DOSI
DEEP-OCEAN STEWARDSHIP INITIATIVE
Climate change

POLICY BRIEF
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Climate and Biodiversity Beyond the Limits of National Jurisdiction

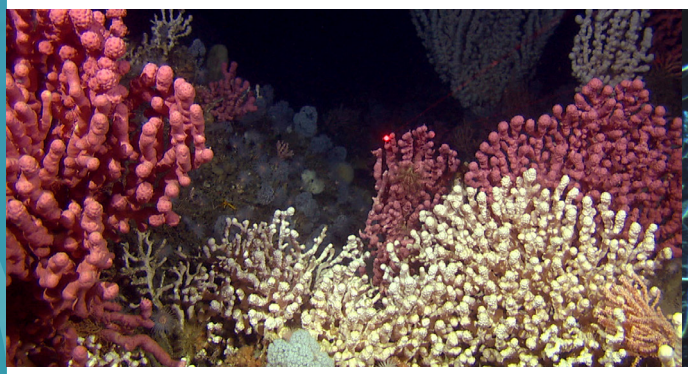

Fig 1 *Deep-water coral reefs - Norwegian Margin, Atlantic Ocean; Credit: MAREANO Project, Institute of Marine Research, Norway*

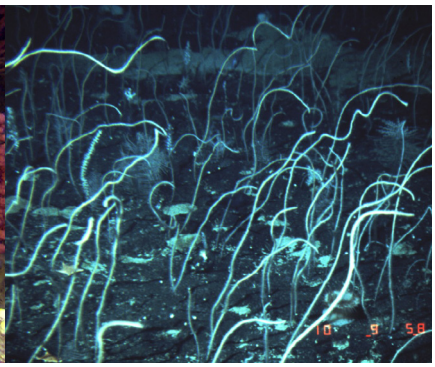

Fig 2 *East Pacific seamount coral garden; Credit: Lisa Levin*

Sustainable use and conservation of marine biodiversity in areas beyond the limits of national jurisdiction can aid climate mitigation, adaptation and resilience for the benefit of humankind and the planet.

There is an intimate link between climate and deep-ocean biodiversity. The deep ocean is highly connected to the atmosphere and to the surface ocean through: exchange of heat; wind-driven upwelling of nutrients promoting CO_2 assimilation by phytoplankton; and vertical and lateral export of that organic carbon via particle transport and migration of animals.

The ocean plays a vital role as a climate mitigator. The deep ocean is a major active sink and reservoir of heat and CO_2, but its sequestration capacity is not unlimited and removal rates of anthropogenic carbon from the atmosphere depend on the capacity of deep-ocean ecosystems to maintain their functions.

Anthropogenic climate change has interrelated and cumulative adverse effects on deep-ocean biodiversity through ocean warming, acidification, deoxygenation and changes in the amount of food that will be available for the fauna in the deep ocean. Climate-related changes in deep-sea environments combined with human disturbance from resource extraction and pollution will alter deep-sea ecosystems and the services they provide (e.g. carbon uptake, biodiversity, genetic resources, fisheries and food security among others).

The relationships between international legal instruments relating to the ocean and those relating to climate remain distant, incomplete and fragmented despite the strong ecological connections between ocean and climate systems. The consideration of climate change under the United Nations Convention on the Law of the Sea *(see Box 1)* is limited. Ocean and climate related cross-cutting issues are insufficiently addressed within climate law.

BOX 1

Who is responsible for climate change beyond the limits of national jurisdiction?

Greenhouse gas emissions have deleterious effects far beyond their source at several geographical and temporal scales, and upon the ocean within and beyond national jurisdiction. States are responsible, in accordance with the 1945 Charter of the United Nations and the principles of international law, for ensuring that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction. The customary and conventional obligation for States to protect and preserve the marine environment embedded in Article 192 of the 1982 United Nations Convention on the Law of the Sea is potentially relevant for greenhouse gas emissions that adversely impact marine biodiversity. This biodiversity occurs for example in rare or fragile ecosystems like submarine canyons and seamounts, and habitats of depleted, threatened and endangered species and marine life forms affected by ocean warming, acidification and deoxygenation. The due diligence obligation to prevent, reduce and control marine pollution set out Article 194 of the United Nations Convention on the Law of the Sea should be activated in ways that enable integrated, collective and precautionary action.

Fig 3 Black coral, Phoenix Islands MPA; Credit: NOAA Oceanos Explorer 2017

Aspects of the future international legally binding instrument on the conservation and sustainable use of marine biological diversity in areas beyond national jurisdiction are linked to climate mitigation, adaptation and resilience

1. Area-based management tools

Climate change will redistribute and compress habitats, communities and species.

