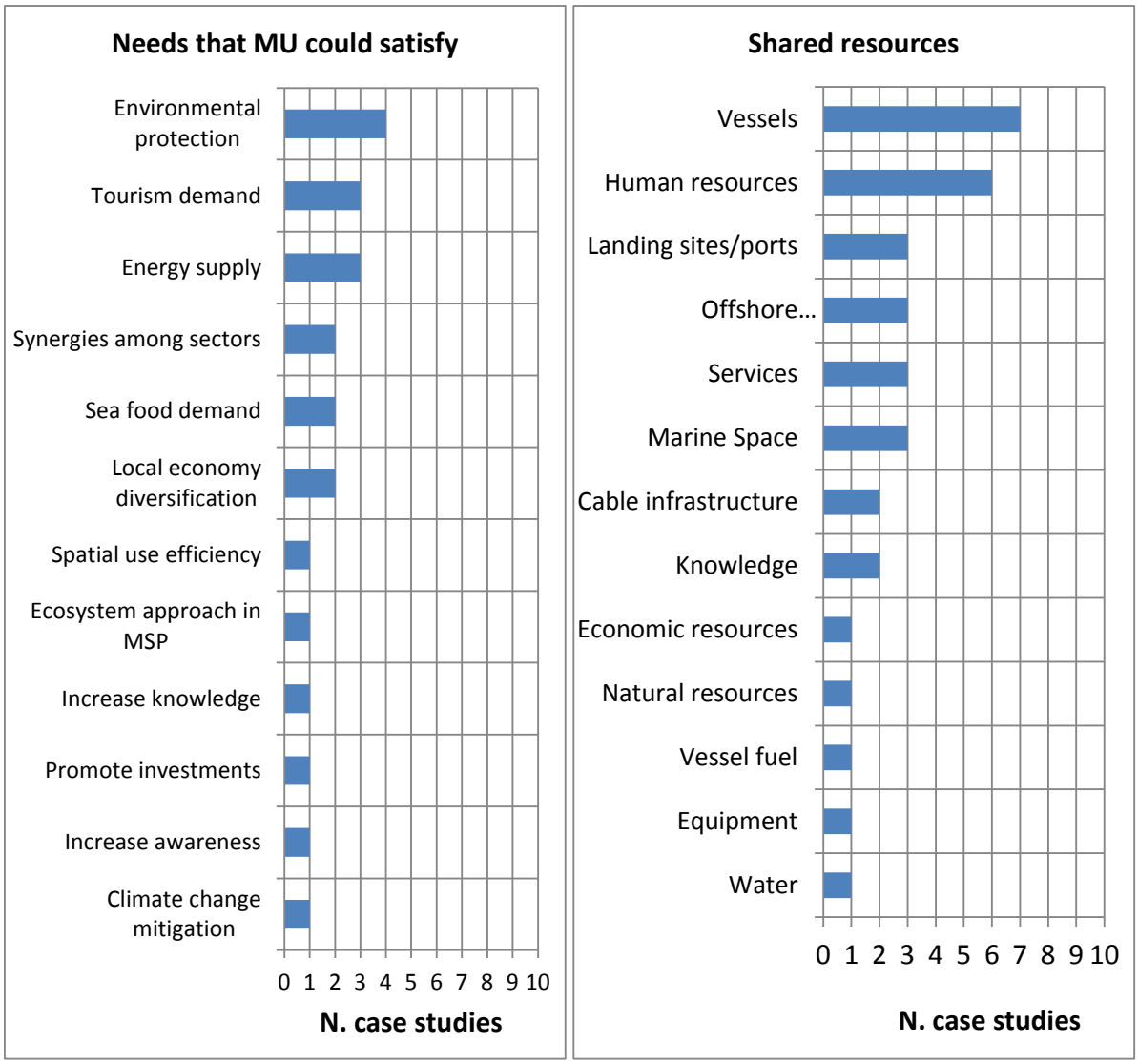

Figure 17 Needs that MU could satisfy and shared resources among uses.

3.2 Focus Area 2 "Boosting Blue Maritime Economy"

This Focus Area analyses those aspects of MUs strictly linked to the development of the maritime economy. The main objectives are: to highlight economic added value of co-use of resources (infrastructures, services, personnel); to identify strategies reducing risks associated with economic development of combined uses; to promote local entrepreneurship and create context to favour job creation, broader social aspects and promote economic recovery.

This Focus Area was explored through KEQs, as reported in the following sub-sections. As for Focus Area 1, for most of these questions, Yes/No answers are expected, allowing to synthetize and easily represent the available information (Figure 18). A high level of agreement among case studies was identified, concerning almost all questions.

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3.2.1 Societal and economic benefits

Do you see added values for society and the economy at large and/or for local communities of developing / widening / strengthening MU in the case study area (Y/N)? What are the most important ones?

All case study reports assess positively the role of MU in bringing *societal-economic values* (Figure 18) and tools for their quantifications seem to already exist. Socio-economic added values (Figure 19) firstly include job creation/retention, being mentioned by all case studies except for two. The development of new specialized jobs and the opportunity of preserving and re-evaluating traditional activities such as fisheries were especially expressed. The increase of social awareness (on local traditions, cultural heritage, environmental resources and ecological solutions) and the boost of local economies (promotion of parallel economic activities, development of related services on land, promotion of blue growth) are two other important factors which emerged from half of the case studies. Other interesting socio-economic added values are related to the general knowledge upgrade (technological innovation, good practice exchange, valorisation of expertise, cultural growth).

Is it possible to quantify the socio-economic benefits related to MUs and how they (could) contribute to the sea economy at local and regional/national scales (Y/N)? What tools, knowledge, experiences are available?

Tools for quantification of societal-economic added values are considered generally available (in eight cases, Figure 18) and include estimation of the gross value added (GVA) to the economy (nationally, regionally, and locally), estimation of ecosystem services, mapping tools, turnover, employment and education statistics, economic and environmental studies, business plans, product life cycle assessments and Blue Growth contribution to regional sustainable development.

Would MU development / strengthening be an opportunity for job creation and / or job requalification in your area (Y/N)?

MU development / strengthening is generally assessed as an opportunity for job creation and / or job requalification in case study areas (Figure 18), with considerable agreement among cases. Indeed, this opportunity is considered a societal-economic added value of a MU approach, as arisen from the previous question.

3.2.2 Investors

Do you see possible elements of attractiveness for investors in developing / widening / strengthening MU in the case study area (Y/N)? What are these elements?

Some elements of attractiveness for investors were identified in 8/10 case studies (Figure 18). These are summarised in Figure 19. Firstly, they are related to the development of new opportunities for revenue, deriving both from diversification of *traditional* economic sectors (e.g. increasing demand for diverse forms of tourism, diversification of traditional activities experiencing economic crisis) and from the development of parallel economies. Secondly, the production of new high quality products is considered (for example if aquaculture is performed offshore, in cleaner waters, in combination with wind energy). Green products are also considered as attractive: if renewable energy is employed or if sustainable practices are adopted. Also, primacy in the sector is an asset: benefits from being a first adopter would attract investors. Similarly, further elements of attractiveness rely in

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the natural, cultural and socio-economic aspects of the territories, offering attractive potentialities for the development of new MU experiences.

Who are possible investors interested in developing / widening / strengthening MU in the case study area?

Main reported categories of investors potentially interested in a MU approach include commercial business category (such as economic operators of sectors involved in the combinations, private investment companies), research institutes, non-governmental organizations (NGOs) and policy makers/regulators. Where high initial costs are foreseen, large corporate investors can have a major role. Similarly, a clustered organisation of economic operators in associations, cooperatives or networks can facilitate the needed investment.

3.2.3 Dialogue

Is there sufficient dialogue between the stakeholder sectors for developing / widening / strengthening MU (Y/N)?

An insufficient *dialogue among stakeholders* was remarked in almost all cases (Figure 18). Indeed, for the two cases where a sufficient dialogue was assessed, the need for additional dialogue was stressed as well. Though in some cases experiences dialogues were reported also coming from previous projects, further engagement of all relevant stakeholders emerged in almost case studies. Indeed, the need for further cooperation among different sectors involved in MU, the need to develop discussion platforms involving all stakeholders of different categories (policy, research, commercial, etc.) and also exchanging different success experiences is a major element of recommendations which emerged in several case studies (see chapter 5).

3.2.4 Vision, strategies and projects

In order to promote MU development / strengthening in the case study area,

- *would the availability of a vision/strategy (e.g. at national or sub-regional level) be helpful (Y/N)?*
- *would a feasibility study including evaluation of alternative scenarios be helpful (Y/N)?*
- *would detailed projects on already identified simulations be useful (Y/N)?*
- *do you see other enablers?*

The *availability of a vision/strategy or feasibility studies or detailed projects* was indicated as positively influencing MU development by all case studies (Figure 18). In some cases, a vision is already in place (case study 1B) or multiple research projects have been already carried out (case study 1C). The need for financial incentives or measures that lower investment risks accompanying visions and strategies was also evidenced (case study 2), while strategies and visions should be embedded in MSP processes (case study 6) and shared by all consulted stakeholders (case study 3A). Scalable demonstration projects, successful cases, and testing sites are considered particularly useful for the development of MU and were put in evidence in several case study reports.

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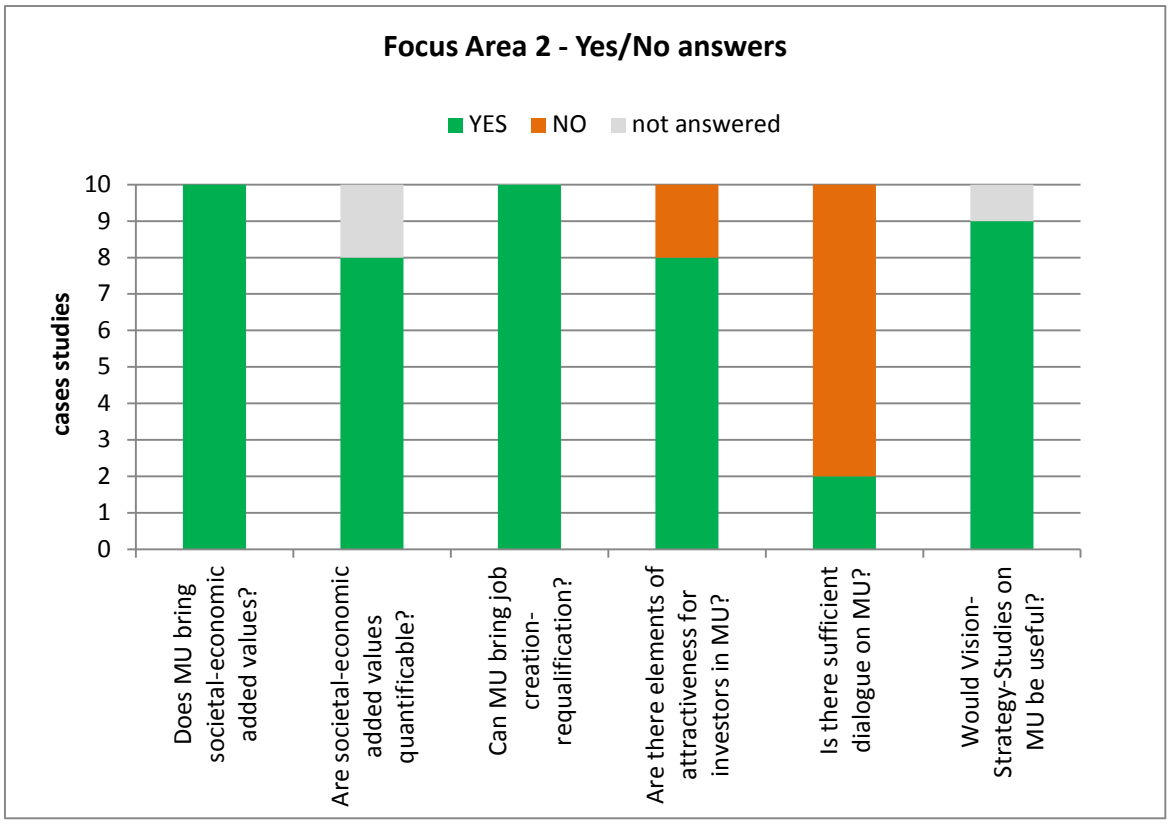

Figure 18 Number of Yes/No answers for questions of Focus Area 2.

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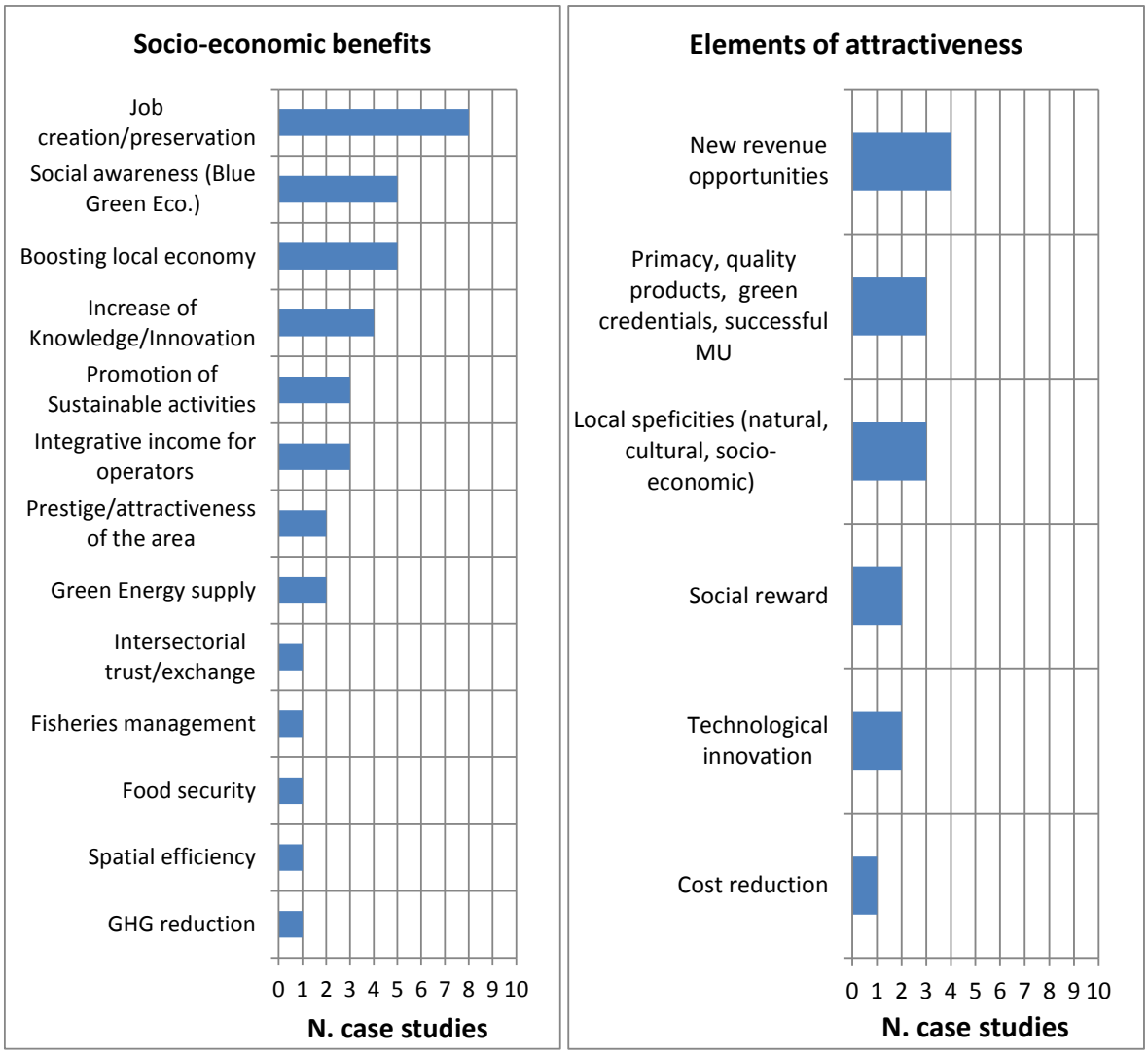

Figure 19 Added values for society and the economy and elements of attractiveness at large and/or for local communities of developing / widening / strengthening MU in the case study area.

3.3 Focus Area 3 "Improving Environmental Compatibility"

Focus Area 3 "Improving Environmental Compatibility' analyses those aspects of MUs linked to the protection of the marine environment and/or minimization of existing impacts. The main objectives are: to identify solutions to concentrate marine activities in order to minimize the use of sea space; to identify positive and negative impacts of MU; to identify technical solutions to minimize environmental impacts; to identify win-win solutions triggering both socio-economic development and environmental protection (e.g. sustainable tourism and MPAs, or small scale fishery/aquaculture and MPAs).

This Focus Area was addressed answering to KEQs, as reported in the following sub-sections. Some of them are closed questions and Yes/No answers are expected from case studies. However, the cross analysis of case study reports revealed the presence of more complex answers not easily

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synthesisable, especially for questions related to environmentally friendly knowledge/technology and for the promotion of MU through SEA/EIA procedures.

3.3.1 Environmental benefits

What are / would be the environmental added values (positive environmental impacts) of developing / widening / strengthening MU in the case study area?

Most of the *environmental added values of MU combinations* (Figure 20) suggest possible benefits for biodiversity conservation, nursery area creation or fish stock recovery offered by various combinations, especially involving offshore infrastructures (e.g. wind or tide turbines). A potential for fish stock recovery was also considered an added value for the combination between fisheries and tourism whenever this combination compensates a loss of income for fishers changing towards more sustainable and respectful fishing techniques. Similarly, issues related to reduction of GHG emissions (climate change mitigation) is an important added value which emerged from case studies that explored possible combinations with offshore renewable energy sources. Better environmental education and more effective environmental protection are expected from different combinations. For example, better environmental protection can derive from the combination between environmental protection and tourism (whenever funds generated from tourism are expected to converge to environmental protection initiatives), from pescatourism activities (if complementary activities of environmental protection are performed) or from aquaculture driven combinations (both aquaculture and environmental protection benefits of high quality waters). More monitoring data, more space for nature, food security/sustainability, eutrophication reduction, water saving and an increase in sustainability are other environmental added values expected from MU implementation.

Which tools (conceptual, operational) are used or should be further developed and used to better estimate the environmental impacts and benefits of MU?

To better estimate the environmental impacts and benefits of MU, monitoring tools (such as use of new technology, remote sensing or monitoring plans) were mentioned in a half of case studies, revealing the need to fill gaps in data collection. The use of EIA procedures are also mentioned to assess environmental impacts, as well as the development of environmental status indicators and of other tools available or currently under fine-tuning and research (e.g. cumulative effects assessment, maritime use conflicts, marine ecosystem services threat assessment tools, etc.). Capitalisation on the existing research experience (gathering data, exchanging practices) and engagement of stakeholders in the evaluation of impacts were also mentioned in case study reports.

3.3.2 Saving free space

Is saving free sea space for nature conservation a driver for MU the case study area (Y/N)? Are there evidences about the present and future benefits of reserving free sea space? What are they?

Free space for nature conservation is a driver for MU only in three cases (1C, 3A and 3B). In these cases, free space can be considered a *de-facto* protected area and can be reserved for the use of what are currently far future uses such as carbon sequestration, hydrogen generation or others. Related ecosystem services include ecological functions (e.g. CO_2 sequestration), as well as of species (e.g. beneficiating fisheries, biotech), and habitats or landscapes (e.g. beneficiating tourism).

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3.3.3 Improving environmental compatibility of maritime activities

What practical actions would you undertake to link MU development / widening / strengthening to improved environmental compatibility of maritime activities?

Practical actions to improve the environmental compatibility (Figure 20) through MU include firstly initiatives of environmental education in order to increase public awareness about benefits of MU for the environment. Moreover, quite different types of actions are suggested across case studies and include fund optimisations, inter-sectoral dialogue and stakeholder engagement (including exchange of good practices), environmental monitoring initiatives, actions to improve a licensing framework which ensures that environmental issues are addressed, realisation of studies evaluating impacts and benefits, development of common guidelines for MU implementation, promotion of complementary initiatives of environmental protection, and the adoption of an ecosystem-based approach to marine planning.

Are there win-win solutions triggering both socio-economic development and environmental protection already available in the case study area that MU should take up (Y/N)? What are they?

Win-win solutions triggering both socio-economic development and environmental protection were mentioned in 5 case studies. They concern very heterogeneous past or on-going local reported experiences especially including the touristic synergetic use in combination with submerged marine archaeological sites (1B), environmental protection and research (cases 3A and 3B), diving activities in collapsed gas platforms also subjected to environmental protection regimes (case study 6), and sea water filtration to reduce algae content (case study 4).

3.3.4 Environmentally friendly technology

Is the environmentally friendly knowledge / technology for MU development / strengthening in the case study area available (Y/N)? What is the level of readiness of available solutions? Are there still research needs for blue/green technologies for MU?

