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ROADMAP TO INTEGRATE CLEAN OFFSHORE RENEWABLE ENERGY INTO CLIMATE-SMART MARINE SPATIAL PLANNING

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ACRONYMS

EIA – ENVIRONMENTAL IMPACT ASSESSMENT

MSP – MARINE SPATIAL PLANNING

NDC – NATIONALLY DETERMINED CONTRIBUTIONS

NGO – NON-GOVERNMENTAL ORGANISATION

ORE – OFFSHORE RENEWABLE ENERGY

SEA – STRATEGIC ENVIRONMENTAL ASSESSMENT

SIDS – SMALL ISLAND DEVELOPING STATES

MARINE SPATIAL PLANNING (MSP)[1] HAS BEEN IDENTIFIED AS A HIGHLY USEFUL PROCESS FOR RECONCILING NATIONAL AND INTERNATIONAL CLEAN ENERGY POLICIES WITH THE BIODIVERSITY AGENDA,[2] THE SUSTAINABLE DEVELOPMENT GOALS AND AMBITIONS OF OTHER MARINE USERS, INCLUDING FISHERIES, SHIPPING AND COASTAL TOURISM.

1. MSP as defined by IOC UNESCO: “A public process of analysing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that are usually specified through a political process” (Charles Ehler and Fanny Douvere, Marine spatial planning: a step by step approach (Paris, UNESCO, 2009)).
2. This includes both conservation and nature positive actions.

INTRODUCTION

This roadmap presents a framework for climate-smart MSP aiming to respond to the urgency of decarbonization that is needed to meet the Paris Agreement temperature goal to limit global warming to 1.5°C.[3] Specifically, it strives to support a more rapid, socially acceptable and just implementation of Offshore Renewable Energy (ORE) as one of the key clean energy sources for getting to net zero as quickly as possible.[4] As such, the roadmap encourages not only an increase of ORE — with offshore wind energy being the most promising option currently — but also its co-use with other climate-smart uses of the ocean and climate solutions — such as natural carbon sinks and nature restoration, low-trophic aquaculture and other innovative forms of renewable energy.

HOW TO READ THE ROADMAP

The roadmap provides a visual overview of key recommendations and accompanying actions. It uses visual signalization to address the main relevant actors for the implementation of the actions and assigns a certain level of urgency to each of the recommendations. The actions under each of the recommendations are also ordered according to their urgency, with the first one always assigned the highest level of urgency. The key actors are addressed in the roadmap using the icons below. However, it is important to note that the actions can be applicable to several actors even those not currently in the roadmap. Most importantly, there is a need for collaboration and partnership-based approaches.

MSP/ ORE planning authorities

Research community

Policymakers

Regulators

Public financiers and private investors

NGOs

ORE industry

Intergovernmental Organizations

HIGH URGENCY

This recommendation is crucial for further progress of ORE and should be prioritized. Associated actions should be implemented in a short-term period, i.e. 3–5 years.

MEDIUM URGENCY

This recommendation is important and its implementation can bring added benefits. Associated actions should be implemented in the medium term, i.e. within 7–10 years.

3. Intergovernmental Panel on Climate Change, Global Warming of 1.5°C: An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty (2018), available at www.ipcc.ch/sr15/.
4. Net zero should follow the definition of the science-based targets initiative: https://sciencebasedtargets.org/net-zero.

OVERVIEW OF EIGHT KEY RECOMMENDATIONS AND ACCOMPANYING ACTIONS

URGENCY	KEY RECOMMENDATIONS	ACCOMPANYING ACTIONS								
HIGH URGENCY	1. Recognize the importance of and ensure implementation of a Climate-Smart MSP	Develop practical guidelines on how to deliver climate-smart MSP	●							
		Establish and scale up cross-sectoral interdisciplinary partnerships to lead a climate-smart MSP process		●	●					
		Ensure long-term commitment by formally adopting the plan while building in mechanisms to ensure a dynamic and adaptive process		●	●	●				
HIGH URGENCY	2. Unlock public and multilateral financing to support countries in advancing a climate-smart MSP process	Unlock financing for MSP, particularly for developing countries and SIDs					●			
		Ensure that domestic budgets cover at least a share of the total cost to ensure ownership and demonstrate commitment				●				
HIGH URGENCY	3. Improve knowledge and data-sharing on national and international levels	Accelerate ORE knowledge and data-sharing through incentives and initiatives			●					
		Support the formation of data coordination groups to ensure strategic collection and harmonization of data across borders and agencies	●							
		Establish common monitoring and impact assessment frameworks, to ensure ecological connectivity is considered at regional/sea-basin scales, with harmonized approaches to data interpretation and its use in MSP	●					●		
HIGH URGENCY	4. Strengthen socio-economic considerations of planning decisions	Ensure that MSP is accompanied by a sustainability appraisal and/or Strategic Environmental Assessment (SEA)		●						
		Use decision support tools to assess the socioeconomic impacts of planning measures		●						
		Ensure proper coordination of MSP with coastal management		●	●	●				
		Actively involve labour authorities in the process		●						
		Develop guidance on implementation of benefit-sharing structures			●			●	●	
HIGH URGENCY	5. Strengthen cross-border and transnational collaboration mechanisms on MSP and ORE	Intensify collaboration between the ORE community and the MSP community		●						●
		Support the development of transnational (e.g. Sea Basin-wide) public-private cooperation initiatives on ORE and MSP		●						●
MEDIUM URGENCY	6. Ensure a stakeholder process that uses a climate-smart approach to minimize conflicts and maximize synergies between ocean users	Mobilize the ocean business community to develop guidance on how to consult the ORE sector						●	●	●
		Use long-term engagement approaches, such as Community of Practice initiatives, that go beyond one-time consultation and bring stakeholders around the table in a solution-oriented manner.			●					
		Build strong partnerships with the fishing industry and other users of marine resources and space						●		
		Set up dedicated high-level liaison groups for conflicting sectors			●	●				
HIGH URGENCY	7. Strengthen the links between ORE and biodiversity protection / restoration to maximize climate mitigation effects	Produce guidance on how to site ORE in relation to existing or potential future high priority sites for biodiversity conservation.						●	●	●
		Implement pilot demonstration projects on ORE infrastructures designed in a nature-inclusive way and monitor their positive and negative environmental impacts						●	●	
		Establish a Community of Practice for ORE and biodiversity stakeholders to share knowledge and learnings		●				●		●
MEDIUM URGENCY	8. Explore synergistic multi-use combinations that can speed up the transition to low-carbon and climate-resilient economies	Based on pilot demonstration projects, develop good practice guidelines, business cases and case studies on multi-use						●	●	●
		Use an MSP process and Strategic Environmental Assessment (SEA) to identify areas that could be suitable for co-location or multi-use between ORE and other uses			●					
		Develop procedures for assessing multi-use options as part of permitting processes				●				

1. "CLIMATE-SMART" MSP AND THE PARIS AGREEMENT

The vital role of the ocean in combatting our planetary crises — including biodiversity loss and climate change — is increasingly recognized.[5] Ocean-based climate mitigation and adaptation actions will be critical in meeting the goals of the Paris Agreement.[6] However, due to the increasing usage of marine space and associated environmental pressures, a holistic multi-objective approach to planning and managing our seas and ocean is ever more urgent.

Marine Spatial Planning (also called ocean planning, maritime spatial planning or MSP for short) has emerged in the last two decades as a streamlined, multi-stakeholder public and participatory process. It uses an evidence-based approach to engage and inform an ocean constituency and improve coordination among marine stakeholders. MSP can also be used to minimize cross-sector conflicts, tap into synergies and encourage decision-making that is based on the best available science and relevant information.

While there is considerable effort already ongoing to develop and implement MSP worldwide, **there is an urgent need to ensure that MSP is "climate-smart"**. The impacts of climate change on the ocean — including ocean warming and acidification and sea-level rise[7] — will alter current ocean conditions, leading to a redistribution of marine ecosystem goods and services.

Consequently, ocean users dependent on those services will suffer a spatial-temporal redistribution, together with increases or decreases in intensity, leading to a higher risk of conflicts between maritime uses on the one hand and between maritime uses and the environment on the other. **MSP has an important role as a holistic framework: it can ensure that several policy priorities, such as sustainable food production, energy security and reversing biodiversity loss, are upheld while making sure tensions exacerbated by climate change are collectively addressed.** Moreover, it serves to identify potential synergies in the implementation of these policies in the context of spatial planning.

Nevertheless, only a few marine spatial plans integrate adaptation and mitigation to climate change in their objectives and planning frameworks. These, however, still often lack operationalization through explicit measures or actions.[8]

MSP is a process that does not occur in isolation from a supporting policy landscape. For climate-smart MSP to be realized, it must be supported by a broader government commitment to climate action, delivering benefits for ecosystems and people.

It is never too late to undertake an MSP process. Existing marine spatial plans serve to showcase the benefits of such integrated planning: Over 70 countries worldwide already have or are in the process of developing marine spatial plans.[9] In the European Union, the MSP Directive requires Member States to develop and adopt marine spatial plans and update them regularly. By 2030, IOC-UNESCO targets that through international support and knowledge-exchange between multiple initiatives, 30 per cent of the world's maritime areas under national jurisdictions will have a marine spatial plan in place (in 2017, this value was about 10 per cent).[10] This is reflected in the 2030 Agenda for Sustainable Development which calls for a "proportion of national exclusive economic zones managed using ecosystem-based approaches .[11]

5. United Nations Global Compact, The Ocean-climate Nexus: A Blueprint for a Climate-Smart Ocean to Meet 1.5°C, p. 13 (2021), available at https://ungc-communications-assets.s3.amazonaws.com/docs/publications/_Blueprint%20for%20a%20Climate-Smart%20Ocean%20to%20Meet%201.5%C2%B0C.pdf.
6. Ove Hoegh-Guldberg and others, The Ocean as a Solution to Climate Change: Five Opportunities for Action (Washington, D.C., World Resources Institute, 2019), available at www.oceanpanel.org/climate.
7. Intergovernmental Panel on Climate Change, IPCC Special Report on the Ocean and Cryosphere in a Changing Climate (2019), available at https://www.ipcc.ch/srocc/.
8. Catarina Frazão Santos and others, "Integrating climate change in ocean planning", Nature Sustainability (2020), available at www.researchgate.net/publication/341138653_Integrating_climate_change_in_ocean_planning.
9. Charles Ehler, "Two decades of progress in Marine Spatial Planning", Marine Policy, vol. 132 (2021), available at www.sciencedirect.com/science/article/pii/S0308597X18303816.
10. United Nations. Joint Roadmap to Accelerate MSP worldwide (2017) available at: https://oceanconference.un.org/commitments/?id=15346
11. See SDG indicator 14.2.1 at https://sdgs.un.org/goals/goal14.

