HORIZON EUROPE

Observing and mapping biodiversity and ecosystems, with particular focus on coastal and marine ecosystems

Better biodiversity observations are needed to assess the health of ecosystems and the impact of measures derived from EU policies, and to feed data into models for the predictions of effects and the development of management measures for the implementation of EU policies.

Observation and mapping of coastal and marine biodiversity are key tools to manage and share the "ocean commons" in a fair and responsible way under the present global challenges and rapid environmental changes. They also help ensure that the benefits derived from the exploitation of ocean resources can be sustainably managed and equitably shared. The distribution of these "ocean commons" is changing. The melting polar ice caps, stagnation in wild seafood provisioning opportunities, emergence of harmful pathogens and parasites, and previously inaccessible ocean spaces (e.g. the deep sea) now increasingly within human reach, are challenges that need to be addressed by responsible ocean governance to reduce the potential for conflicts at all levels and ensure human well-being. Current knowledge on how to relate and govern marine natural resources and associated societal changes is fragmented, and observations of resource distribution, use, state and dynamics are scant and insufficiently accessible. We need to advance observations to support modelling of the complex links between marine ecosystems and societal developments to forecast, manage and mitigate these changes.

Adequate scientific knowledge is also fundamental to protect and restore favourable conservation status of habitats and species under EU nature legislation, notably the Birds and Habitats Directive and good ecological status under the Water Framework Directive. Reliable data and knowledge are necessary inter alia to define protected areas in line with the EU biodiversity strategy and its underlying legislation, to develop conservation objectives, conservation and restoration measures, to define the conservation status and to undertake environmental impact assessments.

In order to do so, projects are expected to encompass all of the following aspects:

- Use of satellite and drone images (earth observation) to assess pressures on freshwater, coastal and marine ecosystems (fragmentation, hydromorphological changes, etc.);
- Develop eDNA protocols complementing established biological indicators to monitor ecological status, in the context of the Water Framework Directive.
- New platforms and integration of variety of sensors in situ, autonomous unmanned vehicles, acoustic monitoring, satellite applications, holistic approaches (e.g. systems biology, meta-omics, and ecosystem approaches) and novel theoretical frameworks linking evolutionary theory and oceanography as well as marine social sciences and humanities can provide an integrated framework to inform decision making, particularly in inherently dynamic coastal ecosystems.
- Where relevant, creating links, contributing to and using the information and data of the European Earth observation programme Copernicus, the Group on Earth Observations (GEO) and the Global Earth Observation System of Systems (GEOSS), European Space Agency Earth Observation Programme and in particular the flagship actions on biodiversity and ocean health of the EC-ESA Joint Earth system science initiative, is expected.
- Contribute to improving the knowledge on marine and terrestrial habitats and species protected under the Birds and Habitats Directive.
- Contribute to improving the knowledge on how invasive alien species interact with local biodiversity to better feed policies on their prevention, eradication and management In line with EU Regulation 1143/2014 on invasive alien species,
- Implement the Essential Ocean Variables for sustained observations of marine biodiversity and ecosystem changes identified by the Global Ocean Observing System (GOOS).
- The projects should benefit from the large datasets recovered from the long-term environmental monitoring conducted through the national and European dedicated Research Infrastructures (e.g. eLTER).
- Technical, theoretical and practical development and validation for the use of environmental DNA (eDNA), combined with other ocean data (both biotic and abiotic). These approaches promise leaps in our ability to sample ecosystem-wide data at increasingly low costs.
- Investigate all key processes (ecological and anthropogenic) controlling the fate of carbon and its sequestration in marine and costal ecosystems. Evaluate the "Blue Carbon" balance in the different marine ecosystems through high-resolution mapping and modelling of marine ecosystems of the European EEZ, characterised by habitats, species, processes and functions, from deep sea, offshore to coastal.
- The tools, models and geo-referenced information systems that should be designed should be focused on user needs and designed with user experience.
- Standardised minimum set of Essential Ocean and Biodiversity Variables (EOVs / EBVs)
- Contribution to enhancing the overall societal and public understanding of link between biodiversity and ecosystem functioning through education and training (school & adult education, citizen science platforms)
- All the marine observations connected though these actions should be incorporated into EMODnet.
- Cooperation with the EC Knowledge Centre for Biodiversity and other relevant existing platforms and information sharing mechanisms[[BISE, Oppla, NetworkNature and their joint work streams.]].

- Contribute to the free and open access to biodiversity data of the Global Biodiversity Information Facility.
- Opportunities for cooperation with relevant projects, such as EUROPABON [[https://europabon.org/]] awarded under the call 'SC5-33-2020: Monitoring ecosystems through research, innovation and technology' or the projects resulting from topics under the Heading 'Understanding biodiversity decline' in Destination 'Biodiversity and ecosystem services' and from Destination 'Land, ocean and water for climate action' (Carbon cycle and natural processes) and Destination 'Innovative governance, environmental observations and digital solutions in support of the Green Deal' (environmental observation) should be identified. Furthermore, cooperation is expected with the European co-funded partnership on biodiversity[[https://www.biodiversa.org/1759]] (HORIZON-CL6-2021-BIODIV-02-01) and other relevant Horizon Europe missions and partnerships. Proposals should outline a plan on how they intend to collaborate with other projects selected and with the mentioned initiatives, by participating in e.g. joint activities, workshops, common communication and dissemination activities, etc. Applicants should allocate the necessary budget to cover the plan. Relevant activities of the plan will be set out and carried out in close co-operation with relevant Commission services, ensuring coherence with related policy initiatives.
- This topic should involve the effective contribution of SSH disciplines.
- In order to achieve the expected outcomes, international cooperation is strongly encouraged.

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