Environmental technology revealed a sector in development (as already discussed according to sub-section 3.1.6 of focus area 1), with several research needs, including scalability and deployment in deeper and more offshore locations. More research is needed especially for offshore aquaculture and artificial reefs (case studies 2, 4 and 5), while for "soft" MU it is necessary to improve good practices and to import blue/green technologies (3B) or to perform specific investments to improve environmental sustainability of certain maritime activities.

3.3.5 SEA & EIA procedures

Would it be possible to promote MU through SEA/EIA procedures (Y/N)? What modifications would you suggest at your national/local level to promote MU through SEA/EIA procedures?

Concerning the possibility of promotion of MU through SEA/EIA procedures, several positive answers assign relevance to this aspect. For example, for the Eastern Atlantic case studies (case studies 3A and 3B) and for the Baltic sea basin (case study 4), mandatory EIA for all activities at sea would promote MU in this context. The need for more complete assessments in regards to the drawbacks and benefits of a MU scenario with respect to single a use scenario (1C, 7), but also for streamlining the EIA procedures (2) and making them fast enough (6), was reported. Positive scores to EIA, which include MU as part of the application, were proposed by stakeholders of case study 5.

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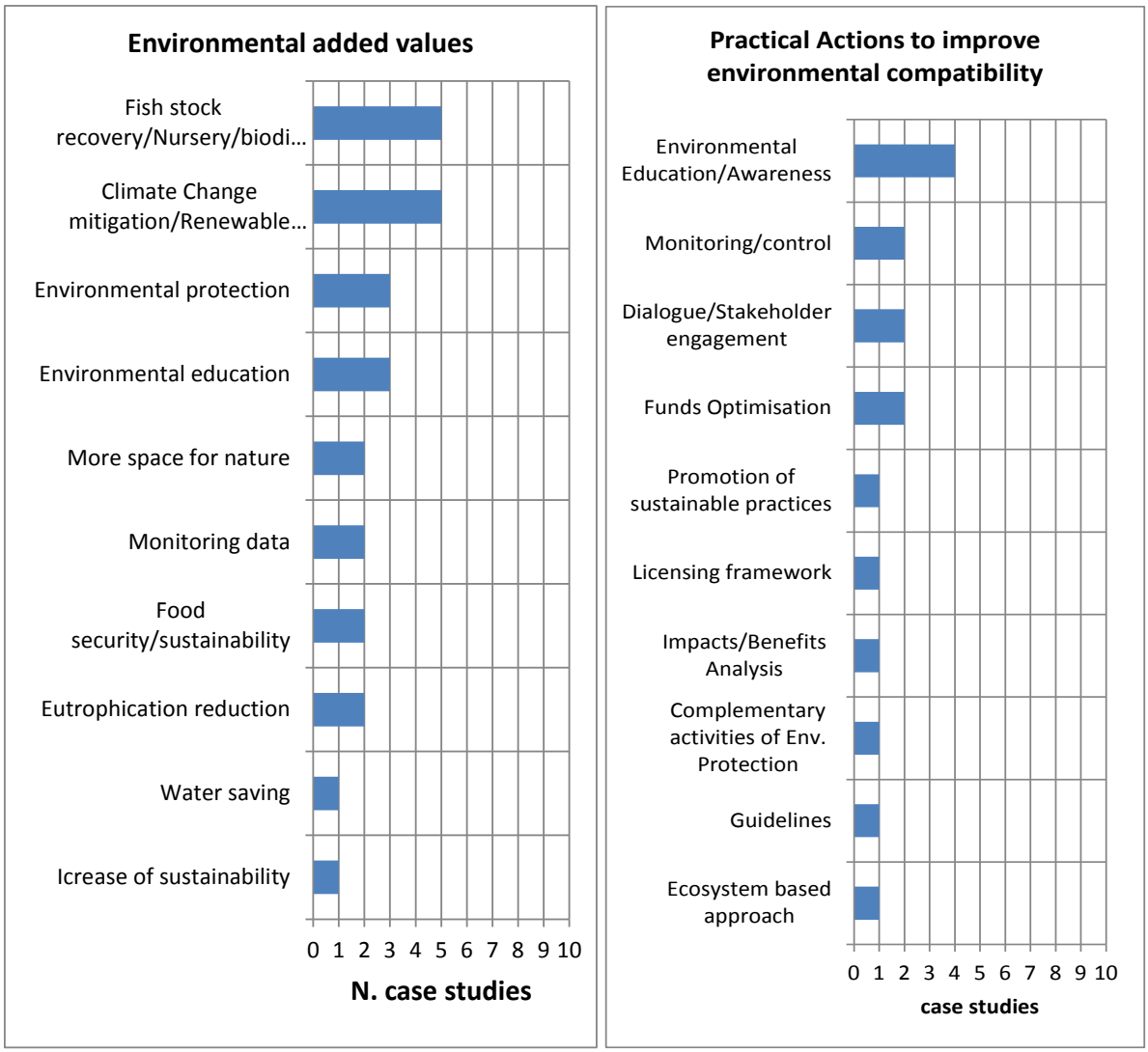

Figure 20 Environmental added values and practical actions of developing / widening / strengthening MU in the case study areas.

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4 INTEGRATED ANALYSIS OF THE MOST FREQUENT COMBINATIONS

In this chapter, the most important drivers for MU development and the most relevant barriers to be overcome in order to create a favourable environment for implementation of MU at a local level are summarised, according to the outcomes of the case study analysis.

The most important factors representing Added values of MU and MU Impacts are also summarized.

This information is provided with regard to the five combinations investigated in two or more case studies: 1. Tourism & Fisheries; 2. Wind Energy & Aquaculture; 3. Tourism & Environmental Protection; 4. Wind Energy & Fisheries; 5. Tourism & Aquaculture.

To allow for a comparative analysis of these combinations, integrated DABI catalogues were compiled for each of the five combinations, merging the information from the original catalogues delivered in the case study reports. These new catalogues of factors (drivers, barriers, added values and impacts) therefore include both common factors and single-case factors (hence more site-specific). The information about the source of each factor is tracked in new integrated catalogues, allowing to understand if the factor has a local validity or if it represents a common issue for more cases. All stakeholder scores from different case studies were considered together to compute average scores (for single factors and for categories) under the same combination. Some adjustments of the original textual formulation of factors were required, as well some changes in the attribution of each factor to the proper category were performed, especially to merge information coming from different case studies in a harmonized way.

Most relevant outcomes from this chapter regarding drivers and barriers are summarized in the following boxes. It is worth noting that the combination between Wind Energy & Fisheries is not described with a box because too few commonalities have been identified through the cross-case analysis and, therefore, no general conclusions can be drawn from cases in terms of common drivers and barriers.

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Tourism & Fisheries

This MU is already somewhat implemented across Europe and in some of the MUSES case studies. It surely needs to be widened and strengthened and this can be promoted by exploiting the opportunities offered by some relevant drivers, such as the existence of some legislative frameworks at EU and - in some cases - at national and subnational levels, and of specific, focussed funds (within EFF and EMFF). The increasing demand for diversification of touristic offer and for high-level products (e.g. responsible, eco-friendly tourism, consumption of local fish products, links to the culture of the territories, etc.) represent additional drivers for this MU. Also, societal motivations, like maintaining a fishing community's identity, play an important role.

In order to release the development potential of this MU, some critical barriers must be removed. The most relevant are still of a legislative nature and are related to the severe regulations that limit this activity by imposing specific hygiene and security requirements of passengers on the vessel. Lack of harmonized procedures and guidelines at national levels is also an issue. In addition, strengthening of this MU would enhance fishermen skills (e.g. foreign languages, communication, etc.) and also the adaptation of fishing vessels, and the availability of adequate logistic infrastructure on land. Fragmentation of fisheries should be also overcome since it presently acts as a barrier due to the poor investment capacity of the single operators. Oversaturation of the touristic market should be also resolved, particularly in the most popular EU beach tourism destinations (e.g. Mediterranean).

Offshore Wind Energy & Aquaculture

This MU can count on a quite large knowledgebase from research projects and pilot sites. It was selected as potentially relevant in some MUSES cases for some areas where no examples of implementation are presently available. Offshore wind energy production in combination with mussel or seaweed cultivation are the most promising characters for this combination. Its implementation should be promoted through national policies and specific legislation (recognized as relevant drivers), and by encouraging the sharing of resources. Interest of local communities and environmental benefits (e.g. nutrient sequestration in the Baltic) can also play a role at local scale.

At present, the implementation of this MU is limited by a series of barriers, starting from technical ones (aquaculture devices are not suitable to be mounted on all kinds of wind farm infrastructures: MU should be designed as such from the beginning). Additional difficulties in the licensing process in comparison with single uses represent an issue and there is the general perception that investment needs are larger for MU than for single uses. The lack of adequate incentives for pilot projects and for their scaling up was also underlined, together with the lack of dialogue and cooperation among the sectors involved and of public awareness on possible MU benefits.

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Tourism & Environmental Protection

This combination consists of developing touristic activities inside designated marine areas, managed with the goal to preserve natural resources. It is an opportunity to expand the protection of the marine environment by developing socio-economic activities at the same time, with advantages for both sectors. Some MUSES case studies considered this combination, based on examples of implementation, although limited.

Favourable conditions for expanding the implementation of this MU can rely on the current existence of marine protected areas and on the need for their expansion and new designations, in agreement with EU and international policies. The increasing demand for sustainable tourism, together with the opportunity to identify multiple synergies between tourism and environmental protection, should be exploited to widen the implementation of this MU.

The main common barriers for the implementation of this MU are due to the lack of a common vision on the development of this MU between stakeholders of the two sectors, on their limited cooperation and coordination, which are reflected also in the complexity of administrative procedures. Local specificities should also be considered in each case (e.g. some sites might lack the proper infrastructures, services, expertise).

Tourism & Aquaculture

This MU considers the use of aquaculture facilities as touristic attractions where diving, recreational fishery, and the boarding of people on aquaculture vessels to visit plants and learn aquaculture techniques can be developed. Some examples of implementation are available through MUSES case studies as well as potential for this MU development.

Like in the case of the combination between Tourism & Fisheries, the main driver for this combination is recognized in the legislation regulating this MU at national or sub-national levels, in association with the availability of targeted funds to support pilot projects and initiatives (particularly EMFF supporting initiatives of diversification of fisheries and aquaculture activities). Also for this MU, the increasing demand for experience-based tourism, eco-tourism and responsible tourism can be exploited for widening the implementation of this the combiantion.

Releasing the potential of this MU requires some relevant barriers to be overcome, including the lack of common guidelines and common regulation of aquaculture-related tourism activities, at least at the national level. Particularly, the presence of very restrictive legislation (or its interpretation) limiting the number of people hosted on board of aquaculture vessels and/or imposing severe hygiene and security constraints should be resolved. The complexity of the procedures to obtain this type of licence should be reduced. Similarly to the combination of Tourism & Fisheries, fragmentation of the operators is a barrier to the needed investments to develop MU. Lack of adequate funds to aquaculture fleets needed for this MU was also identified, together with inadequate skills of the aquaculture operators. Additional constraints concern the lack of marketing of this type of touristic offer at the local level, with difficulties for the public to get in contact with the operators and vice-versa.

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4.1 Tourism & Fisheries

Tourism & Fisheries is the most represented combination across case studies and it was explored in four case studies, two of them located in the Mediterranean basin (6, 7) and two in the Atlantic basin (3A, 3B). Pescatourism is the most used expression to refer to this combination, which is performed through boat tours on-board fishing vessels where tourists can participate in real fishing experiences with the involvement of professional fishers. Local food and drink offered on-board can be included in the experience, which often also has educational purposes, with the aim of spreading the local culture of the sea, respecting the environment and promoting sustainability principles.

T & F Integrated DABI catalogue
Interviewees: three stakeholders were engaged in the DABI catalogue formulation and scoring for case study 3A, seven stakeholders for case study 3B, nine stakeholders for case study 6 and seven stakeholders for case study 7. The integrated DABI catalogue for this is therefore built joining the scores of 26 overall stakeholders representative of the four case studies.
Integrated catalogue: see Annex 1, Table A1. 1, Table A1. 2 , Table A1. 3 , Table A1. 4
DABI factors by categories: see Figure 20
Integrated MU assessment: see Table 4

State of implementation. Current experiences of this combination were encountered in all the considered case studies. In the South coast of mainland Portugal (case 3A), this combination was identified as potential by stakeholders around the main ports of the Algarve: Sagres, Portimão, Albufeira, Vilamoura, Faro, Olhão, Tavira and Vila Real de Santo Antonio, as well as along Ria Formosa and Costa Vicentina. Currently, there are few activities in place but in an informal way since there is not specific legislation allowing the activity. For the Azores Archipelago (case 3B), this combination can benefit of a sub-national legislation that regulates pescatourism initiatives and requires an annual license released from the Regional Directorate of Fisheries. Based on 2016 data, 11 licenses were overall given in five islands of the archipelago (São Jorge, Terceira, São Miguel, Pico and Flores). National and sub-national legislation (Veneto and Emilia Romagna Italian regions) also exists for the Northern Adriatic case study (case study 6), where though several valuable initiatives of pescatourism exist, especially in lagoon and delta areas, a quite low level of activity was identified with still weak and isolated experiences. Finally, in the Mykonos Island in the Aegean Sea (case study 7), there is currently only one licensed small-scale vessel for fishing tourism activities (which however actually does not practice it) and a second application is pending, also due to a Ministerial Decision (2015) regulating pescatourism activities. A low interest towards this type of tourism limits a real development of the combination, because fishermen already enjoy the high profits offered from their original fishing activity during the touristic period.

MU Potential and MU Effect assessment across cases

A quite negative MU Potential (-0.3, Table 3) was assigned to the combination between Tourism and Fisheries in the case study 3A (Eastern Atlantic – South coast of mainland Portugal), where barriers (though fewer than drivers) are clearly perceived as more important in developing this MU.
A MU potential that is still slightly negative was also assessed for the two cases of Mediterranean basin (-0.1 for cases 6 and 7). A positive MU potential (0.2) is instead assessed for case study 3B in the Atlantic Sea basin. In this case, the highest score of drivers (2.2) and the lowest score of barriers (-1.8) was calculated.
An overall positive MU Effect is expected from the combination according to all four case studies. MU effect ranges from 0.4 (case study 6) to 0.9 (case study 3B, where the lowest score of impacts

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was found). For case study 7, no impacts were identified against 14 different added values, only one impact was identified in case study 3A and 3B (concurrence with other tourism sectors), while the only case study 6 identified 4 different negative impacts. In all cases the number and the average score of added values overcome the number and the average score of negative impacts.

Case-study	Drivers average score	Barriers average score	Added Values average score	Impacts average score	MU potential	MU effect
3A	1.5	-2.1	2.7	-1.3	-0.3	0.7
3B	2.2	-1.8	2.2	-0.3	0.2	0.9
6	2	-2.1	2.3	-1.5	-0.1	0.4
7	1.9	-2.2	1.6	0	-0.1	0.8

Table 3 DABI average scores, MU Potential and MU Effect from the four cases that addressed the combination Tourism & Fisheries.

Commonalities across cases. For all case studies, the only types of fishing involved in the combination are the small-scale fisheries or bivalve fisheries. Moreover, all case studies agree on the fact that fishing tourism may provide the opportunity to fishers to diversify their effort, limiting the pressure to the natural resources and getting an additional income, by promoting ecotourism and educational activities, and introducing new, alternative touristic offers.

Drivers

- Policy/legal drivers for this combination include the existence of a legislative framework at European, national and sub-national levels establishing and regulating fisheries diversification and pescatourism activities. Different factors of the integrated DABI catalogue, from all four case studies, address this issue through different formulations of factors reflecting the specificities of each case study.
- Issues related to licensing processes with easy or short procedures to get pescatourism activities are included as legal driving factors for cases 3A, 3B and 7, but not for case 6 which highlighted the presence of complex bureaucratic procedures in order to get pescatourism licences.
- Increasing demand for a diversification of tourism offer, towards alternative touristic experiences such as eco-tourism, sustainable tourism, experience-based tourism, is highlighted in all case studies that addressed this combination, with an average score of 2.1.
- Existence of economic funds, which can be sector specific, dedicated to the development of an enterprise network, or which can specifically support pescatourism (EMFF) combination, also through the activities of FLAGs, represent another shared driver among almost all cases.

The current legislative framework can act also as a barrier for the development of this combination, according to stakeholders' opinion. In fact, the presence of severe regulations limits the activity or impose specific hygiene and security requirements of passengers on the vessel. Similarly, the lack of harmonized procedures and guidelines at the national level to start pesca-tourism is seen as a barrier for such a MU (case studies 3A, 3B and 6).

The analysis by categories reveals that the societal category got the highest average score (2.4). In this category, the need to diversify fishing activity to maintain a fishing community's identity, the capitalisation on previous successful experiences and the support from Local Action Groups towards

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sector diversification proposals are included and scored by a relevant number of stakeholders. Policy and economic categories have a similar relevance with average scores of 2.1. Lower scores are assigned to environmental drivers and to the interaction with other uses. Indeed, all categories are well represented across the four case studies.

Barriers

Beyond the above mentioned legislative barriers (with an average score of -2.3), other categories well represented in all four case studies include the administrative, economic and technical categories.

- Barriers related to technical capacity get the second highest (negative) score. They include factors such as the limited availability of specific skills of fishers, the need for adaptation of fishing vessels, and the need for logistic infrastructure on land.
- Economic barriers such as the poor entrepreneurship and investment capacity of operators, also due to the medium-small size of enterprises and to its fragmentation over the territory was emphasised by stakeholders of three case studies, with a relatively high average value.
- Less relevant, even if common to all case studies, is the competition with other touristic sectors (food distribution services, accommodation facilities, recreational fisheries).
- Low interest towards eco-tourism initiatives such as pescatourism, due to an oversaturation of the actual touristic offer (especially luxury tourism) is instead stressed for case study 7.

Added Values

The cross analysis of added values highlights the presence of a long list of benefits expected from the implementation of the combination. Several added values of the integrated catalogue are common to all four case studies, or for at least three of them. Economic, social and environmental categories are well represented across the cases.

- Economic added values. Activities of pescatourism can produce an integrative income for fishers due to the development of new market opportunities and sector diversification. This is an expected economic added value for all the considered cases, having one of the highest average scores equal to 2.4 (average of 26 scores). Among the other economic added values, benefits for the local economy are moreover expected by all cases, through an expected increase of commercialisation of local fish products.
- Societal added values are among the most important benefits of the combinations, since all case studies recognized a general professional growth of operators involved in pescatourism, with the improvement of personal skills and management capacity. Educative benefits for tourists and civil society are also expected, with an increased awareness about the issues of the marine environment and of the fisheries. These factors can be considered very relevant according to the scores assigned by stakeholders (V.2.3 and V.2.4, average score of 2.8 and 2.7 respectively).
- Environmental added values are especially mentioned in cases 3A, 3B and 6, however, with a relatively low relevance. They concern the possible contribution of pescatourism to the sustainable management of fisheries and the relief from coastal tourism pressures. This last factor was not relevant for case study 6, where instead a possible increase of the touristic pressure on already crowded areas is considered a possible negative impact deriving from the attractiveness increase generated by new touristic offers.

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Impacts

Very few negative impacts are expected from the combination, concerning for example (according to cases 3A, 3B and 6) possible conflicts with other touristic sectors ("conventional" touristic services, recreational fisheries, other environmental related touristic offers). Other negative impacts were highlighted only in case study 6, including for example the risk of entrance of non-professional fishers in pescatourism activities with a distortion of the correct meaning of the specific MU. A similar factor (included however among barriers for case study 7) was also stressed for the Mykonos Island where commercial/charter touristic boats can offer fishing experiences, in competition with pescatourism performed by professional fishers.

Integrated assessment

The **integrated assessment** of the four original DABI catalogues gives an overall MU Potential close to 0 and a positive MU Effect equal to 0.4 (Table 4).

Factors	Tourism & Fisheries integrated assessment N. total stakeholders =26	
	Average score	Standard Deviation
Drivers	2.0	0.6
Barriers	-2.1	0.6
Added Values	2.1	0.5
Impacts	-1.4	0.4
MU Potential	-0.1	
MU Effect	0.4	

Table 4 Integrated assessment of the combination Tourism & Fisheries from integrated analysis of cases 3A, 3B, 6 and 7.