KEY FEATURES OF CLIMATE-SMART MSP

Data-driven	■ [illegible] is based on the best up-to-date data and knowledge and regularly [illegible]corporates new knowledge on climate change.
Dynamic and adaptive	■ [illegible]tive MSP is iterative and can be modified to consider additional evidence [illegible]becomes available in the context of a changing ocean. It is flexible and open [illegible]ation, i.e. it foresees the space for new ocean-climate technologies, e.g. [illegible]uoys or hydrogen storage. ■ [illegible]amic in the sense that it allows for a more spatially and temporally [illegible] approach to planning and management — because ocean physio-[illegible] conditions change and marine ecosystems move and interact. ■ [illegible] with and integrates systematic conservation planning — for example [illegible] dynamic [illegible] or completely new approaches to conservation such [illegible] temporal [illegible]tions.
Considers climate change scenarios	■ [illegible]ferent clim[illegible] sc[illegible]gy [illegible] planning [illegible]
Promotes ocean-climate literacy in stakeholder engagement	■ The stakeholder engagement process as part of climate-smart MSP seeks to improve and build on climate literacy, fostering societal support and understanding for climate mitigation solutions such as ORE.
Uses an integrated approach to prioritize space for ocean-climate solutions	■ Climate-smart MSP recognises the need for climate action and prioritizes adequate space for ocean-climate mitigation and adaption solutions and innovation, especially in terms of renewable energies, green shipping, blue bio-economy (low-trophic aquaculture), sand extraction and coastal protection solutions. It does so in an integrated manner by balancing the needs of other sectors, socioeconomics, and environmental/ biodiversity objectives.
Gives priority to nature-based solutions and smart combinations	■ It prioritizes adequate space for marine protected areas — including climate refugia (areas that are relatively buffered from climate impacts), seagrass meadows and kelp forests[12] as key carbon sinks — but also nature-inclusive design of renewable energy installations and nature restoration within wind farms.
Ensures socioeconomic benefits in conjunction with coastal management	■ It considers how planning decisions that support the transition to a net zero ocean economy will affect society and coastal communities, striving to ensure equitable development, positive ripple effects and socioeconomic benefits, particularly to disadvantaged communities, e.g. new jobs and opportunities from ORE development.

12. United Nations Global Compact, Seaweed as a Nature-based Climate Vision Statement (2021), available at https://unglobalcompact.org/library/5974.

WHAT DOES CLIMATE-SMART MSP ENTAIL?[13]

MITIGATION

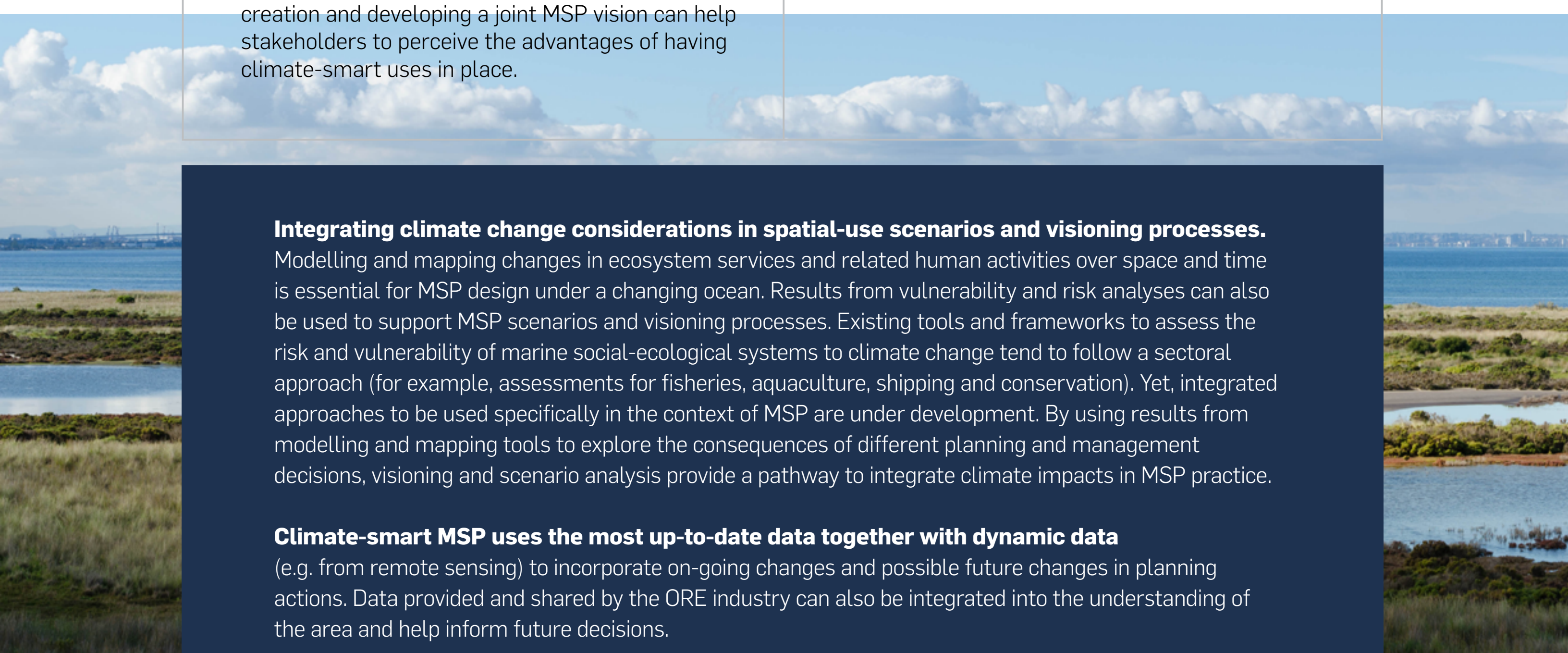
Climate-smart MSP supports the expansion of climate mitigation solutions by:

- Prioritizing space for expanding ORE initiatives, such as new wind and wave energy installations, and encouraging smart combinations with nature-based solutions and nature-inclusive design;
- Prioritizing adequate space (or facilitating the attribution of permits) for ocean uses and activities that choose to use new eco-efficient technologies and power sources that tend to zero emissions (for example, fuel-efficient shipping, electric engines, solar and wind power, hydrogen production and storage), and encouraging smart combinations with nature-based solutions and nature-inclusive design;
- Prioritizing space for nature-based solutions such as marine protected areas (MPA), protecting blue carbon (capture and storage) ecosystems[14] that constitute nature-based mitigation tools with clearly quantifiable carbon sequestration benefits; and
- Decreasing conflicts and fostering compatibilities among climate-smart uses (such as ORE or carbon capture and storage) and other activities. Active co-creation and developing a joint MSP vision can help stakeholders to perceive the advantages of having climate-smart uses in place.

ADAPTATION

Climate-smart MSP can promote climate adaptation by:

- Ensuring adequate space allocation to nature-based solutions that promote climate adaptation. For example, MPAs and other spatial marine management tools can be used to promote specific adaptation-relevant features, e.g. kelp forests and seagrass meadows can help decrease ocean acidification locally and provide refuge for vulnerable shell-forming organisms; and
- Providing a holistic approach to climate adaptation planning — ensuring that adaptation actions for one sector are not maladaptive to others.



Integrating climate change considerations in spatial-use scenarios and visioning processes. Modelling and mapping changes in ecosystem services and related human activities over space and time is essential for MSP design under a changing ocean. Results from vulnerability and risk analyses can also be used to support MSP scenarios and visioning processes. Existing tools and frameworks to assess the risk and vulnerability of marine social-ecological systems to climate change tend to follow a sectoral approach (for example, assessments for fisheries, aquaculture, shipping and conservation). Yet, integrated approaches to be used specifically in the context of MSP are under development. By using results from modelling and mapping tools to explore the consequences of different planning and management decisions, visioning and scenario analysis provide a pathway to integrate climate impacts in MSP practice.

Climate-smart MSP uses the most up-to-date data together with dynamic data (e.g. from remote sensing) to incorporate on-going changes and possible future changes in planning actions. Data provided and shared by the ORE industry can also be integrated into the understanding of the area and help inform future decisions.

13. Adapted from UNESCO-IOC, MSPglobal Policy Brief: Climate Change and Marine Spatial Planning (Paris, 2021), available at https://unesdoc.unesco.org/ark:/48223/pf0000375721.
14. Refers to ocean ecosystems — such as mangroves, seagrass, seaweed and coral reefs — which provide highly valuable ecosystem goods and services, including capturing carbon. See UNEP (2021) available at: https://www.unep.org/explore-topics/oceans-seas/what-we-do/protecting-restoring-blue-carbon-ecosystems/why-protecting.

MARINE AND COASTAL ECOSYSTEMS

While supporting the transition to a net zero ocean economy, MSP also strengthens and safeguards the resilience of marine ecosystems by:

- Addressing relevant stressors and pressures (e.g. pollution, overfishing and habitat loss) through spatial management actions in combination with other ocean and coastal management frameworks; and
- Ensuring effective protection of critical marine areas, the establishment of resilient MPA networks and protection of climate refugia.

SOCIETY

Climate-smart MSP incorporates the social dimension and aims to enhance coastal community socio-economic resilience to climate change and increase social acceptance for related policies

Therefore, climate-smart MSP has an important role in:

- Promoting climate literacy – using the MSP process as a forum to facilitate discussions founded on a baseline of climate literacy with the aim of strengthening understanding of the climate crisis. It is important this is accessible and tangible to the public rather than abstract – for instance, using economic modelling to convert climate change impacts into metrics people understand (e.g. jobs, revenue); and by using scenarios that elicit emotional responses when engaging with communities.
- Facilitating environmental justice by enabling meaningful involvement of all persons in decision-making, empowering local communities and society at large.
- Considering coastal management and socioeconomic effects on coastal communities. Careful siting of ORE can be an opportunity to revitalize remote, disadvantaged coastal communities and serve as a mechanism for a just transition to a net zero ocean economy.

2. THE ROLE OF MSP AS A KEY CONDITION AND LEVER FOR SUSTAINABLE ORE DEVELOPMENT — A KEY FACTOR IN MEETING CLIMATE TARGETS

At this crucial moment on the path to rapid and widespread decarbonization, **offshore wind — having been adopted by many countries globally — represents one of the chief ocean-based climate mitigation solutions**. Offshore wind energy together with other ocean-based solutions can usher in the transition to clean energy and reduced greenhouse gas (GHG) emissions to meet the Paris Agreement goals.[15]

The significant number of ORE projects that are already developed or planned is leading to rising tensions and pressures on the amount of available ocean space.[16] **To date, a lack of spatial planning has led to delays, increased costs, lost economic opportunities and pushback from other more traditional ocean users** — including fisheries, shipping, tourism and nature recreation — in the implementation of offshore wind in many countries.

Moreover, there is increasing demand from the investment community for MSP to lower investment barriers to ORE investments.[17] This will be a critical factor to ensuring that ORE can expand sustainably and at the accelerated pace required to meet the Paris Agreement goals.

MSP has been recognized by both industry and Governments as a tool that can improve the level of certainty, transparency and predictability of private investments.[18] If done right, MSP, accompanied by a Strategic Environmental Assessment (SEA), can inform site selection, lower Government regulatory costs, streamline developments by mitigating risks of litigation, speed up delivery and investment and ease permitting processes. In the Netherlands for example, the MSP cut the cost of offshore wind permitting process by two-thirds.[19]

MSP has played a key role in the siting of ORE in many countries and will continue to play a role in ensuring that enough space for ORE will be allocated in the future. Moreover, MSP is crucial to the socially responsible advancement of ORE as it can reduce conflicts and foster synergies with other ocean users.

The continued advancement of ORE, and especially the environmentally and socially responsible installation of offshore wind, should be a strategic priority for countries and companies striving to meet the Paris Agreement goals.[20] The World Bank estimates the global technical potential for offshore wind exceeding 71,000 GW using current technology.[21] Exploiting just one per cent of this potential would meet more than 10 per cent of the world's current electricity consumption with at least 2,800 TWh per year in power generation.[22] IRENAs 1.5°C scenario also foresees enormous growth of offshore wind, increasing from the 34 gigawatts (GW) today to 380 GW by 2030 and more than 2,000 GW by 2050[23]. Nevertheless, other sources of ORE such as offshore solar wave tidal and thermal energy installations can provide reliable and flexible energy for many coastal countries and Small Island Developing States (SIDS), balanced with offshore wind and different forms of land-based renewable energy production.

