# BIOcean5D

MARINE BIODIVERSITY ASSESSMENT AND PREDICTION ACROSS SPATIAL, TEMPORAL AND HUMAN SCALES

# D7.2 Policy briefs detailing recommendations for ocean governance process

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# List of Acronyms

| | |
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| **ABMT** | Area Based Management Tool |
| **BBNJ** | Biodiversity Beyond National Jurisdiction |
| **COP** | Conference of the Parties |
| **EBSA** | Ecologically or Biologically Significant Area |
| **EEZ** | Exclusive Economic Zone |
| **GBF** | Global Biodiversity Framework |
| **GCA** | Global Climate Action |
| **GHG** | Greenhouse gas |
| **IPCC** | Intergovernmental Panel on Climate Change |
| **IPOS** | International Panel for Ocean Sustainability |
| **IUCN** | International Union for Conservation of Nature |
| **MPA** | Marine Protected Area |
| **NDC** | Nationally Determined Contribution |
| **OPEC** | Organisation of the Petroleum Exporting Countries |
| **SBSTA** | Subsidiary Body for Scientific and Technical Advice |
| **SDG** | Sustainable Development Goal |
| **SIDS** | Small Island Developing States |
| **SROCC** | Special Report on the Ocean and Cryosphere in a Changing Climate |
| **STB** | Scientific and Technical Body |
| **UNCBD** | United Nations Convention on Biological Diversity |
| **UNFCCC** | United Nations Framework Convention on Climate Change |
| **UNOC** | United Nations Ocean Conference |

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# Executive summary

The World Ocean produces ecosystem services necessary for life on the planet. It is estimated that 90% of the biosphere is found in the oceans, with highly complex marine food webs demonstrating interdependence between various coastal, open ocean and deep sea environments. But the biological functioning of the oceans remains relatively unknown. It is estimated that only 5% of the ocean has been explored. The least known areas and mechanisms are certainly the deep zones but also the physicochemical phenomena related to CO2 and the interactions between biophysical compartments.

The role of the microbiome is fundamental in these mechanisms. But the community of ecologists and fisheries scientists is confronted with the inability of the current scientific models to correctly integrate the existing knowledge on the microbiome in order to represent the functioning of the marine ecosystems of the upwelling regions and the associated trophic chains.

For these limiting factors, the knowledge generated on planktonic ecosystems is not sufficiently valued to better inform decision-making processes at different scales regarding ocean governance, marine biodiversity conservation, climate policy, and to enhance public understanding of ocean and biodiversity conservation issues. We try here to address this gaps, exploring how some current ocean policy processes can be an opportunity to build new tools, models and policy recommendations including data and knowledge about ocean microbiome, this invisible majority with essential functions for the marine life and the planet as a whole.

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# Introduction

## 1. Context and Background

### 1.1 Bridging the gaps in the Science to Policy Interface

For more than 30 years, after the United Nations Earth Conference held in Rio in 1992, the scientific community highlighted the urgency of an ambitious action to address unprecedented and enduring changes in the Ocean biodiversity and their impact on human populations. More recently, with the growing evidence of the climate crisis, experts warn that the cumulative impact of rising temperatures, Ocean acidification and deoxygenation will have a strong negative impact on almost all forms of life in the Ocean, from bacteria to fish, including all planktonic organisms.

These climate-driven impacts, combined with increasing land-based pollution, will certainly affect the way the Ocean contributes to the global ecosystem as a whole, changing essential services such as the carbon cycle and oxygen production. These impacts can also have direct consequences on human communities, especially coastal areas, with the rising of sea levels, changes in salinity, or losses of essential species, coral reefs and mangroves.

In parallel to these increasing impacts, we are witnessing an important evolution on marine research technologies, shifting from a classical taxonomic or species-based approach towards multidisciplinary groups working on DNA analysis, Metagenomics, eDNA, high throughput microscopy, and using bioinformatics and Artificial Intelligence to analyse big genomic datasets generated by sequencing facilities.

Despite these recent progress made by the international scientific community, the knowledge acquired on the marine microbiome remains limited in terms of its specific composition, its geographical distribution and its functions within Ocean ecosystems. The plankton and microorganisms, are, in fact, insufficiently integrated into transdisciplinary work of modelling marine socio-ecosystems. There is also a lack of basic information from field sampling, including data from the most historically exploited fishing regions, such as the Canary Current.

