GINGR Discussion Paper No. 1

Maritime Spatial Planning

A Nature- and People-Positive Navigator for Offshore Wind Development

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GINGR
Global Initiative for Nature, Grids and Renewables

An introduction to GINGR

GINGR – the Global Initiative for Nature, Grids and Renewables - aims to support the just and sustainable energy transition by providing assessment tools to quantify contributions to Nature- and People-Positive goals. To facilitate this, we intend to develop monitoring and reporting systems that are globally aligned and standardised.

At GINGR, we are developing a comprehensive framework that allows energy actors to report on progress towards biodiversity gains and co-created community benefits in the deployment of wind, solar and electricity grids. GINGR will support governments, the renewable energy industry, and the financial sector to achieve their energy, climate and biodiversity targets in a timely and socially responsible manner.

Through the efforts of several working groups with active participation from industry, NGOs, and academia, we plan to deliver robust and legitimate guidance and tools that support the final objective of a global standard in monitoring and reporting. Recognising the significant challenges posed by implementation, GINGR will develop a technical assistance hub to provide guidance and support, as well as a repository of best practices and lessons learnt.

The collaborative work on the GINGR Framework will be complemented by a series of GINGR Discussion Papers, initially with a strong focus on offshore wind development. Through a series of Navigator papers, we aim to provide initial ready-made solutions for companies, governments and the financial sector. This also has the potential to help bring more stakeholders together to share experiences and data, and to improve biodiversity monitoring around offshore wind developments.

GINGR is a collaborative initiative of the International Union for Conservation of Nature (IUCN) and the Renewables Grid Initiative (RGI). Find out more on www.gingr.org.

Foreword

The global shift towards renewable energy has placed offshore wind at the forefront of sustainable energy solutions. However, this advancement introduces a new set of challenges, particularly for the marine ecosystems and communities that share these waters. Maritime Spatial Planning (MSP) is essential to navigate these complexities and ensure that offshore wind development is consistent with both environmental protection and social well-being.

At its core, MSP is a collaborative, strategic approach that balances ecological, economic, and social priorities in marine spaces. By coordinating different activities—such as fishing, shipping, conservation, and energy development—MSP helps to protect marine biodiversity, promote community engagement, and reduce conflicts. With MSP, we can ensure that offshore wind development is consistent with broader goals of environmental restoration and social well-being, contributing to a Nature- and People-Positive future for our oceans.

This GINGR MSP Navigator aims to explore the role of MSP in fostering responsible offshore wind development, offering pathways to support biodiversity and communities. We believe, through MSP, we can guide the energy transition towards a sustainable future for our seas.

Together with this GINGR discussion paper, we provide a GINGR Navigator checklist to support the principles of Maritime Spatial Planning for offshore wind development. All GINGR Navigator documents are available at www.gingr.org.

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Abbreviations & Acronyms

CBD	Convention on Biological Diversity
CIA	Cumulative Impact Assessment
EbA	Ecosystem based approach
EEZ	Exclusive Economic Zone
EU	European Union
GINGR	Global Initiative for Nature, Grids and Renewables
GBF	Kunming-Montreal Global Biodiversity Framework
IUCN	International Union for Conservation of Nature
MPA	Marine Protected Area
MSP	Maritime/Marine Spatial Planning
SEA	Strategic Environmental Assessment
SDG	Sustainable Development Goal

Executive Summary

As the world faces both a climate and biodiversity crisis, there is growing urgency to manage our oceans more sustainably. One approach that has emerged as crucial for achieving this is Maritime Spatial Planning (MSP), a process that allocates spatial and temporal distribution of human activities in a way that balances environmental protection, economic development, and social interests.

While offshore wind farms and grid infrastructure play a crucial role in producing renewable energy and reducing dependence on fossil fuels, their development must be carefully managed to avoid adding stress to already vulnerable marine ecosystems. Oceans are already facing significant pressures from overfishing, pollution, and habitat loss. However, Maritime Spatial Planning can help ensure that offshore wind farms are thoughtfully sited to minimize impacts on marine life and balance other uses of the ocean.

At its core, MSP is about thoughtful and collaborative planning. It aims to bring together various stakeholders—from government agencies and environmental groups to local communities and industries—to decide how marine areas should be used. MSP is not a one-size-fits-all approach, as the needs and priorities of marine environments and the people who depend on them vary greatly across different regions.

This report highlights the importance of Nature-Positive and People-Positive approaches. Nature-Positive MSP involves planning projects that not only avoid damaging ecosystems but actively contribute to the restoration of biodiversity. This includes setting aside space for nature to recover and ensuring that offshore wind farms are built in areas that minimise harm to wildlife, such as bird migration routes or fish habitats. On the other hand, People-Positive MSP ensures that local communities are involved in decision-making. Large-scale infrastructure projects like offshore wind farms can have far-reaching social and economic impacts. For example, they can create jobs, but they might also affect traditional industries like fishing. MSP offers an opportunity to involve local communities early in the planning process to ensure they benefit from these projects and that their concerns are addressed early in the planning process.

To support sustainable MSP, access to good quality data is essential. Planners rely on a wide range of information, from environmental studies to social and economic data, to make informed decisions. This data helps them evaluate different options, predict future trends, and monitor the ongoing impacts of MSP decisions.

Finally, to achieve successful MSP, cross-border cooperation is required. Marine ecosystems and human activities do not stop at national borders, so countries need to work together to protect shared seas and coordinate activities like offshore wind farm development.

Lastly, this report comes with an accompanying checklist which aims to guide planners through different steps of MSP to ensure Nature- and People-Positive approaches are being applied. The Global Initiative for Nature, Grids, and Renewables (GINGR), coordinated by the Renewables Grid Initiative and International Union for Conservation of Nature, encourages relevant authorities, marine spatial planners, civil society, and industries to implement it. GINGR recognises that cooperation is crucial. Therefore, all interested stakeholders are invited to give their feedback to this report and join the endeavour of supporting Nature- and People-Positive Maritime Spatial Planning.

Key words: Data sharing, Environment, Grids, Maritime/Marine Spatial Planning, Nature, Offshore Wind

1. Introduction

In 2024, **the Kunming-Montreal Global Biodiversity Framework (GBF)** was adopted to address the global biodiversity crisis. A key target of the framework is to protect and effectively manage at least 30% of terrestrial, inland water, and marine areas by 2030, ensuring the inclusion and rights of indigenous peoples and local communities (Convention on Biological Diversity (CBD), 2022). This commitment, alongside the Sustainable Development Goals (e.g., SDG 14, which focuses on the sustainable use of marine resources), emphasises the urgent need to address severe pressures on marine ecosystems (IOC-UNESCO, 2024). Currently, oceans are suffering from pollution, nutrient overload, acidification, overfishing, and habitat destruction, leading to alarming declines in marine biodiversity (Helsinki Commission - HELCOM, 2023; IOC-UNESCO, 2024; IPBES, 2019; OSPAR, 2023). Over one-third of fish stocks are overexploited, many marine mammal species are threatened, and loss of vital habitats such as seagrass meadows is impairing the ocean's role as a critical carbon sink (IPBES, 2019; Unsworth et al., 2022).

