# G Science Academy2023

## Restoration and recovery of the ocean and its biodiversity

The ocean is the cradle of evolution and the largest living space on Earth. Because of its size and history, it contains unparalleled biodiversity. Biodiversity refers to the enormous variety of life on Earth and evolves in a complex web of interactions among organisms and their environments. It is necessary to improve understanding of this complex interaction, to resolve the challenges posed by the various international interests, and to sustain the richness of biodiversity into the future.

However, the ocean is still a frontier, full of unknowns and more than 90% of marine life has not yet been described1. Therefore, it is imperative to increase our scientific knowledge of the ocean, its diverse marine life, how the ocean and its life are changing during rapid environmental change and the crucial roles they play in recovering and sustaining a healthy planet.

The ocean provides numerous essential benefits and services to humanity, including weather and climate mitigation through absorption of heat and atmospheric carbon dioxide, food and energy provision, cultural and recreational opportunities, and support for human health and well-being. There is an ethical and vital imperative to manage human impacts on the ocean in order to sustain the critical roles performed by the ocean to future generations. Sustainable management and protection are thus mandatory.

Anthropogenic global climate change is causing multiple impacts on the ocean, including rising water temperatures and sea levels, increased stratification and ocean acidification, as well as more frequent and intense extreme events such as storm surges, high waves, and marine heat-waves. Furthermore, ocean deoxygenation, along with ocean warming, threatens to cause a major collapse in marine biodiversity[2), 3)].

Today, 41% of the total ocean areas are strongly affected by human impacts[4)]. Human activities (e.g., shipping, resource mining, fishing, and coastal, offshore, and deep-water development) cause harmful effects if not managed sustainably. Major concerns include loss of marine life through blocking or creating unsafe passages that are critical for species migrations, the invasion of alien species, and marine pollution, including antifouling agents, pesticides, pharmaceuticals, heavy metals, plastics, discarded ("ghost") fishing gear, noise and artificial light. Measures to reduce the damage caused by the above-mentioned human activities cannot wait.

The ocean and its biodiversity are composed of complex systems that interact on a number of scales in time and space. Understanding and elucidating their mechanisms including the long-term perspective of evolution is critical for any human intervention. It is therefore important to cooperate and promote long-term efforts over time, including the maintenance and development of international databases and observation networks, as well as human resource development and education to support the marine sector.

According to the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) in its 2019 global assessment report, loss of marine biodiversity is primarily caused by overexploitation, principally industrial fishing, followed by sea use changes and other local, regional, and global drivers[5)]. Ecosystem functions are more resilient and stable with high biodiversity[6)]. In light of these circumstances, the G7 Governments must focus efforts towards a "healthy and resilient ocean" as one of the goals of the United Nations Decade of Ocean Science for Sustainable Development (the Ocean Decade, 2021-2030) and the "nature positive" goal in the G7 2030 Nature Compact adopted in 2021 as well as the G7 Ocean Deal adopted in 2022.

In accordance with these goals, the G7 Governments must work not only to "conserve" but also to "restore and recover" the ocean and its biodiversity, strongly recognizing the interconnectedness between land and the ocean, and the fact that land-based pollution inevitably affects the ocean. In December 2022, the Kunming-Montreal Global Biodiversity Framework (GBF) was adopted, setting out goals and targets for marine biodiversity conservation, including, in particular, the target of 30% sustainably protected marine areas by 2030 (30 by 30), with a focus on preserving the most vital areas for biodiversity and restoring the most degraded coastal ecosystems.

Good intentions for sustainable development and ecological restoration are not enough in the face of never-ending human activities and unprecedented ecosystem change: specific international regulations and infrastructures are immediately needed, such as the 30 by 30 goal, which include ensuring restoration and sustainability.

## Recommendations

To restore and recover the ocean and its biodiversity, it is now imperative that G7 Governments take sustained, coordinated action. Furthermore, the G7 Governments must ensure actions in accordance with international initiatives, rules, and regulations to achieve a sustainable marine environment. Therefore, we call on the G7 Governments to take the following actions.

## Recommendation 1

To not only "conserve" but to further "restore and recover" the ocean and its biodiversity,

Take measures to end Illegal, Unreported and Unregulated (IUU) fishing, control large-scale commercial trawling and deep-sea trawling, eliminate ghost fishing gear, and prevent overfishing, to shift towards sustainable fishing practices. Ensure that fisheries management measures are adaptive and based on the best available and real-time scientific information and knowledge.

Strengthen regulation to prevent alien species invasions associated with fisheries and shipping (e.g., from importing and exporting aquaculture target organisms, ballast water, and biofouling) and ensure their enforcement.

Provide financial incentives and support to respond to socio-economic challenges related to the loss of marine biodiversity, including in Small Island Developing States (SIDS). Empower low-income states to conserve, restore, and recover ecosystems to support sustainable social systems and to improve ocean literacy and research capacity.

Promote the further establishment of Marine Protected Areas (MPAs) and Other Effective area-based Conservation Measures (OECMs). Based on scientific evidence, ensure that MPAs and OECMs are effective, well-connected, and well-enforced and that all stakeholders participate in their establishment. Implement frameworks for adaptive management based on a scientific analysis of monitoring and observation results.

## Recommendation 2

To create a sustainable marine environment,

Develop a roadmap for decarbonization in line with the Paris Agreement and G7 climate goals, to ensure that actions toward carbon neutrality are implemented. One key action is increasing ocean carbon sinks and introducing mitigation and adaptation measures, particularly with regard to rising sea level. Ensure that comprehensive assessments are conducted before and after the implementation of climate mitigation and adaptation technology to evaluate and mitigate any potential negative effects on the marine environment.

Encourage efforts to spread awareness and improve literacy in society on climate change, biodiversity, and sustainable use of marine resources to societies.

Adopt a comprehensive, ecosystem-based approach to the management of the coastal marine environment, including the effects of agricultural runoffs and other terrestrial pollutants, and establish clear governance structures.

Advance international cooperation in setting international rules and standards to prevent marine pollution, including land-based sources, and significantly reduce regional and transboundary pollution, aligned with the Manifesto for Clean Ocean 2030 in the Ocean Decade.

Eliminate all subsidies and incentives that are harmful to marine ecosystems and biodiversity, including built infrastructure and agriculture subsidies that lead to nutrient, pesticide, and antibiotics pollution in terrestrial ecosystems that is a major contributor to pollution in coastal ecosystems in addition to aquaculture.

## Recommendation 3

To achieve long-term success in conserving, restoring, and recovering the ocean and its biodiversity,

Enhance human resource development for marine survey/research, and foster students and early career scientists, by increasing the funds required for field survey/research and the costs required for field surveys/research security.

Increase support for monitoring observations of ecosystems, species and genetic diversity using standardized methods.

Promote open science and data-driven science by strengthening global observation networks (e.g., Argo, the Global Ocean Observing System (GOOS), the Ocean Tracking Network (OTN), the Marine Biodiversity Observing Network (MBON), Global Ocean Ship-based Hydrographic Investigation (GO-SHIP)) and the international system of Long Term Ecological Research (LTER) sites. Enhance, maintain, and manage marine biodiversity databases (e.g., Ocean Biodiversity Information System (OBIS), World Register of Marine Species (WoRMS)) with stable financial resources, promote integration, centralization, visualization, and publication.

## References:


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