

Böttcher, Miranda; Geden, Oliver; Schenuit, Felix

Research Report

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SWP Comment

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Into the Blue: The Role of the Ocean in Climate Policy

Europe needs to clarify the balance between protection and use

Miranda Boettcher, Oliver Geden and Felix Schenuit

Since net zero targets have become a keystone of climate policy, more thought is being given to actively removing carbon dioxide from the atmosphere while continuing to drastically reduce emissions. The ocean plays a major role in regulating the global climate by absorbing a large proportion of anthropogenic carbon dioxide emissions. As the challenges of land-based carbon dioxide removal (CDR) approaches are increasingly recognised, the ocean may become the new “blue” frontier for carbon removal and storage strategies in the EU and beyond. However, the ocean is not an “open frontier”; rather, it is a domain of overlapping and sometimes conflicting rights and obligations. There is a tension between the sovereign right of states to use ocean resources within their exclusive economic zones and the international obligation to protect the ocean as a global commons. The EU and its Member States need to clarify the balance between the *protection* and *use* paradigms in ocean governance when considering treating the ocean as an enhanced carbon sink or storage site. Facilitating linkages between the ongoing review of the Marine Strategy Framework Directive and the establishment of the Carbon Removal Certification Framework could help pave the way for debate about trade-offs and synergies in marine ecosystem protection and use.

Following the kick-off of the UN Ocean Decade in 2021 and in the wake of the UN Ocean Conference in Lisbon in 2022, the nexus between climate change and ocean governance is increasingly being acknowledged. Not only is there growing awareness of the risks posed to marine environments by climate change (acidification, bleaching, etc.); there is also increasing focus on the role of the ocean in mitigating climate change. Since net-zero greenhouse gas

emissions targets have become a keystone of EU climate policy, the need to actively remove carbon dioxide from the atmosphere while continuing to drastically reduce emissions has become the subject of ever more debate. The ocean plays a key role in regulating the global climate by absorbing a large proportion (25 – 30%) of anthropogenic carbon dioxide emissions. As the technical and socio-political challenges of land-based CDR approaches become apparent, the



ocean may offer new hope for carbon removal and storage strategies in the EU and beyond. Proposals for using the ocean as an enhanced carbon sink range from the expansion of seagrass beds to geochemical approaches, including ocean alkalinity enhancement (see Figure 1 below). While EU policymakers have signalled they are ready to address the idea of marine carbon dioxide removal (mCDR), there is a disconnect between actors engaging on climate change mitigation policy and those engaging on marine protection policy. This disjointed marine and climate policy landscape may present a barrier to the comprehensive consideration of the role of the ocean in the EU's climate strategy.

The ocean as a carbon sink in international climate policy

Since the Intergovernmental Panel on Climate Change (IPCC) made clear that net zero targets cannot be achieved without the deployment of CDR methods, a debate has emerged about how to actively remove carbon dioxide from the atmosphere in addition to drastically reducing emissions. At the same time, the role of the oceans is becoming increasingly central to international climate policy discussions at the United Nations Framework Convention on Climate Change (UNFCCC) Conferences of the Parties (COPs). Since COP21 in Paris in 2015 – when 23 parties (including France, Spain, Sweden, Australia, Canada, Mexico, Chile and several small island developing states) issued the “Because the Ocean” declaration, which argued that the Paris Agreement was too land-centric – there have been numerous attempts to raise the profile of the ocean in climate negotiations. A second “Because the Ocean” declaration was issued at COP22 in Marrakech in 2016 and currently has 41 signatory parties. COP23 in Bonn in 2017 featured an “Oceans Action Day” and the launch of an initiative of the Presidency to integrate a strategy for the ocean into climate change mitigation pathways. The “Oceans Action Day” at

COP24 in Katowice in 2018 focused on the discussion of how achieving nationally determined contributions (NDCs) may involve and affect the ocean. COP25 in 2019 was referred to as the “Blue COP” to highlight its focus on the ocean-climate interface. Despite this multitude of initiatives, the role of the ocean has not been directly addressed in UNFCCC negotiation tracks, indicating that while the link between the ocean and climate is being recognised, the role of the ocean in international climate policy remains unclear.

Recent policy-focused analyses have further highlighted opportunities for ocean-based climate action in NDCs and emphasised “ocean solutions” to climate change. Furthermore, an assessment of ocean-based climate strategies was included in the 2019 IPCC Special Report on the Ocean and Cryosphere in a Changing Climate.