The urgency to protect and restore marine ecosystems is not only a conservation issue but also a climate imperative, as healthy oceans are essential for regulating the planet's climate. However, the challenge is compounded by the rapid expansion of human activities at sea. **The Paris Agreement**, aiming to limit global warming to 1.5–2°C, has accelerated efforts toward decarbonising energy systems (UNFCCC, 2015). This shift has spurred the large-scale deployment of offshore wind farms, which will be crucial for achieving climate targets but also risk placing additional stress on already fragile marine environments. To navigate these intertwined challenges, the offshore wind sector has an opportunity to lead by adopting Nature- and People-Positive approaches that prioritise environmental integrity alongside economic and social benefits (Offshore Coalition for Energy and Nature, 2024).

To ensure sustainable management of expanding human activities at our seas, **Marine or Maritime Spatial Planning (MSP)**[1] has emerged as a vital tool (IOC-UNESCO, 2024; IPBES, 2019; Spijkerboer et al., 2020). MSP involves allocating marine space for human activities through participatory processes with a goal of achieving ecological, social, and economic objectives (UNESCO-IOC/European Commission, 2021). Rather than being a top-down mechanism, MSP is designed as a collaborative approach, balancing the needs of different stakeholders, and proactively shaping the distribution of activities at sea (Partelow et al., 2023; Wächter, 2013). Therefore, MSP can facilitate offshore

[1] 'Marine' and 'Maritime' are being used interchangeably. For this paper, the term 'Maritime' is used.

renewable energy deployment, enhance coastal resilience, and protect critical habitats such as climate refugia (UNESCO-IOC/European Commission, 2021). In the European North Sea, the rapid development of offshore wind has been a key driver for MSP, enabling countries to coordinate infrastructure projects without exacerbating environmental degradation or causing conflicts among sectors (SEANSE project partners, 2020; Spijkerboer et al., 2020).

However, MSP should not merely focus on managing risks—it must become a proactive tool to promote "Nature-Positive" and "People-Positive" planning at sea. **"Nature-Positive"** planning means that projects not only minimise harm but actively contribute to restoration and biodiversity recovery, aligning with global conservation goals. **"People-Positive"** planning ensures that local communities are deeply involved in decision-making, recognising and addressing the impacts of large-scale infrastructure on their livelihoods and delivering long-term benefits. Nature and People-Positive MSP will be essential as offshore wind projects and grids expand, bringing economic opportunities but also significant changes to coastal and marine landscapes.

To support this shift, **the Global Initiative for Nature, Grids, and Renewables (GINGR)** aims to provide guidance for achieving Nature- and People-Positive outcomes in the offshore wind sector. With this report, GINGR offers planners and authorities a suite of tools, best practices, and a comprehensive checklist to ensure that MSP supports offshore wind development while promoting the protection and restoration of marine biodiversity.

2. Legal framework & governance: Maritime Spatial Planning

The initial step for preparing Maritime Spatial Plans is typically to become familiar with the relevant regulatory context. This context varies between countries but regulatory frameworks can be found at global, regional, and national levels. Currently, there is no global regulation solely dedicated to MSP. However, since 1982, the **UN Convention on the Law of the Sea (UNCLOS)** has granted nation-states the right to regulate activities on the sea surface and within the water column up to the limits of their Exclusive Economic Zones (EEZs) through marine spatial plans (Albotoush & Tan Shau-Hwai, 2021; UNESCO-IOC/European Commission, 2021). On the regional level, there are several initiatives aimed at establishing MSP practices among participating member states. For example, in the European Union (EU), the **Maritime Spatial Planning Directive** mandates that all coastal EU Member States must develop MSPs. However, this directive does not specify the concrete objectives these MSPs should aim to achieve or the methods for doing so (European Parliament & Council of the European Union, 2015; UNESCO-IOC/European Commission, 2021). Similarly, the **Nairobi Convention** guides Western Indian Ocean countries in developing MSPs, with a focus on achieving regional harmonisation (UNEP-Nairobi Convention et al., 2021).

The **legal status and strength** of an MSP, however, depend on the specific nation. An MSP may be purely advisory, serving as a guiding document, or it can be legally binding and enforceable (UNESCO-IOC/European Commission, 2021). For instance, Belgium has a legally binding MSP, while Finland's plan is non-binding. Argentina's MSP serves only as a guidance document, whereas Mexico and Angola have legally binding MSPs. In addition to national MSPs, there is a growing call for the development of regional or transboundary MSPs, especially in the Baltic Sea, North Sea, and Western Indian Ocean regions (IOC-UNESCO, 2024).

Currently, more than 120 countries or territories have initiated their MSP processes, and at least 45 have approved national, subnational, or local MSPs (IOC-UNESCO, 2024). Nevertheless, there is no one-size-fits-all approach for successful MSP implementation. The structure and form of an MSP should reflect the unique needs and priorities of each nation. The legal strength and objectives should align with the specific context and resources of the nation-state. Nevertheless, some general recommendations have emerged regarding MSP legal frameworks and governance structures.

1. **Legally Binding or Advisory:** Depending on national priorities and context, MSPs should be either advisory or legally binding based on the principle of proportionality, which states that policy interventions should not exceed what is necessary to achieve their objectives. The choice of instruments should be informed by past policy experiences (UNESCO-IOC/European Commission, 2021).
2. **Establishing Clear Authority and Legislation:** Before the planning process begins, it is advisable to establish a dedicated authority to oversee MSP implementation, along with clear MSP legislation. This authority could be a multi-sectoral entity comprising representatives from various sectors (Albotoush & Tan Shau-Hwai, 2021).
3. **Coordination among Governance Bodies:** The relationship between the MSP authority and other relevant governance bodies should be well-defined to ensure effective collaboration and avoid overlaps (Albotoush & Tan Shau-Hwai, 2021; UNESCO-IOC/European Commission, 2021).

After preparing a clear regulatory framework and establishing a dedicated authority, the process of planning can commence. The next few chapters explain which approaches and tools can be employed in order to facilitate Nature- and People-Positive MSP.

3. Background summary: Offshore Wind Energy Deployment

Maritime Spatial Planning is a crucial process during which, among others, sites for both offshore wind farms and nature protection are chosen. For instance, the ambitious targets for offshore wind in the European Union have pushed EU Member States to develop their Maritime Spatial Plans in order to prevent conflicts with other human activities and ensure necessary infrastructure is developed with the least environmental impact. This chapter offers a brief overview of offshore wind energy, including the historical development of this energy and the status of its deployment on a global scale. A historic overview of the most important developments is given in Table 1.