We explore here how a multi-disciplinary project like **BIOcean5D** can contribute to closing these gaps and how the upcoming results could be used to better inform existing and current Ocean policy dialogues and political decisions.

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### 1.2 SROCC, first IPCC report dedicated to the Ocean (2019)

The IPCC Special Report on the Ocean and Cryosphere in a Changing Climate (SROCC) represents a significant milestone in our understanding of the complex interactions between the Ocean, ice-covered regions, and the global climate system. Released amidst growing concerns about the impacts of climate change on these critical components of the Earth system, the report synthesises the latest scientific evidence to provide policy-makers, stakeholders, and the public with a comprehensive assessment of the current state of the Ocean and cryosphere, as well as projected future changes under different climate scenarios.

One of the key advancements highlighted in the report is the recognition of the Ocean's crucial role in regulating the Earth's climate. Not only does the Ocean absorb vast amounts of heat and carbon dioxide from the atmosphere, but it also plays a fundamental role in driving weather patterns, supporting marine ecosystems, and sustaining livelihoods for millions of people around the world. By shedding light on the Ocean's vulnerability to climate change, the report underscores the urgent need for concerted global action to reduce greenhouse gas emissions and mitigate the impacts of climate change on Ocean ecosystems and coastal communities.

In terms of policy-making, the SROCC serves as a vital resource for developing evidence-based strategies and policies to address the challenges posed by climate change to the Ocean and cryosphere. By providing a robust scientific foundation and highlighting key areas of concern, the report catalyses discussions and actions at local, national, and global levels to strengthen resilience, protect vulnerable ecosystems, and promote sustainable management practices in the face of a changing climate.

Civil society organisations and scientists have been instrumental in raising awareness about the need to address the knowledge gap and mobilising support for the creation of this report.

### 1.3 Bringing innovation to historical Ocean conservation policies

Current decision-making processes to tackle biodiversity loss at an international level historically rely on the creation of protected areas. These tend to be geographically and seasonally fixed, and often focused on a few symbolic endangered species. Despite the importance of whales or sharks for their potential socio-economic and cultural significance, criteria to define protection should be completed with a more holistic vision, considering the Ocean as an integrated ecosystem. In the current context, where environmental conditions are unstable and species are likely to migrate, it will be necessary to complement the more traditional and fixed protected areas with dynamic (both geographically and seasonally) and global concepts.

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To reach this objective, innovative scientific tools and measurements could provide us with real-time information on some key phenomena and ecological functions that have a global impact in sustaining biodiversity beyond just a few iconic species. They could become monitoring tools informing decision-makers, with the best of scientific knowledge, about what areas could be protected and when, to provide the most crucial benefit for the whole planet.

Although the legal concepts for such dynamic protection are not applied yet, we believe that it would represent an essential step towards implementing a sustainable management of global biodiversity. In this context, **BIOcean5D** is bringing together scientists, economists and philosophers to think about how marine protection is perceived, how society can be better informed and which will be the next-generation tools to define areas in need of protection. This conceptual, economic and societal analysis will also assess different levels of efficiency of existing protection tools, in order to better inform decision makers in different Ocean policy processes here further detailed below.

# 2. Potential targets and momentum for inputs on Ocean governance processes

## 2.1 Short description of some relevant international Ocean policy frameworks

The **UNFCCC Paris Treaty** process is increasingly considering the Ocean as part of the solutions for mitigation and adaptation. After the COP25 in Spain, up to 60 states presented Ocean-related measures, including protection of coastal areas with Blue carbon assessments, as a part of the Nationally Determined Contributions (NDCs) in the framework of the treaty.

The **UN High Seas Treaty (BBNJ)**, adopted in 2023 and in phase of ratification, opens the possibility to sustainably manage the high seas with new tools for monitoring and conservation, including Marine Protected Areas.

The **UN Convention on Biological Diversity adopted in 2023 the Global Biodiversity Framework**, with a target to conserve 30% of coastal and marine areas through protected areas or other effective area-based conservation measures by 2030. New criteria, new forms of monitoring and protection are being explored as a solution to go forward on new protected areas.