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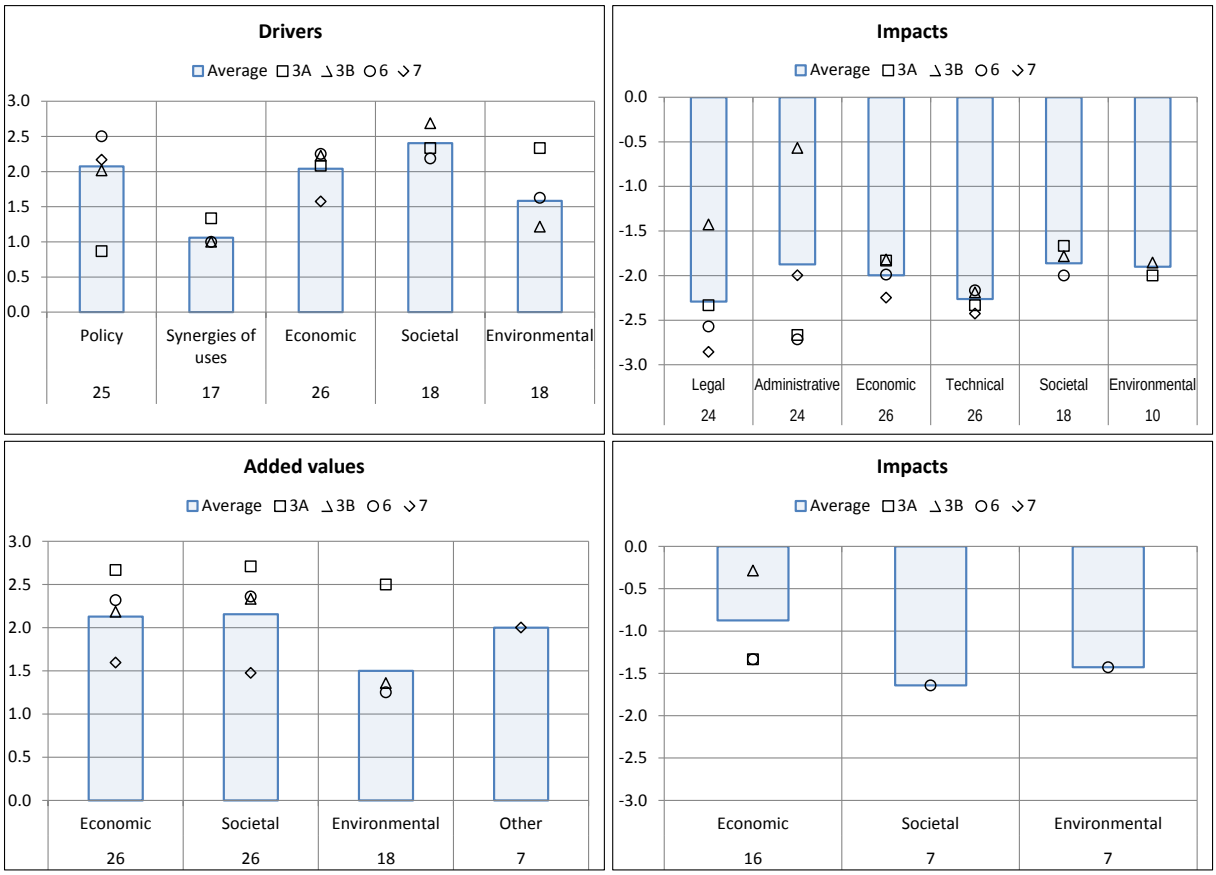

Figure 21 Tourism & Fisheries. Average scores of categories derived from the integrated DABI catalogue. Bars represent averages of ALL scores from the four case studies. Symbols represent the average scores of each case study. The numbers indicated close to the axis of categories refer to the overall number of stakeholders that have scored each category.

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4.2 Wind energy & Aquaculture

The combination of Wind Energy & Aquaculture was explored in three case studies: in the Southern North Sea (1C) and in the Baltic Sea for the Island of Gotland (4) and the Southeast coast of Denmark (5). This combination can be implemented using wind park infrastructures to attach aquaculture equipment, or considering co-location of aquaculture installations within the security zone of the OWF.

WI & A Integrated DABI catalogue
Interviewees: Four stakeholders were overall involved in case study 1C, seven stakeholders in case study 4 and nine stakeholders in case study 5.
Integrated catalogue: see Annex 1, Table A1.5 (drivers), Table A1.6 (barriers), Table A1.7 (added values) and Table A1.8 (negative impacts).
DABI factors by categories: see Figure 21
Integrated MU assessment: see Table 6

State of implementation.

No examples of implementation of this combination exist in the three case studies considering Wind Energy & Aquaculture, though a large basis of scientific knowledge actually exists, coming from previous research projects and pilot sites in the marine space. Mussel farms or algae are the most promising species for this combination, especially for the Baltic Sea, due to their role in nutrient sequestration potentially reducing the levels of marine eutrophication.

MU Potential and MU Effect assessment across cases

The lowest MU Potential (-0.4, Table 5) for this combination was calculated for case study 5 (Baltic Sea, Southern Denmark). This negative score was also interpreted as a lack of incentive and involvement by the regulators to encourage the employment of MU in Denmark with the OWF owners. However, the other two cases that addressed the same combination gave a quite different evaluation of its MU potential: still slightly negative for case study 4 (-0.1) and slightly positive for case study 1C (0.1). Barrier scores are similar between case study 5 and case study 1C, but the driver score of case study 1C (2.5) is much higher than the driver score of case study 5 (1.5), determining the difference between the MU Potential of the two case studies. However, the high score assigned to drivers for case study 1C refers to only one driver (related to the need of spatial efficiency in the marine area), while 11 drivers contribute to the average score of case 5 and case 8 drivers to the average score of case study 4. For case study 4, a low score both for barriers (-0.8) and for drivers (0.6) was found, determining a slightly low potential for this combination.

The combination evidenced a balance among added values and impacts for case study 5 (MU Effect close to 0) and a positive, but relatively low, effect in the other two cases (1C and 4). As for case 1C, only one impact (environmental category) was indeed identified against 3 added values. Societal, economic and environmental impacts were instead identified in case study 4 and 5.

Case-study	Drivers average score	Barriers average score	Added Values average score	Impacts average score	MU potential	MU effect
1C	2.5	-2.3	2.0	-1.5	0.1	0.3
4	0.6	-0.8	0.8	-0.4	-0.1	0.2
5	1.5	-2.2	1.9	-1.9	-0.4	0.0

Table 5 DABI average scores, MU Potential and MU Effect from the three cases that addressed the combination of Wind Energy & Aquaculture.

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Drivers

- Support from national policies and national legislation can help the implementation of this combination, especially concerning case study 5, while policy/legal drivers were not considered relevant for the other two cases.
- Several economic driving factors arise from the three case studies, concerning for example sharing of resources that can encourage investments (a factor shared by the three cases even while having a relatively low score), the increase of the wind energy sector and the increasing demand for marine products.
- Societal drivers (e.g. involvement and interest of local communities) and environmental drivers (nutrient sequestration) are included only in the two Baltic case studies.

Barriers

More barriers than drivers emerge from the analysis of the three case studies. They are legal, administrative, economic, technical, social and environmental barriers.

- Barriers related to the technical capacity reveal several concerns related to the lack of adequate knowledge and studies on the technology required, showing that (according to the experience of case study 1C) connection of aquaculture systems to existing OWFs is not possible—mainly for the increased load caused by aquaculture systems—unless it was properly designed.
- A common factor among the three cases (though with a relatively low average score) concerns license/permission issues. MU might complicate the procedures to get the permission to operate and a simplification of procedure is hence needed.
- Several economic factors are highlighted in the three cases. They concern the need for larger investments, the lack of adequate incentives to promote pilot projects and for their scaling up, as well the lack of financial incentives or subsidies.
- Societal and environmental barriers are mainly considered by case study 5, revealing for example a lack of cooperation and dialogue among sectors, lack of public awareness, and lack of studies concerning the environmental impacts of the combination.

Added values

Among added values, cost sharing is a common factor considered by the three cases, with an average score equal to 1.4, while the environmental added values got the highest score (1.8), including factors such as spatial efficiency (leaving free space for nature conservation), nutrient reduction, and an increase in biodiversity due to the shelter effect of the wind foundations.

Impacts

- Negative impacts are mainly found by the two Baltic case studies, while the only impact considered in the North Sea case study refers to possible negative interferences on the marine environment whenever aquaculture is not well managed through best environmental practices and best available technologies.
- Similar or more specific environmental impacts (e.g. noise impacts, biofouling, colonisation of alien species) are also mentioned by the two Baltic case studies, so that the average score of the environmental category is quite high (-1.4).
- Several economic impacts considered in the two case studies of the Baltic Sea, refer to different possible conflicts between the two sectors (damages to aquaculture facilities, access restriction, unknown economic risks due to the novelty of the combination).

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Integrated assessment

The integration of all DABI factors of the combination lead to assess a negative MU Potential and a positive MU Effect (Table 6).

Factors	Integrated assessment N. total stakeholders =20	
	Average of factors	Standard Deviation
Drivers	1.2	0.7
Barriers	-1.8	0.8
Added Values	1.7	0.8
Impacts	-1.3	0.8
MU Potential	-0.3	
MU Effect	0.2	

Table 6 Integrated assessment of the combination of Wind Energy & Aquaculture from the cases 1C, 4 and 5.

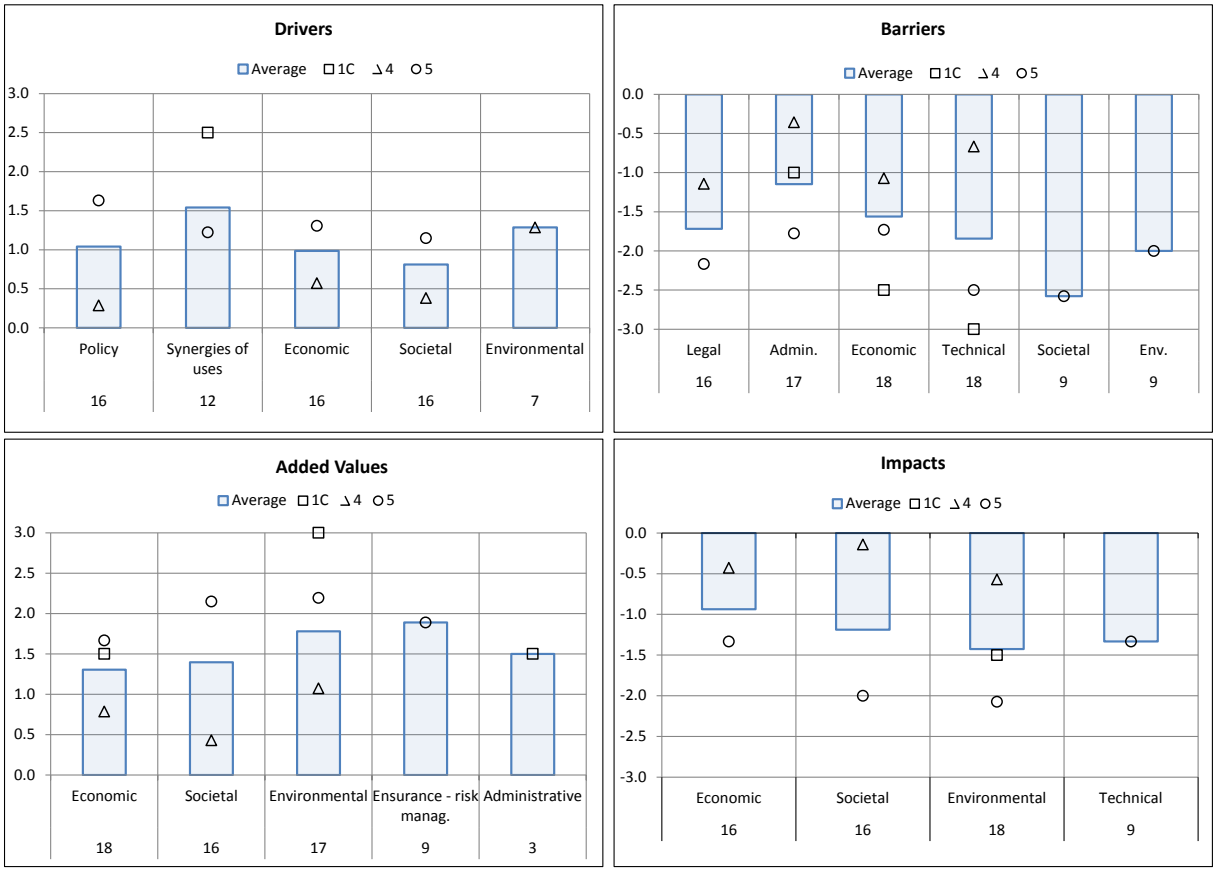

Figure 22 Wind Energy & Aquaculture. Average scores of categories derived from the integrated DABI catalogue. Bars represent the averages of ALL scores from the three case studies. Symbols represent the average scores of each case study. The numbers indicated close to the axis of categories refer to the overall number stakeholders that have scored each category.

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4.3 Tourism & Environmental Protection

The MU combination of Tourism & Environmental Protection was addressed by three case studies located in the Atlantic basin (3A and 3B) and in the Mediterranean basin (case study 6). It consists of the development of touristic activities (mainly diving) inside designated marine areas, managed with the goal to preserve natural resources. It is also seen as an opportunity to expand the protection of the marine environment, developing at the same time socio-economic activities, with advantages for both sectors.

T & E Integrated DABI catalogue
Interviewees: Four stakeholders were overall involved in scoring factors of case study 3A, two stakeholders from case study 3B and seven stakeholders from case study 6.
Integrated catalogue: see Annex 1, Table A1.9 (drivers), Table A1.10 barriers), Table A1.11 (added values), Table A1.12 (negative impacts)
DABI factors by categories: see Figure 22.
Integrated MU assessment: see Table 8.

State of implementation. This MU was identified to be currently in place in the South coast of mainland Portugal (case study 3A), in the areas surrounding important towns of Algarve region, such as Sagres, Lagos, Portimão, Albufeira, Vilamoura, Faro, Olhão, Tavira e Vila Real de Santo Antonio, and specifically in the natural protected areas of Ria Formosa and Costa Vicentina. The combination is reported as existing also in the Azores (case study 3B), where important connections with UCH sites were also explored. In the Northern Adriatic Sea (case study 6), though poorly implemented, the potential of the combination relies on a number of marine Natura 2000 sites which are mainly rocky outcrops (the so-called "*Tegnùe*")[6] a few miles off the coast of the Veneto Region, and a wreck of a gas platform collapsed during the sixties (Piattaforma Paguro) located off the coast of the Emilia Romagna Region, that has been significantly colonised by marine flora and fauna species.

The integrated DABI catalogue shows several commonalities of factors mainly between case study 3A and case study 3B, clearly due to the proximity of the two cases, both located in Eastern Atlantic basin, and both belonging to Portugal.

MU Potential and MU Effect assessment across cases

A high MU Potential (0.4) was calculated in case study 3B (Southern Atlantic – the Azores): here the average driver score clearly prevails over the average barrier score. The other two case studies that investigated this combination assessed a MU Potential equal to 0, with a balance between barriers and drivers. While the number of drivers and their average scores are similar among the three mentioned case studies (2.2.-2.3), the main differences among cases are found for barriers. Only 4 barriers were indeed identified in case 3B having a low negative average score (-1.4), while 9 to 13 barriers were identified for cases 3A and 6, with a high average score of about -2.

All three cases assessed a MU Effect equal to 0.2: the average score of added values ranges between 2.1 and 2.4, while the average score for impacts ranges between -1.7 and -2.1, with the highest negative score for case study 3B.

[6] The so-called "tegnùe" refers to particular rocky substrates, typical of some areas of the Northern Adriatic seabed. The name "tegnùe", which means "held" in the Venetian dialect, comes from the fact that the fishing nets can be entangled by the roughness in the seabed. Their nature of very hard, bare calcareous stones makes them dangerous for navigation and fishing but very rich in biodiversity (benthic organisms and fish).

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Case-study	Drivers average score	Barriers average score	Added Values average score	Impacts average score	MU potential	MU effect
3A	2.2	-2.2	2.1	-1.7	0.0	0.2
3B	2.2	-1.4	2.4	-2.1	0.4	0.2
6	2.3	-2.3	2.3	-1.9	0.0	0.2

Table 7 DABI average scores, MU Potential and MU Effect from the three cases that addressed the combination of Tourism & Environmental Protection.

Drivers

- The current existence of environmental protection areas (case study 6) jointly considered with the increasing number of sites to be explored (case study 3A) scored the highest (average values of 13 stakeholders equal to 2.5), showing the great potential of natural resources in the studied areas.
- The increasing demand for sustainable tourism, with the related valorisation of natural resources, was considered relevant for all three cases, with a high average score (2.5).
- The possibility to create multiple synergies between tourism and environmental protection, also involving UCH sites, was considered another relevant factor shared by the three cases and by 13 stakeholders, with an average score equal to 2.4.
- The three case studies also highlighted the importance of support from strategies, like the EU Blue Growth Strategy or the EU Strategy for the Adriatic and Ionian Macro-Region (EUSAIR), both promoting sustainable tourism (average score of 2.2).
- Another important similarity among cases is related to the need to expand environmental protection (included in the environmental category for case 3A and case 3B) which goes along with the increasing need to identify new protected areas to meet European targets (included in policy category for case study 6). This last factor is seen from local stakeholders as an opportunity to develop the touristic sector in connection with environmental protection initiatives.

Analysis by categories: The average scores for all categories are equal to or greater than 2, indicating a similar importance for MU development. Legal drivers are mentioned only in one case study (3A) and scored by only one stakeholder, so that this category was not considered significant for the scope of this work and it is not included in the histogram of Figure 23.

Barriers

- Seasonal/weather restrictions for the touristic use of marine protected areas, with further limitations connected to the non-optimal transparency of waters (for case study 6) are environmental barriers common to all three cases, showing however a rather low negative average score.
- The highest negative score of the integrated catalogue (equal to -3) was assigned to the lack of touristic infrastructures and services (factor B.3.3). However, this factor is very site specific (it only refers to case study 3A) and it is scored by one single stakeholder. Consequently, its relevance can be considered as low in the integrated analysis of main barrier factors.
- Several administrative barriers were encountered by the three cases. Generally, the limited coordination and cooperation among involved actors with a lack of a common vision (case study 6), the existence of complex bureaucratic procedures (case studies 3A and 6) and the

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need for specific authorisation to implement the combination (3A and 3B) are the main administrative issues which arise from the analysis. The average score of this category is equal to -2.3, being one of the most important categories for this combination.

- A similar score was assigned to the societal factors (which are however mainly highlighted in case study 6).
- The lowest negative score (-1.3) is related to the technical capacity category, including the lack of proper infrastructures and services (3A, 3B) and the limited expertise in the field (case study 6).

Added values

All categories of added values expected from the implementation of such a MU can be considered important in the integrated catalogue, all with average scores higher than 2.

- One of the most important added values, scored by all 13 stakeholders of the three cases (average score equal to 2.5) is the diversification of the tourism offer, which involves people interested in environmental and nature conservation issues.
- Educational benefits are also shared by the three cases, leading to raising awareness about environmental protection (average score of 2.3). Raising of end user awareness is also considered to generate benefits for present and future projects (case study 6).
- Enhanced environmental protection (factor V.3.2, cases 3A and 3B), also generated by an effective collaboration among operators and end users (factor V.3.1, case 6) is one of the main environmental added values of the combination.

Impacts

The only negative impact shared by all three case studies concerns the possible negative impacts on the environment, due to a rise in touristic activities operating in the fragile marine ecosystems, thus impairing the natural resources. This factor scores the highest in the integrated catalogue (-2.3). A possible decrease of the level of satisfaction of tourists due to site congestion (societal impact) arose only in the two Atlantic cases, with similar average scores, while possible economic impacts mainly relate to possible use restrictions or conflicts with other maritime uses of the sea.

Integrated assessment

The integrated analysis of the DABI factors of the combination Tourism & Environmental Protection reveals a balance between barriers and drivers (MU Potential exactly equal to 0), while positive effects overcome the expected negative impacts (MU Effect equal to 0.2, Table 8).

Factors	Integrated assessment N. total stakeholders =13	
	Average of factors	Standard Deviation
Drivers	2.2	0.3
Barriers	-2.2	0.5
Added Values	2.4	0.3
Impacts	-1.9	0.3
MU Potential	0.0	
MU Effect	0.2	

Table 8 Integrated assessment of Tourism & Environmental Protection, from integrated analysis of cases 3A, 3B and 6.

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Additional uses to this combination: MU triplets

The combination between Tourism & Environmental Protection was further investigated in combination with Underwater Cultural Heritage (UCH) in the Azores Archipelago (case study 3B) and in combination with Wind Energy in the Baltic Sea (Southeast Denmark, case study 5).

The combination **Tourism & Environmental Protection & UCH**, existent in different Islands of the Archipelago, relies on the presence of many shipwrecks around the Azorean islands, some of them accessible for visitation. According to the results of DABI factors, multiple synergies between UCH, tourism and environmental protection should be promoted and disseminated in order to develop the combination. In this case, still a positive MU potential was estimated (0.3), with an overall positive MU effect comparable to the MU effect of the two sector-combination.

Synergies among the three sectors were also highlighted in the Northern Adriatic case study (6), where, though tourism & environmental protection and tourism & UCH were separately analysed, real examples of MU involving all three sectors were found. In this case, UCH sites (like wrecks), can become important natural protected areas accessible for touristic visitations. The Natura 2000 site "Paguro" located in the Northern Adriatic Sea provides a good example of a MU combination among three different sectors (tourism, environmental protection and UCH), attracting divers visiting the remains of the collapsed methane platform and the protected rich life it hosts.