Table 1: Brief overview of some important historical developments in wind energy. Clicking on each section leads to a website describing the development in more details.

1850s	• First commercial onshore wind **turbine** (USA) • 3.7 KW and 6.6 metres rotor diameter
1980	• First **onshore** wind **farm** in the world (USA) • 20 wind turbines at 30 kilowatts (kW) each
1991	• First **offshore** wind park (Vindeby in Denmark) • 11 turbines of 450 kW, rotor diameter 35 meters, providing power for 2,200 households
2000	• First **large-scale** offshore wind farm (Middelgrunden in Denmark) • 20 turbines of 2 MW, rotor diameter 76 meters, 50% ownership by 8,500 shareholders in cooperative
2009	• First full-scale **floating turbine** (Hywind in Norway) • 2.3 MW, rotor diameter 82.4 meters
2010	• Ten European North Seas countries agree to work together to develop an **offshore electricity grid** • First commercial offshore wind farm in China (102 MW, rotor diameter 90 meters, powering 200,000 households)
2016	• July: Dutch tender brings offshore wind **on a par with conventional power** generation (€72.7/MWh) • First offshore wind farm in the USA (125 MW, 30 turbines, rotor diameter 150 meters)
2017	• The world's first floating wind farm is commissioned (5 turbines of 6 MW, rotor diameter 154 meters, in Scotland) • German offshore tender results in the **world's first subsidy-free** offshore wind farm (to be developed by 2025)
2020	• Hornsea One is now the **largest** offshore wind farm in the world with 1,218 MW • The Dogger Bank wind farm raises €9.4bn and becomes the largest project ever financed
2021	• The largest offshore wind turbine of 16 MW is produced (rotor diameter 252 meters, in China) • The world record gets broken the same year with a **18 MW turbine** (rotor diameter 260 meters, in China)
2024	• 44% of the world's offshore wind capacity is installed in Chinese waters • The largest wind turbines in the world reach a rotor diameter of over 300 meters (concept stage)

The International Energy Agency forecasts the need for 494 GW of offshore wind by 2030 and 2,465 GW by 2050 to meet the 1.5°C goal. To put this in context, the Global Wind Energy Council indicates that by the end of 2022, 64 GW of offshore wind capacity had been installed worldwide, almost entirely in China and northern Europe. This means that the offshore wind energy sector needs to expand its current energy capacity by 32 times over the next 28 years (Global Wind Energy Council (GWEC), 2024).

To contribute to reaching the 1.5°C goal, countries around the globe have set ambitious offshore wind targets. Some of these targets are summarised in Table 2 (Allianz Commercial, 2023). Having clear targets before the start of the Maritime Spatial Planning process can give clarity on the amount of space that should be dedicated to offshore wind and grid infrastructure.

Table 2: Overview of selected national offshore wind energy targets around the world (Source: Allianz Commercial, 2023).

Country	**Target**
Canada, Province of Nova Scotia	5 GW by 2030
United States of America	30 GW by 2030
United Kingdom	50 GW by 2030
Norway	30 GW by 2040
European Union	110 GW by 2030
India	37 GW by 2030
China	200 GW by 2030
South Korea	12 GW by 2030
Japan	10 GW by 2030
Taiwan	5,7 GW by 2025
Australia, State of Victoria	9 GW by 2040

Currently, two technologies exist to build these offshore wind gigawatts: bottom-fixed and floating. Offshore wind farms are traditionally bottom-fixed, built in shallow waters at a depth of around 50 meters. In deeper waters and further from the shore, where winds are more constant, they can be replaced by floating structures, anchored to the deep-sea floor. This new technology is not yet as mature as bottom-fixed turbines, and is therefore more costly. Furthermore, the associated environmental impacts of floating offshore wind farms are being monitored in the existing few pilot projects but are still not fully understood. Nevertheless, floating technology is forecasted to play a big role in the future of offshore wind deployment, particularly those further from the shore and in deeper waters.

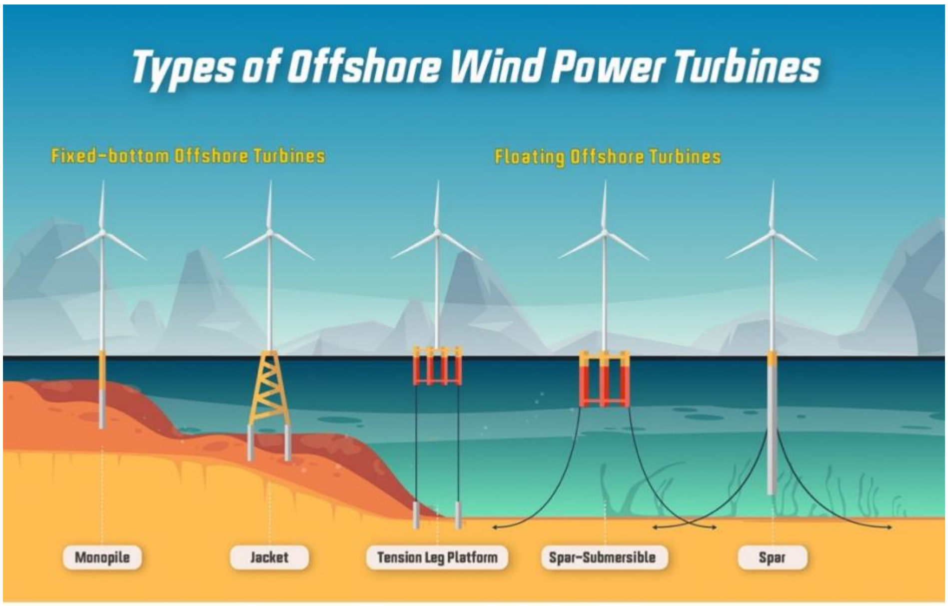

Figure 1: Types of offshore wind power turbines (Source: Energy Watch)

Offshore wind energy generation is highly dependent on robust and resilient electricity grids, which serve as a backbone to transmit the electricity produced offshore to onshore demand centres. Once energy is generated by an offshore wind farm, it is transferred through offshore grid infrastructure, which includes subsea cables (both inter-array and export cables), offshore and onshore substations, and finally to the onshore grid. From there, the energy is delivered to customers, as shown in Figure 2. Additionally, grid capacity plays an essential role because the electricity generated needs to be transported to load areas, sometimes over hundreds of kilometres. Therefore, as offshore wind capacity expands, the development and upgrading of grid infrastructure is essential to accommodate higher volumes of renewable energy and maintain the overall stability of the energy system.