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### 2.2 Participation in key International and European efforts to foster Ocean governance

- **UNOC -** In 2017, the United Nations organised the first **Ocean Conference** (UNOC) in New York, in order to push for the Marine Sustainable Development Goals (SDGs14). Four years later, Portugal organised a disappointing second conference, without concrete measures to reach the SDG targets. In 2025, a UNOC 3 will be held in Nice, France, with hopes to engage in more concrete action to protect Ocean biodiversity. France is giving high priority to the success of this UNOC3, trying to galvanise efforts towards concrete outputs, including for Ocean sciences. In the frame of the Conference, France and the EU will be presenting a proposal for an IPOS (International Panel for Ocean Sustainability), a proposal to structure an international scientific panel specifically addressing Ocean policy recommendations.

- **EU Mission Ocean -** With a 2030 target, the European Commission launched an initiative to catalyse efforts and bring coherence to different Ocean related projects. The EU Mission "Restore our Ocean and Waters" aims to protect and restore the health of our Ocean and waters through research and innovation, citizen engagement and blue investments. The Mission's new approach will address the Ocean and waters as one and play a key role in achieving climate neutrality and restoring nature.

# 3. Overview of the Ocean governance processes under the United Nations conventions

## 3.1 UNFCCC / Ocean and Climate Nexus

### 3.1.1 Background

Despite its crucial role in regulating the climate and providing essential ecosystem services sustaining life on Earth, the Ocean has long been overlooked in climate negotiations. Recognising this gap and committed to addressing it, the newly created Ocean & Climate Platform, co-founded by the Tara Ocean Foundation, along with a coalition of ambitious States, joined forces to bring the Ocean to the forefront. In 2015, during COP21, twenty-three countries launched the *Because the Ocean Initiative* and signed the first *Because the Ocean Declaration*. They supported a then-proposed Special Report on the Ocean and Cryosphere by the IPCC, the convening of a high-level UN Ocean conference in support of the implementation of Sustainable Development Goal (SDG) 14: "Conserve and sustainably use the oceans, seas and marine resources for

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sustainable development", and promoted an Ocean Action Plan within the UNFCCC.

These efforts were rewarded with the integration of the Ocean into Article 4.1 of the UNFCCC and the preamble of the Paris Agreement during COP21 in 2015. These were the first fundamental steps in recognising the Ocean as an essential component of the climate system. The political momentum persisted at COP22, in 2016, with the adoption of the Marrakech Partnership, which included the Ocean as one of the priority themes of the Global Climate Action Agenda (GCA), bringing together civil society in favour of climate action. As well as during COP23, in 2017, with the launch of the Ocean Pathway, an initiative of the COP23 Presidency to call attention to the critical links between the Ocean and climate change, and to present a strategy for including the Ocean in the UNFCCC process.

During the "Blue COP" in Madrid, in 2019, the Ocean was included in the final decision of a COP for the first time. Moreover, the Chair of the Subsidiary Body for Scientific and Technical Advice (SBSTA) was requested to "convene at its fifty-second session a dialogue on the ocean and climate change to consider how to strengthen the mitigation and adaptation action in this context[1]."

The first Ocean and Climate Change Dialogue took place on 2nd and 3rd December 2020. It provided a space for Parties and non-Party stakeholders to discuss how to strengthen adaptation and mitigation action on Ocean and climate change, drawing upon the knowledge and scientific findings from the IPCC Special Report on the Ocean and Cryosphere in a Changing Climate. One year later, COP26 reinforced the decision by making the Ocean and Climate Change Dialogue an annual meeting, held under the aegis of the SBSTA Chair, starting in June 2022. Building on the success of the first Dialogue, this new decision further anchored the Ocean-climate nexus in the UNFCCC and encouraged Parties to strengthen Ocean-based climate action within the context of the existing bodies of the UNFCCC. Some countries, like Chile or USA, are seeking to create Climate related MPAs, but still do not have the Ocean and climate nexus behind the proposals for these areas. Potentially, states will include blue carbon assessments to seek funding in the carbon market for these new areas, and there are risks of private operators pushing for geoengineering projects without proper ethical dialogue and science-based impact studies to assess potential negative impacts.