15. Hoegh-Guldberg and others, The Ocean as a Solution to Climate Change.
16. For an example in France, see "France's offshore renewable strategy faces pushback from fishermen"; and in South Korea, see "Fishermen threaten South Korea climate plans".
17. Mauro Randone, "Blue Invest Workshop | Financing a Sustainable Blue Economy: From Pipe Dream to Pipeline at EMD 2021", video, 3 June 2021.
18. Ocean Renewable Energy Action Coalition, The Power of our Ocean (2020), available at https://gwec.net/oreac/.
19. Jason Blau and Lee Green, "Assessing the impact of a new approach to ocean management: Evidence to date from five ocean plans", Marine Policy, vol. 56 (2015), available at www.sciencedirect.com/science/article/pii/S0308597X15000299?via%3Dihub.
20. It should be noted that onshore solutions such as wind and solar energy have equally important role in the total renewable energy mix.
21. UNFCCC, Climate Action Pathway: Oceans and Coastal Zones (2021).
22. World Bank Group, Offshore Wind Technical Potential Analysis and Maps (2021) available at: https://esmap.org/esmap_offshorewind_techpotential_analysis_maps
23. IRENA, World Energy Transitions Outlook: 1.5°C Pathway (2021) availbale at https://www.irena.org/publications/2021/Jun/World-Energy-Transitions-Outlook

Nevertheless, **MSP is not the only tool** that can address the sustainable development of ORE. In fact, **to be effective MSP needs the support of other ocean management tools and other levels of decision-making**. Sectoral planning and environmental impact assessment (EIA) processes for ORE have had an important role in many countries, especially in conducting ORE siting and providing additional sector-specific planning details. Moreover, fishery management and conservation planning are often dealt with under other frameworks; thus, although very much needed, the level of their integration with MSP differs across countries.

Depending on the local conditions and specific needs, a combination of planning mechanisms can to be used. For example, having a sectoral renewable energy plan nested within MSP can ensure more detailed siting and elaboration of sector-specific policies (e.g. mitigation measures, co-location and multi-use guidelines) and thus enable robust sector-based planning while still accommodating plans for multiple objectives.

EXAMPLES: Sectoral energy planning

In Germany, MSP is regarded as 'high-level planning' to balance several interests and implement political goals. Apart from MSP, the federal planning authorities also make use of sectoral energy planning as the sub-discipline. Marine energy sector planning deals primarily with the spatial planning of areas for wind energy at sea and offshore grid connections in the German part of the North Sea and Baltic Sea. In addition, the plan deals with spatial determinations for cross-border (international) grid connections and connections between grid infrastructures. The plan is generally updated every four years or as changes occur.

On the other hand, the Republic of Ireland has put forward draft legislation for the Maritime Area Planning Bill.[24] The approach foresees having a national marine plan (the National Marine Planning Framework, NMPF) as well as an ability to nest sub-national or sectoral plans underneath (Designated Marine Area Plans). Although in its nascent stage, this could present an opportunity to develop sectoral marine plans within an MSP process.

24. Government of Ireland. Maritime Area Planning Bill. (2021)

3. THE IMPORTANCE OF RECONCILING ORE WITH OTHER SECTORS AND DIMENSIONS — IN A CLIMATE-SMART FRAMEWORK

MSP must address climate change by balancing socioeconomic and environmental dimensions: A holistic MSP process should integrate different priorities, acknowledging that apart from renewable energy, other solutions, especially nature-based, may play an important role in combating climate change. **MSP can subsequently also play a significant role as a catalyst for ORE nature-based solutions and ocean multi-use approaches**.

The demand for ocean space is also rising amongst industry stakeholders as established sectors, such as fishing, tourism and shipping, continue to grow while new users, such as ORE and emerging forms of aquaculture including seaweed, are set to increase in response to the need for clean energy and protein-rich food and feed. Moreover, the amount of space assigned to spatial conservation measures such as marine protected areas (MPAs) is also set to increase.[25] MSP will have a role in prioritizing uses that adopt a climate-smart approach (e.g. fuel-efficient shipping, sustainable fishing and aquaculture) and considering possible conflicts between different climate- smart objectives.

While MSP has been mainly used as a tool to minimize conflicts between ORE and other sectors, in recent years the concept of ocean multi-use has emerged. **Multi-use aims to foster a more synergetic relationship between ocean users while enabling more efficient use of marine space.**

The ocean multi-use concept has been identified as a significant opportunity to better integrate offshore wind developments into the existing context of traditional uses. ORE can foreseeably be co-located with other marine industries, such as tourism (e.g. boat tours), low-trophic aquaculture or certain types of passive fisheries, or potentially support the move of aquaculture developments further offshore (i.e. combined operations and maintenance, direct energy supply and artificial reefs).[26]

Restrictions on marine space access by other users, make ORE sites amenable to the deployment of nature-based solutions that can be used to deliver climate change adaptation and mitigation.

Examples such as nature-inclusive design in the form of smart offshore wind foundations or scour protection serving as an artificial reef, can potentially boost local biodiversity and improve fishing resources. There is still an open question as to how ORE would interact with such measures and what the conditions are for successful co-location. Any co-location and multi-use solution should be considered carefully and assessed on a case-by-case basis.

MSP can be a suitable framework to identify such multi-use and co-location opportunities. However, on the project level, other regulatory frameworks also have an important role to play — such as sectoral permitting procedures, insurance and safety regulation and fishing quota regulations.

By identifying suitable space for testbeds and demonstration sites for multi-use solutions, MSP can facilitate their de-risking. Information collected from such pilot tests can serve to increase the confidence of planners, regulators, and industries about such solutions.

25. Convention on Biological Diversity (CBD) Post-2020 Global Biodiversity Framework (2021), available at: www.unep.org/resources/publication/1st-draft-post-2020-global-biodiversity-framework
26. Angela Schultz-Zehden and others, Ocean Multi-Use Action Plan (Edinburgh, 2018), available at https://www.submariner-network.eu/images/news/MUSES_Multi-Use_Action_Plan.pdf.

EXAMPLE: OFFSHORE WIND FARMS AND TOURISM MULTI-USE

Combinations between offshore wind farms and tourism is already taking place in several locations.

For example, in Europe — in Sweden, Denmark, Belgium, the Netherlands, United Kingdom and Germany — boat tours and information centres on land are to a certain degree common social outreach strategy of the offshore wind sector for obtaining social acceptance, and improving their corporate social responsibility. Moreover, several pilot projects examined the multi-use of offshore wind farm and low tropic aquaculture:

- EDULIS (Belgium) – feasibility of mussel cultivation in two wind farms; C-Power (27 km from the coast, operational since 2013), and Belwind (46 km from the coast, operational since 2010);
- Value@sea (Belgium) – a small-scale pilot project, implemented at the Westdiepzone near the coast at the Nieuwpoortbank, to test the technical, ecological and economic feasibility of integrated forms of aquaculture (oyster, scallop and sugar weed) within the offshore wind farm;
- UNITED – three demonstration pilots taking place in Germany, the Netherlands and Belgium combining several types of aquaculture and renewable energies including solar and wind energy;
- SUBMARINER – tests within Rødsand 2 offshore wind farm located in the Baltic Sea off the south coast of Lolland.

4. KEY RECOMMENDATIONS AND ACTIONS

RECOMMENDATION 1

RECOGNIZE THE IMPORTANCE OF AND ENSURE IMPLEMENTATION OF A CLIMATE-SMART MSP PROCESS.

HIGH URGENCY

To ensure a sustainable and equitable use of the ocean, climate-smart MSP will be increasingly essential to balance marine pressures and thus enable the development of, and co-existence among, ocean-based climate solutions.

ACTIONS

1. DEVELOP GUIDANCE ON HOW TO DELIVER CLIMATE-SMART MSP,[27] INCLUDING:

- **RES:** Projections of different scenarios (both optimistic and catastrophic) on climate change impacts and their future effects on planning initiatives;
- **MSP:** Guidance on how to identify, map, analyse and discuss trade-off scenarios between ocean users in the context of climate crisis;
- Collaborative approaches to co-design climate adaptation and mitigation measures and solutions;
- **NGOs:** Awareness-raising materials on the potential consequences of climate change on different ocean uses;
- **RES:** Guidance on how to integrate climate-smart considerations into existing MSP processes and accompanying Strategic Environmental Assessments (SEA) (i.e. during the plan revision process).

2. ESTABLISH AND SCALE-UP COOPERATIVE MECHANISMS AND CROSS-SECTORAL INTERDISCIPLINARY PARTNERSHIPS TO LEAD A CLIMATE-SMART MSP PROCESS.[28]

Establishing effective mechanisms, such as an intra-governmental and multisectoral coordination group, or a 'one-stop shop' authority to coordinate Government ministries and agencies, is key for a cross-sectoral integrated approach to climate-smart MSP. An interdisciplinary leadership approach involving a wider range of actors (e.g. industry, non-governmental organizations, indigenous peoples and academia) is likely to increase the effectiveness, and can ensure stronger ownership and commitment that goes beyond Government mandates. While these mechanisms are needed for MSP in general, they can be especially important in the climate change context for establishing cooperation with climate change-related Government entities. This can include the development of dedicated pathways for the provision of climate change evidence to the coordinated MSP process, as well as clear routes for linkage to secondary climate-change policy, to enable climate-smart MSP that is actionable.

3. ENSURE LONG-TERM COMMITMENT TO CLIMATE-SMART MSP BY FORMALLY ADOPTING THE PLAN WHILE BUILDING IN MECHANISMS TO ENSURE A DYNAMIC AND ADAPTIVE PROCESS.

The formal adoption of a marine spatial plan by the respective regional or national government provides more certainty for planning and investment while a statutory plan requires compliance by other sectors and therefore ensures implementation. Nonetheless, planners must ensure that MSP remains adaptive and dynamic as the ocean and its users are dynamic entities and new knowledge is constantly being generated and technology developed.
However, any changes to the original plan need to be justified and should not interfere with key planning principles.

27. Building on IOC-UNESCO and European Union Commission MSPglobal guidelines (see https://www.mspglobal2030.org/).
28. Different parts of a national government often have separate responsibilities, which could include overseeing fisheries management; managing marine protected areas; enforcing maritime safety; or identification of suitable locations for potential ORE development.

EXAMPLES: Cooperative mechanisms and cross-sectoral partnerships

Marine Legislation Steering Group (Ireland) – Across central Government, there is a standing Marine Legislation Steering Group that involves high-level representatives of all parts of government, including the Department of the Taoiseach (Prime Minister) and over 50 departments, agencies and public bodies (including local authorities) with marine responsibilities. The Group has enabled communication of the National Marine Planning Framework (NMPF) development across Government, ensured that the NMPF has been informed by marine initiatives going on in other departments and helped other departments to begin integrating the NMPF as a consideration in their work. Clear communication of responsibilities of different departments from the outset has helped in clarifying who to engage as well as creating a better overall picture of marine governance among stakeholders.

Bureau of Ocean Energy Management (BOEM) Intergovernmental Offshore Renewable Energy Task Force (United States) – The BOEM task force involves participation by all levels of government, including federal agencies and officials from state, local and tribal governments. The purpose of the task force is to facilitate coordination and consultation among federal, state and local governments and to introduce their respective roles and responsibilities regarding offshore wind energy and the renewable energy leasing process on the Outer Continental Shelf (OCS) in the Gulf of Maine.