Given the scale of upcoming offshore wind and grid deployment, it is of the utmost importance to utilise tools and methods which ensure that this infrastructure is built with the smallest environmental impact possible and with local stakeholders on board. The energy transition at sea can only be successful if it simultaneously addresses the ongoing biodiversity crisis, which not only takes its toll on marine life, but puts livelihoods at risk worldwide.

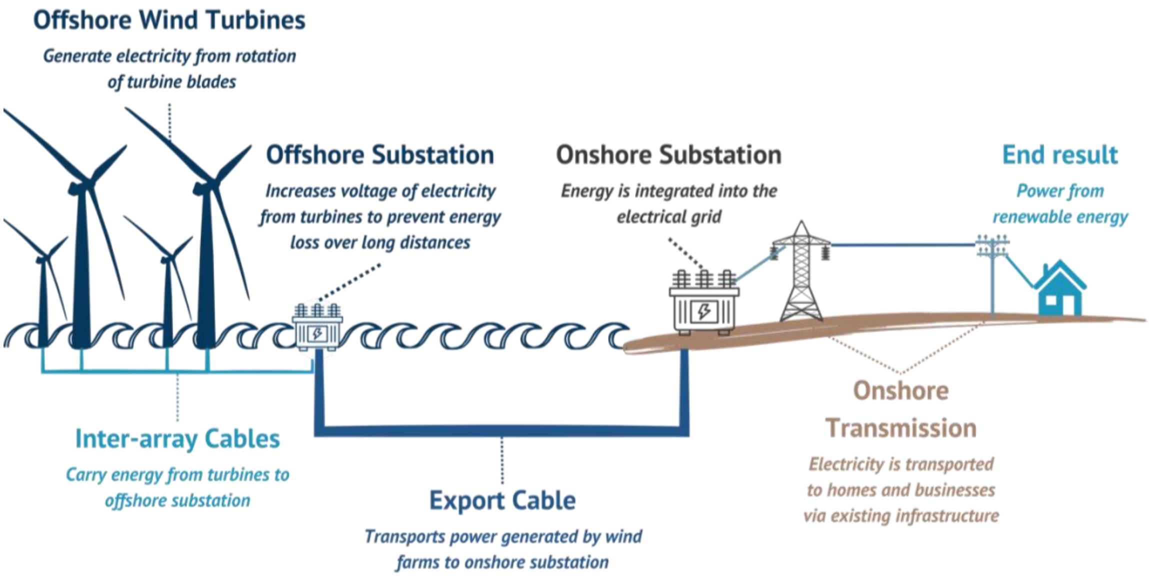

Figure 2: Offshore Wind Transmission (Source: Sea Grant Offshore Wind Energy)

4. Data: prerequisite for a successful MSP

To ensure a comprehensive, up-to-date, and effective Marine Spatial Planning (MSP) process, robust and high-quality data is essential. MSP is inherently complex and data-intensive, with its success heavily relying on the type, quality, and usability of the available data. Such data underpins spatial analysis tools, supports scenario development for various management alternatives, and enables informed decision-making (Abramic et al., 2018; Flynn et al., 2023; Stamoulis & Delevaux, 2015).

There are several primary sources of data relevant to MSP: scientific literature, expert scientific opinions, government sources, local knowledge, and direct field measurements (Stamoulis & Delevaux, 2015). Typically, nation-states are responsible for data collection and management. However, these national databases usually focus on data within their respective Exclusive Economic Zones (EEZ), which may not provide a comprehensive view of broader marine ecosystems. Thus, fostering cross-border data management is crucial to filling this gap (Abramic et al., 2018).

Given that MSP aims to balance environmental, social, and economic objectives, a wide array of geophysical, environmental, and socio-economic data is required (Flynn et al., 2023; Stamoulis & Delevaux, 2015). One of the initial challenges lies in defining the scope, scale, and boundaries of the plan. National boundaries, whether on land or offshore, do not always align with the ecological realities of marine ecosystems (e.g., migratory routes for marine mammals) or human activities (e.g., international shipping lanes). To ensure that MSPs support both ecological and social goals, they should be aligned with natural marine ecosystem boundaries to maintain habitat connectivity, while also considering social and administrative contexts (Abramic et al., 2018; Stamoulis & Delevaux, 2015).

Once the relevant data is collected, it is analysed with tools like ecological modelling and cumulative impact assessments and used to define current conditions and project future scenarios based on various management alternatives. Importantly, MSP is not a one-time, linear process—it involves continuous feedback loops and iterative rounds of data collection, analysis, and refinement (Abramic et al., 2018; Stamoulis & Delevaux, 2015).

While data collection and analysis for MSP can be complex and demanding, they are crucial for supporting a Nature- and People-Positive energy transition at sea. There are several strategies to streamline this process:

- **Ensuring data availability and accessibility** - Once collected, data should be made available and accessible through frameworks like Spatial Data Infrastructures (SDI), which facilitate spatial data exchange. Examples include the NOAA Coastal Services Center's Digital Coast and the Multipurpose Marine Cadastre in the United States (Stamoulis & Delevaux, 2015). However, data availability varies across countries due to differences in data management and infrastructure (Leadbetter et al., 2023). To address this, data can be shared through international repositories and initiatives such as the European Marine Observation and Data Network (EMODnet) or regional sea conventions like OSPAR and HELCOM (Abramic et al., 2018).
- **Harmonising and reusing data** - It is not enough for data to be accessible—it must also be harmonised to ensure usability and reusability. Data harmonisation is vital for successful transboundary cooperation, as it saves time, supports scientific inquiry, encourages innovation, and reduces the cost of duplicating data collection efforts (Abramic et al., 2018; Flynn et al., 2023). The FAIR Data Principles (Findability, Accessibility, Interoperability, and Reusability) provide widely accepted guidelines for achieving this. Additionally, creating metadata for maritime spatial plans helps ensure data is adequately described, further supporting reusability (Flynn et al., 2023; Leadbetter et al., 2023).
- **Engaging Stakeholders** - Given that some necessary data may not be readily available in scientific literature, involving relevant stakeholders in the planning process is critical. Stakeholders can help define the boundaries and scale of the MSP, contribute additional environmental and social information, and prioritise data needs, thereby accelerating data collection and analysis (Flynn et al., 2023).
- **Monitoring and Evaluating MSP Impacts** - Once the MSP is implemented, its impacts should be continuously monitored and evaluated to allow for necessary adjustments. This requires the establishment of long-term monitoring systems for both environmental and social data.

By following these strategies, the challenges associated with data collection and management in MSP can be effectively addressed, ensuring that plans are not only scientifically sound but also aligned with broader environmental and social objectives.