The combination **Wind energy & Tourism & Environmental Protection** was explored in the Baltic Sea with specific reference to the Danish Rødsand 2 wind park where the establishment of artificial reefs was considered in order to recreate marine habitats, encouraging new settlements of various marine species and increasing biodiversity. The sheltering effect of the wind park and the new underwater environment would provide a completely new form of water tourism, including diving and environmental education initiatives. One of the biggest barriers identified for this MU specifically refers to the actual cost of establishing an artificial reef and a marine natural park. The need for proper funding and the current lack of documentation and environmental impact assessments concerning the establishment of artificial reefs is also considered a barrier. Concerns were also raised regarding the safety and insurance issues of allowing public access to the wind park area. In this case, MU potential and MU effect are positive, but close to 0.

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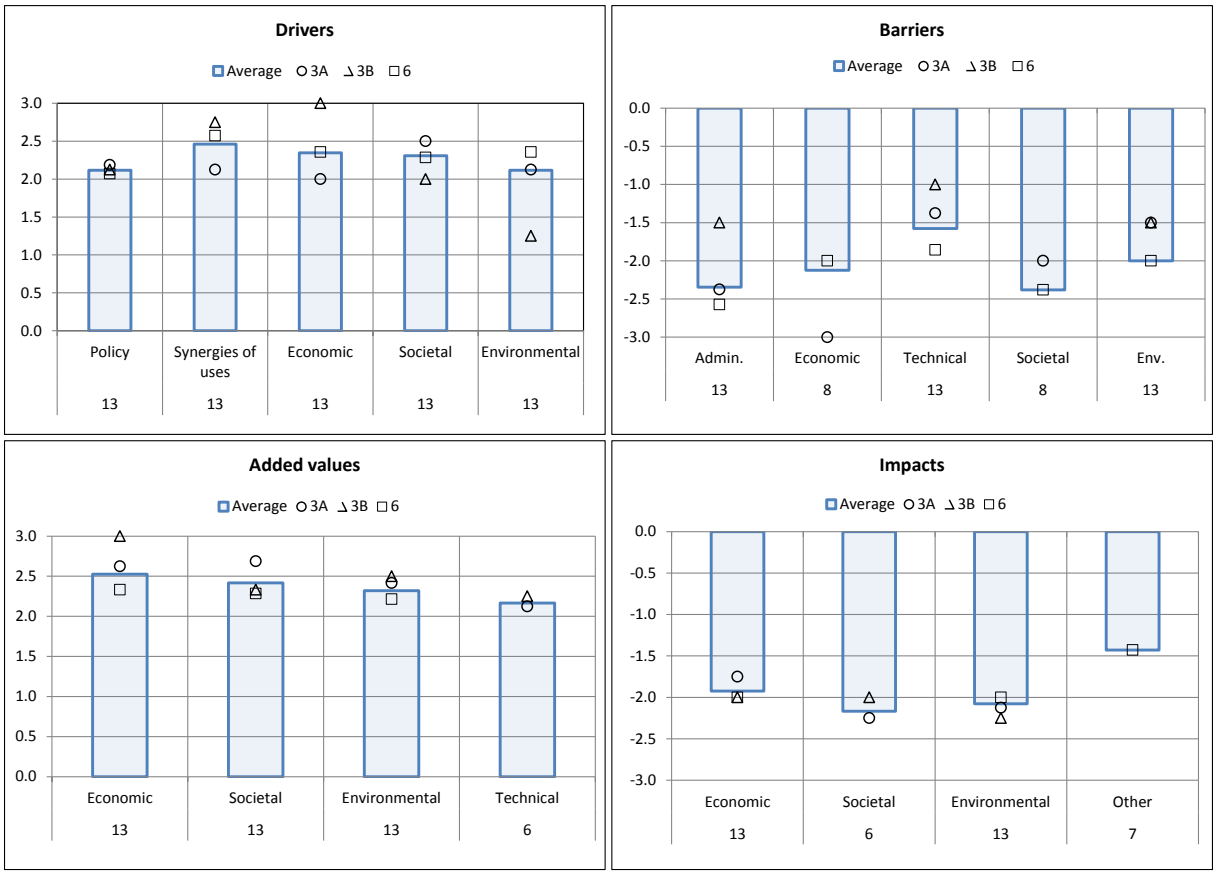

Figure 23 Tourism & Environmental Protection. Average scores of categories derived from the integrated DABI catalogue. Bars represent the averages of ALL scores from the four case studies. Symbols represent the average scores of each case study. The numbers indicated close to the axis of categories indicate the overall number stakeholders that have scored each category.

4.4 Wind Energy & Fisheries

The combination Offshore Wind Energy & Fisheries was investigated in two cases in the North Sea: case 1A (Eastern Coast of Scotland) and case 1C (Southern North Sea, German EEZ). Case study 1A specifically considered the MU combination of fixed foundation OWFs and commercial fisheries (mobile & static gears). However, results are directly transferable to the emerging floating offshore wind and hybrid platform markets in Scotland and potentially to other locations. Both uses seek access to marine locations with similar physical characteristics leading to spatial overlap and possible conflicts. The coexistence of uses is assessed as possible in the case study area and requires each industry to represent their ocean space use effectively, reach a better understanding of the interactions between activities, and work towards negotiation and cooperation.

WI & F Integrated DABI catalogue

Interviewees: Nine stakeholders overall were involved in scoring the factors of case study 1A, while four stakeholders were involved overall in case study 1C.
Integrated catalogue: see Annex 1, Table A1.13 (drivers), Table A1.14 (barriers), Table A1.15 (added values) and Table A1.16 (negative impacts)
DABI factors by categories: not shown due to a limited number of interviews and a lack of commonalities between the two cases
Integrated MU assessment: see Table 13

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Case study 1C addressed the same combination considering that in the German North Sea EEZ fisheries are awarded special considerations in the priority areas of other uses, though no economic or regulatory incentives to promote MU concepts currently exist. Real MU experiences do not exist yet in the case study area, even if the combination has also already been the subject of past research projects in Germany.

MU Potential and MU Effect assessment across cases

Case study 1C assigned a quite high MU Potential (0.25) for this combination (Table 9), while MU Potential resulted in a score equal to 0 according to case study 1A. A comparison between the two case studies reveals similar scores among barriers (with an average score of about 2) and a slightly higher score for 1C drivers. However, only one factor of drivers was scored in case study 1C, while a lot of factors (19) were identified in case study 1A, belonging to five different categories.

Similarly, the negative MU Effect assessed by case study 1C (-0.1) derives from only one negative impact concerning the loss of de-facto fishing free zones within the wind farms and hence the loss of related environmental benefits. On the contrary, a higher number of negative impacts were found in case study 1A (the highest scores were assigned to economic and social impacts), which scored lower overall than the added values, with an overall slight positive effect (0.2).

Case-study	Drivers average score	Barriers average score	Added Values average score	Impacts average score	MU potential	MU effect
1A	2.1	-2.1	2.2	-1.8	0.0	0.2
1C	2.5	-2	1.8	-2.0	0.3	-0.1

Table 9 DABI average scores, MU Potential and MU Effect from the two cases that addressed the combination of Wind Energy & Fisheries.

Commonalities across cases. Few commonalities of factors can be found between the two cases, revealing the existence of local relevant specificities. One of the main sources of differences is the different management practices of the two countries (making the co-location of the two sectors easier in Scotland than in Germany) also creating different settings between the interviewed stakeholders. Moreover, a lower number of drivers, barriers, added values and impacts were identified in case 1C in comparison to case 1A, potentially reflecting a higher maturity of this MU in the UK. Furthermore, few scores were assigned by a limited number of stakeholders in case study 1C. For these reasons, which make poorly representative the results of the cross-case analysis, the integrated assessment of this combination in terms of MU Potential and MU Effect must be considered with caution. For the same reasons, the graphical representation of average scores per category is not shown for this combination.

Drivers

According to stakeholders' perception of case study 1C, the most prominent driver for the combination is the need for spatial efficiency in order to maintain the livelihoods of fisheries in the marine area. This becomes an important factor only in 1C due to the limited surrounding marine space while it is not relevant for case 1A. Indeed, the need for spatial efficiency was the only scored driving factor of 1C catalogue, while the other factors related to policy and environmental categories were not scored by stakeholders.

For case study 1A, several drivers got high scores, revealing their relevance to develop the combination. Policy, economic, societal, technological and administrative driving factors were

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identified, with average scores from 0.5 (policies of climate change adaptation which can support the changing of fishing grounds to newly productive areas) to 3 (Avoid unnecessary additional costs for both uses and support fisheries development as contributing to the national food security system).

The main (though overall poor) commonalities between the two cases relate to the support from national policies encouraging the combination. For case 1C, this factor specifically refers to special considerations awarded for fisheries inside the priority areas for OWFs by the national MSP (Germany case study). For the Scottish case (1A), policy factors encourage the reinstatement of fisheries after the construction of a new wind farm and prevent interferences among uses. Administrative factors are also included in case study 1A and related to legal factors. They refer to the obligation to engage fisheries as a pre-condition when providing a license for an installation (e.g. new wind farm).

Societal drivers were emphasized for case study 1A but not for case study 1C, while environmental drivers (wind turbines acting as fish-attracting devices) were emphasized only in case study 1C.

Barriers

As for barriers, the lowest score (-3) was assigned to prohibitively high insurance costs for possible damages of fisheries to OWFs. However, this factor was scored by only one stakeholder of one case study (1C) and hence its relevance in the integrated DABI catalogue is quite low. Few scores were overall assigned to other factors of 1C.

Different factors of administrative and economic barriers were identified between the two cases, as well different factors related to the technical capacity. Possible incompatibilities between the two uses were for example emphasised according to case 1A, while possible damages of certain fishing practices to wind foundations according to case 1C.

Added values

Economic added values emerge from case 1A alone where cost reduction for sharing infrastructures, benefits to the local economy, new job opportunities and new economic opportunities for fisheries were mentioned. Societal added values are instead found by both cases, showing for example the societal benefits of an increased spatial efficiency (case 1C), benefits to fishing communities, generation of trust among different sectors, innovation and sustainable development, and increased food security (1A). The average score of the societal category is among the most relevant categories, with an average score of 2.4.

Environmental added values were also identified by both cases, especially related to the shelter effect of wind foundations (creating a potential habitat for marine species, or favouring nursery areas, 1A) and also to the increase of local fish production coming from well managed fishery practices (1C), thus limiting fish import from other not European countries. The average score of this category is 2.2.

Impacts

All categories for impacts are indicated as relevant for this MU combination. Based on case study 1A, the following factors are those scoring the highest: increased sediment suspension during and after the installation of the OWF, affecting benthic communities (environmental impacts), limitation of access to productive areas with possible consequences on the national food security system (societal impacts), increased safety risks for the operators (risk impacts), economic impacts such as lack of income for fishers, reduced quality of catches, etc.

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Integrated assessment

DABI Factors	Integrated assessment N. stakeholders =13	
	Average of factors	Standard Deviation
Drivers	2.2	0.8
Barriers	-2	0.7
Added Values	2.1	0.7
Impacts	-1.8	0.6
MU Potential	**0.1**	
MU Effect	**0.1**	

Table 10 Integrated assessment of the combination of Wind energy & Fisheries from the cases 1A and 1C.

4.5 Tourism & Aquaculture

This combination was explored in two case studies, one located in the South coast of mainland Portugal (case study 3A) and the other located in the Northern Adriatic Sea (case study 6). In both cases, aquaculture facilities are considered as potential touristic attractions where recreational activities can be performed, including diving, recreational fishing in areas close to farm sites, the boarding of people on aquaculture vessels to visit plants and learn aquaculture techniques. Educative scopes of the combination are mentioned by both cases. In this respect, for case study 6, the approach of national and regional legislation regulating this combination (ministerial Decree 293/1999, legislative decree 4/2012 and LR 22/2014) assigns great relevance to the aspects of dissemination of the local culture of the sea, also promoting knowledge and valorisation of the marine, coastal and lagoon environment.

T & A Integrated DABI catalogue
Interviewees: Four overall stakeholders were involved in scoring the factors of case study 3, while seven stakeholders overall were involved in case study 6.
Integrated catalogue: see Annex1, Table A1.17 (drivers), Table A1.18 (barriers), Table A1.19 (added values) and Table A1. 20 (negative impacts)
DABI factors by categories: see Figure 23Figure 20
Integrated MU assessment: see Table 12

State of implementation. In both case studies, this combination is already implemented through some successful experiences. For case study 3A, this MU is implemented offshore of Ria Formosa with touristic activities (diving or boat tours) performed close to fish farms (specifically tuna farming) and mussel cultures. Visitors can especially enjoy the observation of large tuna shoals and other fish in the fish traps. For case study 6, the combination, though overall poorly developed, encountered the interest of several stakeholders who indicated some successful examples of already occurring experiences in the case-study area, mainly involving fishing tourism in the proximities of aquaculture plants. An active experience of this combination is located in the Cavallino-Jesolo mussel plant (northern area of Veneto region), where sport-recreational fisheries, managed by the Italian Federation of Sport Fishing, is occurring within the area used for aquaculture. Experiences of guided tours in the aquaculture plant have been also organized on board a fishing vessel within the same area where sport fisheries are also practiced.

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MU Potential and MU Effect assessment across cases

MU Potential was assessed as slightly negative for case study 6 (Mediterranean) and slightly positive for case study 3A (Eastern Atlantic). Positive MU Effect values were estimated in both cases, with greater negative impacts scored in case study 6 than in case study 3A. Similar added value scores are found between the two case studies, while impact scores are higher for case study 6 (Table A1.18).

Case-study	Drivers average score	Barriers average score	Added Values average score	Impacts average score	MU potential	MU effect
3A	1.9	-1.8	2.3	-1.2	0.1	0.6
6	2.1	-2.4	2.3	-1.9	-0.2	0.2

Table 11 DABI average scores, MU Potential and MU Effect from the two cases that addressed the combination of Tourism & Aquaculture.

Drivers

- The existence of legislation (factor D.1.1.) specifically regulating this combination is considered a common most important driver for the two cases. This factor got the second highest score of the list (2.4) and assumes a great relevance, being scored by seven stakeholders.
- Other common drivers of the two cases concern the availability of funds (European funds, factor D.3.1 or sub national funds, factor D.3.2). In particular, the European Maritime Fisheries Fund (EMFF, 2014-2020) can play an important role in supporting initiatives concerning the diversification of fishing and aquaculture activities. This factor was scored by eight stakeholders from both cases, with an average factor equal to 2.3.
- The increasing demand for experience-based tourism, responsible tourism or eco-tourism (included in the economic category of drivers, factor D.3.5) has a lower score (1.6) but was evaluated by seven stakeholder representatives of both case studies.

Other factors of the two original catalogues can be considered complementary. For example, the increase in demand of local fish products (factor D.3.3., case study 6) goes along with the low potential for fisheries growth (factor D.3.8, case study 3A). Both factors jointly suggest the potential for aquaculture development in the marine area which can compensate the experienced or projected reduction of fisheries.

Environmental drivers were considered only in case study 3A, including the need to reduce touristic pressure on the coast and to reduce fisheries exploitation. For case study 6, the general opinion of stakeholders indicates a negligible effect of this combination in the relief of touristic pressure from the coast, being especially considered (as pescatourism) a niche tourism not able to move mass tourism destinations. On the contrary, technical-operative drivers, related with the possibility of developing the combination between tourism & aquaculture in different and integrated ways (activities similar to pescatourism, diving/snorkelling, recreational fisheries), was only mentioned in case study 6, with a significant score (2.2).

All the other categories (policy/legal, interaction with other uses, economic and societal) are well represented in both case studies, with similar average scores between the two cases.

Analysis by categories. The most relevant categories are policy/legal, economic, societal and technical/operative, all with an average score equal to or greater than 2. Environmental drivers and the interaction with other uses are the least relevant categories to develop this combination.

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Barriers

- The lack of guidelines and of a common regulation of aquaculture-related tourism activities (B.1.1) is considered the most relevant factor hindering the combination for both case studies. Nine overall stakeholders from both cases scored this factor with convergent assessments (individual scores range from -2 to -3) and an average score of -2.7. A similar factor, still related to legal issues, refers to the presence of very restrictive legislation (or in its interpretation) limiting the number of people hosted on-board aquaculture vessels and/or imposing severe hygiene and security constraints (factor B.1.3). This factor is particularly relevant for case study 6, where all stakeholders gave a significant score (between -2 and -3), while the only two stakeholders who gave a score to this factor for case study 3 revealed a quite discordant opinion.
- Bureaucratic and administrative barriers revealing complex procedures to obtain licences were highlighted by stakeholders of both case studies, with quite a low average score (-2.5).
- Several other factors show a commonality of barriers hampering the combination across the two case studies. They are related to economic issues (both due to limited available funds and to a poor entrepreneurship and investment capacity of aquaculture operators) and to the technical capacity of implementing the combination. The latter category reveals for both case studies the need for the adaptation of aquaculture vessels for touristic activities (average score of -2.5) and the limited expertise of operators, who need specific training to improve their capacity of interaction with the public (communication, foreign language skills).
- Related to this issue, the lack of online platforms to contact operators and organize the touristic activities (factor B.4.5) as well the lack of adequate advertisement promoting this combination (factor B.3.5) were considered as barriers for case study 3A. Indeed, recommendations coming from case study 6 suggest the creation of clusters of business operators more able to develop and implement the combination, still revealing an interesting degree of commonalities between the needs of the two case studies.

All categories of barriers have an average score equal to or greater (in absolute value) than 2, except for societal barriers and technical-operative barriers, with slightly lower average scores of 1.5 and 1.7 respectively.

Added values

Several added values and very few negative impacts are expected according to stakeholders' opinion if the combination was implemented.

- The most relevant added values highlighted by the two case studies refer to the possibility of getting an integrative source of income for aquaculture operators (who can experience temporal losses of revenues) and to the creation of new and specialised job opportunities, whenever specific training courses are organised. These two factors were scored by nine-11 stakeholders who gave convergent evaluations (scores between 2 and 3 except for one).
- Another important economic added value shared by the two case studies relies in the increase of commercialisation of local fish products, also stimulated by the increased awareness of local aquaculture practices (average score of 2.5). Societal added values common to both case studies refer to the contribution of the maintenance of these local traditional activities (factor v.2.1) and to a general cultural feedback, both for operators and

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for tourists and civil society, with an overall increase of awareness about sustainable practices (factors v.2.2 and v.2.3).

- Three other factors got the highest score (3), but this score was the result of one single stakeholder of one single case study (3A) and hence their relevance is definitely low. Among these factors, the reinforced environmental protection (v.3.1) is the only factor belonging to the environmental category, while the shared responsibility (v.5.4) is the only factor of the category related to better insurance policies and risk management. Consequently, these two categories cannot be considered relevant for the analysis and are not included in Figure 24.

Analysis by categories. The economic category, the societal category and the technical category are the three main categories of added values resulting from this cross analysis. The average scores are quite homogenous among categories, ranging from 2.1 to 2.4.

Impacts

The only impact jointly evidenced by the two case studies is the possible increase of touristic pressure in areas that are already overcrowded, with the possible increase of cumulative impacts (average score equal to 2, calculated from seven stakeholders, six of them from case study 6). Possible impacts might be related to conflicts with other maritime activities if aquaculture needs more space for its development or relate to environmental concern, if a not well regulated, recreational fishing activity performed next to the aquaculture plants leads to an overexploitation of fish stocks.

The integrated MU Potential of this combination (Table 12) is equal to 0, evidencing an exact balance of drivers and barriers, in agreement with the low level of implementation of such a MU in the two considered case studies. The overall MU Effect is evaluated as positive, with more added values than impacts.

Integrated assessment

Factors	Integrated assessment N. total stakeholders =11	
	Average of factors	Standard Deviation
Drivers	1.9	0.7
Barriers	-1.8	0.8
Added Values	2.3	0.5
Impacts	-1.7	0.7
MU Potential	0.0	
MU Effect	0.3	

Table 12 Integrated assessment of MU Potential and MU Effect of the combination of Tourism & Aquaculture, from the cross analysis of cases 3A and 6.