Marine Plan Partnership for the North Pacific Coast (MaPP) (Canada) – The MaPP initiative was formed in 2011 through a formal Letter of Intent between 18 First Nations and the Province of British Columbia (the MaPP Partners). In this formal partnership commitment, First Nations and Provincial government became equal governing partners. During the planning phase of the MaPP initiative, the Partners employed an advisory approach to engagement. This advisory approach committed the Partners to engage meaningfully with stakeholders and the public, consider their feedback, work towards balanced solutions and incorporate what was found to be agreeable. However, it did not require a consensus among participants in order for advice to be accepted or acted upon.

External support for the facilitation of MSP in the countries bordering the Benguela Current Large Marine Ecosystem (South Africa, Namibia, Angola) – MSP is a relatively new endeavor in the countries bordering the Benguela Current Large Marine Ecosystem (BCLME). As an integrated area-based approach that guides when and where human activities occur in the ocean, it is regarded as an important tool to guide the future sustainable use of the BCLME in times of climate change. The project is implemented by the German Development Cooperation (GIZ) in partnership with the Benguela Current Commission and supported by an international consultancy, s.Pro - sustainable projects. Together with GIZ staff, they form an independent but locally embedded advisory team that has established itself as a credible and objective facilitator of MSP. An important role in the early MSP process was to bring together relevant ministries and authorities to raise awareness of MSP and establish support for the MSP process. This resulted in the establishment in inter-ministerial National Working Groups that are now developing the country's first marine spatial plans. The GIZ/s.Pro team still works in close partnership with the National Working Groups on a variety of aspects, including practical spatial management approaches, stakeholder involvement, implementation of MSP and monitoring and evaluation. It also coordinates meetings of regional MSP groups that discuss cross-border MSP. Important success factors were the perceived independence of the advisory team, the long-term approach that enabled the team to gradually understand local needs and build up trust, continuity of staff, the involvement and training of local experts and the support of key ministries in setting up MSP.

RECOMMENDATION 2
UNLOCK PUBLIC AND MULTILATERAL FINANCING TO SUPPORT COUNTRIES IN ADVANCING A CLIMATE-SMART MSP PROCESS.

HIGH URGENCY

Dedicated financing is required for both the development and implementation of MSP as well as for associated capacity building initiatives.[29] Moreover, the production of climate change scenarios or visioning processes and the use of modelling tools in MSP may require additional funds, and these should be budgeted accordingly. Beyond existing domestic budgets, other sources to finance MSP include ocean-use fees, loans, philanthropic grants, overseas development assistance and in specific contexts, blue bonds and debt conversion.[30]

ACTIONS

1. FINANCIALLY SUPPORT THE DEVELOPMENT OF CLIMATE-SMART MSP.

This is particularly relevant in developing countries and SIDS where the use of innovative financial instruments can play an important role.

2. ENSURE THAT DOMESTIC BUDGETS COVER AT LEAST A SHARE OF THE TOTAL COST OF DEVELOPING AND IMPLEMENTING MSP.

This can ensure ownership and demonstrate commitment to other sources of funding.

EXAMPLE: Seychelles launches world's first sovereign Blue Bond

In the case of the Seychelles Blue Bond,[31] proceeds supported the expansion of marine-protected areas and improved governance of priority fisheries — sending a powerful signal that investors are increasingly interested in supporting sustainable ocean management.

29. UNESCO-IOC, MSPglobal Policy Brief: Capacity Development in Marine Spatial Planning (Paris, 2021), available at https://unesdoc.unesco.org/ark:/48223/pf0000375722.
30. The Ocean Finance Handbook (de Vos and Hart, 2020) as cited in the forthcoming publication Hanson and others, 100% Sustainable Ocean Management: An introduction to Sustainable Ocean Plans (Washington, D.C., World Resources Institute, 2021
31. World Bank, Seychelles Launches World's First Sovereign Blue Bond (2018 available at: https://www.worldbank.org/en/news/press-release/2018/10/29/seychelles-launches-worlds-first-sovereign-blue-bond

RECOMMENDATION 3
IMPROVE KNOWLEDGE AND DATA-SHARING ON NATIONAL AND INTERNATIONAL LEVELS.

HIGH URGENCY

To facilitate more efficient data-sharing, policymakers and planners can require industry data-sharing either through regulatory mechanisms or by supporting public-private collaborations. More comprehensive data that increases our understanding of the pathways through which climate change impacts marine ecosystems will be increasingly essential, as will improved monitoring of human uses. Such data and knowledge — both scientific and localized — will need to be at appropriate spatial and temporal scales to respond with adaptation measures and incorporate these into data-driven MSP.[32]

ORE development can also galvanize and drive data-driven MSP processes.[33] In many countries — including most northern European Union Member States and the United States (Rhode Island) — offshore wind has been a major driver for MSP. Thus, as an international sector, the ORE industry has abundant experience from these early MSP processes as well as from sectoral and project planning, siting and environmental impact assessment studies.

The ORE industry is therefore well-positioned to share its learnings at the local level, especially in developing countries where capacities for MSP may be lacking. The ORE industry can also provide evidence to enable MSP authorities to develop well-informed plans by providing non-commercially sensitive data assets. High-quality, real-time data is collected at operational sites and is already being shared through certain platforms and partnerships.[34]

ACTIONS

1. ACCELERATE ORE KNOWLEDGE AND DATA-SHARING THROUGH INCENTIVES AND INITIATIVES.

The ORE industry has data and knowledge which can be used not only for MSP but also to support coastal adaptation for climate change impacts, resilience and planning. Governments should provide incentives for industry data and knowledge-sharing and/or the co-design of installation of sensor technology and other observation capacity within installed infrastructure (e.g. commitment through the Global Biodiversity Information Facility). The broad distribution of this infrastructure could greatly enhance the ability to monitor in situ conditions (especially on the seabed where observational capability is always a challenge), being especially useful to monitor the unfolding of climate change, as well as how conditions vary within infrastructure, to give a sense of the health of the surrounding ecosystem. All of these are important evidence to support climate-smart MSP. Such monitoring programmes should be linked with and support national research programmes through a continuous exchange.

2. SUPPORT THE FORMATION OF DATA COORDINATION GROUPS: This is to ensure strategic design of monitoring capability and ensure strategic collection and harmonization of data across borders and agencies.

The United Nations Decade of Ocean Science for Sustainable Development[35] is a good example of the type of frameworks which accelerate and facilitate data sharing. Other more localised or sectorial initiatives, such as the i-Atlantic initiative may also be replicated in other areas.

32. UNESCO-IOC, MSPglobal Policy Brief: Identifying Existing and Future Conditions in Marine Spatial Planning (Paris, 2021), available at https://unesdoc.unesco.org/ark:/48223/pf0000375719.
33. For an example, see the Rhode Island Ocean SAMP website (https://seagrant.gso.uri.edu/oceansamp/).
34. For examples, see Ocean Data Platform (https://www.oceandata.earth/) and Orsted and NOAA data-sharing MoU (https://www.noaa.gov/media-release/noaa-signs-data-share-agreement-with-offshore-wind-energy-company).
35. For further information, please see: https://www.oceandecade.org/.

3. ESTABLISH COMMON MONITORING AND IMPACT ASSESSMENT FRAMEWORKS, TO BE USED ACROSS BORDERS

Impact assessment and monitoring often stop at the border while marine life and possible impacts span across countries. Given the ecological connectivity, and other key ecosystem properties, potential impacts need to be considered at regional/sea basin scales. Currently, there is a lack of common monitoring and impact assessment frameworks, as well as harmonized approaches to data interpretation and its use in MSP.[36]

LESSONS LEARNED: HOW IS ORE DATA USED IN MSP?

1. WHAT DATA IS THE ORE INDUSTRY COLLECTING?

ORE developers usually undertake most of the data collection as part of the pre-planning and Environmental Impact Assessment (EIA) stage. Some of the data are also collected on an on-going basis, thus also covering the construction and operation phases. The table below provides an overview of the types of data and methods typically used for their collection for each of the phases.

DATA COLLECTED	METHODS	TYPES OF DATA	STAGE COLLECTED AT
Metocean	Meteorological masts/LIDAR	Wind speed and direction	PP & OP
	Acoustic Wave and Current Metres	Wave and current data	PP & OP
	Directional Waverider Buoys	Wave height and direction	PP & OP
	Acoustic Doppler Current Profilers	Tidal speed and direction	PP
Geophysical	Bathymetry	Seabed bathymetry and texture; morphological features; shallow geology; seabed habitats; archaeology; potential unexploded ordnance	PP
	Side-scan sonar		
	Magnetometer		
	Seismic		
Geotechnical	Boreholes	Site geology; archaeology	PP
	Cone Penetration Tests		
Seabed Communities	Grab samples or drop-down video or camera	Infaunal and epifaunal species composition; fish species composition	PP & OM
	Trawl samples		PP
Marine Mammals	Aerial surveys and/or acoustic monitoring	Marine mammal species densities	PP, OM & CO
	Boat-based surveys		
Birds	Aerial surveys	Bird species densities	PP & OM
Shipping and Fishing	AIS Information	Shipping and fishing types and densities	PP
	Site-specific radar surveys	Live monitoring during construction and operations via marine coordination centres	

Table 2 A short (non-exhaustive) overview of the types of data and methods used for their collection in the context of ORE projects, as provided by ScottishPower Renewables and Vattenfall. (PP – Pre-planning, OM – Ongoing monitoring, CO – Construction, OP – Operation)

36. WWF. Maritime Spatial Planning Guidance. (2021) available at: https://wwfeu.awsassets.panda.org/downloads/wwf_eb_maritime_spatial_planning_guidance_paper_march_2021.pdf.

2. HOW IS THE COLLECTED DATA SHARED WITH THE AUTHORITIES AND OTHER ACTORS?

ORE industries share their EIA-related monitoring data through submission to the public authorities responsible for environmental and natural resource management. In some countries, this is done through annual reporting (e.g. Germany); in others, through submission to a central repository (e.g. United Kingdom).

EXAMPLES

Annual reporting to the German Federal Maritime and Hydrographic Agency: In Germany, offshore wind projects undergo a statutory Environmental Impact Assessment (EIA). ORE developers devote significant resources to environmental-technical expert analysis through monitoring surveys, e.g. bird and bat species surveys as well as habitat surveys. To verify the assumptions made in the EIA underlying the project award, operations are typically monitored for 3–5 years, as specified by the Federal Maritime and Hydrographic Agency (BSH). Reporting to the BSH occurs annually through submission of the monitoring data to the BSH. This data, among others, is then used by the BSH to determine measures to prevent and mitigate environmental impacts.[37]

Marine Data Exchange in the United Kingdom: In the United Kingdom, most of the data collected is shared via the Marine Data Exchange (MDE). The MDE was established by The Crown Estate in 2013 to "store, manage and share offshore survey data collected by our customers throughout the lifetime of their projects. This resource, now one of the biggest sources of marine data in the world, is helping to make valuable data freely accessible, promote collaboration within the sector, reduce survey costs and ultimately de-risk investment offshore". In Scotland, the MDE data was used to validate the results of a new, high-resolution numerical weather prediction model over the north of the United Kingdom to screen the offshore wind leases available in the 2021 Scotwind lease round.

