

# The blue imperative

## Ocean, climate and economy – summary brief

This policy brief has been written by  
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### Summary

- The ocean and marine ecosystems are pivotal to sustaining life on Earth and underpin vital interactions between the climate, economy and human wellbeing.
- But the ocean is under threat from the excessive heat and carbon dioxide it has absorbed as part of its crucial role in climate regulation, leading to cascading effects including melting ice, sea-level rise, marine heatwaves, ocean acidification and storm surges.
- In addition, human activities as part of a burgeoning ocean economy, such as fishing, agriculture, aquaculture, pollution, maritime transport and tourism, exert stress on ocean ecosystems, depleting ocean biodiversity.
- The marine environment is often overlooked as policy discussions focus on the economic implications of the loss of terrestrial ecosystems. But ocean degradation and associated risks pose threats to ocean economy sectors – and to broader financial system stability.
- There is a need for collective action to achieve a sustainable ocean economy in which economic growth is integrated with environmental sustainability and social equity.
- Economic and financial policymakers should enhance their understanding of the ocean and how it interacts with climate and society, and develop sound environmental risk management practices that account for ocean-related risks.

**Policy briefs** provide analysis on topical issues, presenting specific recommendations to inform ongoing policy debates. Drawing on CETEX's expertise, they either summarise our research findings or the state of knowledge about a particular issue.

# The ocean and the climate system

The ocean is a major global reservoir for water, heat and carbon, thus playing a crucial role in climate regulation. The ocean is vital in mitigating the worst impacts of climate change and has a significant role to play in ensuring Earth system stability.

The ocean contributes to the following key functions:

- **Absorbing carbon emissions:** The ocean is Earth's largest carbon sink and absorbs carbon dioxide (CO<sub>2</sub>) at a magnitude surpassing the world's forests. Around 25% of anthropogenic carbon emissions released since the Industrial Revolution have been absorbed by the ocean (Gruber et al., 2023).
- **Absorbing excess heat:** As a result of rising greenhouse gas emissions, larger amounts of solar radiation are being retained in the Earth's atmosphere, and this excess heat has largely been absorbed by the ocean (Rhein et al., 2013).
- **Controlling temperature distribution:** The ocean regulates the climate by distributing heat around the Earth.<sup>1</sup> Some components of this system, particularly the Atlantic Meridional Overturning Circulation (AMOC), are showing signs of weakening and are approaching 'tipping points' (Van Westen et al., 2024; Ditlevsen and Ditlevsen, 2023).
- **Regulating the water cycle:** The ocean plays a critical role in regulating the Earth's water cycle, which sustains terrestrial and aquatic ecosystems while also maintaining the Earth's climate.
- **Regulating the nutrient cycle:** Land and ocean interact through the exchange of nutrients, whereby dead organic matter decomposes into valuable nutrients like nitrogen and phosphorus, which are crucial for biological production.

Anthropogenic climate change has resulted in increasing global air temperatures – and has led to increasing ocean temperatures. Over the past 140 years, ocean temperatures have risen by 1°C, and in some places as much as 3°C (Mladenov, 2020). By absorbing this heat, the ocean has played an enormous role in mitigating the severity of the physical impacts of climate change experienced to date.

The excessive heat, energy and CO<sub>2</sub> absorbed by the ocean leads to cascading effects including melting ice, sea-level rise, marine heatwaves, ocean acidification and storm surges, which ultimately have a profound and lasting negative impact on marine biodiversity, and the lives and livelihoods of coastal communities and beyond.



Photo: Naja Bertol Jensen/Unsplash



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<sup>1</sup> This process is called thermohaline circulation and occurs as a result of changes in currents on the ocean's surface and in the deep ocean. It is sometimes also referred to as the 'global conveyor belt'.

## Ocean governance structures

The unique characteristics of the ocean pose challenges for governance and enforcement, often resulting in environmental harm due to inadequate oversight.

The United Nations Convention on the Law of the Sea (UNCLOS) was established in 1982, providing the key framework that governs the rights of sovereign states to control the waters adjacent to their coasts, including activities such as fishing, commercial development of marine energy, mineral extraction and undertaking scientific research.

