

Input on the next Framework Program for Research and Innovation (FP10)

Q1: Which thematic areas are particularly important for us to collaborate on at the European level in the upcoming framework programme? Justify the proposals and explain how they will contribute to European added value.

The Institute of Marine Research (IMR) aims to be a robust knowledge provider to the EU in its core areas: sustainable fisheries, aquaculture, safe and healthy seafood, ecosystems and the impact of human activity to strengthen ocean governance at the European level.

In a Europe where technological autonomy, value-chain security and efficiency highly influence the framework conditions for research, innovation, and impact-monitoring, FP10 should shape the premises for knowledge development and governance in a key area of expertise: sustainable ocean governance. For the digital and green transition, this involves addressing the quality of data, data-capture technology and the embedded design of automated systems, a key trend in international ocean governance which blurs the boundaries between science, policy and decision-making with consequences for Norwegian democratic autonomy.

The proposed research and collaboration should enhance the knowledge basis for ocean governance by including the process of developing these systems. European collaboration should identify risks and benefits of integrating new technology into marine research domains and contribute to the development of sound European governance and societal impact parameters.

Europe must seek to influence the rapid implementation of digital twins as international tools for ocean governance. This implies safeguarding the applicability of “Destination Earth” to the and Arctic natural contexts, to ensure the science-based execution of relevant legal frameworks. For the upcoming framework program, it is particularly important that Europe collaborates on the following thematic areas, to add European value and promote sustainable development:

- **Accumulated Impact and Coexistence in Marine and Coastal Areas.** This will help understand and manage the combined effects of human activities and natural processes, which is crucial for sustainable management.
- **Mapping Biological Diversity and Genetic Resources.** This provides a better understanding of ecosystems and their resources, essential for conservation and sustainable use.
- **Marine Nature Restoration.** Developing the knowledgebase for restoring marine habitats.
- **Diversification in Aquaculture.** Expanding aquaculture to include more fish species and low-trophic species like shellfish and seaweed can enhance food security and reduce pressure on wild stocks.
- **Blue-Green Links for Food and Feed:** Integrating aquaculture with agriculture can create synergies that improve resource use and reduce environmental impact across the blue and green value chains. A better alignment of blue and green food systems is

pivotal for sustainable and resilient European food production and improved food security.

- **Sustainable Offshore Wind and Multi-Use Planning:** Developing offshore wind farms with a multi-use perspective can optimize space use and reduce conflicts between different interests.
- **Shared Knowledge Base for the Deep Sea:** Deep-sea mining and marine Carbon Dioxide Removal techniques are being considered by some governments and industries while others are violently against such initiatives. At the same time the deep sea hosts the least known ecosystems on earth, the Global Biodiversity Framework calls for conservation and restoration, and the oceanic uptake of atmospheric CO₂ needs to be safe-guarded. Knowledge-informed national and international decision making on each of these topics requires development of knowledge and a shared knowledge base. This is particularly suited for international collaboration.
- **Democracy and Ocean Governance:** Responsible data-intensive ocean intelligence must address the applicability, transparency and integrity of scenario modelling, data-ecosystems and decision-making processes. Democratic implications of blurring the boundaries between research, knowledge development, policymaking and decision-making must be jointly explored by the European marine research environments. Best practices for inclusive, iterative and integrated sustainable ocean planning processes should be developed.
- **Artificial Intelligence and Data-Ecosystem Design:** The rapid development of AI presents an interdisciplinary challenge, particularly in fostering good collaboration between domain experts in ecology, oceanography, and AI technologists. This growing gap in marine research regarding data analysis and processing complicates the path from research to value creation.
- **Fish welfare:** The EU lacks a comprehensive fish welfare framework, a key challenge in the aquaculture industry. A holistic approach needs to be developed through European collaboration, covering both aquaculture and capture-based fisheries. Key challenges include understanding breeding methods' impact on fish health, the effects of new production methods on the environment, and developing humane harvesting and slaughter procedures. AI-based welfare diagnostics are crucial for efficient data collection and analysis. Collaboration with the EU in genetics, physiology, disease management, production disorders, and digital technology is essential for sustainable, responsible fish welfare solutions.

Q2. The European partnerships and missions are instruments used by the EU in addition to regular calls for proposals. They are only used where regular calls are not expected to yield the same benefits. In partnerships, the private sector and public sector actively contribute, including with funding. The goal of the EU missions is to solve global challenges. Both instruments emphasize the practical application of knowledge. In which areas is it particularly important for Norway that these instruments are used? Justify the proposals.

1) A European Mission for Coastal and Ocean-Based Tourism: Coastal and ocean-based tourism is the largest global and European ocean economy sector both in terms of number of jobs and gross value added. Yet it is one of the sectors which has received least research efforts. Mechanisms by which tourism can contribute to ecosystem conservation and restoration could be explored in a wide collaboration between the private sector and government at several levels.

2) A European partnership for the quality of marine data ecosystems

The rapid development of AI presents an interdisciplinary challenge, particularly in fostering good collaboration between domain experts and AI technologists. This growing gap in marine research regarding data analysis and processing complicates the path from research to value creation. A European Partnership for the critical evaluation of marine data quality and data-ecosystem design should be established to reduce risks associated with the rapid AI scale-up. Such a partnership could also contribute to the responsible enhancement of the Digital Twin of the Ocean (DTO), by connecting with Local Digital Twins and regional data ecosystems initiatives. The partnership should support domain specific and bottom-up collaborative activities, exploring and experimenting with AI applications in research and data-collection processes. Such a partnership can be a valuable contributor to the development of “AI-Factories” and other service infrastructures in relation to marine data processing and analysis.