There are dozens of regional, national or international databases that include ORE data. The examples encompass offshore wind farm datasets at the COWRIE, 4C Offshore Wind Database, the Wind Power portal and the Dutch Offshore Wind Atlas (DOWA) regarding wind conditions and wind energy. The European Marine Observation and Data Network (EMODnet) provides a wind farm database and other data and information related to MSP at the geoportal EMODnet Human Activities. The geoportal displays MSP plans at the local, sea basin and European levels. Well-founded and structured ocean data infrastructures from other regions include the United States National Oceanic and Atmospheric Administration's (NOAA) National Centres for Environmental Information - National Oceanographic Data Centre and Marine Cadastre and Australia's Integrated Marine Observing System – Australian Ocean Data Network, which host and provide access to the significant archives for marine environmental data. The OSPAR website data platform aims to promote the sharing of information and data for ORE.

3. HOW IS THE COLLECTED DATA USED IN MSP OR SECTORAL PLANNING PROCESSES?

The use of ORE data in MSP differs across countries. However, there is an increasing number of good practices showcasing how this can be facilitated.

EXAMPLES

The Dutch private-public partnership supporting data use in MSP: Collaboration in the form of private-public partnerships (PPP) can support the sharing of data and its use in MSP and in other sectoral planning processes and water applications. In the Netherlands, the Top Sector Water & Maritime, is a PPP established by the Dutch Government for public-private water sector collaboration in the field of maritime technologies, delta and water technologies.

37. White & Case, Offshore wind projects: Assessing the environmental impact
www.whitecase.com/publications/insight/offshore-wind-projects-assessing-environmental-impact

This PPP has initiated the DigiShape Data Science - Digitwin Nordzee, which assembles data from different stakeholders, including maritime businesses, and delivers spatial maps for the North Sea to facilitate decision-making around the sea basin.[38] It is an open innovation platform for MSP authorities, governments, knowledge institutions and businesses who together exploit the potential of improving open access to data at the national level. One of the key aspects of the initiative is the possibility to visualize and compare geographic characteristics, human activities and economic dimensions of the maritime sectors. The Top Sector TKI Offshore Wind Energy programme, on the other hand, runs various projects and Joint Industry Projects (JIPs). Much of the wind farm data is stored in the North Sea Energy Atlas. In addition, an open-access digital metocean database has been developed under the Netherlands Enterprise Agency (RVO) to provide ORE developers with easy access to consistent, reliable and high-quality metocean data as a basis for the design, operation and maintenance of future offshore wind farms in the Netherlands.

The European Commission Technical Expert Group on Data for MSP: Throughout the process of MSP development in Europe under the European Union MSP Directive,[39] countries faced various challenges related to the data used for MSP. One of the problems was that data comes from different sources with diversity in types and format and that there is varying data availability. Furthermore, national MSPs use different non-standardized database structures which apply diverse labels, making it difficult to understand, compare and assess planning coherency in cross-border contexts. To address these challenges, the European Commission established the Technical Expert Group on Data for MSP, which has recently published recommendations for making harmonized MSP plan data available across Europe.marine environmental data available across Europe.

4. LOOKING FORWARD — WHAT ADDITIONAL ORE INDUSTRY DATA COULD MSPS USE IN THE FUTURE, IN PARTICULAR TO HELP MAKE IT MORE CLIMATE-SMART?

With the increase of ORE and other marine activities, cumulative impact assessments for all marine activities will require more detailed data along with the development of practical approaches and guidance on more ecosystem-level cumulative impacts and transboundary effects assessments. Additional data will be needed to address knowledge gaps and uncertainties concerning potential effects from individual and cumulative effects of multiple ORE developments.

The improved access to data and knowledge from all relevant sources would enrich the knowledge base about the marine realm relevant for MSP.

In the near future, technological developments in floating offshore wind farms and other ORE installations will enable activities to move into deeper waters, opening up greater areas of seas and oceans for potential energy resources and bringing more opportunities for data coverage and knowledge availability.

In areas with new and future developments,[40] some data already acquired by the ORE industry is commercially sensitive and not required by the EIA, i.e. data covering meteorology, oceanography and geophysics. This data could still be shared at least in the form of knowledge, for example, via scientific publications and through collaboration with research institutes. This local knowledge would help improve short-term and long-term forecasts, especially in areas where MSP and coastal risk assessments are in their inception phase and insufficient data is currently available. This is considered of high importance given increased climate impacts on offshore and coastal structures, coastal cities and communities.

More inclusive approaches to data and knowledge exchange largely require cooperation in the form of sharing information in the private-public arena. This would support sustainable planning of marine space as well as planning and management actions as MSP is aimed at protecting the sea space and encouraging long-term stewardship of marine resources.

With input from and thanks to Helen Walker, ScottishPower Renewables, Kathy Wood, Vattenfall, and Patrycja Enet, European MSP Platform and Aktis Hydraulic.

38. European Commission, Communicating MSP: An inspiring era of cooperation between institutions, p. 12 (2020), available at https://communicatingmsp.msp-platform.eu/.
39. Directive 2014/89/EU of the European Parliament and of the council of 23 July 2014 establishing a framework for maritime spatial planning (https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0089&qid=1634186993910&from=en).
40. New and future developments refer to the new and future offshore wind projects, ORE in general and other developments, such as hydrogen pipelines, refill for vessels, etc.

RECOMMENDATION 4
STRENGTHEN SOCIOECONOMIC CONSIDERATIONS OF PLANNING DECISIONS.

HIGH URGENCY

MSP is a forum for social and public discussion. Through involving local affected communities, MSP can be a mechanism to deliver environmental justice, i.e. meaningful involvement of all persons in decision-making.[41] This in turn can enable inclusivity in the transition to a net zero ocean economy, giving people a say in the future uses of their local marine environment and thus helping to promote socioeconomic resilience to climate change.

The ORE transition is already giving rise to new green jobs with socioeconomic benefits to coastal communities.[42] One offshore wind farm has the potential to create 10,000 full-time jobs over the 25-year project lifetime of a 500-MW offshore wind farm.[43] Thus, careful siting of new ORE developments in MSP could have a cascading positive effect on potentially less-developed coastal areas and disadvantaged communities. Carefully sited ORE, with adequate consideration given to local perspectives, health and socioeconomic impacts, could play a key role in revitalizing coastal communities far away from urban economic centres, creating jobs and catalysing new investments in underdeveloped ports and waterfronts.

ACTIONS

1. ENSURE THAT MSP IS ACCOMPANIED BY A SUSTAINABILITY APPRAISAL AND/OR STRATEGIC ENVIRONMENTAL ASSESSMENT (SEA)
This can ensure that the socioeconomic impact of the planning decisions is taken into consideration.

2. USE DECISION SUPPORT TOOLS to assess the socioeconomic impacts of planning measures, thereby seeking to maximize societal benefits for all.

An MSP process can ensure that more long-term benefits are taken into consideration using modelling tools for ORE siting that allow for the integrated assessment of socioeconomic and environmental impacts of spatial planning decisions.

3. ENSURE PROPER COORDINATION OF MSP WITH COASTAL MANAGEMENT, necessary for effective consideration of land-sea interactions.

This can help a more efficient integration of ORE with other associated sectors — for example, grid connections to land and port development and expansion — and deliver socioeconomic benefits.

4. ACTIVELY INVOLVE LABOUR AUTHORITIES IN THE MSP PROCESS to discuss viable options, avoiding negative impacts on vulnerable communities and maximizing long-term benefits by strengthening the local job market.

This is to understand where jobs may be needed and what support — for instance skill development or redevelopment — communities may require for the sustainable continuation of the activities they depend on in the given region, e.g. tourism, fisheries, etc.

41. The US EPA defines environmental justice as: environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies.
42. Rystad Energy, Hiring wave coming: Offshore wind staff demand to triple by 2030, hundreds of thousands needed (2021) available at: https://www.rystadenergy.com/newsevents/news/press-releases/hiring-wave-coming-offshore-wind-staff-demand-to-triple-by-2030-hundreds-of-thousands-needed/.
43. IRENA, Renewable Energy Benefits: Leveraging local capacity for offshore wind (2018) available at: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/May/IRENA_Leveraging_for_Offshore_Wind_2018.pdf.

EXAMPLES: Socio-economic analysis and benefit sharing

Spatial Economic Benefit Analysis (SEBA) tool: The SEBA tool has been developed in the context of the European Union-funded BONUS BALTSPACE project, and applied in Germany, to identify and map the spatial distribution of benefi ts associated with ORE developments. The tool identifi es benefi ciaries and analyses their geographical distribution. It is of use to planners to answer questions, such as who benefi ts from which marine use and where are those benefi ciaries geographically located. As such, the tool allows better understanding of the socioeconomic impacts of planning decisions and improved decision-making.

Local cooperative ownership of the Danish Middelgrunden wind farm: Examples of energy cooperatives and local ownership of wind energy projects have been present on land for over two decades,[44] but their application offshore has been scarce. The use of cooperative ownership has had an important role in establishing synergies with local tourism and ensuring local acceptance of the Danish Middelgrunden offshore wind farm. Namely, 50 per cent of the wind farm is owned by a local cooperative with 8,553 members from the local community and businesses. The early engagement and involvement of local communities in the layout design contributed to the success of the project. Apart from producing three per cent of the total power used in the capital city of Copenhagen, the wind farm is also a landmark in the region. Moreover, the boat tours to the farm organized by the cooperative also bring added socioeconomic benefi ts to the community.

44. Anna Schreuer and Daniela Weismeier-Sammer, Energy Cooperatives and Local Ownership (Vienna, 2010) available at: https://www.researchgate.net/publication/47442634_Energy_cooperatives_and_local_ownership_in_the_field_of_renewable_energy_technologies_A_literature_reviewAgency/Publication/2018/May/IRENA_Leveraging_for_Offshore_Wind_2018.pdf.

RECOMMENDATION 5
STRENGTHEN THE CROSS-BORDER AND TRANSNATIONAL COLLABORATION MECHANISMS ON MSP AND ORE.

MEDIUM URGENCY

Both the benefits and impacts of ORE development traverse national boundaries and jurisdictions. Future large ORE projects are likely to span across multiple territorial jurisdictions. Nevertheless, there remain considerable differences between countries in terms of how these projects are considered in MSP and other governance mechanisms, e.g. criteria for siting ORE, permitting processes and impact assessments. Moreover, collaboration on combined hybrid grid solutions[45] and transnational grid systems is important so that renewable energy can be produced where it makes most sense and transported across sea basins. Compatibility of planning criteria and harmonization of EIA procedures will have an important role, especially for transnational ORE projects, such as energy islands.[46] The case for data sharing and its harmonization across borders is emphasized under recommendation three.

ACTIONS

1. **INTENSIFY COLLABORATION BETWEEN THE INTERNATIONAL ORE AND MSP COMMUNITY** for a better exchange of perspectives, data and solutions on how to drive forward transboundary MSP.

Future initiatives should build on the work of IOC-UNESCO and the European Commission on the MSP Global initiative on sector-related MSP guidelines.[47]

2. SUPPORT THE DEVELOPMENT OF TRANSNATIONAL (E.G. SEA BASIN-WIDE) PUBLIC-PRIVATE COOPERATION INITIATIVES ON ORE AND MSP.

While the European Union has seen several initiatives and funding programmes supporting such cooperation initiatives (i.e. mainly through short-term projects), transnational cooperation outside of the European Union is still nascent. Existing European Union cooperation structures, such as the North Sea Energy Political Initiative for example, could be a good practice example on MSP and ORE collaboration across countries.