An important feature of UNCLOS is that it defines maritime zones and outlines which laws apply to specific areas of the ocean:

- **Territorial Seas:** the marine area that extends 12 nautical miles from states' low water lines, within which the state has exclusive rights to control activities, apply laws and use resources.
- **Exclusive Economic Zones (EEZs):** marine areas that extend 200 nautical miles from states' low water line, over which they also have rights.
- **High Seas:** the area beyond the EEZs that is not governed by any jurisdiction but is shared globally.

The lack of governance structures and enforcement mechanisms for the High Seas raises questions around the sustainability of economic activities and the equitable sharing of benefits from this area, particularly as wealthier and more technologically advanced nations tend to hold the capabilities required to exploit its rich resources.

UNCLOS does not provide governance frameworks for the equitable and just use of resources in the High Seas. Instead it encourages the negotiation of further agreements to implement the relevant provisions of the convention. For example, the Biodiversity Beyond National Jurisdiction (BBNJ) Agreement, also known as the High Seas Treaty, was recently signed to uphold the UNCLOS objective for the conservation and sustainable use of marine resources. It marks a significant step towards protecting marine biodiversity in line with the goal of the Kunming-Montreal Global Biodiversity Framework to protect 30% of the Earth's land and seas globally by 2030 by, for example, establishing Marine Protected Areas in the High Seas.

A number of international institutions – including the International Maritime Organization (IMO), the United Nations Fish Stock Agreement, and the International Seabed Authority – have been established to regulate specific ocean-based activities. These institutions are usually sector-focused to develop rules and regulations relevant to activities such as shipping, mining and fishing that utilise the High Seas for sea routes or resources.

The momentum that led to the formation of UNCLOS in the middle of the 20th century mirrors the current surge in economic interest and activities in the ocean, demanding better governance structures.

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## The ocean economy

The ocean has been a resource and medium for conducting economic activities for millennia. Through the provisioning of food and energy, and the enabling of trade, the ocean has played a vital role in the development of human civilisation and it continues to be crucial to the global economy today.

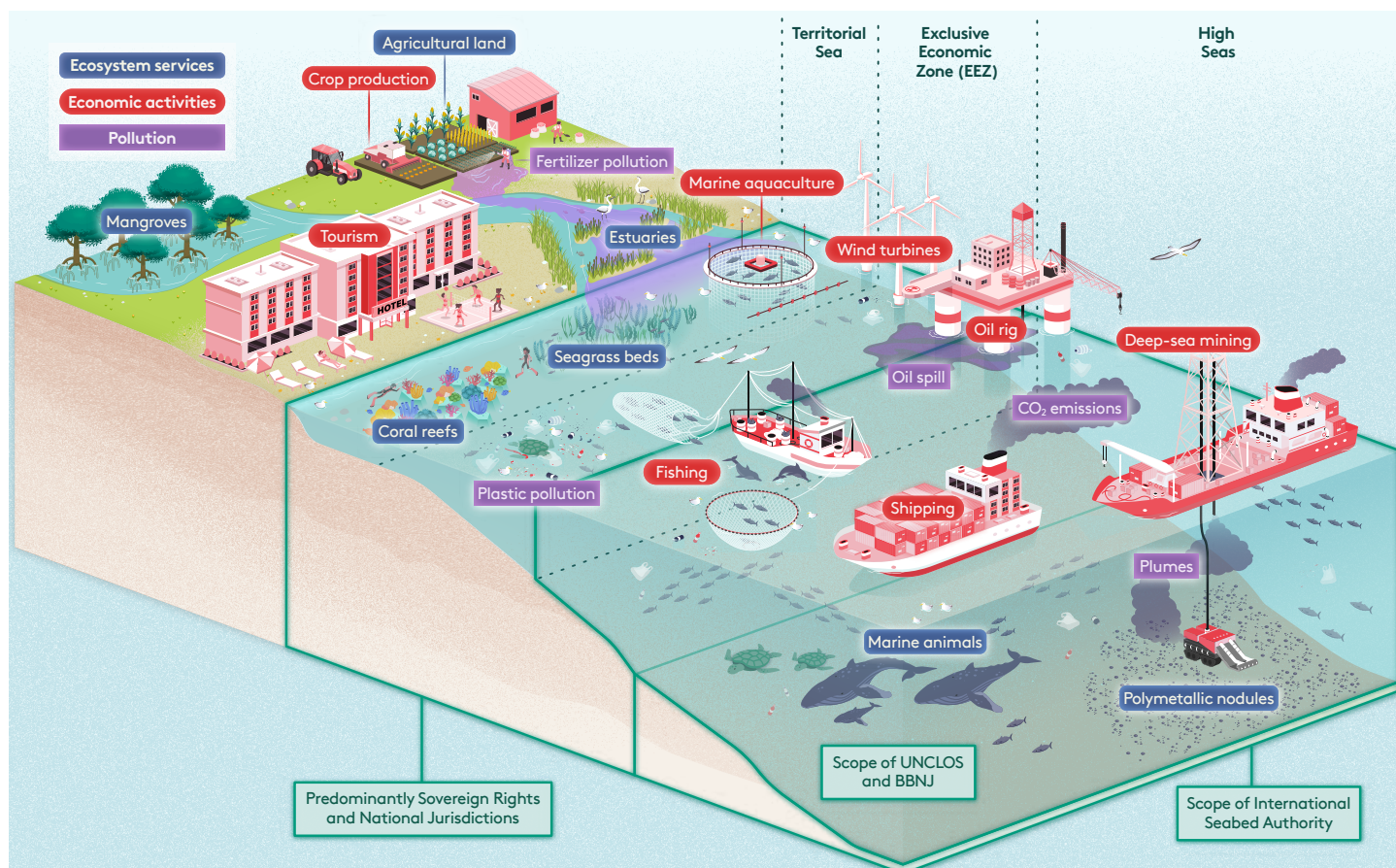
The ocean economy is generally understood to encompass “all economic activities related to ocean and coastal seascapes, covering a range of interlinked sectors, both established and emerging blue growth sectors” (World Bank, 2023). The ocean economy is worth around US\$1.5 trillion, which is estimated to rise to \$3 trillion by 2030, with growth anticipated across all ocean-based industries (OECD, 2016).