Good practice:

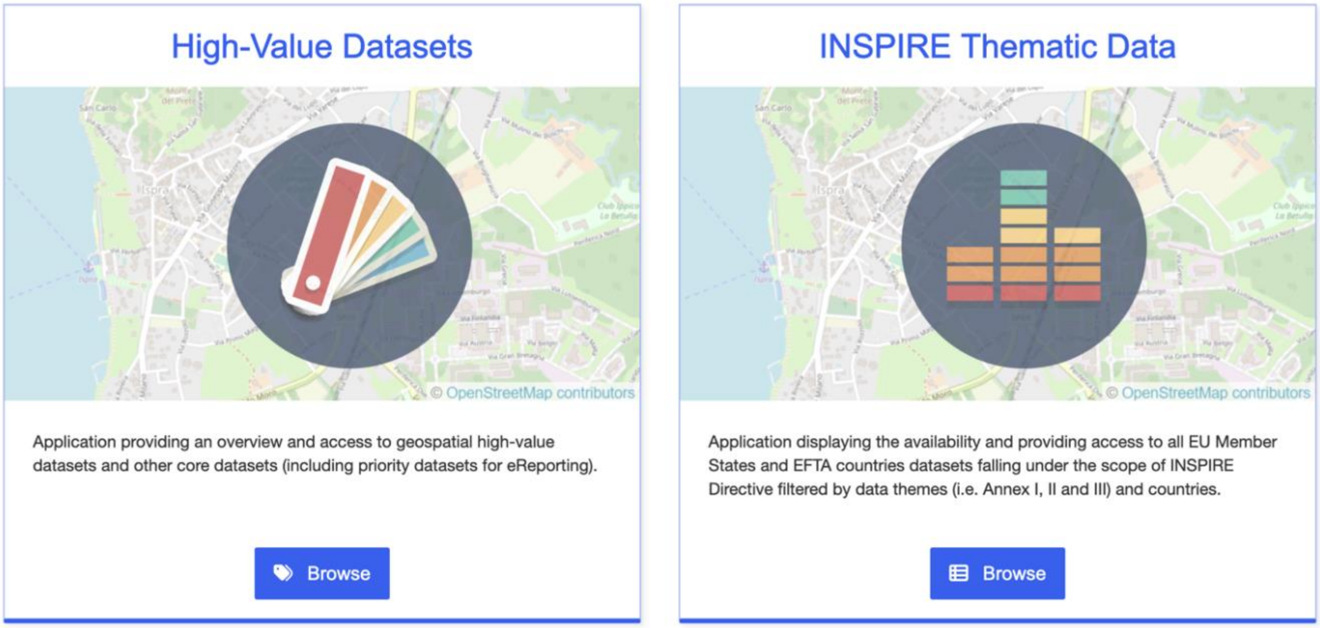

Figure 3: Screenshot of INSPIRE website interface.

INSPIRE (Infrastructure for Spatial Information in Europe) is a Directive adopted in the EU in 2007, which aims to support the implementation of MSP and environmental policies in the EU by improving access, re-use, harmonisation and sharing of spatial data. Due to INSPIRE, EU Member states are required to build a European decentralised system for sharing harmonised spatial data and information (Abramic et al., 2018).

5. Nature-Positive MSP

The development of Nature-Positive offshore wind and grid infrastructure begins during Maritime Spatial Planning (Offshore Coalition for Energy and Nature, 2024). Furthermore, MSP should go beyond risk management and must become a proactive tool promoting Nature-Positive planning at sea. Nature-Positive planning means that its goal is not only minimising harm, but actively contributing to restoration and biodiversity recovery, aligning with global conservation goals.

Therefore, underlying and guiding MSP should be the **ecosystem-based approach** (EbA), or a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way (Convention on Biological Diversity (CBD), 2002). An ecosystem-based approach (EbA) for MSP involves allocating sufficient space for nature conservation and restoration so that biodiversity can regenerate and maintain its ability to provide ecosystem services on which we depend. Furthermore, EbA in MSP also entails planning and management of human activities in a way that ensures sustainable use of available natural resources, includes relevant stakeholders, and provides benefits to communities (European Commission: European Climate, Infrastructure and Environment Executive Agency., 2021; Spijkerboer et al., 2020; UNESCO-IOC/European Commission, 2021). An ecosystem-based approach should be integrated into every stage of the Marine Spatial Planning (MSP) process, including the initial plan development, gathering and analysing data, implementing the plan, and evaluating its performance (European Commission: European Climate, Infrastructure and Environment Executive Agency., 2021).

To ensure this, there are plenty of available tools available for planners, such as Strategic Environmental Assessments, Cumulative Impact Assessments, transboundary cooperation, and dedicating enough space for nature to rehabilitate. These tools are elaborated in more details further in this chapter.

5.1 Strategic Environmental Assessment

Even though MSP should already have environmental concerns integrated within, to ensure no significant impacts are caused by future activities, a Strategic Environmental Assessment of the MSP should be done in parallel. **Strategic Environmental Assessment** (SEA) is a procedure used to assess the environmental impact of a program, plan, or policy. During SEA, an environmental report is produced based on desktop research within which different plan alternatives are assessed. Furthermore, during SEA, a monitoring program is developed which allows monitoring and evaluation of MSP progress post-implementation (Stelzenmüller et al., 2021). SEAs are conducted by public authorities and generally have a broad geographical coverage and long-term focus. SEAs integrate economic and social factors in decision-making, help address environmental challenges and provide alternatives for mitigating environmental issues to support sustainable development (Nautiyal & Goel, 2021). To assess the MSP's impact on the environment, it is therefore essential to conduct an SEA.

There is no one correct way to do a SEA. SEAs can be adjusted according to each MSP's needs. However, each SEA should include stakeholder engagement processes. Furthermore, as part of SEA, it is essential to conduct a Cumulative Impact Assessment (CIA). **Cumulative impacts** are the total impacts resulting from the successive, incremental, and/or combined effects of a project when added to other existing, planned and/or reasonably anticipated future projects, as well as background pressures (International Finance Corporation, 2012). Assessments of cumulative impacts must consider all types of possible interactions - not only between human activities and the environment but also between activities themselves, e.g. between offshore wind energy infrastructure, fishing activities, oil and gas infrastructure, proximity of shipping lanes, or interaction with tourism activities. Furthermore, assessments should take explicit account of the volume and intensity of projected activities over the period of the plan. This must also be based on an evidence-informed evaluation of alternative scenarios, which set out future pathways with varying volumes, intensities, and spatial distributions of activities.

Globally, efforts are underway to develop **tools assessing cumulative impacts** at local, regional, or sea basin scales (see Table 3). However, it remains an extremely complex task, with each available tool having its own strengths and weaknesses. To ensure effectiveness, countries and relevant stakeholders should share successful practices, such as in regional fora or dedicated MSP working groups, to learn from each other and ultimately develop broadly applicable tools.