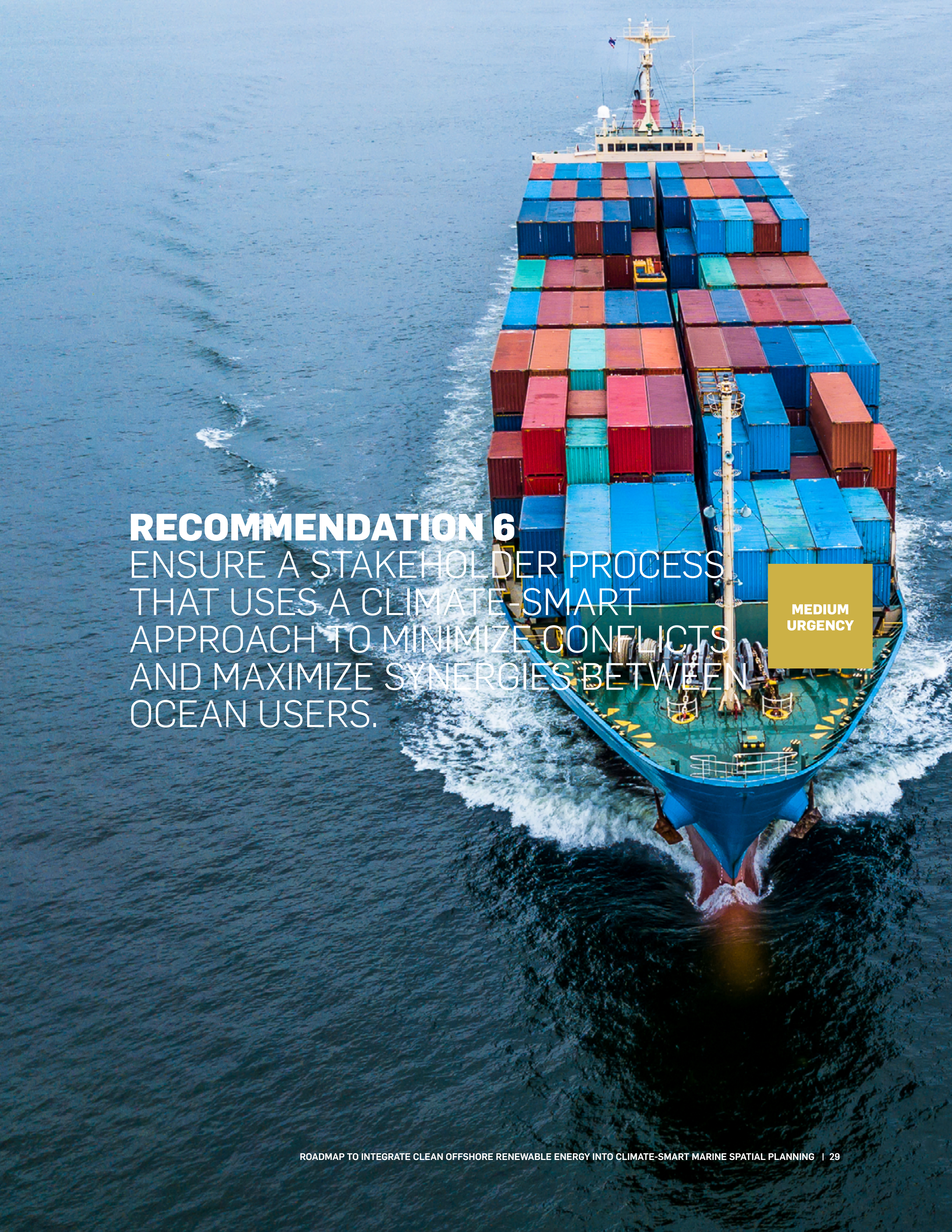
EXAMPLE: Cooperation in the North Sea

The North Sea Energy Political Initiative involves 10 North Sea countries to cooperate on offshore renewable (wind) energy; in particular, on MSP and creating greater coherence in dealing with cumulative ecological impacts in the sub-working group. The work programme for 2020–2023 put a particular emphasis on developing concrete cross-border offshore wind and grid projects (hybrid projects), with the potential to reduce costs and space of offshore developments.

The European Union funding programmes (Interreg, EMFAF) also provide a platform for collaboration across the region. For example, the NorthSEE project was one of the transnational MSP-related projects, led by the German Federal Maritime and Hydrographic Agency and involving MSP authorities as well as selected research institutes from countries around the North Sea. It represented the transnational Government collaboration for better compatibility in planning transnational energy, shipping corridors and green infrastructure across borders. It aimed to identify differences regarding competences, objectives, legal basis, steps used in the planning processes and planning criteria applied for in the shipping, energy and environmental designations.

The project collaboration specifically focused on identifying joint principles and recommendations for the region to be followed in the national plans. The project also contributed to increased communication and trust between the national authorities in the region, allowing them in an informal setting to identify key cross-border and transnational issues relevant to the aforementioned sectors. The interim findings report provides the summary of key conclusions and recommendations from the project.

45. 50Hertz (2021). Kriegers Flak combined grid solution. (2021) available at: https://www.50hertz.com/en/Grid/Griddevelopement/Offshoreprojects/CombinedGridSolution
46. Danish Energy Agency, Planned energy islands. (2021) available at https://ens.dk/en/our-responsibilities/wind-power/energy-islands
47. IOC UNESCO, MSP Global 2030 initiaitve (https://www.mspglobal2030.org/)



RECOMMENDATION 6
ENSURE A STAKEHOLDER PROCESS THAT USES A CLIMATE-SMART APPROACH TO MINIMIZE CONFLICTS AND MAXIMIZE SYNERGIES BETWEEN OCEAN USERS.

MEDIUM URGENCY

Multi-stakeholder planning can create management actions that are accepted and sustained over time by engaging a complex set of stakeholders, their interests and expectations. MSP needs to be an inclusive participatory process that has an essential role in gathering stakeholders around the same table to discuss different planning options, collect and share data and build capacities. This kind of process can also address conflicts between newer users — such as offshore renewables versus more traditional users such as the fishing industry — allowing science and local knowledge to drive informed decisions.

An integrated approach to planning, ORE MSP should aim to engage not only different tiers of government but also representatives of different ocean industries, research and academia, NGOs and civil society. An inclusive, transparent stakeholder engagement process is key to successful MSP to ensure long-term and sustainable social acceptability.

Moreover, using a fair, participatory process that includes disadvantaged populations and indigenous peoples and their perspectives and going beyond a one-time public consultation can ensure proper consideration of local issues and improve local resilience.

ENSURING A JUST TRANSITION

The transition to a net zero ocean economy will need to be socially inclusive and equitable as well as economically efficient and environmentally effective if it is to succeed. Scaling up climate mitigation solutions such as ORE will need to address and mitigate social concerns and maximize social benefits if they are to be accepted by society.[48] As a public process, climate-smart MSP is an opportunity as well as a tool to engage with local communities and society at large around climate policies and climate-related changes.

ENABLERS AND RECOMMENDATIONS FOR EFFECTIVE ENGAGEMENT IN MSP PROCESSES — LESSONS LEARNED:

- **Build capacities** so that participants first understand the functioning of other sectors and the impacts of the climate crisis; having introductory presentations on the industry at the very beginning of the engagement process goes a long way to helping to understand the industry needs, issues and the importance of each sector in society as a whole. Gamification is being increasingly considered as a tool to engage with the wider, sometimes disinterested public in MSP. Using simple simulation game tools such as MSP Challenge for increasing awareness about climate crisis and possible solutions can be beneficial during the MSP engagement process.

- **Engage early** – Allow time for building trust and capacities; when the spatial plan is to accommodate the new offshore wind energy targets, then early involvement of potentially conflicting sectors is crucial to minimize these conflicts and maximize possible synergies.

- **Be open, transparent and build trust** – Without trust, some industries may not engage and their data, which can be thought of as commercially confidential, will be lost in the plan — exacerbating the problem rather than solving it. Stakeholders need to know how to confidently access information and voice their concerns and recommendations. They must have trust that this process is transparent and based on science and sound knowledge. Utilizing independent assessments and scientific research can be a key tactic to establishing trust between stakeholders. Moreover, having a neutral facilitator for a public process should be considered as government-run MSP processes can pose challenges when it comes to ensuring trust.

48. As underlined by leaders at COP24, considering the social aspect of the transition towards a low-carbon economy is crucial for gaining social approval for the changes taking place. See: Solidarity and Just Transition Silesia Declaration (2018) available at: https://cop24.gov.pl/presidency/initiatives/just-transition-declaration/.

- **Manage expectations** – Clarify to what extent the plan is open to inputs and acknowledge received contributions. Regularly demonstrating where stakeholders have been listened to and what input has been used (e.g. by showing changes to map data) helps to build confidence in the process and meet expectations.

- **Ensure engagement is taking place at appropriate scale** – National-level MSP can often be very high-level and strategic with limited capacities for local engagement. The detail is then left to individual consenting processes later and this can cause delays in delivery. This can be overcome by nesting sectoral or sub-national marine plans within a national framework — within which specific local knowledge can be more readily applied. Moreover, using tools and methods that meet local and individual needs and contexts can be crucial for effective engagement.

ACTIONS

1. MOBILIZE THE OCEAN BUSINESS COMMUNITY
to develop guidance on how to consult the ORE sector on future scenarios and plans based on international experience.

2. USE LONG-TERM ENGAGEMENT APPROACHES,
such as community of practice initiatives, that go beyond one-time consultation and bring stakeholders to the table in a solution-oriented manner.

Long-term, informal engagement opportunities taking place outside of political processes are crucial in ensuring that there is sufficient time to build trust between stakeholders. This has been recognized recently by the European Commission in its announcement to launch a Blue Forum — which will bring marine stakeholders together from across the European Union for coordinated dialogue.[49]

Moreover, there is a need to have dedicated discussions/fora for an exchange between planners, industry and conservation interests to talk about what mitigation contributions are possible from nature solely and where the limits of ORE expansion should be drawn.

Long-term engagement can allow sectors to:
- Learn about each other's issues;
- Build ocean-climate literacy as a basis to drive and explore ocean-climate solutions;
- Identify potential synergies and exchange ideas and solutions;
- Build understanding about the role ORE can play in meeting the decarbonization agenda as well as the important role that sustainable food production and biodiversity protection play in the climate change context; and
- Realize the need for collaboration in a shared future.

49. European Commission, European Green Deal: Developing a sustainable blue economy in the European Union (2021) available at: https://ec.europa.eu/commission/presscorner/detail/en/ip_21_2341

EXAMPLE: Dutch "Community of Practice North Sea"

In the Netherlands, several public authorities collaborated to set up a Community of Practice (CoP) to bring various stakeholders together, from NGOs and entrepreneurs to policy. Collaboration takes place in larger meetings, as well as small working sessions where participants have an opportunity to share experiences and learn from each other in the context of a shared goal. It also enables the development of both spatial and social claims. New collaborations often arise during these meetings, as well as knowledge-sharing on technology, finance, and ecology.

3. **BUILD STRONG PARTNERSHIPS** with the fishing industry and other users of marine resources and space.

Open and honest interaction between ORE and fishery sectors can help to manage conflicts when they arise and identify ways to avoid or mitigate impacts that may occur. Given the diversity of the fishing industry (e.g. small-scale and industrial fisheries using different fishing gears and targeting different species), interaction models will differ. In general, partnerships can focus on potential co-existence models, for example by allocating a dedicated fisheries liaison, stock preservation or other benefit-sharing programmes.[50]

4. **SET UP DEDICATED HIGH-LEVEL LIAISON GROUPS** to foster good relations between specific conflicting sectors.