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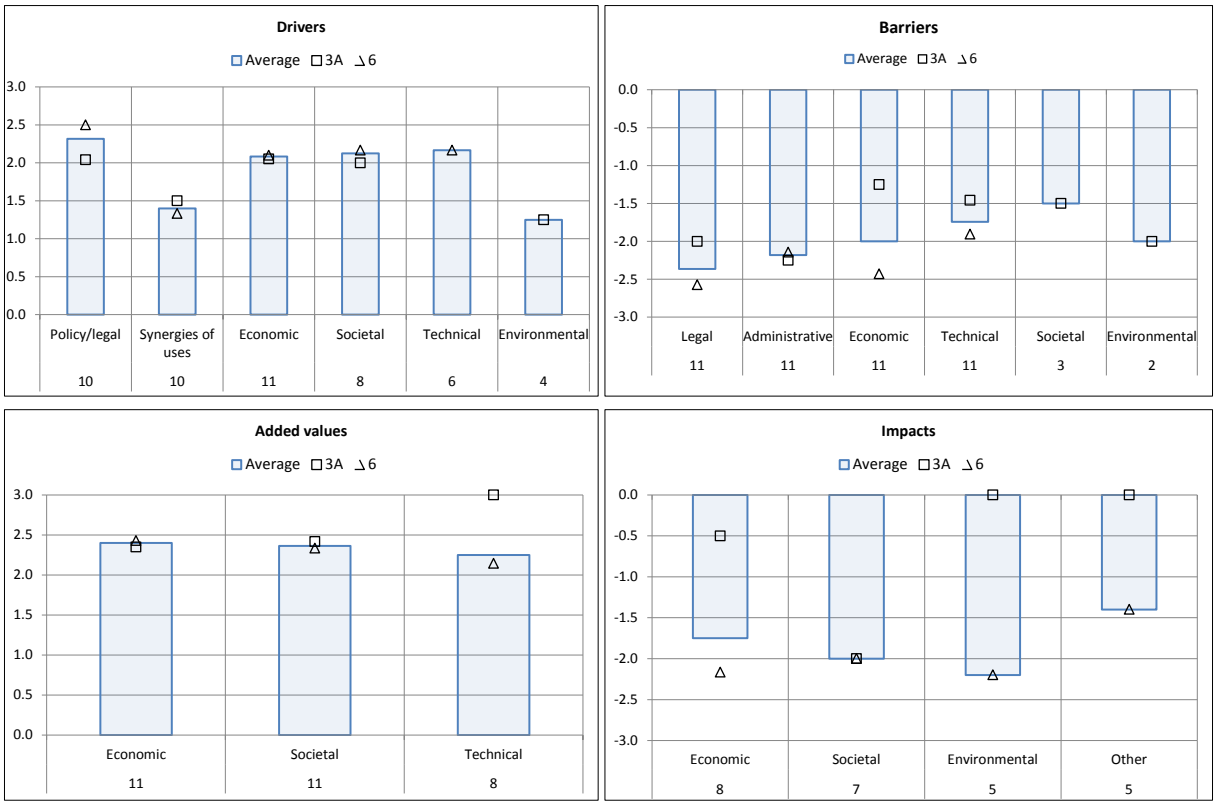

Figure 24 Tourism & Aquaculture. Average scores of categories derived from the integrated DABI catalogue. Bars represent the averages of ALL scores from the three case studies. Symbols represent the average scores of each case study. The numbers indicated close to the axis of categories refer to the overall number of stakeholders that have scored each category.

Additional uses to this combination: MU triplet

The combination between tourism and aqauculture was further investigated in combination with O&G decommissioning in the Northern Adriatic Sea (case study 6). Decommissioning of O&G platforms in the Northern Adriatic Sea is considered in this case a driving sector to develop several MU opportunities. DABI factors of O&G decommissioning & Tourism & Aquaculture, being very specific and strictly related to the decommissioning issues, are kept separated from the integrated DABI catalogue discussed above. Beyond factors specifically related to decommissioning issues, some other factors go along with those of the integrated DABI catalogue discussed above, strengthening the results. Commonalities include, among drivers, the need for diversification of tourism activities on a regional level, and among added values, the development of qualified jobs. As for impacts, the uncertainty on the cumulative effects that can potentially be generated by the combination of uses is also mentioned. No quantitative scores were assigned to this three sector-combination, so that MU potential comparison is not possible.

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5 RECOMMENDED ACTIONS TO FAVOUR MU DEVELOPMENT

An overview of the recommendations for MU development, provided by case studies and concerning the five most frequently analysed combinations, is presented in this chapter in a table format. Several commonalities between the combinations with Tourism – illustrated in Table 13 – are evident, and for this reason the tourism-related combinations are presented together. The combinations with Wind Energy are illustrated in Table 14. Recommendations reported in the case study reports have been clustered according to common themes, in order to be synthesized and compared. A summary of the main cross-cutting elements is given in the following box. A complete overview of all the recommendations provided regarding all analysed combinations is reported in Annex 2.

Summary

Actions for MU development recommended by case studies

MSP process at national and sub-national levels can support MU development including explicit reference/policies towards MU, assisting in the identification of areas suitable for establishing MU combinations, addressing actions aimed at removing barriers to MU, targeting cross-sector needs and opportunities, and encouraging a shift from a sectoral approach to a MU opportunity planning approach.

MU development would benefit from **national/sub-national legal frameworks for MU**. MU can be promoted through licensing processes and by introducing it in EIA processes. Improving coherence of legislation and administrative procedures across sectors (at least) at the national level would also be a key factor for MU development. Ensuring harmonization of local and sub-national administrative procedures is required too.

Focussing and targeting of existing EU regional funds on MU is essential. They should target MU implementation including development of concrete business cases, valorisation, promotion of operators' skills enhancement, etc. Moreover, it is key to sustain MU implementation over time (through funding), after the pilot phase.

The explored combinations with offshore wind energy would benefit from **additional research** on environmental compatibility, on new opportunities emerging from combining uses, on risk assessment and prevention (e.g. navigational hazards), and pilot project development. The development of the tourism-related combinations seems to be less dependent on additional research, thought better knowledge on the bio-economy chain and socio-economic aspects would undoubtedly be beneficial to boost these MUs.

Development of pilot cases is indicated as beneficial for the considered combinations with offshore wind energy production. In the case of the explored combinations with tourism, successful experiences and transfer of good practices are considered as motivators (drivers) for additional MU implementation.

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Strengthening of dialogue and cooperation is recommended for all the combinations explored in this chapter. Different actors to be involved in dialogue (economic sectors, governmental institutions, society at large) and different vertical and horizontal dimensions* for the dialogue are emphasised. Physical meetings and all occasions for joint discussion and project development are also recommended to facilitate MU implementation.

Education and training. Improve skills of sector operators (e.g. fisheries, aquaculture) through targeted educational programs would benefit MU by providing a better understating of its opportunities. Training and capacity-building for MU and other basic educational actions are also recommended, e.g. foreign languages and entrepreneurship in the case of tourism related MU and business skills (e.g. contractors) in the case of wind related MU.

Communication and social awareness are seen as a common need for all the examined combinations. The general public and local communities should be informed about the opportunities offered by MU. Promotion of MU benefits to the society at large would be beneficial for the implementation of all the combinations related with tourism. Participatory processes and links of MU to Corporate Social Responsibility should be encouraged. Communication on MU could also be done through the social media and can include facilitation to access to specific data (e.g. location of environmental and UCH sites open to visitors).

* Vertical: across governance levels; horizontal: across sectors.

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RECOMMENDATIONS	Tourism & Fisheries (3A, 3B, 6, 7)	Tourism & Env. Prot. (3A, 3B, 6)	Tourism & Aquaculture (3A, 6)
Policy, strategies, planning	MSP processes should have a role in promoting MU at the sub-national level, removing barriers and targeting cross-sector needs and opportunities. The role of regional (MSP) authorities is thus highlighted.		
Legal framework & administrative issues	There is a need for a strategy or a legal framework addressing MU. This could be at national or at sub-national (regional) levels. Under this umbrella legislation, administrative procedures (licensing) for MU should be facilitated.		
		The need to promote a change of perspective in environmental legislation towards more strategic legislative instruments has been pointed out, ensuring marine ecosystems and biodiversity protection, allowing the exploitation of their potential in terms of sustainable development opportunities.	The need to harmonize sub-national legislative frameworks (recognizing this specific MU as a regulated business activity) has been pointed out in the Italian case study.
Funding	Targeting on MU of European Regional funds is recommended, particularly to support fleet upgrade, according to MU development requirements.		Targeting on MU of European Regional funds is recommended, particularly to support fleet upgrade, according to MU development requirements.
Research & data production	In case study 3A (Algarve region, Eastern Atlantic Sea) the need for testing solutions through pilots has been highlighted.		
Technical improvements & innovation	Need of fleet adaptation to MU with the identification of the most suitable type of boat (according to the local marine conditions) accomplishing the needs of the commercial sector (fisheries, aquaculture) and the need to host tourist on-board.		
Pilot projects	The development of pilot projects and testing sites is pointed out as potentially beneficial by the Eastern Atlantic cases.		
Networks & clusters	To create clusters of business operators, also including networks with local operators in the field of food supply, is indicated among key actions to support this MU development and implementation in the Italian case study.		

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RECOMMENDATIONS	Tourism & Fisheries (3A, 3B, 6, 7)	Tourism & Env. Prot. (3A, 3B, 6)	Tourism & Aquaculture (3A, 6)
Dialogue and cooperation	Actions to strengthen dialogue are recommended in order to stimulate MU development. A dialogue should be promoted across the sectors involved, between economic operators and regulators, and ultimately across all relevant actors (including academia, policy makers, business, local NGOs). The dissemination of successful MU practices should be considered among the topics to be covered with dialogue. Working tables among sectors and between sectors and institutions are seen as needed tools to promote the implementation of this combination.		
	Specifically for this combination, cross-sectoral cooperation among institutions (Departments, Ministries, etc.) and strengthening of horizontal and vertical governance integration are considered as key factors.		
Education & training	Training and capacity-building for MU and other basic educational actions (e.g. foreign languages and entrepreneurship) addressed to business operators in fisheries and aquaculture should be further supported.		
Communication, social awareness	Promotion of MU benefits to the society at large would be beneficial for the implementation of this combination and, in general, for all the combinations related with tourism. This can also be done through social media and can include facilitation to access to specific data. In the Italian case study (6), communication should be utilized to promote the culture of the sea, including seamanship tradition, expertise, professions, historical marine routes, etc.		
	In the Greek case (7), the involvement of the local communities in a transparent and participatory process is highlighted as contributing to raising awareness and the benefits of MU.		

Table 13 Recommendations from case studies to promote MU implementation (Combinations: T&F, T&E, T&A).

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RECOMMENDATIONS	Wind energy & Aquaculture (cases 1C, 4, 5)	Wind energy & Fisheries (cases 1A, C)
Policy, strategies, planning	Marine Plans should make explicit reference to MU by assisting in the identification of areas suitable for establishing this MU combination and encouraging the shift from sectoral planning maps to "MU opportunity maps". National MSP authorities should have a role in this. National task forces for MU development would be recommendable.	
Legal framework & administrative issues	The need for a legislated claim for the secondary users (typically aquaculture ones) in a MU scenario is highlighted. More generally, the need for a legislative framework for MU is felt as a common need.	The concept of MU should be included in environmental assessment methodology, with a co-existence plan and mitigation strategy to be included in the license application. Guaranteeing safety rights to fishers is also a need. National MSP authorities are called to play a role in these processes.
Funding	Maintaining the long-term necessary funds for pilot project continuation after the start-up phase is key to gathering valuable insights on the real potential of MU.	Emphasis on MU development from existing funding mechanisms is recommended, considering both the area of technical innovation and promoting links between the two sectors.
Research & data production	The Baltic cases highlight the need to promote research on the possibility of cultivating mussels and algae on a large scale in the Baltic, and promote the combination with wind energy production. The need for in-depth impact assessment is identified and also for proof-of concept and business models to encourage investors.	This combination would profit from additional knowledge derived from research on compatibility between OWFs and commercial fisheries, better mapping of navigational hazards, and over-trawlability surveys. Data sharing agreements and protocols between the two sectors would also be beneficial.
Technical improvements & innovation	Testing the available technology in full-scale and *in situ*	Technical innovations, optimized management schemes and technologies for risk minimization are recognized as key issues to promote the implementation of this MU combination. Innovation studies should consider i.e. moorings, cable installation methods, fishing-friendly cable protection, and gear modification.
Pilot projects	The need to showcase the potential of this MU combination can be satisfied by the development of pilot projects, in view of the lack of experience of full-scale implementation.	The development of pilot projects would be beneficial for this MU. It is recommended to facilitate the development of pilot projects by exempting them from full-scale assessments.
Networks & clusters		
Dialogue and cooperation	Actions to strengthen dialogue are recommended in order to stimulate MU development. Dialogue should be promoted across the sectors involved, and between economic operators and regulators	

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RECOMMENDATIONS	Wind energy & Aquaculture (cases 1C, 4, 5)	Wind energy & Fisheries (cases 1A, C)
	Dialogue should be promoted ultimately across all relevant actors (including academia, policy-makers, business, local NGOs). Various scales should be involved, including local, where pertinent. Opportunities for physical meetings of actors involved (like workshops) are highly recommended (Baltic Sea cases – 4 and 5).	Promote cross-border exchange with regulators of bordering countries where this combination exists already (i.e. UK, DK) to find commonalities and streamline management approaches.
Education & training		To facilitate the development of this MU, the commercial fisheries sector should be provided with additional educational resources addressed to developers and contractors.
Communication, social awareness	The development of this MU would benefit from engagement of local stakeholders and dissemination of available results and existing knowledge.	This MU development would benefit from communication actions addressed to demonstrate the links between MU and Corporate Social Responsibility.

Table 14 Recommendations from case studies to promote MU implementation (Combinations: WI&A, W&F).

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ANNEX 1: INTEGRATED DABI CATALOGUES FOR THE MOST FREQUENTLY ANALYSED COMBINATIONS

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A.1.1 Integrated DABI catalogue - Tourism & Fisheries

Case studies	Combination: Tourism & Fisheries case studies 3A, 3B, 6, 7	n stakeholders	Factor average for all stakeholders
	Category D.1 - Legal/Policy drivers		
3A, 3B	Factor D.1.1 Strategic measures for fisheries sector with the aim to diversify fishing activity with tourism	10	2
3A, 3B	Factor D.1.2 Limitation (e.g. quotas, closed seasons and not allowed areas) in fisheries activities	9	1
3A, 3B	Factor D.1.3 Regional legislation focused on pescatourism	10	2
6	Factor D.1.4 Legislative provisions at EU level (e.g. Reg. 508/2014-FEAMP) national and regional (Emilia Romagna LR 22/2014; Veneto LR 10/2012 and DGR 646/2014) contributing to regulate pesca-tourism and icthy-tourism.	8	3
7	Factor D.1.5 Future amendment of the fishing tourism law to open the activity to larger fishing boats	5	1
3A, 3B	Factor D.1.6 License is issued in short time	9	2
3A, 3B, 7	Factor D.1.7 Licensing process for Pescatourism is very simple or it is similar to the process for commercial fishery	17	1
7	Factor D.1.8 Shared need for Ecosystem based approach already addressed in national legislation	7	3
	Category D.2 - Interaction with other uses		
3A, 3B	Factor D.2.1 High number of maritime activities in the area – need to limit conflicts	10	1.1
6	Factor D.2.2 Significant presence of ports and marinas, being careful not to create dispersion or competition among localities.	7	1.0
	Category D.3 - Economic drivers		
3A, 3B	Factor D.3.1 Tourism growth	10	2.5
3A, 3B	Factor D.3.2 Financial incentive systems	10	2.2
3A, 3B	Factor D.3.3 Low potential for fisheries' growth	10	2.0
3A, 3B, 7	Factor D.3.4 Ensure all year activity for fishermen and tourism	17	1.5
3A, 3B	Factor D.3.5 Find new sources of income for fishermen	10	2.8
3A, 3B, 6, 7	Factor D.3.6 Increasing demand for a diversification of tourism: experience-based tourism, responsible tourism, eco-tourism	26	2.1
6, 7	Factor D.3.7 Increasing demand for sustainable and local fish products. Relevance for seasonality and commercialisation of little-used species.	16	2.1
3A, 3B, 6	Factor D.3.8 Dedicated regional funds specific for pescatourism activity, or for the touristic sector, specifically dedicated at the development of enterprise network (European Regional Development Fund - ERDF).	17	2.1
3A, 3B, 6	Factor D.3.9 Availability of EU funding, especially EMFF (European Maritime and Fisheries Fund (EMFF) for 2014-2020	17	2.2
7	Factor D.3.10 Interest from investors	6	1.5
7	Factor D.3.11 Taxation for fishermen applying tourism activities is favorable. This can encourage MU	6	1.0
	Category D.4 - Societal drivers		
3A, 3B	Factor D.4.1 Need to diversify fishing activity to maintain fishing communities identity	10	2.5
3B	Factor D.4.2 People/fishers' will to move towards MU	1	3.0
3B	Factor D.4.3 Increase dissemination to tourists	1	3.0
3B, 6	Factor D.4.5 Capitalisation of experiences and good practices in the case-study area or in other regions (e.g. organisation in cooperatives for the management of pesca-tourism or protocols for the sustainability of pesca-tourism), leading to more dissimination of successfull cases	9	2.2
3B, 6	Factor D.4.6 Support by Local action Groups according to Community–Led Local Development Approach	9	2.3
	Category D.5 - Environmental drivers		
3A, 3B, 6	Factor D.5.1. Decreasing of fish catches, which contributes to stimulate the research of synergies among fisheries and other economic sectors related to tourism, in order to find alternative sources of income.	16	1.8
6, 7	Factor D.5.2 Need for a co-management of fish stocks. Demand for sustainable fisheries	8	1.9
3A, 3B	Factor D.5.4 Need to reduce tourist pressure on the coast	10	1.1

Table A1.1 Integrated DABI catalogue for the combination of Tourism & Fisheries: DRIVERS

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 727451

Case studies	Combination: Tourism & Fisheries case studies 3A, 3B, 6, 7	n stakeholders	Factor average for all stakeholders
	Category B.1 - Legal barriers		
3A, 3B, 6	Factor B.1.1 Presence of severe regulations which limit the activity (e.g. motor-power limits, maximum number of people hosted on board etc.) or which impose specific hygiene and security requirements of passengers on the vessel	17	-2.1
3A, 3B, 6	Factor B.1.2 Lack of a national harmonized law for this MU and inhomogeneity among regional legal provisions.	7	-2.6
3A, 3B	Factor B.1.3 Funding schemes are decentralized (e.g. national funds are subjected to specific regional development priorities)	10	-1.6
7	Factor B.3.2 Lack of long term strategic planning	7	-2.9
	Category B.2 - Administrative barriers		
3A, 3B	Factor B.2.1 Need for a second license	10	-1.2
6	Factor B.2.2 Complex bureaucratic procedures to get licences of pesca-tourism, discouraging operator initiatives	7	-2.7
7	Factor B.2.3 Lack of monitoring mechanisms from the competent authority: commercial/charter touristic boats can offer fishing experiences, competing with pescatourism performed by professional fishermen	7	-2.6
7	Factor B.2.4 Insurance processes for fishing boat is time consuming	7	-1.4
	Category B.3 - Barriers related with economic availability / risk		
3A, 3B, 6, 7	Factor B.3.1 Competition with traditional food distribution services , accommodation facilities or from other tourism sectors e.g recreational fishers	24	-1.2
6	Factor B.3.2 Competition with other areas (e.g. Croatian coast) with higher environmental potential.	6	-1.0
6	Factor B.3.3 Lack of a structured touristic offer finalised to promote MU and connection among different experiences (pesca-tourism and itchy-tourism).	14	-2.5
3A, 3B, 6,	Factor B.3.4 Poor entrepreneurship and investment capacity of operators, also due to the medium-small size of enterprises and to its fragmentation over the territory	19	-2.4
3A, 3B	Factor B.3.5 Lack of advertisement/publicity of the MU	10	-2.1
3A, 3B, 6	Factor B.3.6 Limited availability of funds (also due to the difficulties of the access to finance) for startup activity (e.g. buy material for ensuring security or pay a second license and insurances)	17	-1.9
7	Factor B.3.7 Limited interest to develop other forms of tourism	6	-2.3
3B	Factor B.3.8 Vessels maintenance costs	1	-3.0
7	Factor B.3.9 Overcapacity from tourism activities (high offer of luxury touristic activities is already present)	7	-2.9
	Category B.4 - Barriers related with technical capacity		
3A, 3B,6	Factor B.4.1 Limited availability of specific skills of fishermen, for example concerning communication, public interaction, and foreign languages. Need for a specific training.	18	-2.4
6	Factor B.4.2 Need for adaptation of fishery vessels for tourism activities, for example due to the small size of vessels and the requirements of hygiene and security standards	9	-2.4
3A, 3B, 7	Factor B.4.3 Lack of other supporting and logistic infrastructures on land (e.g. docks)	17	-2.1
3A, 3B	Factor B.4.5 Lack of on-line platform to contact the fishers	10	-2.0
	Category B.5 - Barriers related with social factors		
3A, 3B	Factor B.5.1Resistance to change in small fishing communities	18	-2.2
6	Factor B.5.2 Disappearance of traditional jobs related to fisheries (e.g. Delta Po), relevant to develop the combination	6	-2.0
3A, 3B	Factor B.5.3 Risks onboard (e.g., fall during recovering gear)	10	-1.2
	Category B.6 - Barriers related with environmental factors		
3A, 3B	Factor B.6.1 Current degradation of marine resources might impair the activity	10	-2.3
3A, 3B	Factor B.6.2 Restriction/dependence on fishing ban periods	10	-1.4
3A, 3B, 7	Factor B.6.3 Restriction/dependence on weather conditions. Unfavourable weather conditions can impair the MU	10	-2.0

Table A1.2 Integrated DABI catalogue for the combination of Tourism & Fisheries: BARRIERS