Global and national economies are directly and indirectly linked to the ecosystem services that the ocean provides, for example through the provision of seafood, energy, tourism opportunities and hazard protection. While ocean sectors contribute materially to economies, if not properly managed, they can negatively impact marine ecosystems.

Natural elements of the ocean and marine environment, along with human activities and impacts that belong to the ocean economy, are illustrated in Figure 1, which also demarcates the legal zoning of international governance frameworks.

“Global and national economies are directly and indirectly linked to the ecosystem services that the ocean provides.”

Figure 1. The ocean economy, comprising marine ecosystem services, economic activities and selected polluting effects



Source: Authors



## Impacts of human activities on the ocean

In addition to the detrimental impacts of climate change on ocean ecosystem health, human activities such as fishing, agriculture, aquaculture, pollution, maritime transport and tourism as part of the burgeoning ocean economy exert stress on ocean ecosystems (IPBES, 2020), depleting ocean biodiversity.

Agricultural practices can cause soil erosion and lead to sediment pollution, in turn harming plants, fish, wildlife and coral reef ecosystems. Human reliance on plastic and inadequate waste management also exacerbates ocean pollution. Growing demand for seafood has increased the risk that overfishing will occur and expanded the use of aquaculture, leading to harmful consequences such as the deterioration of water quality and habitat destruction. Further, the emergence of new economic activities like deep-sea mining creates new and as yet poorly understood risks that could lead to further declines in ocean health.

The ocean economy has historically prioritised short-term economic gains over long-term environmental sustainability, leading to significant ecological degradation and resource depletion. Growing global efforts to mitigate climate change have led to increased recognition of the need to reduce carbon emissions associated with the ocean economy, giving rise to the concepts of the 'decarbonised ocean economy' and the 'blue economy'. These terms need to be more clearly distinguished, and their implications for policy and practice better understood (see Box 1).

While there is no agreed definition of the 'blue economy', we posit that the term should encompass the aim of achieving long-term sustainability by ensuring that economic activities support environmental conservation and social responsibility. While decarbonisation is important in mitigating climate change and ensuring the health of the ocean, a more stringent conceptualisation of the blue economy that integrates ecosystem protection and decarbonisation is required.