### 3.1.2 - Challenges for upcoming Blue NDCs : Ocean breakthroughs - Ambition and funding

On June 11, 2023, during the IUCN Leaders Forum and in the run-up to COP28, the Ocean community, united under the Marrakech Partnership for Global Climate Action,

[1] FCCC/CP/2019/13/Add.1, p.4.

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with the support of the UN Climate Change High-Level Champions, launched the Ocean Breakthroughs. These transformative pathways cover five key Ocean sectors: marine conservation, Ocean renewable energy, shipping, aquatic food, and coastal tourism. Accelerated action and investments in these sectors could deliver up to 35% GHG emissions reduction, contribute to a resilient, nature-positive and net zero future by 2050, and further anchor the Ocean into climate and biodiversity negotiations.

Scientific evidence underscores the Ocean's critical role as a climate regulator and the largest living space on Earth, instrumental to deliver on the goals of the Paris Agreement and the Global Biodiversity Framework. The Ocean Breakthroughs are science-based targets that should be understood as tipping points to be reached by 2030, designed to contribute to the achievement of existing global climate and biodiversity targets, for the benefit of People and Nature.

Launched ahead of COP28, the Ocean Breakthroughs aims to inform the conclusions of the Global Stocktake, and inspire Ocean-climate action for the coming years. Despiste the complex context of COP28, presided by the United Arab Emirates, a member of the Organisation of the Petroleum Exporting Countries (OPEC), the contribution of the Ocean in achieving the goals of the Paris Agreement received unprecedented recognition. From the preamble to the guidance and ways forward, the ocean's potential for both mitigation (Article 33 and 35) and adaptation (Article 55, 56 and 63d) has been unequivocally acknowledged as part of the solutions to address the climate and biodiversity crises.

Moreover, COP28 witnessed momentum at the highest political level for the Mangrove Breakthrough, with 49 Governments and over 50 non-States Actors supporting its targets, and with the launch of its Financial Roadmap. Additionally, 18 countries signed the COP28 Joint Statement on Climate, Nature and People to urgently address climate change, biodiversity loss and land degradation together in a coherent, synergetic and holistic manner, in accordance with the best available science. The Small Island Developing States (SIDS) Coalition for Nature launched their "Nature-Climate Action Roadmap" to strengthen selected marine protected areas as nature-based solutions to climate change.

Overall, there are increasing ambitions and initiatives to build synergies between the Paris Agreement and other global frameworks, especially the Kunming-Montreal Global Biodiversity Framework and Sustainable Development Goals.

### 3.1.3 Geoengineering solutions and mCDR: Need for science inputs and political action to apply the precautionary principle

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Blue carbon is a recent concept designating CO2 sequestration performed by coastal ecosystems like mangroves, seagrasses and wetlands. For more than twenty years, climate-related projects have been using existing land-based models to assess the amount of carbon sequestration in these different coastal ecosystems. The main objective of most projects is to exchange an amount of carbon tons for monetary revenues, using different financial tools, such as voluntary carbon compensation, blue bonds and other derivatives.

More recently, some States used blue carbon quantification to estimate the value of ecosystem services in their economic exclusive zone (EEZ), valuing carbon sequestration in exchange of investment in the conservation of these ecosystems. With the State of Seychelles, the NGO The Nature Conservancy launched in 2020 an initiative - Debt for climate swap - proposing to buy an amount of the national debt at discount rates feeding a fund for the implementation of Marine Protected Areas, using carbon sequestration as one of the sources of valuation.

Despite the interest of these very innovative and concrete initiatives, there are still some doubts and critiques addressed for lack of transparency, low participation of local stakeholders and risks of loss of value of these Blue Bonds in the long term.

**Beyond Coastal Ecosystem: How to assess?**

Considering that the part of marine coastal ecosystems in the total estimated carbon sequestration in the Ocean is less than 1%, several initiatives are now trying to quantify open Ocean carbon sequestration performed by planktonic ecosystems. This "oceanic blue carbon" sequestration is estimated up to 25% of the total carbon sequestration on earth, including physical and biological processes. But even if science is quickly evolving in these domain, researchers needs to deal with several uncertainties to quantify the amount of CO2 sequestration, mainly linked to the lack of data, but also due to lack of knowledge in specific fields, like the horizontal fluxes in the deep Ocean that can send back the carbon particles to the surface (remineralisation).