Table 3: Overview of available CIA tools with their geographical scope

Name	Geographical scope
EcoImpactMapper	Various areas including the eastern North Sea, the Baltic Sea, the Mediterranean, and Black Sea.
Tools4MSP	Tested for Adriatic-Ionian sub-basin but can be deployed to any research area around the globe.
Symphony	Developed for Sweden but can be transferred to other countries.
Mytilus	Applied on Baltic Sea level but it can be applied in any geographic sea area.
SEANERGY	Baltic Sea
Baltic Sea Impact Index (BSII)	Baltic Sea
PlanWise4Blue	National level (Estonia)
MSP Challenge Simulation Platform	North Sea, Baltic Sea and Firth of Clyde
CUMULEO	Northeast Atlantic
Interim Population Consequence Of Disturbance (iPCOD)	The UK
Disturbance Effects Of Noise On The Harbor Porpoise Population In The North Sea (DEPONS)	North Sea
HARMONY Project – North Sea Impact Index (NSII)	Denmark, Germany, Norway, and Sweden
DESEASION	Northeast Atlantic
Options For Delivering Ecosystem-Based Marine Management (ODEMM) Project	tested in all European marine regions

5.2 Cross-border and transboundary cooperation

As previously mentioned, both marine ecosystems and human activities do not necessarily stop at national marine borders. To promote Nature-Positive Marine Spatial Planning, it is crucial to establish cross-border and transboundary cooperation. Cross-border MSP refers to collaboration between two nations sharing a political border relevant to maritime spatial planning, while transboundary cooperation involves multiple entities with a shared interest in marine planning for a particular sea basin. The forms of cooperation may vary, but they are essential for creating synergies and fostering a comprehensive approach (Albotoush & Tan Shau-Hwai, 2021; UNESCO-IOC/European Commission, 2021).

However, transboundary cooperation between different institutions, both at national and international levels, is not without challenges. Some of the most evident obstacles include competing economic interests, mismatched MSP timelines, language barriers, unclear responsibilities between agencies, and variations in the types of stakeholders that need to be involved (Albotoush & Tan Shau-Hwai, 2021). A key recommendation arising from this is the need for synchronising MSP processes at the regional level. To achieve this, existing regional organizations such as HELCOM and OSPAR within the EU could be leveraged (Albotoush & Tan Shau-Hwai, 2021).

5.3 Dedicating space for nature recovery

An ecosystem-based approach within Marine Spatial Planning should ensure a balance between human activities and the environment. Interestingly, although MSP has its roots in nature conservation, today it often prioritises economic objectives over environmental ones. Given the current health of our oceans, a proactive approach to nature restoration is necessary. For MSP, this means allocating space for both active and passive restoration measures (Manea et al., 2023). Currently, nature restoration efforts are limited in both scope and scale. While these efforts are valuable, current environmental challenges call for large-scale restoration initiatives and enhanced connectivity between small- and large-scale actions. Without this connectivity, the success of restoration efforts may be limited (Manea et al., 2023). MSP, due to its wide-reaching scale, is well-positioned to address connectivity needs.

Nature restoration planning could be streamlined if a strong regulatory framework is in place. For example, the European Union passed its Nature Restoration Law in 2024, which requires Member States to develop Restoration Plans aimed at restoring 20% of land and marine areas by 2030 (BirdLife International - Europe and Central Asia et al., 2024). However, the goals of nature restoration and economic growth can often be at odds with each other. MSP can serve as a tool to prioritise which activities should expand and which should be reduced or transformed into more sustainable practices (BirdLife International - Europe and Central Asia et al., 2024; Trouillet, 2020).

Additionally, to protect biodiversity from the impacts of climate change, it is crucial to develop climate-smart MSPs. Concepts such as designating climate refugia—areas where climate change is not expected to severely impact species or habitats—can be instrumental in achieving this (UNESCO-IOC/European Commission, 2021).

5.4 Siting offshore wind and grid with nature in mind

During MSP, optimal locations for offshore wind farms are identified, ensuring maximum electricity generation while minimising conflicts with other sectors and protecting the environment. Currently, siting process within MSP typically considers basic criteria such as grid connection options, wind speed, seabed conditions, and proximity to the coast. Additionally, it takes into account the distance from corridors and areas reserved for other sectoral activities, though specific distances and methodologies vary between countries. For example, ensuring safe and undisturbed shipping routes often involves establishing safety buffers around shipping lanes, corridors, and designated zones (SEANSE project partners, 2020). Through careful spatial planning, MSP helps harmonise the interests of multiple stakeholders, paving the way for sustainable offshore wind development.

Equal attention should be given to nature protection when siting offshore wind and grid infrastructure. Siting is the most powerful tool governments and offshore wind and grid developers can and are using to avoid negative environmental impacts such as bird collisions, displacement and injury of fish and marine mammals, benthic habitat disturbance, and habitat loss. To ensure future offshore wind and grid infrastructure is planned with nature in mind, governments and planners are encouraged to avoid Nature 2000 sites, Marine Protected Areas, and areas designated under national protection schemes for nature and biodiversity conservation. Similarly, valuable habitats used by sensitive species such as spawning and nursery habitats for fish, breeding colonies of seabirds, and marine mammal migratory routes should also be avoided (Offshore Coalition for Energy and Nature, 2024).

6. People-Positive MSP

As stated by the International Renewables Energy Agency, the energy transition depends on a transformation of the global energy sector from fossil-based to zero-carbon sources by the second half of this century (International Renewable Energy Agency, n.d.). However, this large-scale technical endeavour will have far-reaching economic and societal impacts. Therefore, considerable attention and resources should be addressed to the economic and social implications of the energy transition in addition to the technical and environmental challenges. Building social acceptance of the transition means bringing citizens and communities on board, and ensuring equitable distribution of socio-economic benefits, thereby building a renewables-based system that improves people's lives. People-Positive planning ensures that local communities are deeply involved in decision-making, recognising and addressing the impacts of large-scale infrastructure on their livelihoods and delivering long-term benefits.

During Maritime Spatial Planning, there are a few concepts and tools that can ensure a social perspective is incorporated early on. Some of the most important tools are described below.

6.1 Stakeholder engagement

Maritime Spatial Planning (MSP) is inherently a social process. Firstly, it organizes human activities in ways that minimises environmental impacts, finds synergies, and resolves conflicts between different uses. Secondly, MSP involves a wide array of stakeholders, as the decisions made can have far-reaching consequences, particularly for coastal communities. These communities may face conflicts not only with established traditional activities but also with newer uses, such as offshore wind energy (UNESCO-IOC/European Commission, 2021). Therefore, decision-making within MSP should be participatory, involving diverse representatives from relevant stakeholders, local communities, and authorities (Ryan et al., 2019).