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 727451

Case studies	Combination: Tourism & Fisheries case studies 3A, 3B, 6, 7	n stakeholders	Factor average for all stakeholders
	Category V.1 - Economic added values		
3A, 3B, 6, 7	Factor V.1.1 Integrative source of income for fishermen due to the development of new market opportunities and diversification of fishing sector	26	2.4
3A, 3B	Factor V.1.2 Extension of income season for both tourism and fisheries	10	1.8
3A, 3B, 7	Factor V.1.3 Diversification of tourism sector, towards eco-tourism	17	2.2
7	Factor V.1.4Diversification of fishery sector	7	2.1
3B, 6, 7	Factor V.1.5 New and specialized job opportunities, whenever specific training courses are organized.	17	2.0
3B, 6	Factor V.1.6 Upgrade of the touristic offer: development of an offer dedicated to a new group of users, more interested in discovering the environmental and socio-economic characteristics of the area. Creates, preserves and promotes other activities (e.g. accommodation, tour guides, catering)	7	2.6
6	Factor V.1.7 Overall increase of the attractiveness of the coastal areas which offer pesca-tourism activity.	6	2.0
3A, 3B, 6, 7	Factor V.1.8 Increase of the dynamic of local market, through commercialization of local fish products, also due to the direct understanding of the sustainable fishing practices. The direct commercialization of fish products is endorsed by fishermen and meets the expectative of an experience – based tourism.	26	2.1
7	Factor V.1.9 All incomes are controlled by the taxation system	7	0.6
	Category V.2 - Societal added values		
3A, 3B	Factor V.2.1 Involving fishermen's families in the distribution of product once on-shore	10	2.1
3A, 3B, 6	Factor V.2.2 Contribution to the maintenance of local fishing tradition and to the related cultural heritage	19	2.6
3A, 3B, 6	Factor V.2.3 Awareness of tourists and civil society about sustainable fisheries and fishermen culture.	10	2.8
3A, 3B, 7	Factor V.2.4 Education and public awareness about state and issues of marine environment	10	2.7
3A, 3B	Factor V.2.5 Promotion of seafood diet	10	1.8
3A, 3B	Factor V.2.6 Oportunity for tourists to present a high degree of satisfaction (e.g. Sardinia – Italy)	10	2.8
3B	Factor V.2.7 Fish as key product in marketing the Region	10	2.3
3A, 3B, 6, 7	Factor V.2.8 Professional growth of the economic sector of fisheries, with more informed and aware operators (improvement of technical skills), able to create an enterprises network, with more potential in the territory	23	2.0
6	Factor V.2.9 Cultural feedback for operators offering multi-use experience; personal cultural growth.	9	2.2
3B	Factor V.2.10 Sharing of good practices	1	2.0
3A, 3B, 7	Factor V.2.11 Public awareness to responsible fisheries and tourism activities	17	2.0
3B	Factor V.2.12 Economic benefits for fishermen who may have lower need to apply for financial social support	1	2.0
3B	Factor V.2.13 Reduction of financial support for fleet decommissioning due to fisheries decline	1	2.0
7	Factor V.2.14 Reduction of illegal activities, through reduction of fishing effort	6	1.8
	Category V.3 - Environmental added values		
3A, 3B, 6	Factor V.3.1 Contribution to the reduction of fishing effort and to a sustainable management of fish stocks (How much relevant? Factor also depending on the typology of involved fisheries).	18	1.8
3A, 3B	Factor V.3.2 Reduction of tourists in the coast (e.g. traditional beach tourism)	10	1.2
	Category V.4 -Others		
7	Factor V.4.1 Ecosystem based approach and integrated approach	7	2.3
7	Factor V.4.2 Possible improvement and update of legislation	7	1.7

Table A1.3 Integrated DABI catalogue for the combination of Tourism & Fisheries: ADDED VALUES

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 727451

Case studies	Combination: Tourism & Fisheries case studies 3A, 3B, 6, 7	n stakeholders	Factor average for all stakeholders
	Category I.1 - Economic impacts		
3A, 3B, 6	Factor I.1.1 Concurrence for other tourism sectors (e.g. whale watching and recreational fishing)	16	-0.9
	Category I.2. - Social impacts		
6	Factor I.2.1 Risk of entrance of not-competent operators (not-professional fishermen), with a distortion of the real meaning of multi-use.	7	-1.7
6	Factor I.2.2 Risk of an increase of the touristic pressure in areas which are already overcrowded.	6	-1.5
	Category I.3 - Environmental impacts		
6	Factor I.3.1 If not properly managed, pesca-tourism can lead to an overexploitation of fish stocks	7	-1.4

Table A1.4 Integrated DABI catalogue for the combination of Tourism & Fisheries: IMPACTS

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 727451

A.1.2 Integrated DABI catalogue - Wind Energy & Aquaculture

Case studies	Combination: Offshore Wind & Aquaculture Case studies 1C, 4, 5	n stakeholders	Factor average for all stakeholders
	Category D.1 - Legal/Policy drivers		
4	Factor D.1.1 Political support: if the politicians on a local and/or national level were interested in developing multi-use in marine areas, this will also entail support for this development (through economic compensation, pilot projects etc.).	7	0,3
5	Factor D.1.2 Strong national policies on environmental remediation (CO2/N/P)	9	1,4
5	Factor D.1.3 Strong national policies on bio-economy and blue growth	9	1,9
5	Factor D.1.4 New national laws on compensatory aquaculture for nutrient sequestration	9	1,6
	Category D.2 - Interaction with other uses		
1C	Factor D.2.1 German MSP urges connection of marine aquaculture and other offshore uses in order to benefit from synergistic effects	9	1,2
1C, 5	Factor D.2.2 Expansion of new uses into the available area requires spatial efficiency to allow future growth of additional uses	3	2,5
	Category D.3 - Economic drivers		
1C, 4, 5	Factor D.3.1 Increased economic potential and profitability for both users through cooperation and sharing of resources	16	0,8
4	Factor D.3.2 Investment in wind power (infrastructure, piles) already made	7	0,7
5	Factor D.3.3 Global increase in demand for marine protein	9	2,2
5	Factor D.3.4 New market opportunities for blue bio-mass	9	1,9
4, 5	Factor D.2.2. Combining offshore wind (already in operation) with activities which can reduce nutrient loads (such as aquaculture) might increase or emphasize Corporate Social Responsibility (CSR)/green image. This factor can encourage entrepreneur's investment	16	0,3
	Category D.4 - Societal drivers		
4	Factor D.4.1 Technical development of mussel farms, creating a local interest	7	0,4
4	Factor D.4.2. Beyond development of mussel farming itself, this MU might be interesting for research as a pilot study for combining offshore wind and aquaculture.	7	0,6
4, 5	Factor D.4.3 Local communities and fishermen willingness/involvement/interest	16	0,5
5	Factor D.4.2 Creation of potential new jobs in a peripheral area	9	0,8
5	Factor D.4.3 Development of specialised courses tailored to include both aquaculture and offshore wind aspects	9	1,9
	Category D.5 - Environmental Drivers		
4	Factor D.5.1 Environmental benefit (if mussels or algae) for nutrient uptake	7	1,3

Table A1.5 Integrated DABI catalogue for the combination of Wind Energy & Aquaculture: DRIVERS

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 727451

Case studies	Combination: Offshore Wind & Aquaculture Case studies 1C, 4, 5	n stakeholders	Factor average for all stakeholders
	Category B.1 - Legal/Policy barriers		
1C	Factor B.1.1 The legislation requires that any activity inside OWF must not hinder normal operations, maintenance or navigational safety inside the priority area	0	
4	Factor B.1.2 According to the Environmental Act some water activities need a specific permission in an Environmental Court. Also MU establishment may imply the need for this permission	7	-1,1
5	Factor B.1.3 Lack of regulatory support or incentives to promote co-localization between sectors	9	-1,8
5	Factor B.1.4 Different regulations apply to different types of aquaculture	9	-1,7
5	Factor B.1.5 Lack of high level political focus on MU	9	-2,2
5	Factor B.1.6 Lack of involvement from regulators through MSP and other policies	9	-3,0
	Category B.2 - Administrative barriers		
1C, 4, 5	Factor B.2.1 Licensing/permission issues. MU might complicate the procedures to get the permission to operate. Not clear point of contact. Simplification is needed	17	-1,2
4	Factor B.2.2 Potential/risk of future use restrictions in the area (for example aquaculture regulations could imply restrictions on shipping in the area of wind park, or restrictions related to safety in the wind park may affect aquaculture development)	7	-0,3
	Category B.3 - Financial barriers/risk		
1C, 5	Factor B.3.1 Moving aquaculture offshore requires special engineering solutions and makes day-to-day operations more expensive. Large investments for aquaculture are required	10	-1,9
4	Factor B.3.2 Lack of investment to develop pilot cases of MU.	7	-1,3
5	Factor B.3.3It is difficult to find joint investors for both OW and AQ, as OW investors rely on slow steady return in a long run, while the aquaculture needs to reach profitability much faster to keep operating.	9	-2,1
5	Factor B.3.4 Lack of financial or other incentives to stimulate such combined development	9	-2,8
5	Factor B.3.5 Lack of risk capital/funding for scaling up pilot projects	9	-2,1
1C, 5	Factor B.3.6 Insurance against possible damages to OWFs is prohibitively high for small scale fishing companies. Insurance costs can increase due to higher (unknown) risks	10	-1,2
4	Factor B.3.7 No subsidies in place for the environmental benefit of the combination (uptake of nutrients)	7	-0,4
4	Factor B.3.8 Low profitability of both sectors involved in MU	7	-2,1
5	Factor B.3.9 Existing compensation for loss of fishing areas within OWF discourages new aquaculture establishment incentives	9	-0,9
4, 5	Factor B.3.10 Conflicts of interest between sectors	16	-0,9
	Category B.4 - Barriers related with technical capacity		
1C	Factor B.4.1 Connection of aquaculture systems to existing OWFs is not possible unless it was designed for the increased load caused by aquaculture systems	2	-3,0
1C	Factor B.4.2 Need to integrate other users into the established health, safety and emergency concepts, while they are operating within the windfarm.	0	
4, 5	Factor B.4.3 Lack of knowledge and studies on technology for aquaculture and offshore wind (what mussels, algae etc. are possible and how they should be cultivated). Some knowledge exists at the county board administration, but it needs to be further discussed, tested and adapted to local conditions	16	-2,2
4	Factor B.4.4 Limitations due to wind and weather conditions	7	-0,3
4	Factor B.4.5 Timing in processes of different activities/uses. Complex coordination among the aquaculture maintenance activities and the wind farm maintenance activities.	7	-0,3
5	Factor B.4.4 TRLs vary according to the sector (Offshore wind energy/ Aquaculture)	9	-2,6
5	Factor B.4.7 Lack of proof of concept/large scale pilot cases	9	-2,2
5	Factor B.4.8 Lack of business cases, documentation regarding production efficiency, quality and quantity	9	-2,4
	Category B.5 - Barriers related with social factors		

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5	Factor B.5.1 Stakeholder profiles are not aligned (i.e. giant international energy companies with self-employed, niche production, small scale companies)	9	-1,9
5	Factor B.5.2 Lack of tradition for cooperation between different sectors	9	-3,0
5	Factor B.5.3 Lack of dialogue between sectors and society – no tradition of considering MU at sea	9	-3,0
5	Factor B.5.4 Lack of local public and political awareness regarding the positive effects of mussel and seaweed cultivation – aquaculture is associated with negative effects	9	-2,4
5	Factor B.5.5. Lack of consumer awareness and market demand for energy and aquaculture products coming specifically from combined and spatially efficient sites	9	-2,6
1C	Factor B.5.5 Opposition to aquaculture (whether fed, extractive or IMTA) in German waters	0	
	Category B.6 - Barriers related with environmental factors		
5	Factor B.6.2 The ecology of wind-farm site is unstable, affecting aquaculture development (steep salinity gradients, water temperature flux, nutrient availability, direction of currents and water flow)	9	-1,7
5	Factor B.6.3 Lack of EIA for MU on local biodiversity – concerns regarding negative environmental impacts	9	-2,1
5	Factor B.6.4 Lack of documentation of EI of large scale mussel/seaweed cultivation in general	9	-2,2

Table A1.6 Integrated DABI catalogue for the combination of Wind Energy & Aquaculture: BARRIERS

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 727451

case studies	Combination: Offshore Wind & Aquaculture Case studies 1C, 4, 5	n stakeholders	Factor average for all stakeholders
	Category V.1 - Economic added values		
1C, 4, 5	Factor V.1.1 Possible lowering of operational costs for all involved actors through sharing of resources (e.g. vessels, ports, equipment, personnel, etc.) and integration and cost sharing of health and safety concepts. Additional income for Offshore wind energy sector if a rent for aquaculture use of its infrastructure is applied	18	1,4
4, 5	Factor V.1.2 Creation of additional local and specialized job with broader local skills	16	1,2
5	Factor V.1.3 Increase in production from the same marine space	9	2,1
5	Factor V.1.4 Sheltering effect of OWF can have positive effect of number of working days possible at sea with aquaculture	9	1,2
	Category V.2 - Societal added values		
4	Factor V.2.1 Innovative local environment and local development	7	0,6
4	Factor V.2.2 Increased acceptance if both activities are developed together	7	0,3
5	Factor V.2.3 Basis for educative/training courses at local level	9	2,2
5	Factor V.2.4 No near-shore visual impact from offshore aquaculture	9	1,6
5	Factor V.2.5 Development of new skillsets and courses for personnel that needs to know both, about aquaculture operations and OW operations/maintenance	9	2,7
	Category V.3 - Environmental added values		
1C	Factor V.3.1 Spatial efficiency will make possible to reserve areas for new ocean uses that might not be apparent yet and lead to an overall decrease of the human geographic footprint	1	3,0
4, 5	Factor V.3.2 Mussel or seaweed farms can increase nutrient uptake (and reduce eutrophication impacts). Good potential for nutrient sequestration	16	2,3
4	Factor V.3.3 Mussels can create a basis for an environmental friendly fodder (fish farms, poultry etc)	7	0,3
5	Factor V.3.4 Good potential for increased marine biodiversity	9	2,6
5	Factor V.3.5 Shelter effect of the OW can increase capacity for biodiversity (settling effect)	9	1,4
5	Factor V.3.6 Establishment of seagrass and mussels can prevent sand erosion on the sea bed	9	2,2
	Category V.4 - Better insurance policies and risk management		
5	Factor V.4.1 Broader understanding of each other's work and risks involved	9	1,9
	Category V.5 - Administrative added values		
1C	Factor V.5.1 Co-location with Aquaculture can ease obtaining an SLO (societal license to operate) for Wind Farm developers and operators	3	1,5

Table A1.7 Integrated DABI catalogue for the combination of Wind Energy & Aquaculture: ADDED VALUES

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 727451

case studies	Combination: Offshore Wind & Aquaculture Case studies 1C, 4, 5	n stakeholders	Factor average for all stakeholders
	Category I.1 - Economic impacts		
5	Factor I.1.1 Repair costs: damage to mussel/seaweed lines from e.g. ice falling from the turbines in winter, or collision with maintenance vehicles	9	-1.4
5	Factor I.1.2 Loss of income: fouling of biomass production due to spillage from OW maintenance equipment, lubrication, paint and other chemicals	9	-1.8
5	Factor I. 1.3. Aquaculture operation and maintenance might compromise the immediate access of OW personal in case of urgent need for repair (the costs for OW investor if the turbine is not operating even only one day are immense) - someone might need to compromise so who takes on that loss.	9	-0.8
5	Factor I.1.4 Low productive hours - Long working hours for aquaculture personnel, incl. non-productive time required to come to the turbine and go back to shore - increasing the costs of human resources	9	-1.3
4	Factor I.1.5 Possible economic risks due lack of knowledge and profitability in these "new" combinations of activities	7	-0.4
	Category I.2. - Social impacts		
5	Factor I.2.1 Possible restrictions of boat traffic in the wind park area, negatively affecting tourists, local leisure and fishing activities	16	-1.2
4	Factor I.2.2 Possible poor acceptance of local community	7	-0.1
	Category I.3 - Environmental impacts		
1C, 4	Factor I.3.1 If aquaculture is not well managed according to BMP (best management practice), BAT (best available technology) and BEP (best environmental practice), it can have negative impacts on the marine environment (e.g. eutrophication, spread of disease or impact of escapees on natural populations)	9	-0.8
4	Factor I.3.2 Noise impacts, due to more traffic in the area, both at sea and on land.	7	-0.6
5	Factor I.3.2 Introduction of habitats supporting invasive species.	9	-1.2
5	Factor I.3.3 Possible bio-fouling due to aquaculture	9	-2.6
5	Factor I.3.4 Increase of bacteria due to increased bird population and excreta	9	-2.4
	Category I.4 - technical impacts		
5	Factor I.4.1 Unclear technical risks and insurance implications	9	-1.3

Table A1.8 Integrated DABI catalogue for the combination of Wind Energy & Aquaculture: IMPACTS

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 727451

A.1.3 Integrated DABI catalogue - Tourism & Environmental Protection

case studies	Combination: Tourism & Environmental Protection case studies 3A, 3B, 6	n stakeholders	Factor average for all stakeholders
	Category D.1 - Policy/Legal drivers		
3A, 3B, 6	Factor D.1.1 - Support from Strategic documents (i.e. Blue Growth strategy) also at macro-regional level (Adriatic Ionian Region) to promote sustainable tourism	13	2.2
6	Factor D.1.2 - EU is strongly encouraging Italy to identify new MPAs. At regional level this is interpreted also as an opportunity to develop touristic sector	7	1.9
3A, 3B	Factor D.1.3 United Nations Convention on Biological Diversity & Natura 2000	6	2.2
3A, 3B	Factor D.1.4 National legislation focused on conservation and management of natural resources	6	2.3
3A, 3B	Factor D.1.5 Regional legislation focused on conservation and management of natural resources	6	2.0
	Category D.2 - Interaction with other uses		
3A, 3B	Factor D.2.1 - MPA already existing, i.e the tegnue, worth being exploited/Increasing number of designated/managed sites to be explored	13	2.5
3A, 3B, 6	Factor D.2.2 – Multiple synergies between tourism and environmental protection with synergies between MPAs and UCH sites	13	2.4
	Category D.3 - Economic drivers		
3A, 3B, 6	Factor D.3.1 - Increasing demand for a sustainable eco-tourism and for activities related to the dissemination of environmental assets' values (value of natural resources)	13	2.5
6	Factor D.3.2 - Increasing demand for diving sites due to a growing interest by divers and operators of the sector	7	2.3
3A, 3B	Factor D.3.3. Financial incentive systems	6	2.0
3A	Factor D.3.3. Financial incentive systems to diversify economy	1	2.0
	Category D.4 - Societal drivers		
6	Factor D.4.1 – Possibility to identify links with environmental related activities along the coast, creating opportunity for growth of the overall area	7	2.3
3A, 3B	Factor D.4.2 Increasing awareness for the value of natural resources	6	2.3
	Category D.5 - Environmental		
6	Factor D.5.1 – Need to regulate and promote sustainable use of MPAs which at present occur in individual, fragmented and not-controlled ways	6	2.5
6	Factor D.6.1 Capitalisation of experiences and good practices in the case-study area or in other Italian regions	7	2.1
3A, 3B	Factor D.6.2 Need to expand environmental conservation	6	2.3
3A, 3B	Factor D.6.3 Need to reduce tourist pressure on the coast	6	1.3

Table A1.9 Integrated DABI catalogue for the combination of Tourism & Environmental Protection: DRIVERS

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 727451

case studies	Combination: Tourism & Environmental Protection case studies 3A, 3B, 6	n stakeholders	Factor average for all stakeholders
	Category B.1 - Legal barriers		
3A	Lack of an adequate regional legislation	1	-2.0
	Category B.2 - Administrative barriers		
6	Factor B.2.1 – Limited coordination between institutions involved, moreover acting at different scales	7	-2.4
6	Factor B.2.2 – Lack of cooperation (finalized to co-management and promotion of marine natural resources) between authorities in charge of environmental protection and touristic sector operators	7	-2.7
3A, 6	Factor B.2.3 – Complex administrative procedures/bureaucracy	8	-2.4
3A, 3B	Factor B.2.4 Need for specific authorization or use restriction	6	-2.0
6	Factor B.2.4 – Lack of a common vision between sectors and of synergies at political level	7	-2.9
6	Factor B.2.5 – inability of institutions to convince stakeholders about the added value of synergies	7	-2.6
	Category B.3 - Barriers related with economic availability / risk		
6	Factor B.3.1 – Niche touristic sector whose potential is still not properly evaluated	7	-1.9
6	Factor B.3.2 - Lack of adequate financial incentives	7	-2.1
3A	Facor B.3.3 Lack of support and resources for tourist infrastructures and services	1	-3.0
	Category B.4 - Barriers related to technical capacity		
3A, 3B	Factor B.4.1 Design of new equipment (vessels to observe sea floor), nautical infrastructures and tourism facilities	6	-1.3
6	Factor B.6.1 – Limited expertise in the field (i.e. divers trained in disseminating biologic-naturalistic knowledge)	7	-1.9
	Category B.5 - Barriers related with social factors		
6	Factor B.5.1 – Limited understanding of benefits of MU to the goals of environmental protection	7	-2.1
6	Factor B.5.2 – Lack of sufficiently diffused culture about environmental protection among population (need to raise social awareness)	7	-2.4
6	Factor B.5.3 –Conflicts instead of synergies between stakeholders working on same subjects	7	-2.6
3A	Factor B.5.4 Conflct for space between resident population and touristic pressure for space	1	-2.0
	Category B.5 - Barriers related with environmental factors		
3A,3 B, 6	Factor B.5.1 – Scarce transparency of water column and seasonal/ weather restrictions to go diving	13	-1.5
6	Factor B.5.2 - Problems of compatibility between MPA high ecological requirements (due to their high vulnerability) and its touristic exploitation	7	-2.4