### Box 1. Definitions

**Ocean economy** – all economic activities that take place in the ocean.

**Decarbonised ocean economy** – an ocean economy with reduced carbon emissions.

**Blue economy** – often focuses on the decarbonisation of existing ocean economy activities, but there is no universally accepted definition of this concept.

**Sustainable ocean economy** – a blue economy that integrates economic growth with environmental sustainability and social equity. We use this term to describe a more ambitious blue economy.

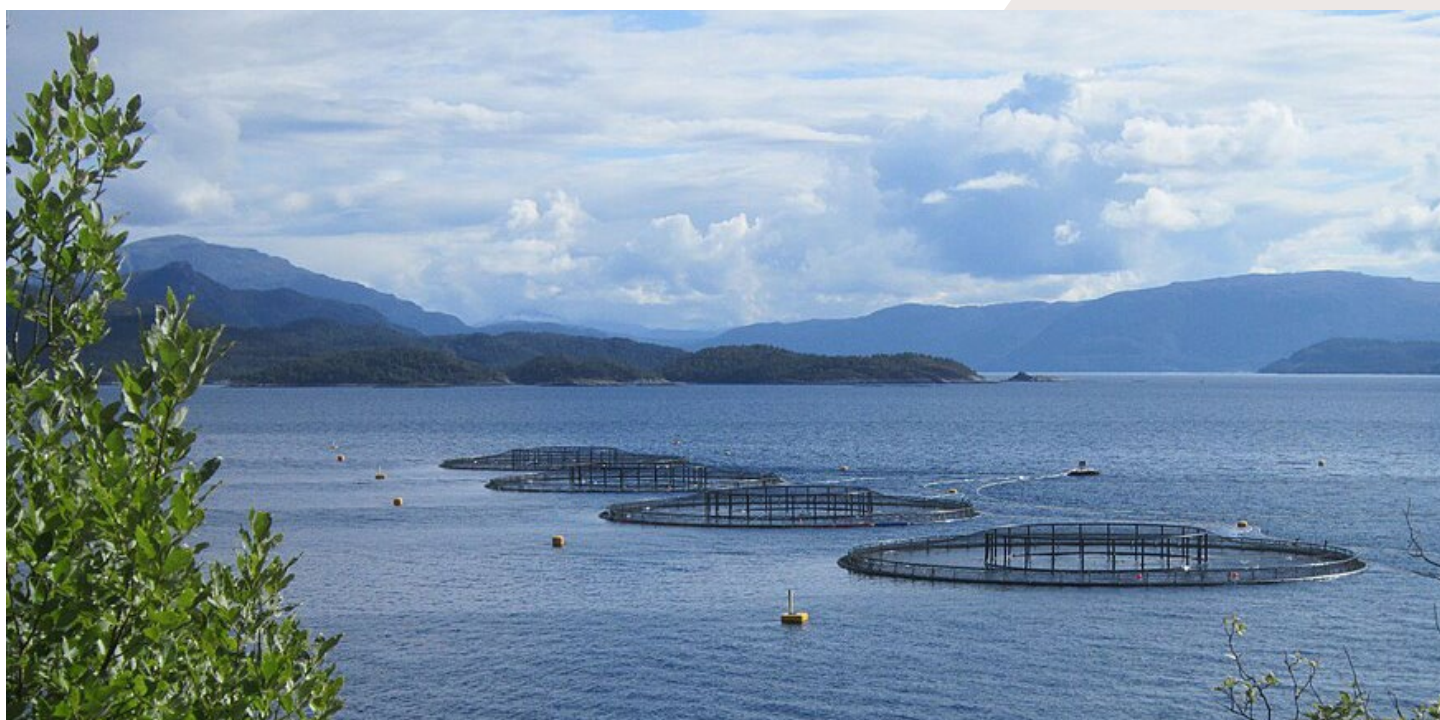


Photo: Brataffe/Wikimedia Commons

## The ocean and financial system risk

Despite the opportunities offered by the blue economy, it is crucial to acknowledge the risks to the financial system associated with climate change and ocean degradation.

Ocean-related financial risk encompasses a wide range of potential threats and challenges that affect marine environments, coastal communities and maritime activities, including: weather-related disruptions and climate change impacts; supply chain disruptions; strengthened environmental regulations; technological vulnerabilities; navigational hazards; piracy; and maritime security threats.

