

**STRATEGIC SCIENCE PRIORITIES
FOR THE NEXT DECADE IN SUPPORT OF SUSTAINABLE LIVING
MARINE RESOURCES AND A HEALTHY ENVIRONMENT:**

AN EFARO VIEW

European Fisheries and Aquaculture
Research Organisations





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The Europe 2020 Strategy and the Commissions Communication: “Innovating for Sustainable Growth: A Bio-economy for Europe” emphasize the importance of research and innovation in supporting inclusive growth and job creation that is smart, green, innovative and sustainable. They suggest a strategy that reconciles food security with the sustainable use of renewable resources for industrial purposes such as biofuels and bio-energy, while ensuring environmental protection. Recently, the European Union’s Marine Strategy Framework Directive (MSFD, Directive 2008/56/EC) gave fresh impetus to implementation of an ecosystem approach to managing human activities in the sea with the aim of balancing economic interests with nature conservation requirements. It states that “The marine environment is a precious heritage that must be protected, restored and treated as such with the ultimate aim of providing **biologically diverse** and dynamic oceans and seas that are **safe, clean, healthy and productive**”. The revision of the EU Common Fisheries Policy will place increased importance on industry involvement, regional management, the allocation of fishing rights and reducing discards. Together these bold strategic and policy developments will require important changes to science priorities in the next decade. This paper sets out EFARO’s view on the developing science agenda that will inform the prioritisation of marine science within Europe in the coming decade. We emphasise the importance of involving existing scientific organisations and networks in implementing the strategy.

Healthy and biodiverse: Improving our capacity to implement the ecosystem approach

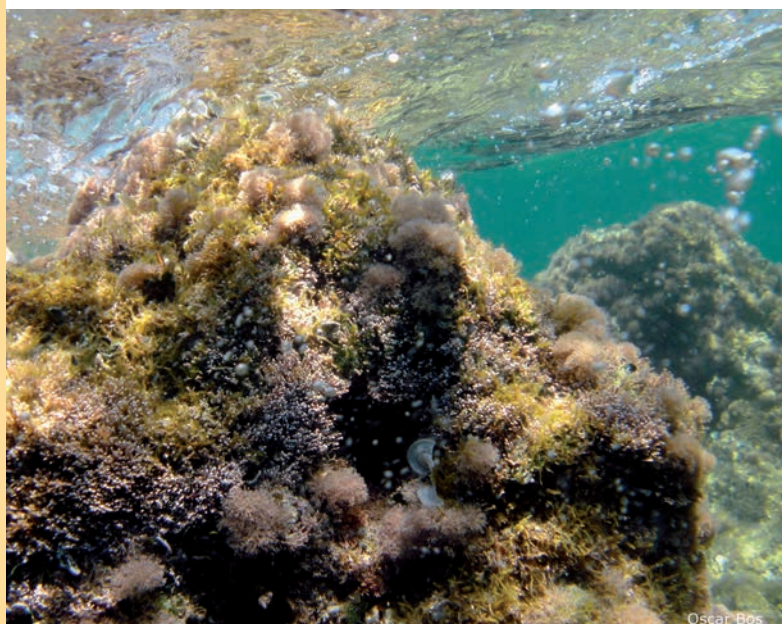
The prominence given to the ecosystem in all marine and maritime policy means that there is a strong need to advance our understanding of ecosystem structure and dynamics so that decision makers have a sound evidence base. We see the leading priorities being related to how enhanced understanding of the ecosystem can be translated into operational advice forming the basis for sustainable management. In particular:

- Research on ecosystem functioning and how ecosystems change under variable forcing so that benefits and risks of human activity can be evaluated
- Assess how ecosystem functioning allows the delivery of ecosystem services
- Develop environmental impact assessment of all the multiple human activities and their cumulative or synergistic effects on the ecosystem functioning
- Development of ecosystem metrics and comprehensive indicator frameworks to support management and implementation of policy
- Early warning methodology to anticipate major system changes such as ecological regime shifts.

Clean and Safe: Improving Europe's environmental performance

An integral part of developing the European marine economy is to ensure that our seas are clean and safe so that the marine ecosystems can support and sustain the goods and services we derive from them. In the field of fisheries and aquaculture we see the highest priorities as:

- Develop methods to facilitate traceability of produce via certification and promote labelling as source of information to guarantee sustainability of production and safety for consumption
- Develop technologies that will reduce escapes from aquaculture to minimise risks to the natural environment
- Develop methods to manage diseases affecting aquaculture to improve productivity and reduce risks to wild populations
- Introduce technologies that minimise the ecosystem impacts of fisheries and ensure that fisheries can flourish alongside other economic activities in the sea, such as renewable energy
- Support technologies to decrease energy consumption and reduce the ecological footprint of aquaculture, fisheries and seafood processing.





Productive: **Improving Europe's economic performance**

Growing the economy and creating more jobs is currently one of the highest priorities for European Governments. This, combined with the need to be environmentally responsible and ensure food security for the human population, requires science that promotes economic performance and food production while respecting the environment. In the field of aquaculture, fisheries and seafood processing we see the highest priorities as:

- Identify and develop high quality, healthy, nutritious and safe fish and shellfish products that respond to consumer demand
- Advance aquaculture technology and systems that are economically sustainable and are sensitive to animal welfare
- Develop sustainable fish feeds that make aquaculture one of the most efficient producers of safe, high value food with low impact on wild forage fish populations
- Increase the understanding of markets for fish and fish products in order to satisfy consumer demand through local production and processing for the benefit of European society and its economy
- Create value from primary production, avoiding fish waste and creating value from all production
- Develop sustainable harvesting strategies for fisheries which consider socio-economic factors, the wider ecosystem and address issues of uncertainty, and risk
- Investigate the use of marine resources in food ingredients or other bio-products such as pharmaceuticals.