- Consider protecting the most resilient deep-ocean ecosystems as **climate refuges** for species with large bathymetric ranges and as reserves for high-risk species with respect to cumulative impacts;
- Enhance the capacity of deep-ocean ecosystems to serve as **greenhouse gases sinks** and reservoirs by protecting ecosystems that are key players in CO_2 and methane sequestration at depth along with their foundation species like cold-water corals, sponges, clams, and mussels; and
- Incorporate drivers of change related to climate change (e.g. warming, acidification, deoxygenation, changes in nutrient fluxes) into ocean planning and strategic environmental assessment.

2. Environmental impact assessment

Identify, predict, monitor and reduce climate change effects on deep-ocean ecosystems.

- Recognize that climate change will cause shifting baselines, altering the composition, abundance, diversity, and productivity of deep-sea ecosystems, and can trigger non-linear ecological responses and abrupt regime shifts, and **ensure monitoring practices can be adapted** accordingly;
- Estimate the **footprint of carbon (and other greenhouse gases)** of all proposed activities and identify measures to reduce these;
- Evaluate potential **synergistic effects** of climate change stressors with direct human disturbances and how their **cumulative impacts** can alter the functionality and resilience capacity of deep-ocean ecosystems; and
- Ensure that relevant **scientific knowledge** will be made available to governments, stakeholders and society for effective assessment of climate impacts, including mechanistic understanding of the vulnerability of species and ecosystems, and that monitoring is done on relevant spatial and temporal scales to support the precautionary approach based on models and *in situ* observation.

3. Marine genetic resources

Genetic resources of still undiscovered deep-ocean biota can help to foster health and resilience of humankind and ecosystems to climate change - they are threatened by climate and other anthropogenic pressures.

- Address knowledge and information gaps on the **mutual relationships** between climate change and deep-ocean ecosystems, together with marine biodiversity, beyond national jurisdiction;
- Support and fund adaptive and integrated **use and conservation** of deep-ocean genetic resources in the context of climate and environmental changes through benefit arrangements; and
- Develop **best practices** for accessing genetic resources in compliance with climate regulations, with specific attention to open data and carbon footprint.

4. Capacity building and technology transfer

Awareness, cost-effective high-resolution monitoring technologies and data management capacity can facilitate sustainable development and use of ocean biodiversity, especially by Least Developed Countries and Small Island Developing States.

- Capacity for assessing and reducing carbon footprints could draw from green and blue **climate funds**;
- Climate change impact **monitoring, early warning systems, and predictive modeling** can improve safety, economic viability and ocean health assessments;
- Sustainable fisheries management is an important way to **improve climate resilience** for exploited fish stocks and fisheries in areas beyond and within national jurisdiction; and
- Reduce deep-ocean vulnerabilities and enhance ecosystem resilience through climate conscious actions *(Box 2)*.

Scientific recommendations

- Conduct further in situ **observations** of climate-related variables and process studies dedicated to species and ecosystem responses to different combination of stressors over relevant spatial and temporal scales;
- Facilitate **data management, and advance modelling** at various geographical and temporal scales supported by the Global Ocean Observing System (GOOS) and the Deep Ocean Observing Strategy (DOOS);
- Develop deep-ocean **interdisciplinary marine scientific research** bringing together natural and social sciences through the **United Nations Decade of Ocean Science for Sustainable Development 2021-2030**, via the Intergovernmental Oceanographic Commission of the UNESCO and other competent international organizations, with the support of States and non-state actors, and scientific networks ;
- Integrate congruent **climate-conscious actions** into all aspects of deep-ocean resource management and conservation plans in areas beyond national jurisdiction.

Fig 4 *Animal associations on nodules near Johnston Atoll, Pacific at 2600m, Pacific Ocean' Credit: NOAA Okeanos Explorer 2017*

Climate-conscious actions

BOX 2

Scientists call upon new and existing ocean industries, ocean researchers and the public in everyday life to take climate-conscious actions to reach the goal of holding the increase in the global average temperature to well below 2°C above pre-industrial levels (*Article 2(1) (a) of the 2015 Paris Agreement*) by:

- Reducing fossil fuel consumption;
- Opting for renewable energy;
- Recycling of metals and wastes;
- Approaching holistically the carbon and biodiversity footprint of industrial processes such as energy production or metal extraction.

ABOUT DOSI

The Deep-Ocean Stewardship Initiative seeks to integrate science, technology, policy, law and economics to advise on ecosystem-based management of resource use in the deep ocean and strategies to maintain the integrity of deep-ocean ecosystems within and beyond national jurisdiction.

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