## 3.2 UNCDB - Global Biodiversity Framework

### 3.2.1 - Overview

In 2023, Parties to the UN Convention on Biological Diversity gathered in Montreal to take stock of the 2011-2020 Strategic Plan for Biodiversity and its associated Aichi targets and agree on a final decision for the post-2020 Global Biodiversity Framework, a roadmap to guide action to halt biodiversity loss by 2030 and achieve recovery by 2050.

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For the second consecutive decade, the international community did not fully achieve any of the 20 Aichi biodiversity targets, including target 11 to conserve 10% of coastal and marine areas, especially of particular importance for biodiversity and ecosystem services. In light of this collective failure and pressing need for concerted and accelerated action, the scientific community and civil society strongly mobilised to promote an ambitious and scientifically informed global biodiversity framework and targets, including the protection of at least 30% of coastal and marine areas by 2030. While the objective of protecting 10% of the Ocean by 2020 was political, the so-called "30x30" target is scientific. Indeed, the 2022 IPCC Sixth Assessment Report indicates that "effective ecosystem conservation on approximately 30% to 50% of Earth's land, freshwater and ocean areas, (...) will help protect biodiversity, build ecosystem resilience and ensure essential ecosystem services[2]".

The adoption of the Global Biodiversity Framework's target to conserve 30% of coastal and marine areas by 2030 through protected areas or other effective area-based conservation measures marks a critical milestone in the collective effort to safeguard some of the planet's most vital ecosystems. Coastal and marine areas are not only rich in biodiversity, but they also provide essential services from regulating the climate to supporting livelihoods and ensuring food security.

Achieving this objective requires extensive scientific and political cooperation to identify priority areas for protection, develop innovative conservative strategies and tools, implement robust monitoring and enforcement mechanisms, and in turn, inform policy-making.

### 3.2.2 EBSAs - Ecologically or Biologically Significant Areas

Ecologically or Biologically Significant Marine Areas (EBSAs) are an indicator to describe special areas in the Ocean that serve important purposes, in one way or another, to support the healthy functioning of the Ocean and the many services it provides. In 2008, the 9th meeting of the Conference of the Parties to the Convention on Biological Diversity adopted the following seven scientific criteria to identify EBSAs in need of protection in open-ocean waters and deep-sea habitats:

- Uniqueness or rarity;
- Special importance for life history of species;
- Importance for threatened, endangered or declining species and/of habitats; vulnerability, fragility, sensitivity, or slow recovery;
- Biological productivity;
- Biological diversity;

[2] IPCC, 2022: Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 109, doi:10.1017/9781009325844.

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- Naturalness.

Considering the EBSAs scientific criteria were defined more than 15 years ago, new technologies and scientific developments have the potential to add updated knowledge to develop innovative and evidence-based EBSAs. In the frame of the CBD, the Conference of the Parties has been discussing ways to improve its criteria since 2014. In 2018, COP requested the Executive Secretary to develop practical options to enhance scientific methodologies and approaches to describe areas in need of protection. To date, the Conference of the Parties has not reached an agreement on modalities for modifying the descriptions of EBSAs. The upcoming COP16 in Colombia could be a good opportunity to move forward on this matter, linking the need for new descriptors with the 30% ambition defined on GBF.

## 3.3 High Seas Biodiversity Treaty (BBNJ)

### 3.3.1 - Overview

The **UN High Seas Treaty (BBNJ)** was adopted in 2023 and is now in the process of ratification by State parties. Once entered into force, the BBNJ Treaty opens the possibility to sustainably manage the high seas with new tools, including Marine Protected Areas. As the high seas represents 70% of the Ocean surface, we can consider a great potential for better understanding and valuing the essential ecosystems and climate services provided by marine life in the open Ocean.