Marine governance

The increased utilization of the seas and the strong call for conservation measures in the marine environment leads to increased competing claims over its natural resources and reveals the need for reconciling the different functions. This immediately reflects on the three levels of governance: the daily practice of management, the institutional setting of marine management and the underlying principal view of the use of Europe's seas and oceans. The main challenges in the field of Marine Governance lie in:

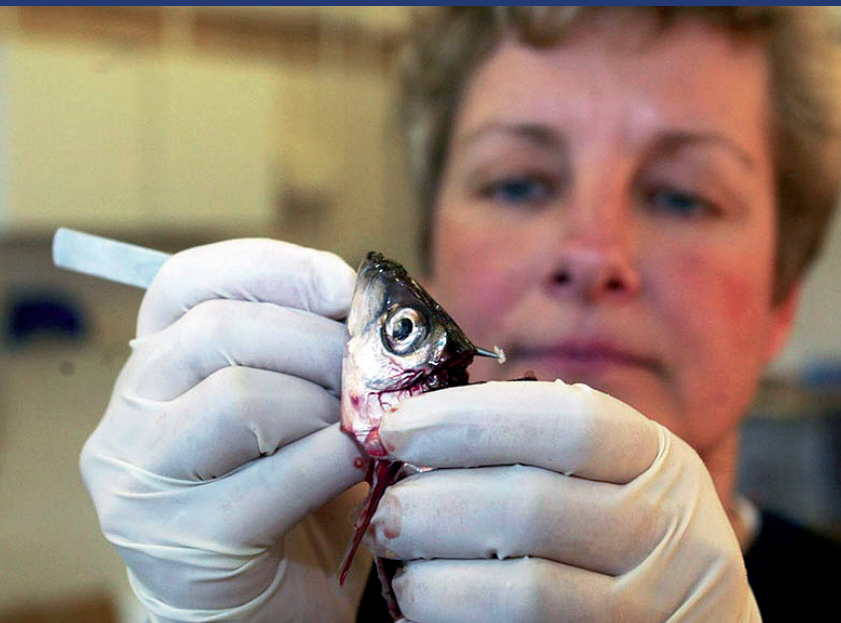
- Analyzing and understanding the main issues of participation, legitimacy and responsibility and providing advice on suitable, acceptable and effective governance models (Institutional Arrangements). This includes, the institutional setting at the regional level, multi-level cross sectoral integrated policy, stakeholder engagement and involvement across scales and sectors, blue growth and marine conservation, Marine Spatial Planning including access and rights to space, and marine cadaster.

Cross cutting issues and capacity building

The growing blue economy increases the pressures on the oceans, seas and coasts. An integrated approach is required in management and its related science in order to ensure the sustainability of these activities. The multifaceted nature of these challenges requires a greater emphasis on the policy, social and economic sciences and the need to integrate these with the natural sciences. Furthermore, substantial improvements are required in the collection and handling of data to underpin the basic science. We see the priorities for cross cutting science as:

- Develop and adapt new technology, such as remote sensing, for obtaining and analysing data to address the right temporal and spatial scales with greater efficiency
- Develop robust methodology that can cope with data poor situations particularly in relation to fish stocks and marine animals that are not intensively monitored
- To develop a better understanding of the dynamics of the different uses, their drivers including the role of management measures and governance, and the related pressure of the different uses on the ecosystem
- Develop decision-making tools to appraise the economic, social and environmental costs and benefits of different uses of resources such as fisheries, aquaculture, recreation, conservation, renewable energy, and carbon capture and storage so as to inform marine spatial planning
- Strengthen regional co-operation to share data, infrastructures and to make the best use of human expertise
- Promote knowledge exchange and inform the public and relevant public bodies.





AZTI Marine and Food Technological Centre
 BIOR Institute of Food Safety, Animal Health and Environment
 CEFAS Centre for Environment, Fisheries & Aquaculture Science
 CNR ISMAR Institute of Marine Sciences
 DFMR Department of Fisheries and Marine Research
 DTU Aqua National Institute of Aquatic Resources
 EMI Estonian Marine Institute
 FOI Institute of Food and Resource Economics
 HCMR Hellenic Centre of Marine Research
 IEO Instituto Espanol de Oceanografia
 IFM Innovative Fisheries Management
 IFREMER French Research Institute for Exploration of the Sea
 ILVO Institute for Agricultural and Fisheries research
 IMARES Institute for Marine Resources & Ecosystem Studies, Wageningen UR
 IMR Institute of Marine Research

IPIMAR Instituto de Investigação das Pescas e do Mar
 IRD Institut de recherche pour le développement
 ISPRA The Institute for Environmental Protection and Research
 LEI Agricultural Economics Research Institute, Wageningen UR
 Marine Scotland Marine Laboratory
 MI The Marine Institute
 MRI Marine Research Institute
 NMFRI National Marine Fisheries Research Institute
 NOFIMA Norwegian Institute of Food, Fisheries and Aquaculture Research
 RKTL Finnish Game and Fisheries Research Institute
 SINTEF SINTEF Fisheries and Aquaculture
 SLU Swedish University of Agricultural Sciences, Department of Aquatic Resources
 TI Baltic - Thünen Institute of Baltic Sea Fisheries
 TI Sea Fisheries - Thünen Institute for Sea Fisheries

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