By moving away from single sectoral planning to a multisector and multi-stakeholder approach, an MSP process can be an opportunity to build trust between the ORE sector and other marine users, including the fishing, aquaculture and tourism industries. For example, studies have shown that fishers are significantly more likely to support a plan if they believed the consultation of the plan was adequate.[51]

50. See examples: 1) Iberdrola liaises with local business as well as contributes funding to local fishing projects around a planned Offshore Wind farm in Britany; 2) Statkraft Hitra Windfarm: created open dialogue with the local municipality and local stakeholders from the onset to encourage comments and recommendations to reduce potential conflicts.
51. Blau and Green (2015) ibid

EXAMPLES: Working with the fishing community

Ørsted Offshore North America working with the fishing community: Ørsted is collaborating with fishers to find ways to minimize and mitigate potential impacts of offshore wind development on fishing and identify ways both industries can work together. The communications plan developed for North America builds on the 'Final Report on Best Management Practices and Mitigation Measures' (Best Management Practices) outlined by the Bureau of Ocean Energy Management (BOEM) for communicating with the fishing industry and provides specific steps and procedures for implementation. It is also advised by the experience from Block Island Wind Farm (BIWF), the first operational offshore wind farm in the United States, and experiences and relationships gained from 28 operating offshore wind farms in Europe that Ørsted owns and operates. The plan describes the outreach with fishing communities during planning, research, construction and operation phases of wind farm development.
It is based on extensive meetings with fishers and is intended to be a living document, which will be expanded and refined with ongoing feedback from fishers. A key part of successful outreach has been the engagement and building of a multi-state network of Fisheries Liaisons (FLs) and Fisheries Representatives (FRs) to serve as two-way channels of information exchange with the fishing industry. Included in this plan is a detailed outline of the responsibilities and qualifications of the FLs and FRs. This is key for successful outreach due to the complexities of the fishing industry, with multiple gear types, port sizes, locations and many small businesses.

The FLOWW Fishing Liaison Best Practice Guidance for Offshore Renewables Developers:
In Scotland, the Fishing Liaison with Offshore Wind and Wet Renewables Group (FLOWW) was set up to foster good relations between the fishing and ORE sectors. Led by The Crown Estate (United Kingdom), the FLOWW published the first Fishing Liaison Best Practice Guidance for Offshore Renewables Developers that draws on the extensive experience gained through the development of the first three offshore wind leasing rounds in the United Kingdom as well as the emerging wave and tidal sector.

THE PHASES OF STAKEHOLDER PARTICIPATION IN MSP: LESSONS LEARNED

While there are different levels of stakeholder participation in MSP (as shown in the figure below), most of the authorities opt for collecting the written input to the draft plan and directly exchange with some of the key sectors with maritime expertise. However, a more collaborative approach can benefit the plan as the stakeholders often hold knowledge that can be of relevance to the planning process. Moreover, the development of ORE as a key ocean-based climate mitigation solution, planners can facilitate discussions between ORE and key stakeholders to help minimize conflicts and increase the acceptance and ownership of the plan.

If possible, all stakeholders should be actively involved in at least three phases of planning to facilitate a desirable result[52]:

1. The initial phase: Before preparation of the draft plan in order to submit opinion and comments concerning the plan;
2. The phase of MSP development: During the exposure and public discussion in order to get acquainted with the draft plan and to meet one's interests in the plan;
3. The phase of drafting and approval: In order to justify disputable issues.

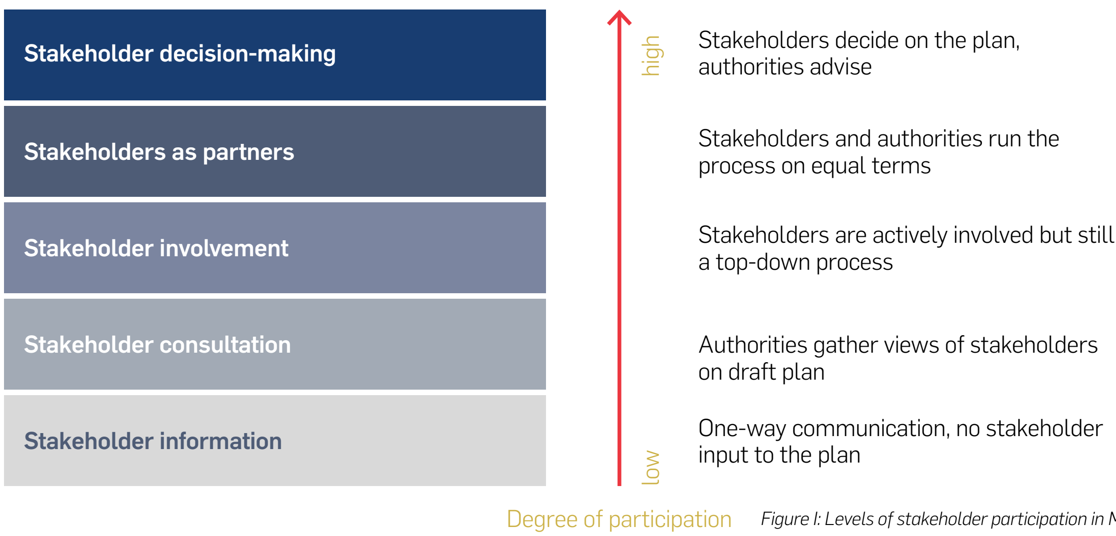


Figure I: Levels of stakeholder participation in MSP

52. Pentz, T-A. Stakeholder Involvement in MSP. BaltSeaPlan Project (2021)

RECOMMENDATION 7
STRENGTHEN THE LINK BETWEEN ORE AND BIODIVERSITY PROTECTION AND RESTORATION TO MAXIMIZE CLIMATE MITIGATION EFFECTS.

HIGH URGENCY

While ORE projects can impact biodiversity (e.g. marine mammals exposed to high noise during construction or bird collisions with turbines), strategic-level planning and early identification of risks through screening are effective tools to avoid placing developments in areas of high sensitivity for biodiversity.[53]

Moreover, amplifying potential synergies between ORE and biodiversity protection and restoration are key to reconciling clean energy needs with nature protection, thus supporting the implementation of climate mitigation strategies. For example, nature-inclusive design in the form of smart offshore wind foundations or scour protection could potentially boost local biodiversity and improve fishing resources.

Beneficial aspects of nature based solutions within or in the proximity of offshore wind farms could potentially include creating habitat in the form of artificial reefs, with increased biodiversity, abundance and biomass, as well as providing enhanced foraging opportunities and refuge areas for many species of fishes, seabirds, sea turtles and marine mammals.[54] The artificial reef effect, where offshore installations offer new habitats for colonisation, can diversify and grow the local flora and fauna.

Nevertheless, more research is needed into safety (or no-go) zones around ORE sites as well as into consequences of ORE decommissioning on the formed habitats and wider ecosystems[54] in order to effectively manage and monitor impacts for conservation outcomes.[55]

1. PRODUCE GUIDANCE ON HOW TO SITE ORE IN RELATION TO EXISTING OR POTENTIAL FUTURE HIGH-PRIORITY SITES FOR BIODIVERSITY CONSERVATION.

Significant R&D work remains to be done in the area of biodiversity monitoring in and around ORE production sites. This monitoring whether manned or automated can help feed the need for increased understanding of the interactions between organisms and offshore turbines.

2. IMPLEMENT PILOT DEMONSTRATION PROJECTS ON ORE INFRASTRUCTURES designed in a nature-inclusive way and monitor positive and negative environmental impacts.

A monitoring programme should be established as soon as nature-inclusive measures have been taken so that the design can be improved, including a baseline prior to measuring the impacts.

3. ESTABLISH A COMMUNITY OF PRACTICE FOR ORE-BIODIVERSITY

There is a strong need for joint dialogue and enhanced sharing of evidence and good practices on ORE-biodiversity interactions. ORE industry and NGOs can work collaboratively to develop key performance indicators (KPIs) and joint monitoring protocols to measure net-positive biodiversity impact.[56] The Community of Practice should also engage with spatial planners to share lessons.

53. IUCN (2021). Mitigating biodiversity impacts associated with solar and wind energy development: guidelines for project developers.
54. BOEM, Comparison of Environmental Effects from Different Offshore Wind Turbine Foundations. (2020) available at: https://www.boem.gov/sites/default/files/documents/environment/Wind-Turbine-Foundations-White%20Paper-Final-White-Paper.pdf
55. Noting also that a marine reserve effect is created when fishing trawlers are excluded from offshore renewable sites, as the fish can live and reproduce unhindered in the area. Fish stocks use the marine reserve to rebuild themselves, which can improve fishing outside of the farm. For additional information, see; Langhamer, Artificial Reef Effect in relation to Offshore Renewable Energy Conversion: State of the Art (2012) available at: https://downloads.hindawi.com/journals/tswj/2012/386713.pdf; Orsted, Ørsted to install artificial reefs for cod recovery at Borssele 1 & 2., Wind Power NL (2019) available at: https://windpowernl.com/2019/03/29/orsted-to-install-artificial-reefs-for-cod-recovery-at-borssele-1-2/
56. World Economic Forum, The Business Case for Marine Protection and Conservation (2020) available at: https://www3.weforum.org/docs/WEF_Business_case_for_marine_protection.pdf

EXAMPLE: IFREMER and TotalEnergies research and development collaboration

The installation and operation of marine infrastructures require environmental monitoring to assess their impact on marine organisms, habitats and therefore on the way ecosystems function. To go beyond the traditional methodologies and existing regulatory frameworks, IFREMER and TotalEnergies signed a research and development collaboration contract at the end of 2019.

The intention is to develop an innovative monitoring tool to assess the impact of anthropogenic pressures on the global marine ecosystem in the vicinity of energy production installations or harbour infrastructures. This research project, based on a holistic approach, focuses on the effects on phytoplankton, microphytobenthos, zooplankton, filter feeders, pelagic and demersal fish and marine mammal compartments. Whilst this was originally designed for Oil and Gas operations, it is now being considered for Offshore Renewable Energies. Currently, MACROCOSME has completed its design phase, and pilots will need to be constructed to assess the relevance and efficiency of the systems and sensors in establishing the ecological state of the water body. The sensitivity and statistical significance of the results obtained will then be reviewed. Data collected should, whenever relevant and possible, be provided to the scientific community to improve knowledge and understanding of the marine environment in the surroundings of offshore wind farms.

EXAMPLES: NATURE-INCLUSIVE DESIGN

Wageningen University Research Nature Inclusive Design (NID) catalogue:

The Dutch Government stimulates nature enhancement within Offshore Wind farms. Currently, permit holders must take measures to increase the suitable habitat for species naturally occurring in the North Sea. The catalogue of nature-inclusive design (NID) options that can be applied in Dutch offshore wind farms was produced by the Wageningen University Research. An important part of the creative process was to include the end users from an early start to ensure the feasibility of NID options offered in the catalogue. The feasibility is reflected in both ecological and technical aspects. The NID options in the catalogue are to be ready-to-use with clear design guidelines and associated risks and costs. The catalogue is to support the Dutch Government to elaborate on nature regulations in future wind farm site decisions or related instruments, and to support asset owners, wind developers and contractors i.e. the end users in implementing NID as a new standard in offshore wind development, including to be able to meet the regulations indicated. Nature-Inclusive Design refers to options that can be integrated in or added to the design of an offshore wind infrastructure to create suitable habitat for native species (or communities) whose natural habitat in the Dutch North Sea has been degraded or reduced. Here, NID options can be part of a wind turbine (monopile) or an offshore substation, a scour protection layer or a cable protection measure.