To enhance MSP acceptance, reduce conflicts, and generate benefits for stakeholders and communities, it is crucial to engage stakeholders from the outset. Research has shown that early and participatory stakeholder engagement is key to successful outcomes (Gopnik et al., 2012; Ryan et al., 2019; Zaucha & Gee, 2019; Zaucha & Kreiner, 2021). Moreover, MSP should not be framed as a top-down process where government policies are imposed. Instead, it should be seen as an iterative process that mediates various forms of knowledge and experiences. This allows for a deeper understanding of the context and reasoning behind decisions, leading to more effective solutions for managing human activities at sea and achieving nature restoration (Lukambagire et al., 2024; Ritchie & Ellis, 2010).

Stakeholder engagement obligations vary by country. For example, the EU MSP Directive mandates early stakeholder involvement and access to finalised plans. In contrast, the Namibian MSP process has no legal requirement for stakeholder engagement. Even where engagement is mandatory, its type, timing, and format differ between countries. For instance, MSP in Latvia is decentralised and interactive, while in Lithuania, stakeholder engagement is limited to informing the public of decisions already made (Zaucha & Kreiner, 2021). This highlights that no single approach to stakeholder engagement works universally; it must be tailored to local and national planning cultures and objectives (Zaucha & Kreiner, 2021).

One of the first steps in MSP should be to prepare a stakeholder engagement strategy that specifies:

- Which stakeholders should be included;
- When they should be invited;
- What specific input is needed from each group;
- What format of engagement is most appropriate (Zaucha & Kreiner, 2021).

Planning cultures with a long history of stakeholder participation show that traditional, conservative methods often fall short. They fail to foster common ground, satisfy stakeholders, or ensure genuine participation, and often exclude a diverse range of voices (Gopnik et al., 2012). In contrast, more interactive, innovative, and creative approaches tend to yield better results. These methods can include visual tools like maps and simulations or targeted workshops (Gopnik et al., 2012; UNESCO-IOC/European Commission, 2021). It is important to match engagement formats to the type of knowledge stakeholders can provide, allowing planners to use their time and resources efficiently (Lukambagire et al., 2024).

While continuous, transparent stakeholder engagement is essential throughout the MSP process—particularly to foster a sense of ownership—not all stakeholders need to be involved at every stage (Lukambagire et al., 2024; Spijkerboer et al., 2020; UNESCO-IOC/European Commission, 2021). Figure 4 summarises key concerns different stakeholders at various levels may raise during MSP. Local stakeholders, such as coastal communities, indigenous groups, conservation organisations, businesses, fishery communities, NGOs, and local policymakers, should be involved during planning, implementation, and evaluation. Their concerns should shape objectives, and they should be engaged from the early stages to discuss their connection to the oceans and perspectives on future developments. This can be facilitated through interactive activities, such as mapping exercises (Lukambagire et al., 2024; UNESCO-

IOC/European Commission, 2021). At regional and national levels, stakeholders help ensure that local objectives align with broader legislative and strategic goals. This includes representatives from national governments, regional authorities, NGOs, academics, private sectors, and industries (Lukambagire et al., 2024).

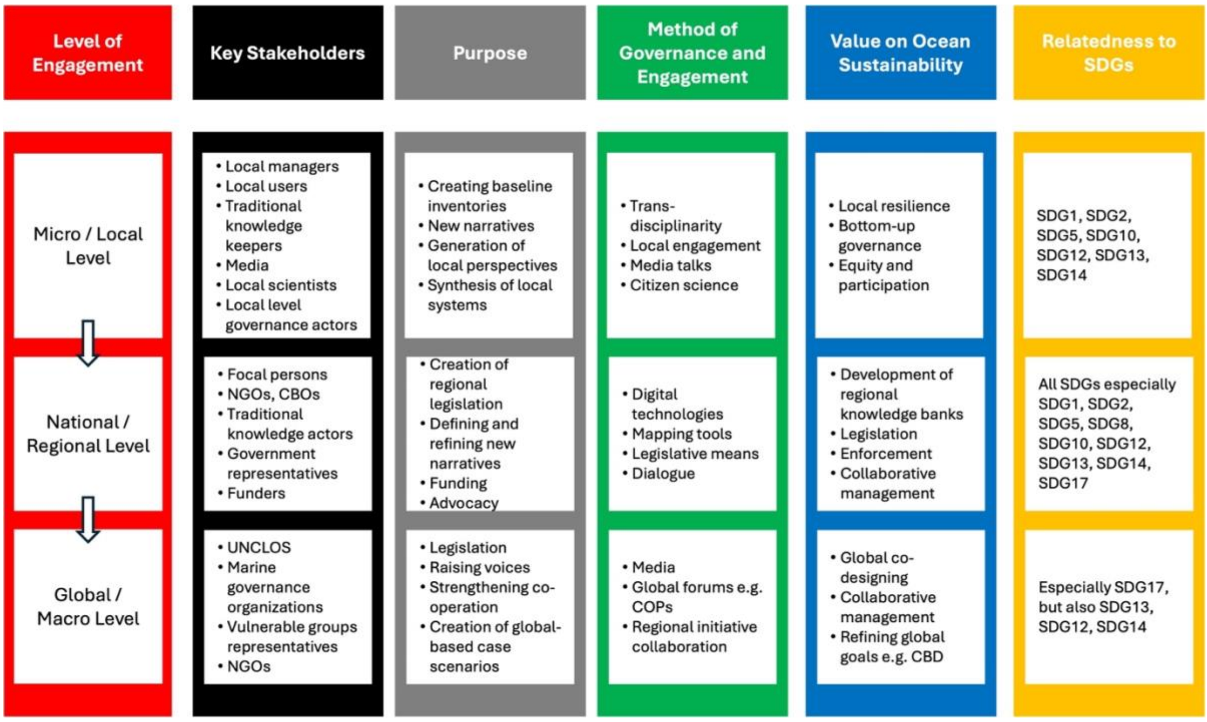

Figure 4: Summary of game-changing elements/aspects that can guide stakeholder engagement in MSP and enhance sustainability narratives (Source: Lukambagire et al. 2024)

Integrating both **top-down and bottom-up mechanisms** is essential to ensure dialogue and knowledge exchange. To be motivated and enabled to participate, stakeholders must be aware of what MSP is, how it works and what outcome it seeks to achieve. The objectives, expected outcomes, and purpose of participation must be clear. Sufficient time and resources should be invested into planning stakeholder engagement activities, which helps establish trust and build support for the decision-making process by addressing values, needs, conflicts, and opportunities. Interactive platforms should include a mechanism to give feedback to the stakeholders on how their inputs are being used. Effective stakeholder engagement avoids subsequent delays to MSP implementation.