Table A1.10 Integrated DABI catalogue for the combination of Tourism & Environmental Protection: BARRIERS

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 727451

case studies	Combination: Tourism & Environmental Protection case studies 3A, 3B, 6	n stakeholders	Factor average for all stakeholders
	Category V.1 - Economic added values		
6	Factor V.1.1 - Additional finance (from tourism) to environmental protection	7	2.4
6	Factor V.1.2 – Creation of synergies between stakeholders	7	2.3
6	Factor V.1.3 – Development of positive economic interactions (production chains) between coastal and marine activities	7	2.3
3A, 3B	Factor V.1.4 Increase of local revenues related to tourist services	6	2.7
3A	Factor V.1.5 Combat seasonality in tourism	1	3.0
	Category V.2 - Societal added values		
3A, 3B, 6	Factor V.2.1 - Diversification of tourism offer, targeting people motivated to know about natural and socioeconomic resources of the area	13	2.5
3A, 6	Factor V.2.2 - Jobs creation, specialization and diversification, formation of new type of professionals	8	2.3
6	Factor V.2.3 – Overall raising in attractiveness of the area, able to offer positive sustainable eco-tourisms experiences (i.e tegnue are already a brand)	7	2.4
3A, 3B, 6	Factor V.2.4 – Educational benefits (raising awareness about environmental protection)	13	2.3
3A, 3B	Factor V.2.5 Establishment of an ecosystem service for designated areas	6	2.7
	Category V.3 - Environmental added values		
6	Factor V.3.1 – Effective collaboration of operators and end users for the management, protection and sustainable use of MPAs	7	2.0
3A, 3B	Factor V.3.2 –Protection of natural resources	6	2.5
3A, 3B	Factor V.3.3 Lower impact use of environmental resources	6	2.5
6	Factor V.3.4 – Raising of end users awareness implies benefits for present and future protection projects	7	2.4
	Category V.4 - Technical added values		
3A, 3B	Factor V.4.1 More frequent presence of tourists can avoid irresponsible and intrusive access and unauthorized activities	6	2.2
3A, 3B	Factor V.4.2 Development of nautical equipment and vessels that enable appreciation	6	2.2

Table A1.11 Integrated DABI catalogue for the combination of Tourism & Environmental Protection: ADDED VALUES

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 727451

case studies	Combination: Tourism & Environmental Protection case studies 3A, 3B, 6	n stakeholders	Factor average for all stakeholders
	Category I.1 - Economic impacts		
6	Factor I.1.1 – Possible conflicts with other maritime uses (transport, fisheries etc.)	7	-2.0
3A, 3B	Factor I.1.2 Other activities are forbidden, except scientific research with authorization	6	-1.8
	Category I.2 - Societal Impacts		
3A, 3B	Factor I.2.1 Risk of congested sites might decrease level of satisfaction of tourists	6	-2.2
	Category I.3 - Environmental impacts		
3A, 3B, 6	Factor I.3.1 – Possible aggravation of environmental impact in fragile marine ecosystems due to raising the volume of touristic activities or to improper use of the resources	13	-2.3
3A, 3B	Factor I.3.2 Changes in behaviour and physiology of local fauna	6	-2.2
6	Factor I.3.3 – Possible entry in the market of operators not interested in real MU, but only in business and exploitation of resources	7	-1.6
	Category I.4 - Other		
6	Factor I.4.1 Other risks to be specifically identified, due to the poor experience available in the case-study area for this combination	7	-1.4

Table A1.12 Integrated DABI catalogue for the combination of Tourism & Environmental Protection: IMPACTS

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 727451

A.1.4 Integrated DABI catalogue - Wind Energy & Fisheries

case studies	Combination: Wind energy & Fisheries case studies 1A, 1C	n stakeholders	Factor average for all stakeholders
	Category D.1 - Policy & legal drivers		
1A	D.1.1. Legal requirements preventing interference with legitimate maritime users e.g. fisheries	5	2,8
1A	D.1.2.Policies supporting fisheries access to sea areas	6	2,5
1A	D.1.3 Political support, encouraging the reinstatement of fishing activity after the construction of a wind farm	1	2,0
1A	D.1.4.EIA requirements which allow to identify, consult, and mitigate affected stakeholders	6	1,8
1A	D.1.5 No law justifying the exclusion of fishing operations within offshore wind farm	3	1,3
1A	D.1.6 Policies for climate change adaptation (supporting changing of fishing grounds to newly productive areas which can be suitable for wind energy production as well).	2	0,5
1C	D.1.7 Fisheries is been awarded special considerations by the national MSP inside the priority areas for Offshore Wind Farm (Germany case study)	0	
	Category D.2 Interaction with other uses		
1C	D.2.1 Expansion of new uses into the available area requires spatial efficiency	3	2,5
	Category D.3 - economic drivers		
1A	D.3.1.Avoid unnecessary additional costs to the offshore wind industry (e.g. delays in permitting, costly installation methods, delays with surveys)	3	3,0
1A	D.3.2 Avoid unnecessary additional costs to the commercial fishing industry (e.g. loss of income, insurance premiums, loss of gears)	6	2,8
1C	D.3.5 Expansion of offshore wind power generation threatens livelihood of fisheries without multi-use development	0	
	Category D.4 - Societal drivers		
1A	D.4.1. Support fisheries development as contribution to the national food security system	4	3,0
1A	D.4.3 Contribution towards Corporate Social Responsibility for offshore wind developers	8	2,9
1A	D.4.4.Greater local acceptance	6	2,8
1A	Positive attitudes for coexistence	6	1,5
	Category D.5 - Technological drivers		
1A	D.5.1 Available technology can satisfy current needs for MU (installation methods, navigation, gear and vessel technology)	9	1,3
	Category D.6 Environmental drivers		
1C	D.6.1 Wind Turbines act as Fish attracting devices due to the special ecosystem their foundations offer, increasing the available biomass in their immediate surroundings and creating valuable fishing grounds	0	
	Category D.7 - Administrative drivers		
1A	D.7.1. Include the obligation to engage fisheries as prescription when providing a license for an installation (e.g. new wind mill)	9	2,6
1A	D.7.2 Avoid potential for legal cases which can prevent stakeholders from investing	9	1,4

Table A1.13 Integrated DABI catalogue for the combination of Wind Energy & Fisheries: DRIVERS

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 727451

case studies	Combination: Offshore wind energy & fisheries case studies 1A, 1C	n stakeholders	Factor average for all stakeholders
	Category B.1 - Legal/Policy barriers		
1A	B.1.1. Commercial fishing parties are not statutory consultee in the marine licencing process	9	-1,7
1A	B.1.2 No legal requirement for compensation	9	-1,2
1A	B.1.3 Current EIA practice does not consider MU proactively	9	-2,1
	Category B.2 - Administrative barriers		
1A	B.2.1 Single-sector industry challenges impacting on the relationships between the 2 industries and attitude towards MU	9	-2,7
1A	B.2.2 Issues with consultation process including timing, frequency, insincere support, governance structure, representation, power imbalances, attitudes, and conflicts of interests	9	-2,2
1A	B.2.3 Design complexity of offshore wind farm developments discourages MU considerations	9	-2,1
1C	B.2.4 Integration into existing Health and Safety Concepts of operational OWFs is too complex and would currently have to be solved on a case by case basis	1	-1,0
1A	B.1.4 No spatial policies for commercial fisheries in marine planning	9	-1,7
	Category B.3 - Financial barriers/risk		
1A	B.3.1Additional financial cost to offshore wind developers (e.g. insurance premiums, foundation types, installation methods, additional protection measures, micro-sitting, cable routing, additional survey cost, maintenance costs)	9	-2,6
1A	B.3.2 No direct financial benefits from MU to offshore wind developers	9	-2,0
1C	B.3.3 Insurance against possible damages to OWFs is prohibitively high for small scale fishing companies	1	-3,0
	Category B.4 - Barriers related to technical capacity		
1A	B.4.1 Offshore wind farm components not always compatible with fishing operations	9	-2,7
1A	B.4.2 Incompatibility of fishing vessel and gear specifications with offshore wind farm altered sea conditions	9	-2,6
1A	B.4.3 Spatial data issues including availability, coverage, deficiencies & misrepresentation, access, interpretation, data gaps and resource requirements to address those problems	9	-2,4
1C	B.4.5 Determining liability in case of accidents and damage to offshore wind turbines can proof difficult and might require specialised surveillance equipment	3	0,0
1C	B.4.6 Certain fishing methods (i. e. dredging) might damage cables connecting turbines (missing data for different depths and methods, based on precautionary principle)	0	
	Category B.5 - Barriers related to social factors		
1A	B.5.1 Fishing industry perceptions around safety of operations within offshore windfarms	9	-2,3
1A	B.5.2 Negative attitudes of the fishing industry (e.g. limited engagement, claiming sole ownership of sea space, exploitation behaviour for compensation)	9	-1,9
1A	B.5.3 Negative attitudes of the offshore wind industry (e.g. deferring mitigation for later stages, insincere support to consultation, declining compensation)	9	-1,9
1A	B.5.4 Power imbalances: Fishing industry opposing multinational developers and government agendas	9	-1,7
	Category B.6 - Barriers related to safety		
1A	B.6.1 Ability to safely operate during extraordinary conditions (e.g. Engine failure, Snagging incident, extreme weather conditions, health issue, other *force majeure*)	9	-2,1

Table A1.14 Integrated DABI catalogue for the combination of Wind Energy & Fisheries: BARRIERS

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 727451

case studies	Combination: Offshore wind energy & fisheries case studies 1A, 1C	n stakeholders	Factor average for all stakeholders
	Category V.1 - Economic added values		
1A	V.1.1 Collaborative working relationships between the two industries (alternative employment opportunities, in-kind information feeding into assessments, avoiding survey disruption)	9	1,9
1A	V.1.2 Proliferation of alternative, static gears and financial gain for the new fleet segment	4	1,8
1A	V.1.3 Cost reduction from shared infrastructure for operations and maintenance	9	1,1
1A	V.1.4.Wider indirect benefits to the local economy	2	2,5
1A	V.1.5 Indirect economic benefits to the fishing industry (e.g. employment opportunities in the future)	4	1,8
	Category V.2 - Societal added values		
1A	V.2.1 Promotes longevity of the fishing industry	3	3,0
1A	V.2.2 Community funding from MU developments can act as a catalyst for better governance, fisheries management, and engagement of the fishing industry in the scientific world	1	3,0
1A	V.2.3 MU might build trust with local fishermen	9	2,1
1A	V.2.4 Promotes innovation in fishing methods as well as in foundations, installation methods, protection measures etc.	1	2,0
1C	V.2.5 Spatial efficiency will make possible to reserve areas for new ocean uses that might not be apparent yet and lead to an overall decrease of the human geographic footprint	1	3,0
1A	V.2.6 Cultural benefits from sustaining traditional fishing communities	1	3,0
1A	V.2.7.Benefits to government for achieving sustainable development	1	1,0
1A	V.2.8 Increased yield and contribution to food security	9	2,4
	Category V.3 - Environmental added values		
1A	V.3.2 Artificial reefs by providing protected habitats for marine species	8	2,3
1A	V.3.3 Nurseries and sheltered areas contributing to strategic fisheries management as marine protected areas	9	2,2
1C	V.3.4 No decrease in the level of production from well managed German (and European) fisheries will lead to less imports from less well managed fishing areas across the world and not increase overfishing as well as the CO2 footprint of consumed fisheries products	1	1,0
	Category V.4 - Administrative		
1C	V.3.5 Co-location with Fisheries can ease obtaining an SLO (societal license to operate) for Wind Farm developers and operators	3	1,5

Table A1.15 Integrated DABI catalogue for the combination of Wind Energy & Fisheries: ADDED VALUES

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 727451

case studies	Combination: Offshore wind energy & fisheries case studies 1A, 1C	n stakeholders	Factor average for all stakeholders
	Category I.1 - Economic impacts		
1A	I.1.1 Loss of income for fisheries from some area exclusions	9	-2.3
1A	I.1.2 Other indirect economic impacts on fishing operations, in relation to displacement, overcrowding, reduced quality of catches, knock-on effect on the supply chain	9	-2.3
1A	I.1.3 Higher energy cost to consumers due to increased development costs	3	-2.3
1A	I.1.4 Financial impact on offshore wind developers through more demanding baseline and post-installation surveys, increased risk to asset integrity, inter-array cable installation method and protection measures	9	-2.0
1A	I.1.5 Other direct cost to fishermen from increased steaming distances, capital costs for diversifying, costs from any fishing equipment	9	-1.9
	Category I.2. - Social impacts		
1A	I.2.1 Locking up of productive biological resources and impacts on food security	9	-2.4
1A	I.2.2 Disempowering local stakeholders and creating an unjust society with power imbalances towards powerful multinationals	9	-2.1
1A	I.2.3 Social and cultural impacts from curtailment or cessation of fishing businesses, including loss of cultural traditions, additional conflicts between fishing groups, and loss of local knowledge	1	-2.0
1A	I.2.4 Fishermen welfare and health risk	1	-1.0
1A	I.2.5Negative attitude and inability to diversity in alternative employment opportunities resulting in unemployment	1	-1.0
	Category I.3 - Environmental impacts		
1A	I.3.1 Impacts on shellfish stock recruitment and resettlement during and after construction, due to sediment resuspension	4	-2.8
1A	I.3.2 Closed areas may impact on prey-predator interactions with undesirable effects on commercial stocks	3	-1.7
1A	I.3.3 Noise impacts on sensitive life stages of commercial stocks	1	-1.0
1A	I.3.4 Implications for the environment and fish stocks in adjacent areas in cases of localised displacement	2	-1.0
1A	I.3.5 Electro-magnetic field effects on shellfish	1	-1.0
1C	I.3.6 Allowing fishing inside OWFs reduces the size of the current de-facto protected areas around installations (potentially increases shipping noise, fishing pressure, pressure on benthic ecosystem, etc.)	1	-2.0
	Category I.4 - Technical impacts		
1A	I.4.1 Increase of competition for access to port infrastructure with other marine users	4	-1.8
	Category I.5 - Health & Safety impacts		
1A	I.5.1 Increased safety risks and snagging potential	8	-2.4

Table A1.16 Integrated DABI catalogue for the combination of Wind Energy & Fisheries: IMPACTS

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 727451

A.1.5 Integrated DABI catalogue - Tourism & Aquaculture

Case studies	Combination: Tourism & Aquaculture (case studies 3A, 6)	n stakeholders	Factor average for all stakeholders
	Category D.1 - Policy/legal drivers		
3A, 6	Factor D.1.1 Existence of a regional law regulating this combination	7	2.4
3A	Factor D.1.3 Co-location of uses recommended by strategic plans	2	2.5
3A	Factor D.1.4 Strategic measures with the aim to diversify the activity with tourism	2	1.5
3A	Factor D.1.5 Limitation to fisheries (e.g. quotas, closed seasons and not allowed areas) can encourage fish production from aquaculture	2	2.0
3A	Factor D.1.6 License is issued in short time	1	2.0
3A	Factor D.1.7 License's process is similar to the process for commercial activity	1	3.0
	Category D.2 - Interaction with other uses		
6	Factor D.2.1 Significant presence of ports and marinas, being careful not to create dispersion or competition among localities.	6	1.3
3A	Factor D.2.2 Competition for space	2	3.0
3A	Factor D.2.3 High number of maritime activities in the area – need to limit conflicts	2	0.0
	Category D.3 - Economic drivers		
3A, 6	Factor D.3.1 Availability of European Funds, especially the European Maritime Fisheries Fund EMFF (2014-2020)	9	2.3
3A, 6	Factor D.3.2 Availability of regional funding (e.g. Veneto) for the touristic sector, specifically dedicated at the development of enterprise network (European Regional Development Fund - ERDF).	8	1.8
6	Factor D.3.3. Increase of demand for local fish products.	7	1.9
6	Factor D.3.4 Possibility of applying and maintaining low (and hence competitive) concession fees for aquaculture spaces, also for activities of aquaculture-related tourism	6	2.3
3A, 6	Factor D.3.5 Increasing demand for an experience-based tourism, responsible tourism or eco-tourism	7	1.6
3A	Factor D.3.6 Tourism growth	4	2.0
3A	Factor D.3.7 Financial incentive systems for both involved sectors	4	2.3
3A	Factor D.3.8 Low potential for fisheries' growth	2	2.0
3A	Factor D.3.9 Ensure all year activity for aquaculture/farming and tourism	2	2.0
3A	Factor D.3.10 Find new sources of income	1	2.0
	Category D.4 - Societal drivers		
6	Factor D.4.1 Support by FLAGs, which encourage local projects about diversification of fisheries.	6	2.2
3A	Factor D.4.2 Need to diversify activity to maintain communities identity	2	1.5
3A	Factor D.4.3 Public awareness to responsible activities	2	2.5
	Category D.5 - technical-operative drivers		
6	Factor D.5.1 Possibility of developing multi-use in different alternative or integrated ways: activities similar to pesca-tourism, combination with diving /snorkelling, combination with the recreational fisheries.	6	2.2
	Category D.6 -Environmental drivers		
3A	Factor D.6.1 Need to reduce tourist pressure on the coast	4	1.5
3A	Factor D.6.2 Reduction of fisheries exploitation, which might be compensated with aquaculture products	2	0.5

Table A1.17 Integrated DABI catalogue for the combination of Tourism & Aquaculture: DRIVERS

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 727451

Case studies	Combination: Tourism & Aquaculture case studies 3A, 6	n stakeholders	Factor average for all stakeholders
	Category B.1 - Legal barriers		
3A, 6	Factor B.1.1 Lack of guidelines and of a common regulation of aquaculture-related tourism.	9	-2.7
6	Factor B.1.2 Lack of a national harmonized law for this MU and inhomogeneity among regional legal provisions.	7	-2.4
3A, 6	Factor B.1.3 Restriction in the legislation or in its interpretation, regulating the possibility of hosting tourists on board aquaculture vessels, including hygiene and securi on the vessel	6	-2.7
	Category B.2 - Administrative barriers		
3A, 6	Factor B.2.1 Bureaucratic (specific license release, need for a second licence) and administrative barriers limiting MU development.	11	-2.5
6	Factor B.2.2 Scarce cooperation among institutions and operators for MU development.	7	-1.7
3A	Factor B.2.3 No possibility of application of national programs aimed to simpliy complex public administrative procedures (Simplex)	1	-3.0
	Category B.3 - Barriers related with economic availability / risk		
3A, 6	Factor B.3.1 Limited availability of proper funds to start the activity, also due to the difficulties of the access to finance	8	-2.5
3A	Factor B.3.2 Funding schemes are decentralized (e.g. national funds are subjected to specific regional development priorities)	1	-1.0
3A, 6	Factor B.3.3 Poor entrepreneurship and investment capacity of aquaculture operators, also due to the medium-small size of enterprises and to its fragmentation over the territory as well as to the limited expertise	11	-1.8
3A	Factor B.3.4 Concurrence of other tourism sectors	3	-1.0
3A	Factor B.3.5 Lack of advertisement/publicity of the MU	2	-1.5
	Category B.4 - Barriers related with technical capacity		
3A, 6	Factor B.4.1 Need for adaptation of fishery vessels for tourism activities, for example due to the small size of vessels and the requirements of hygiene and security standards.	8	-2.5
6	Factor B.4.2 Presence of few experiences and few good practices in aquaculture-related tourism.	6	-1.0
3A, 6	Factor B.4.3 Limited expertise and availability of specific skills, of fishermen, for example due to the communication public interaction, and foreign languages. Need for a specific training	11	-1.8
3A	Factor B.4.4 Need of logistic infrastructure in land (it can be a partner)	2	-1.5
3A	Factor B.4.5 Lack of on-line platform to contact the fishers	2	0.0
	Category B.5 - Barriers related with social factors		
3A	Factor B.5.1 Resistance to change in small fishing communities	3	-1.7
3A	Factor B.5.2 Risks onboard (e.g., fall during recovering gear)	2	-1.0
	Category B.6 - Barriers related with environmental factors		
3A	B.6.1 MU is dependent on environmental conditions. Current degradation of marine resources might impair the activity	2	-1.0
3A	B.6.3 Restriction/dependence on fishing ban periods	1	-3.0
3A	B.6.4 Restriction/dependence on weather conditions	1	-3.0

