European Commission

THE 'FUTURE OF MARINE BIODIVERSITY MONITORING' WORKSHOP SYNTHESIS

'The Future of Marine Biodiversity Monitoring in Europe' workshop took place in Sitges (Barcelona, Spain) on 5-7 November 2024 as part of a collaborative study[1] between the study team, the European Commission (EC) funded by the European Climate, Infrastructure and Environment Executive Agency – CINEA and with technical support of the Joint Research Centre (JRC) and relevant stakeholders. The study aims to analyse the state of marine biodiversity monitoring and to recommend ways forward towards a better future set-up. The study, ending in December 2024, is part of a wider activity led by the EC to improve marine biodiversity monitoring across European marine waters.

The workshop enabled a large-scale review and consolidation of **preliminary recommendations** for improving existing data pathways (from collection to transfer and final use for policy purposes). The workshop addressed a range of topics, through both plenary and smaller group discussions, including monitoring of specific species groups, recommendations for streamlining and harmonising monitoring methods and programmes, and recommendations for improving marine biodiversity data pathways.

The workshop gathered around 70 participants from **16 EU countries** and 5 non-EU countries (UK, Ukraine, Georgia, Turkey, Norway), ranging from **biodiversity monitoring and data scientists** to **policy-related experts** from **Member States** (MS), **Regional Sea Conventions** (RSC) (OSPAR, HELCOM, UNEP/MAP-SPA/RAC, BSC) **and the EU** (EEA, DG MARE, DG ENV, JRC, EMODnet), with very diverse expertise in species, monitoring methods, and data pathways/structures.

KEY MESSAGES

The major challenge is **the lack of a comprehensive overview of what is being monitored**, when and where. To strengthen marine biodiversity monitoring, the most effective approach would be to publish the data, the same way research articles are published.

Although guidelines and common frameworks for the harmonisation of data collection already exist, the challenge is their effective implementation by MS. A potential solution would be to **strengthen regional coordination (e.g. through the RSC)** to harmonise existing monitoring programmes and to **implement common guidelines at the EU-level**. On a more technical side, data collected using different methods could be processed and calibrated for comparability across regions and time, which would require additional efforts from monitoring experts and data managers and investment in human resources. **Innovative monitoring techniques and approaches** (e.g. remote sensing, eDNA, citizen science, AI and Imaging) could complement existing methods to improve the cost-efficiency of monitoring, though they are **not yet fully operational or reliable**. Experts should define effective combinations of methods to address the complexity of marine ecosystems.

Regarding **data management**, common guidelines and standards are already in place, but they are not consistently applied. The **solution** is to **improve literacy and training, while fostering a culture of data management** within the scientific community. **Data should be open access and reusable,** and the mechanisms for their publication should be consistently applied within the scientific community.

1 - https://joint-research-centre.ec.europa.eu/scientific-activities-z/marine-biodiversity/marine-biodiversity-monitoring_en

SOLUTIONS FOR INDIVIDUAL SPECIES GROUPS

There are species group **specific challenges** that need to be identified and addressed.

- For **small organisms** (as such plankton and benthic invertebrates) and macrophytes, the most significant challenges lie in the data collection field. To overcome these, **more relevant and cost-effective methods** and approaches are needed, along with **greater standardisation** of data, metadata and protocols.

- Regarding **large animals** (as such fish, mammals, reptiles and birds), common monitoring protocols are in place but their implementation is inconsistent across regions and species groups. **The key challenges** are i) **the sharing of the data**, particularly fisheries and bycatch sensitive data, as open-access; and ii) **delivering the right data for policies**: spatio-temporal gaps for some species groups (e.g. deep diving mammals) must be addressed to ensure data comparability across time and regions. Solving these issues requires **increased monitoring efforts, improved regional coordination, and more funding**.

Data fragmentation is a common challenge across species groups, pointing to insufficient regional coordination. Moreover, a stronger **enforcement of existing EU policies** is needed to improve harmonisation and interoperability. A potential solution would be the establishment of a **centralised data structure**, with EMODnet being a possible option. While **more funding** may be required, **fostering synergies and capacity building at regional level** and between neighbouring countries is also crucial.