TenneT nature-inclusive design:

TenneT, the offshore grid connection owner, has produced an overview of NID concepts and measures to be considered by offshore renewable energy contractors. As presented in Figure II, such concepts include, for example, a fish hotel where within the jacket, fish-friendly structures are attached to provide shelter for multiple species. The structures are accessible for the target species but protected from predators.

Figure III: Visual representation of the scour protection eco-cable crossing. Image courtesy of TenneT.

The list was produced in collaboration with contractors. Contractors were asked to suggest measures and indicate their practicality, costs and effect. TenneT then assessed the measures they offered for technical feasibility, impact on planning, impact on nature, costs and risks. The list was finally used in the tendering procedure to assess the bids. The tender procedure for the three Noord-Holland coast projects proved to be a successful pilot showcase of how nature-inclusive measures can be applied. A key conclusion of this pilot is that the earlier the measures are considered (i.e. in the project design stage), the more cost-efficient the implementation will be.

The actual application of nature-inclusive design is still in its early stages and monitoring of nature-inclusive design measures is required to gather data on impact and effectiveness in practice. Monitoring of the shortlist of solutions, shown in Figure II, forms an incremental part of the measure. Further insights could be derived from the actual pilots in practice.

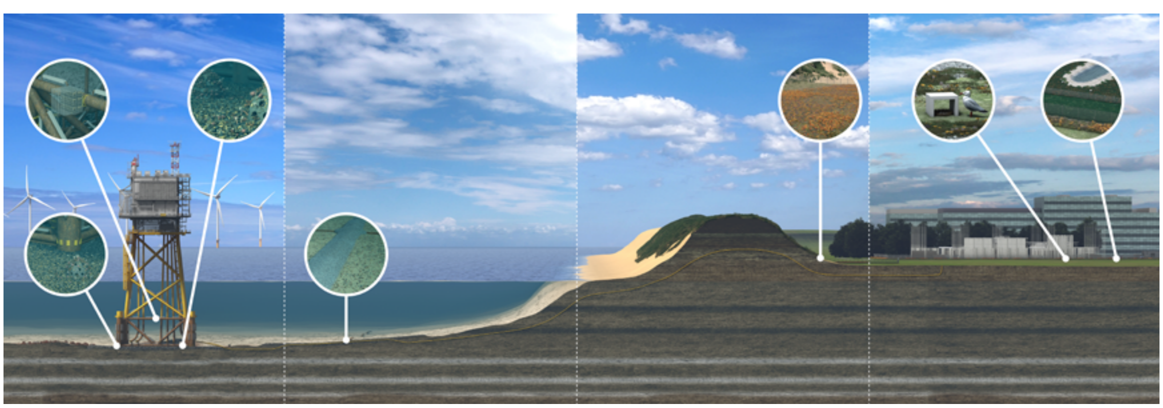


Figure II: Overview of nature-inclusive measures and concepts: (1) fish hotels; (2) artificial reefs (3) eco-friendly scour protection; (4) eco-cable crossings; (5) ecological landscaping; (6) coastal birds breeding area; (7) ecological landscaping. Image courtesy of TenneT.

RECOMMENDATION 8
EXPLORE SYNERGISTIC MULTI-USE COMBINATIONS THAT CAN SPEED UP THE TRANSITION TO NET ZERO AND CLIMATE-RESILIENT ECONOMIES.

MEDIUM URGENCY

Due to increased demand for ocean space and maritime activities, there will be an urgent need for multi-use in a crowded sea. The Ocean Multi-Use Action Plan (2018)[58] recognizes **co-location and multi-use as a concept that can support more sustainable, space-efficient and synergetic use of the ocean space.** While the concept has also been advocated through policy (e.g. European Union MSP Directive) and several research programmes, the concept is still experiencing limited application. The lack of information about its impacts and associated regulatory barriers have been oft-cited reasons.

The multi-use concept has been praised to provide **better integration of ORE developments into the existing context of traditional uses.** This includes, for example, combinations between offshore wind and tourism in the form of boat tours or allowing small-scale passive fisheries in offshore wind farm zones. Nevertheless, the multi-use concept can also be seen as **an enabler for young industries such as solar and wave energy**, allowing them to "get a foot in the door". These sectors may be the most open to the multi-use concept as it can allow them to demonstrate their application to support other sectors. This includes, for example, combining aquaculture with wave energy farms and moving it further offshore. The benefits of such an approach comprise the sheltering effect for aquaculture in exposed offshore conditions, combined operations and maintenance of the two industries and aquaculture using the direct renewable energy supply, supporting the commercialization of early wave energy solutions.

ACTIONS

1. **BASED ON PILOT DEMONSTRATION PROJECTS, DEVELOP GOOD PRACTICE GUIDELINES, BUSINESS CASES AND CASE STUDIES ON MULTI-USE,** combining renewables, nature-based solutions and sustainable food production to build confidence, capacities and awareness among both the public and private sectors.

2. **USE AN MSP PROCESS AND STRATEGIC ENVIRONMENTAL ASSESSMENT (SEA)** to identify areas that could be suitable for co-location or multi-use between ORE and other uses.

3. **DEVELOP PROCEDURES FOR ASSESSING CLIMATE-SMART MULTI-USE OPTIONS AS PART OF PERMITTING PROCESSES** (e.g. Environmental and Social Impact Assessments (ESIA)).

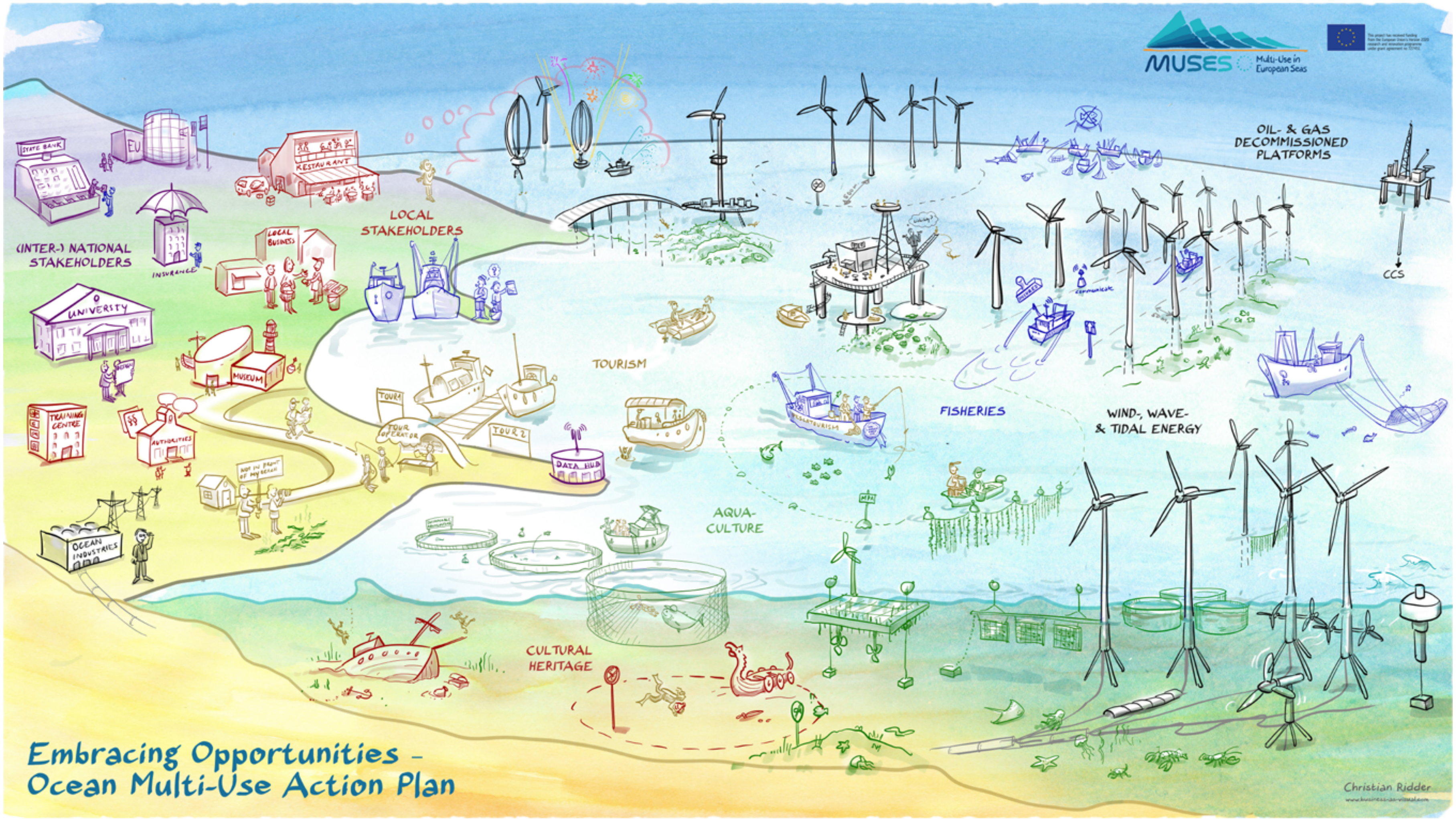
58. Schultz-Zehden, A. et al. Ocean Multi-Use Action Plan. MUSES project. (2018) available at: https://www.submariner-network.eu/images/projects/MUSES/MUSES_Multi-Use_Action_Plan.pdf.

EXAMPLE: Ocean Multi-use research in Europe

The concept of multi-use has been extensively studied in Europe over the last decade, funded mainly by the European Union research and innovation programmes as well as international collaborative funding programmes, such as the Future Earth, JPI Oceans and Belmont Forum Collaborative Research Action on Transdisciplinary Research for Ocean Sustainability.

This list highlights recent key sources on multi-use research in Europe:

- UNITED – a European Union-wide project working on the multi-use demonstration pilots in five European countries (2020–ongoing);
- MULTI-FRAME – an international project developing an assessment framework for assessing sustainability of ocean multi-use solutions and ocean multi-use scenario development in six countries worldwide (2020–ongoing);
- Toward a Common Understanding of Ocean Multi-use (2019);
- Ocean Multi-use Action Plan (2018);
- Can multi-use of the sea be safe? A framework for risk assessment of multi-use at sea (2020);
- Combining results from MARIBE and MUSES: Development of multi-use platforms at sea: Barriers to realising Blue Growth (2020);
- Stakeholder involvement in technological design: Lessons learned from the MERMAID and TROPOS projects (2020);
- Videos about the SOMOS project (2020).


MUSES
Multi-Use in European Seas
STATE BANK
EU
RESTAURANT
LOCAL STAKEHOLDERS
(INTER-) NATIONAL STAKEHOLDERS
INSURANCE
LOCAL BUSINESS
UNIVERSITY
MUSEUM
TRAINING CENTRE
AUTHORITIES
NOT IN FRONT OF MY BEACH
OCEAN INDUSTRIES
TOUR 1
TOUR OPERATOR
TOUR 2
DATA HUB
TOURISM
AQUA-CULTURE
CULTURAL HERITAGE
FISHERIES
MPA
WIND-, WAVE- & TIDAL ENERGY
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Embracing Opportunities – Ocean Multi-Use Action Plan
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