Table A1.18 Integrated DABI catalogue for the combination of Tourism & Aquaculture: BARRIERS

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 727451

Case studies	Combination: Tourism & Aquaculture case studies 3A, 6	n stakeholders	Factor average for all stakeholders
	Category V.1 - Economic added values		
3A, 6	Factor V.1.1 Integrative source of income for aquaculture operators, through the development of new market opportunities	11	2.5
3A, 6	Factor V.1.2 New and specialized job opportunities, whenever specific training courses are organized.	9	2.7
6	Factor V.1.3 Upgrade of the touristic offer: development of an offer dedicated to a new group of users, more interested in discovering the environmental and socio-economic characteristics of the area.	7	2.3
3A, 6	Factor V.1.4 Increase of commercialization of local fish products, also due to the direct understanding of the local aquaculture practices.	11	2.5
3A	Factor V.1.5 Increase of local economy	4	2.5
3A	Factor V.1.6 Diversification of tourism sector	4	2.3
3A	Factor V.1.7 Extension of income season for both tourism and aquaculture/farming	2	1.0
	Category V.2 - Societal added values		
3A, 6	Factor V.2.1 Contribution to the maintenance of local aquaculture tradition and to the related cultural heritage.	8	1.9
3A, 6	Factor V.2.2 Cultural feedback for operators offering multi-use experience; personal cultural growth, improvement of technical skills	8	2.3
3A, 6	Factor V.2.3 Awareness of tourists and civil society about sustainable aquaculture and its benefits.	11	2.5
3A	Factor V.2.4 Increased awareness and education about the state and issues of marine environment	3	2.3
3A	Factor V.2.5 Possibility to involve family of aquaculture operators in this combination (with activities onshore)	2	1.5
3A	Factor V.2.6 Reduction of tourists in the coast (e.g. traditional beach tourism)	2	1.5
	Category V.3 - Environmental added values		
3A	Factor V.3.1 Reinforced environmental protection	1	3.0
	Category V.5 - Technical- operative added values		
6	Factor V.5.1 Realization of pilot activities, which can be exported in other contexts	7	2.0
6	Factor V.5.2 Potential development of multi-functional sites: aquaculture plants, equipped sites for diving/snorkeling, equipped areas for recreational fisheries, artificial reefs, small touristic infrastructures	6	2.3
3A	Factor V.5.3 Creation of regional entreprises	1	3.0
	Category V.6 - better insurance policies and risk management		
3A	Factor V.5.4 Shared responsability	1	3.0

Table A1.19 Integrated DABI catalogue for the combination of Tourism & Aquaculture: ADDED VALUES

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 727451

Case studies	Combination: Tourism & Aquaculture case studies 3A, 6	n stakeholders	Factor average for all stakeholders
	Category I.1 - Economic impacts		
6	Factor I.1.1 Conflicts with other maritime activities, if aquaculture needs more space for its development	6	-2.2
3A	Factor I.1.3 Concurrence for other tourism sectors (e.g. whale watching and recreational fishing)	2	-0.5
	Category I.2. - Social impacts		
3A, 6	Factor I.2.2 Risk of an increase of the touristic pressure in areas which are already overcrowded, with possible increase of cumulative impacts	7	-2.0
	Category I.3 - Environmental impacts		
6	Factor I.3.1 Risk of overexploitation of fish stocks, in case of not well managed recreational fisheries in combination with aquaculture	5	-2.2
	Category I.5 - Other		
6	Factor I.5.1 Other risks to be specifically identified, due to the poor experience available in the case-study area for this combination	5	-1.4

Table A1.20 Integrated DABI catalogue for the combination of Tourism & Aquaculture: IMPACTS

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 727451

ANNEX 2: INTEGRATED FRAMEWORK OF RECOMMENDATIONS FROM CASE STUDIES

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement no 727451

RECOMMENDATIONS	Tourism & Fisheries (case studies 3A, 3B, 6, 7)	Offshore wind & Aquaculture (case studies 1C, 4, 5)	Tourism & Env. Prot. (case studies 3A, 3B, 6)	Offshore wind & Fisheries (case studies 1A, C)
Policy, strategies, planning	To promote MSP the process (3A), also at regional level (3B) To create and/or to improve regional sectoral policies focused on removing barriers to MU and targeting cross-sector needs and opportunities (6)	To address the MU concept and include it in MSP and local maritime and coastal development plans, assisting in the identification of areas suitable for establishing such MU combinations (5) To create a national task force to determine the strategy and conditions surrounding the development of MU (5)	To promote the MSP process (3A), also at regional level (3B) To create and/or to improve regional sectoral policies focused on removing barriers to MU and targeting cross-sector needs and opportunities (6)	To promote stronger coexistence policies in marine plans with explicit references to MU (1A) To encourage change from sectoral planning maps to "MU opportunity maps" (1A)
Legal framework & administrative issues	To establish a general legal framework or a strategy for MU, facilitating licensing for joint activities or processes of risk assessment (3A) To create a more consistent legal and administrative framework focused on MU and its development (3B) To unify health care legislation between pesca-tourism and icthy-tourism at least at the regional scale (6)	To ensure a legislated claim for the secondary users in a MU scenario (1C) To clarify potential legislation and rules when combining different uses in marine areas (4)	To establish a general legal framework or a strategy for MU, facilitating licensing for joint activities or processes of risk assessment (3A) To create a more consistent legal and administrative framework focused on MU and its development (3B) To promote a change of attitude towards strategic and legislative instruments for marine ecosystems and biodiversity protection in order to exploit their potential as sustainable development opportunities (6)	To improve environmental assessment methodologies (1A) To require a co-existence plan and a mitigation strategy prior to the submission of a licence application (1A) To improve the current regulatory framework granting safety rights to fishermen (1C)
Funding	To create targeted opportunities for developing MU in the framework of regional European funds, also including opportunities for acquiring suitable boats (6)	To ensure economic support for starting up and for maintaining pilot project activities long enough to gather valuable insights on the potential of MU (4)		To steer fundings towards MU applications and areas of technical innovation (1A) To encourage MU links between the offshore wind and the fishing industries within existing funding mechanisms (1A)
Research & data production	To promote scientific research (3A)	To promote research on the possibilities of cultivating mussels and algae in the Baltic and in combination with offshore wind power (4) To encourage a transdisciplinary approach to gather information on MU as a topic (4) To perform in-depth assessments of the impacts of the MU combinations and proof-of-concept and business models in order to encourage financial and investment interest (5)	To promote scientific research (3A)	To perform empirical studies exploring the compatibility between offshore wind farms and commercial fisheries (1A) To promote data sharing agreements and protocols to demonstrate that fishing can take place safety within wind farms (1A) To fill research gaps for better mapping of navigational hazards, over-trawlability surveys (1A)
Technical improvements & innovation	To identify the best type of boats for developing MU considering the meteorological and marine conditions in the area, and accomplishing requirements from commercial sectors (fishery, aquaculture) and the need to host tourists on board (6)		To identify the best type of boats for developing MU considering the meteorological and marine conditions in the area, and accomplishing requirements from commercial sectors (fishery, aquaculture) and the need to host tourists on board (6)	To perform innovation studies (e.g. moorings, cable installation method, fishing-friendly cable protection measures, gear modifications) (1A) To develop management strategies and technologies to minimise risks (1C)
Pilot projects	To promote pilot projects and testing sites (3A, 3B)	To address the lack of a functioning full scale pilot facility to showcase the combination (1C) To promote pilot projects providing great knowledge resource (4)	To promote pilot projects and testing sites (3A, 3B)	To exempt small-scale pilot projects from full-scale assessments (1A) To follow the Scottish example of the “Survey, Deploy, and Monitor” (SDM) policy for ocean energy (1A)
Networks & clusters	To create clusters of business operators to develop and implement MU, also including networks with local operators in the field of food supply (6)		To create a network of protected areas for coordinated management in relation to MU development (6)	
Dialogue & cooperation	To enhance dialogue and create a mechanism for stakeholders to get together in order to participate in decision-making (3A) To encourage inter-sectoral cooperation among different institutions, and among public institutions and economic operators to effectively manage new experiences of MU (6) To strengthen the interfaces between policy, science, industry and society in order to promote innovative concepts of MU (7) To strengthen horizontal and vertical integration of the different governance levels, through a truly participatory process (7) To disseminate successful MU practises and knowledge (3A) To create joint working tables between institutions and commercial sectors to complete the analysis of MU opportunities in the area and identify the resources to be valorised through MU (6) To create working tables between commercial sectors to develop project ideas to pilot / implement MU through already available opportunities (6)	To facilitate clear and open communication between all involved stakeholders to promote the sharing of all available information (1C) To encourage discussion about the potential in MU among academia, policy makers, local business and local NGO’s (4) To encourage cooperation among different sectors that are important for developing a MU (4) To favour cross sectoral multi-stakeholder dialogue (5) To further discuss the potential of the MU through meetings or workshop (4) To create physical opportunities for further discussion (5)	To enhance dialogue and create a mechanism for stakeholders to get together in order to participate in decision-making (3A) To encourage inter-sectoral cooperation among different institutions, and among public institutions and economic operators to effectively manage new experiences of MU (6) To disseminate successful MU practises and knowledge (3A) To create joint working tables between institutions and commercial sectors to complete the analysis of MU opportunities in the area and identify the resources to be valorised through MU (6) To create working tables between commercial sectors to develop project ideas to pilot / implement MU through already available opportunities (6)	Cross-border exchange with regulators of bordering countries where this combination exists already (i. e. UK, DK) to find commonalities and streamline management approaches. To encourage clear and open communication between both user groups and regulators (1C)
Education & training	To provide training and capacity-building for MU (3A) To promote educational actions, e.g. foreign languages and entrepreneurship (3B) To create educational opportunities for business operators in fishing and aquaculture to train them for MU (6)		To provide training and capacity-building for MU (3A) To promote educational actions, e.g. foreign languages and entrepreneurship (3B)	Further educational resources for commercial fishing to developers and contractors (1A)
Communication & social awareness	To promote and market MU and its benefits, including the involvement of social media, to spread the MU concept, and to favour data access (3B) To promote the culture of the sea, including seamanship tradition, expertise, professions, historical marine routes, etc. (6) To involve the local community in a truly transparent and participatory process, contributing to raising their awareness and the benefits of MU (7)	To engage local stakeholders for effective dissemination of results and existing knowledge (4)	To promote and market MU and its benefits, including the involvement of social media, to spread the MU concept, and to favour data access (3B) To promote the culture of the sea, including seamanship tradition, expertise, professions, historical marine routes, etc. (6)	To demonstrate the links of MU and Corporate Social Responsibility (1A)

RECOMMENDATIONS	Tourism & Aquaculture (case studies 3A, 6)	Offshore wind & Tourism (case study 4)	Offshore wind & Env. Prot. & Tourism (case study 5)	Wave energy & Aquaculture (case study 2)
Policy, strategies, planning	To promote the MSP process (3A) To create and/or to improve regional sectoral policies focused on removing barriers to MU and targeting cross-sector needs and opportunities (6)		To address the MU concept and include it in MSP and local maritime and coastal development plans, assisting in the identification of areas suitable for establishing such MU combinations (5)	To adequately define MU, at EU, national and local levels, and provide explicit requirements and formal guidance for MU (2) To link MUs to the objectives of GHG emissions reductions; To encourage EU, national and local level "leaders" to champion MU concept and deployment (2)
Legal framework & administrative issues	To establish a general legal framework or a strategy for MU, facilitating licensing for joint activities or processes of risk assessment (3A) To recognize aquaculture-related tourism as a business activity in regional legislation (6)	To clarify potential legislation and rules when combining different uses in marine areas (4)		
Funding	To create targeted opportunities for developing MU in the framework of regional European funds, also including opportunities for acquiring suitable boats (6)	To ensure economic support for starting up and for maintaining pilot project activities long enough to gather valuable insights on the potential of MU (4)		To promote research funding authorities to avail adequate money for scaled-up development and deployment – to showcase commercial viability of MU (2) To align MU development with insurance markets realities: the scope of an MU will differ from the scope of individual developers, especially relating to issues of health and safety and liability (2)
Research & data production	To promote scientific research (3A)	To encourage a transdisciplinary approach to gather information on MU as a topic (4)	To perform in-depth assessments of the impacts of the MU combinations and proof-of-concept and business models in order to encourage financial and investment interest (5)	
Technical improvements & innovation	To identify the best type of boats for developing MU considering the meteorological and marine conditions in the area, and accomplishing requirements from commercial sectors (fishery, aquaculture) and the need to host tourists on board (6)			
Pilot projects	To promote pilot projects and testing sites (3A, 3B)	To promote pilot projects providing a great knowledge resource (4)		
Networks & clusters	To create clusters of business operators to develop and implement MU, also including networks with local operators in the field of food supply (6)			
Dialogue & cooperation	To enhance dialogue and create a mechanism for stakeholders to get together in order to participate in decision-making (3A) To encourage inter-sectoral cooperation among different institutions, and among public institutions and economic operators to effectively manage new experiences of MU (6) To disseminate successful MU practises and knowledge (3A) To create joint working tables between institutions and commercial sectors to complete the analysis of MU opportunities in the area and identify the resources to be valorised through MU (6) To create working tables between commercial sectors to develop project ideas to pilot / implement MU through already available opportunities (6)	To encourage cooperation among different sectors that are important for developing a MU (4) To encourage discussion about the potential in MU among academia, policy makers, local business and local NGO's (4) To favour cross-sectoral multi-stakeholder dialogue (5) To further discuss the potential of the MU through meetings or workshop (4)	To favour cross-sectoral multi-stakeholder dialogue (5) To create physical opportunities for further discussion (5)	To maintain a dedicated on-line portal for MUs and EIAs in MUs, providing a significant mechanism for lessons learning and information exchange (2)
Education & training	To provide training and capacity-building for MU (3A) To create educational opportunities for business operators in fishing and aquaculture to train them for MU (6)			To coordinate a cross-sector group of actors to develop at a least one single scale-up showcase of success (2)
Communication & social awareness	To promote the culture of the sea, including seamanship tradition, expertise, professions, historical marine routes, etc. (6)	To engage local stakeholders for effective dissemination of results and existing knowledge (4)		To integrate local communities in MUs, resolving issues of local residents and communities objecting relevant developments (2)

RECOMMENDATIONS	Tidal energy & Env. Prot. (case study 1B)	Tidal energy & Env. Monitoring (case study 1B)	Tourism & UCH (case study 6)	Tourism & UCH & Env. Prot. (case study 3B)
Policy, strategies, planning	To develop policies and procedures informing how site-level trade-offs are to be made when siting tidal energy developments (1B) To restructure SEAs, EIAs, and MSP to consider synergies and negative impacts specific to MU with tidal energy, EPAs, and other uses/users of marine space (1B) To implement a standardized approval procedure whereby ENGOs agree on limits of potential impact and mitigation measures, and therefore eliminate potential litigation (1B) To restructure the licensing regime to allow for a streamlined process for staggered MU development between tidal energy projects and environmental protection, monitoring, and other uses (1B)		To create and/or to improve regional sectoral policies focused on removing barriers to MU and targeting cross-sector needs and opportunities (6)	To promote MSP process also at the regional level for Azores (3B)
Legal framework & administrative issues				To create a more consistent legal and administrative framework focused on MU and its development (3B)
Funding	To replace the CFD mechanism with a subsidy which allows for tidal energy to be competitive with commercial offshore wind (1B) To provide subsidies for tidal energy developments in remote areas to access necessary grid infrastructure, provide for upgrades to existing infrastructure, and plan for the co-location of monitoring and electricity cable routes, thereby facilitating direct-to-shore connection of monitoring data (1B) To fund fisheries research in order to characterize fish movements, leading to enhanced TCT and fish management plans, individually and in relation to MU, through informed policy development (1B)	To replace the CFD mechanism with a subsidy which allows for tidal energy to be competitive with commercial offshore wind (1B) To provide subsidization for improvements to monitoring equipment (1B) To provide subsidies for tidal energy developments in remote areas to access necessary grid infrastructure, provide for upgrades to existing infrastructure, and plan for the co-location of monitoring and electricity cable routes, thereby facilitating direct-to-shore connection of monitoring data (1B) To fund fisheries research in order to characterize fish movements, leading to enhanced TCT and fish management plans, individually and in relation to MU, through informed policy development (1B)		
Research & data production	To establish measures which standardize environmental monitoring data collection procedures (EU) (1B) To gather standardized baseline data for potential development sites prior to granting consents (1B) To establish a binding requirement for developers to disseminate environmental data as a condition of consent (1B) To determine the viability of TCT arrays acting as default no-fishing zones and artificial reefs, and how this may affect the environmental dynamics in the area (1B)	To establish measures which standardize environmental monitoring data collection procedures (EU) (1B) To gather standardized baseline data for potential development sites prior to granting consents (1B) To establish a binding requirement for developers to disseminate environmental data as a condition of consent (1B) To determine the viability of TCT arrays acting as default no-fishing zones and artificial reefs, and how this may affect the environmental dynamics in the area (1B)	To identify the actions needed to minimize interferences between maritime activities (including MU) and UCH (6) To prepare a database of UCH for the Northern Adriatic Sea, identifying the sites suitable for regulated touristic use and the sites where access is to be prohibited (6)	
Technical improvements & innovation			To identify the best type of boats for developing MU considering the meteorological and marine conditions in the area, and accomplishing requirements from commercial sectors (fishery, aquaculture) and the need to host tourists on board (6)	
Pilot projects				To promote pilot projects to help remove social barriers (3B)
Networks & clusters				
Dialogue & cooperation			To encourage inter-sectoral cooperation among different institutions, and among public institutions and economic operators to effectively manage new experiences of MU (6) To disseminate successful MU practices and knowledge (3A) To create joint working tables between institutions and commercial sectors to complete the analysis of MU opportunities in the area and identify the resources to be valorised through MU (6) To create working tables between commercial sectors to develop project ideas to pilot / implement MU through already available opportunities (6)	To disseminate successful MU practices and knowledge (3A)
Education & training				To promote educational actions, e.g. foreign languages and entrepreneurship (3B)
Communication & social awareness	To fund research investigating the viability of economic benefits being captured within local/regional communities (1B)		To promote the culture of the sea, including seamanship tradition, expertise, professions, historical marine routes, etc. (6)	To promote and market MU and its benefits, including the involvement of social media, to spread the MU concept, and to favour data access (3B)

RECOMMENDATIONS	Oil and gas and Tourism and Aquaculture (case study 6)	Oil and gas and Renewable energy (case study 6)	Renewable energy and Desalination (case study 1)	Shipping terminal and Green energy generation (case study 2)
Policy, strategies, planning	To develop a Master Plan, as a result of a joint effort of central and local administrations, operators of the sector, key local stakeholders and research institutions; to include the analysis of potential MUs in the framework of the on-going MSP process (6)	To develop a Master Plan, as a result of a joint effort of central and local administrations, operators of the sector, key local stakeholders and research institutions; to include the analysis of potential MUs in the framework of the on-going MSP process (6)	To adopt a clear strategic vision by national policy makers on key issues of concern related e.g. to the country's energy development agenda, enabling the implementation of policy agreements and facilitating suitable investments (7)	To adequately define MU, at EU, national and local levels, and provide explicit requirements and formal guidance for MU (2) To link MUs to the objectives of GHG emissions reductions; To encourage EU, national and local level "leaders" to champion MU concept and deployment (2)
Legal framework & administrative issues				
Funding	To get specific attention from national and EU research funding agencies to boost innovation and blue growth in the area (6)	To get specific attention from national and EU research funding agencies to boost innovation and blue growth in the area (6)		To promote research funding authorities to avail adequate money for scaled-up development and deployment – to showcase commercial viability of MU (2) To align MU development with insurance markets realities: the scope of a MU will differ from the scope of individual developers, especially relating to issues of health and safety and liability (2)
Research & data production				
Technical improvements & innovation				To ensure progress on the connection of offshore energy to ports and on shore-side electricity generated from offshore renewables (2)
Pilot projects				
Networks & clusters	To create a joint effort of central and local administrations, operators of the sector, key local stakeholders and research institutions, in order to create the conditions for a MU development that goes beyond some episodic and small scale experiments (6)	To create a joint effort of central and local administrations, operators of the sector, key local stakeholders and research institutions, in order to create the conditions for a MU development that goes beyond some episodic and small scale experiments (6)	To strengthen the interfaces between policy, science, industry and society in order to promote innovative concepts of MU (7) To strengthen horizontal and vertical integration of the different governance levels, through a truly participatory process (7)	To coordinate a cross-sector group of actors to develop at least one single scale-up showcase of success (2) To establish a closer co-operation among port developers/harbour authorities and the competent authorities for the seabed for the offshore renewable energy component (2) To maintain a dedicated on-line portal for MUs and EIAs in MUs, providing a significant mechanism for lessons learning and information exchange (2)
Dialogue & cooperation				
Education & training			To involve the local community in a truly transparent and participatory process, contributing to raising their awareness and benefits of MU (7)	To integrate local communities in MUs, resolving issues of local residents and communities objecting relevant developments (2)
Communication & social awareness				