TRANSVERSAL CONSIDERATIONS

Solutions to improve marine biodiversity data collection

Innovative methods should be applied in combination with existing methods to improve data collection programmes and address data gaps (related to e.g. policy criteria, species, spatio-temporal). To strengthen the coherence of marine biodiversity monitoring strategies, **both a bottom-up approach (to improve regional harmonisation) and a top-down approach (to increase standardisation of methods at EU-level) can coexist**. Increased cooperation and partnerships are essential to develop **shared monitoring programmes with neighbouring countries** more cost-efficiently.

Solutions to improve marine biodiversity data transferring

The **enforcement and evaluation of Data Management Plan requirements** in EU-funded projects need to improve. While guidance on **data and metadata standards** already exists, it must **be more consistently applied** to ensure data interoperability, regardless of where it is submitted. **Enhancing literacy on data and metadata standards by data collectors** could help address this issue. To improve data provenance, data managers must implement traceability across all structures, moving from a voluntary tracking code system (e.g. DOI) to **mandatory data tracking and citation**.

Solutions for delivering the right marine biodiversity knowledge to policy

There is a clear need for **coordination and guidance**, although it was debated whether these functions should be managed centrally by an EU body or regionally through the RSC. Some argued that data management should be handled by the RSC, while EU coordination was seen as more appropriate for developing monitoring strategies, especially for data-deficient species and technical aspects of monitoring programmes. **Primary data** must be reported to advance the understanding of marine biodiversity and to support EC compliance checks, among other purposes. Although **legal obligations to report and deliver primary data already exist (e.g. MSFD Art 19(3), Open Data Directive), they must be more effectively recognised, respected, and enforced**. Improving data literacy within the scientific community is essential, requiring a cultural shift that emphasises the value of data sharing and publishing for career development. This shift must also be supported by changes in education systems to foster a stronger appreciation for open and collaborative data practices.

Policy perspective: Priorities for moving forward

- At MS level, the focus should be on establishing **common monitoring strategies** and relevant and **standardised methods**. The EU bodies should define the **principles for applying these methods and address data gaps** (which method for what/when/where) to ensure consistency and provide a global vision by regions and sub-regions.
- From a regional perspective, while harmonisation is at the core of RSC strategies through the provision of common guidelines, their implementation remains limited due to insufficient human and financial resources. Besides, **primary data are not being reported**. For OSPAR, addressing these issues will be a priority, while in the Mediterranean region, **citizen science is considered the best approach** to collect missing data on species, areas, and specific time periods.
- The EEA acknowledges that the data reported is not enough to address the environmental crisis; further actions need to be taken based on the here mentioned priorities for data collection and data reporting.
- From **DG MARE's perspective**, two ongoing **initiatives** are already on track to address priority topics: 1. Data sharing: **EMODnet supports the implementation of marine polices, like MSFD, MSPD and in the future the NRR** and 2. Data collection: the **Ocean Observation Initiative seeks to encourage MS** to share information about their monitoring efforts to identify and address existing gaps and overlaps. Since each MS is responsible for its own biodiversity monitoring programmes, increased collaboration though initiatives and standardisation of best practises will enable MS to learn from one another.
- According to **DG ENV,** a top-down approach already exists, through the legislative texts (MSFD + GES Decision) which are complemented by guidance on assessment and monitoring produced together with the MS. Moving forward, **ensuring the application and enforcement of these guidelines – and producing more guidance for monitoring with the relevant experts – should be a priority**, together with increasing the use of existing data for policies.
- **MS** are the **key players in the science-policy interface** and DG ENV urges current researchers and MS experts to actively contribute to the groups responsible for reporting to the MSFD and other environmental policies.

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https://joint-research-centre.ec.europa.eu/scientific-activities-z/marine-biodiversity/marine-biodiversity-monitoring