Historically, marine research was structured under national programs, sampling efforts made with national oceanographic vessels, covering priorities under the EEZ area and regional seas under the influence of important States for oceanographic research ( Europe, US, Canada, Japan, Russia…). With the BBNJ agreement, the United Nations will host a complete set of bodies under the umbrella of the BBNJ Treaty: Secretariat, Conference of Parties (COP), Finance Committee, and Capacity-building committee, among others. From the first COP, delegates will be building a framework to structure international cooperation in the high seas, somehow pushing States to go beyond borders. This can be an opportunity to build inclusive scientific cooperation with developing countries, with a funding facility and collective targets addressing microbiome, planktonic ecosystems, with a vision beyond the classical taxonomic-based oceanography.

### 3.3.2 - High seas future monitoring and conservation tools

Within the BBNJ Treaty, a whole package is built for what we call Area Based Management Tools (ABMTs), including Marine Protected Areas (MPAs). These new monitoring and conservation tools specifically designed for the high seas are still being

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discussed, in their form and content, and many experts are asking for a more innovative and dynamic approach for these conservation areas, beyond classical MPAs already being proposed by NGOs.

In the frame of the Treaty bodies, especially within the STB (Scientific and Technical Body), there will be opportunities to give scientific inputs in this process to define conservation areas in the high seas. It will be important to ensure that a holistic vision based on Ecology, Planetary biology, omics and other concepts developed by the BIOcean5D project are represented in these discussions. Furthermore, scientists could even work with national governments to bring ideas and proposals for new areas to monitor and protect, not based on species and habitats assessments but on functions and ecosystem services. In particular, international environmental legal innovations could better articulate with the aims of the BBNJ Treaty. One of them is for instance the import of a better scientific definition of the ecological integrity of an ecosystem and the capacity to represent that ecosystem as a right-holder especially when no national sovereign claim can be exerted towards it.

# 4. Opportunities for leveraging Ocean action and scientific knowledge in International and European processes

## 4.1 UNOC / SDGs

***Background: Birth of the Ocean Conference***

Two months after the adoption of "the 2030 Agenda for Sustainable Development", including the 17 SDGs and the 169 targets in September 2015, the UN General Assembly decided to convene a high-level UN Conference on the implementation of SDG 14: "Conserve and sustainably use the oceans, seas and marine resources for sustainable development". Held from 5 to 9 June 2017 in New York, co-hosted by the Governments of Fiji and Sweden, the first UN Ocean Conference brought together leaders, policy-makers, scientists, stakeholders and NGOs from around the world to address the pressing issues facing the Ocean.

One of the key outcomes of the conference was the adoption of the "Call for Action", a framework outlining specific measures to protect and restore 0cean health. The document emphasises the importance of marine conservation, sustainable fisheries management, pollution reduction, and the mitigation of climate change impacts on the Ocean.

Additionally, the conference facilitated numerous voluntary commitments and partnerships aimed at addressing various ocean-related challenges. Governments, NGOs, and private sector entities pledged to implement concrete actions to combat

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illegal fishing, reduce marine pollution, expand marine protected areas, and promote sustainable ocean-based economies.

The conference also raised awareness about the interconnectedness of the Ocean with other global issues, such as climate change, biodiversity loss, poverty alleviation, and food security. By highlighting the critical role of the Ocean in sustaining life on Earth, the conference underscored the urgent need for collective action to safeguard vital resources for current and future generations.

Overall, the first UN Ocean Conference served as a catalyst for international cooperation and concerted efforts to address the challenges facing the Ocean. It set the stage for ongoing dialogue, collaboration, and implementation of strategies to ensure the long-term health and sustainability of marine ecosystems worldwide.

### 4.2 EU Mission Ocean

The European Commission launched an important process of consultation and debates to define priorities for scientific research linking science to Ocean conservation and blue growth. Under this frame, a set of calls for projects was designed to fill the knowledge gaps with funding for research projects. The projects are also benefiting from coordination and collaboration between partners and the mission Ocean secretariat at the European level.

The Mission supports regional engagement and cooperation through area-based "lighthouses" in major sea/river basins: Atlantic-Arctic, Mediterranean Sea, Baltic-North Sea, and Danube-Black Sea. Mission lighthouses are sites to pilot, demonstrate, develop and deploy the Mission activities across EU seas and river basins.

Participation in the Mission Ocean meetings and linking the project's policy outcomes with the EU priorities for Ocean governance will allow an extended impact of the research tasks and a closer relationship with EU governments on some complex areas of ocean policies.

https://missionoceanwaters.eu/#/

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