6.2 Multisectoral approaches

MSP presents a valuable opportunity to comprehensively and transparently manage our seas by bringing together key representatives from various economic sectors. This integrated approach is proving to be far more efficient than the traditional patchwork method, which focuses on one activity at a time. This is especially important now, as long-established human activities are intersecting with newer ones, such as offshore wind and aquaculture (Gopnik et al., 2012; Spijkerboer et al., 2020; UNESCO-IOC/European Commission, 2021).

Traditional users, such as fisheries, shipping, and tourism, may feel uneasy about changing regulations, new requirements, and the risk of losing areas historically reserved for their activities. Meanwhile, newcomers such as the offshore wind sector may feel it's unfair if they are not given equal consideration when space is allocated (Gopnik et al., 2012). While MSP cannot replace sector-specific management, it offers an integrated, multi-sectoral approach that fosters coherence and balance between different industries (Spijkerboer et al., 2020; UNESCO-IOC/European Commission, 2021).

One potential solution for space conflicts, especially between offshore wind and other sectors like aquaculture and fisheries, is the concept of multi-use. Multi-use refers to the shared use of resources in close geographic proximity by either a single user or multiple users (Schupp et al., 2021). For example, integrating seaweed aquaculture within offshore wind farms can offer not only economic benefits but also positive environmental impacts, such as bioremediation and creating sheltered areas for marine life (Van Den Burg et al., 2023). To promote and clarify multi-use, it is essential to include explicit references to it in regulatory frameworks—a task MSP can help facilitate. During the planning process, representatives from relevant sectors can participate in multi-use opportunity mapping, identifying areas where different activities, like fisheries and offshore wind, can coexist (Schupp et al., 2021).

6.3 Planning offshore wind and grid with people in mind

A just energy transition—ensuring no one is left behind—is essential for gaining public support for renewable energy deployment, including offshore wind (IRENA Coalition for Action, 2023). While global approaches to this transition may differ, the core principles remain: people-centred, active engagement, and equitable access to decision-making and benefits (UNDP Sustainable Energy Hub, n.d.). Onshore renewable energy projects have faced public opposition due to concerns about health, environmental, and economic impacts (JustWind4All, 2024). Offshore wind is often seen as less contentious, but public acceptance remains critical for both on- and offshore projects. While "Not In My Backyard" (NIMBY) is frequently cited as a reason for opposition, the concept frames local communities in a pejorative way, and doesn't necessarily reflect the real reasons for opposition. Therefore, it is crucial to consider social acceptance alongside various forms of energy justice (recognitional, distributional, procedural, and restorative) to address inequalities in access, impacts, and cost-benefit distribution (Pinto et al., 2021). Figure 5 provides an overview of different types of energy justice.

Figure 5: What is energy justice? (Source: JustWind4All project)

Considering these justice principles in offshore wind development encourages more inclusive public engagement and acceptance. Developers should focus on four key aspects to enhance social acceptability:

1. **Address social impacts:** Mitigate disruptions and preserve the local environment's integrity.
2. **Respect local context:** Understand the unique social and historical background of each community.
3. **Communicate local benefits:** Clearly convey the tangible benefits and address concerns about environmental impacts.
4. **Build trust through engagement:** Foster continuous, transparent communication and involve the community in decision-making.

Socioeconomic impact assessments should be integrated with environmental impact studies to build a strong foundation for community engagement. This should include follow-up monitoring to ensure long-term social acceptance.

Furthermore, offshore wind projects can bring significant benefits to coastal communities, such as income, investment, and employment opportunities. These benefits can extend beyond direct jobs in technical roles to sectors like tourism and hospitality. Broader benefits may include infrastructure improvements, skill development, and community funds for local projects and education. However, these benefits are not guaranteed. They depend on factors like the project's stage, scale, location, and the socio-economic context of the community. Developers must commit to long-term, open dialogue with local communities to ensure these opportunities are realised, rather than offering short-term incentives to gain support. Even offshore projects have onshore impacts, such as sub-station connections and port developments, which can catalyse economic activity (Glasson et al., 2022). Developers should ensure that local economies benefit from the construction and supply chain activities associated with these projects.

7. Conclusion

Given the immense pressures on our oceans, it is crucial to rethink how we plan human activities at sea. The urgency to adopt Nature- and People-Positive approaches in Maritime Spatial Planning (MSP) has only intensified with the global push for offshore wind energy development.

Offshore wind farms and their associated infrastructure demand vast amounts of space, which, if not carefully planned, can exacerbate damage to already fragile ecosystems. National MSPs should prioritise an ecosystem-based approach and be complemented by government-led Strategic Environmental Assessments (SEAs). These SEAs must include thorough and comprehensive Cumulative Impact Assessments (CIAs). While current CIA tools have limitations, this should not deter planners from utilising them. Moreover, the boundaries of marine ecosystems rarely align with national borders, making cross-border and transboundary cooperation essential to maintaining habitat connectivity. A key tool to minimise the negative environmental impacts of offshore wind development is careful site selection. Additionally, to achieve Nature-Positive MSP, substantial space must be dedicated to active and passive nature restoration efforts. These restoration projects should be carried out on a significant scale, supported by clear regulatory frameworks at both international and national levels.

Equally important is the concept of People-Positive MSP, which ensures a just energy transition at sea. While stakeholder engagement is often a minimal, obligatory step, it must go beyond mere information sharing. MSP should be an inclusive, participatory, and iterative process, bringing together diverse stakeholders across governance levels to shape a shared future. This requires a multi-sectoral approach and an exploration of opportunities for multi-use spaces, particularly in light of the growing conflicts between competing human activities and nature conservation. By identifying specific areas for multi-use in MSP, industries and stakeholders will have clearer guidance on how to collaborate. People-Positive MSP for offshore wind energy also integrates the principles of energy justice. This means preserving local environmental and social integrity, addressing concerns transparently, and ensuring community involvement in decision-making processes.

The tools for creating Nature- and People-Positive MSP are deeply interconnected and should not be treated as separate initiatives. GINGR encourages planners and relevant authorities to implement these tools holistically, with the support of provided resources like checklists, such as the one at the beginning of this report. Recognising the importance of collaboration, GINGR also invites all stakeholders to provide feedback and join the initiative for a more sustainable future at sea.

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About GINGR:
GINGR – the Global Initiative for Nature, Grids and Renewables aims to support the just and sustainable energy transition by providing assessment tools to quantify contributions to Nature- and People-Positive goals. To facilitate this, GINGR will develop monitoring and reporting systems that are globally aligned and standardised. GINGR is a collaborative initiative of the International Union for Conservation of Nature (IUCN) and the Renewables Grid Initiative (RGI).
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