Companies operating in sectors that are highly reliant on a healthy ocean, such as fisheries and coastal tourism, are at the greatest risk of experiencing a decline in the value of their assets in the short term.

The financial system's absence of consideration for the value of a healthy ocean ecosystem perpetuates its degradation and exacerbates the impacts of climate change through the continuation of harmful activities. Ocean degradation and associated risks pose not only threats to individual entities but also to broader systemic stability, due to the importance, vastness and interconnectedness of the ocean.

### Mitigating risk

Ocean-related physical and transition risks could lead to systemic risks for the economy and financial system. A first step to mitigate these risks would be to recognise the value of ocean ecosystems alongside terrestrial ecosystems and ensure that investments contribute to sustainability and resilience across both land and ocean.

Blue finance represents a niche yet rapidly evolving area within the broader landscape of sustainable finance and has garnered considerable interest from a diverse array of stakeholders, including investors, financial institutions and issuers across the globe. The principal objective of blue finance is to generate beneficial outcomes for the marine environment. By facilitating and labelling investments, it plays a pivotal role in ensuring the regeneration, protection and sustainable use of the ocean and its resources. However, current levels of investment are below what is required. The UN Sustainable Development Goal (SDG) 14, 'Life Below Water', receives the least official development assistance (ODA) of all the 17 SDGs (World Economic Forum, 2022). To achieve its objectives, an estimated annual investment of US\$175 billion is required until 2030 (Johansen and Vestvik, 2020).

Ocean-based climate solutions such as offshore wind or zero-emissions vessels have the potential to close the carbon emissions gap – i.e. the difference between where emissions are heading and where they need to be to meet the 1.5°C target – by up to 35% by 2050 (ibid.). Funding is particularly needed to create ocean-based climate mitigation and adaptation opportunities in emerging markets and developing countries. Generally, more support is required at various stages, including for research into the impacts and possible side-effects of ocean-based climate solutions, and improved governance and regulatory frameworks for risk management and environmental impact assessments.

**“The financial system’s absence of consideration for the value of a healthy ocean ecosystem perpetuates its degradation and exacerbates the impacts of climate change.”**

## Implications for economic and financial policymakers

In the context of climate-related impacts and burgeoning economic activities in the ocean, it is imperative that ocean resources are used sustainably and in a way that addresses economic, environmental and social considerations.

### Recommendations for economic and financial decision-makers

- An enhanced conceptualisation of the blue economy is required that emphasises sustainability and recognises the interconnectedness of the ocean, climate and society. To realise this vision for a sustainable ocean economy, various stakeholders and society at large need to be part of a collective effort.
- To tackle issues such as overfishing, habitat destruction, pollution and climate change impacts, international efforts should prioritise the establishment of transboundary ocean governance frameworks that align with international agreements on marine conservation.
- Sector-specific approaches to regulating ocean industries are essential, requiring coordination and collaboration between stakeholders and across different sectors.
- First steps towards financing a sustainable ocean economy include engaging the financial sector in dialogue about the ocean through capacity-building programmes and ensuring their participation in international fora and networks for ocean-related policy, such as through organisations like the Network for Greening the Financial System.
- The financial sector needs to account for the unique ocean environment and the interacting components of Earth systems through sound environmental risk management practices that include ocean-related risks alongside climate and land-based nature-related risks.
- Innovative financial instruments offer promising avenues for financing the blue economy. These include blue bonds, financing mechanisms for marine conservation, and insurance products that cover ocean-related risks and encourage better practices.
- Governments should undertake due diligence to understand and mitigate the unequal impacts of ocean-based economic activities on coastal communities.
- Policymakers should prioritise support for Small Island Developing States through financial assistance, capacity-building and technical support to enhance resilience and promote sustainable development in these regions.

“To realise this vision for a sustainable ocean economy, various stakeholders and society at large need to be part of a collective effort.”

This policy brief is based on a full-length policy report, *The blue imperative: understanding interactions between the ocean, climate and economy*.

Read it here: [www.lse.ac.uk/cetex/publications/the-blue-imperative-understanding-interactions-between-the-ocean-climate-and-economy/](http://www.lse.ac.uk/cetex/publications/the-blue-imperative-understanding-interactions-between-the-ocean-climate-and-economy/)





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## Authors’ declaration

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