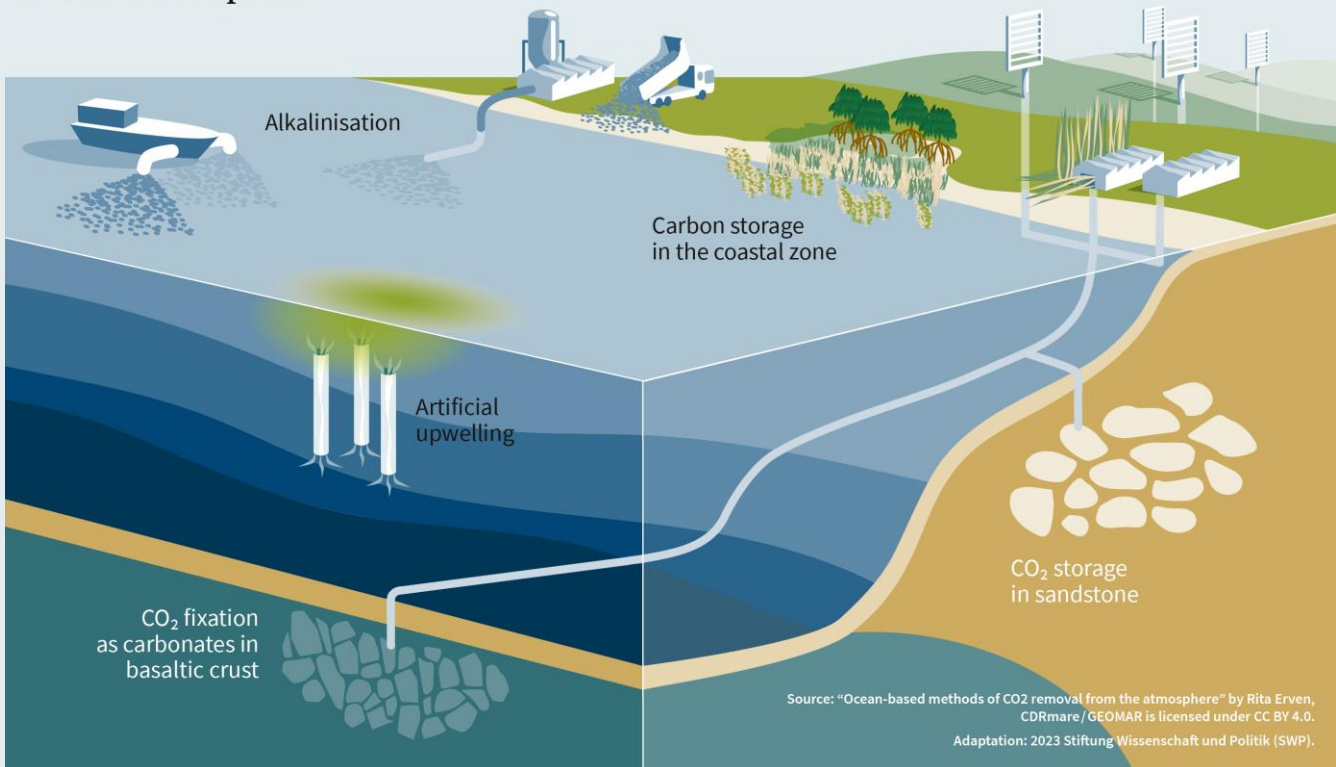
In light of this increased focus on the role of the ocean in international climate governance and as the challenges of land-based CDR become more evident, it might well prove tempting for key emitters such as the US and China to treat the ocean as a new “blue” frontier for carbon removal.

The US is already considering the role of mCDR as part of its mitigation strategy: the National Academies of Sciences, Engineering and Medicine published a report in late 2021 that outlined a national research strategy for ocean-based carbon removal. Since then, several carbon removal bills have been introduced in the US Senate and House of Representatives that emphasise the potential use of the ocean as an enhanced carbon sink and call for the development of an “ocean carbon removal mission”.

China, which has a long history of marine ecosystem management, supports what is currently the world's largest-scale kelp farming industry; and in recent years, it has stepped up investigations into coastal blue carbon potential. Beijing's most recent Five-Year Plan (FYP14), issued in March 2021, stated that ocean carbon sinks should be improved; and the Chinese Ministry of Natural Resources subsequently released a document proposing “Accounting Methods

Figure 1

Ocean-based methods of CO₂ removal from the atmosphere



for the Economic Value of the Ocean Carbon Sink”. In 2021, China initiated its first blue-carbon credit project and the State Oceanic Administration announced trading blue carbon would focus on both coastal ecosystems and novel approaches such as “microbial carbon pumps”. The head office of the Ocean Negative Carbon Emissions programme, launched in 2022, is located in China and its first International Forum took place in Xiamen in November 2022.

In addition, there is increased interest in mCDR among international commercial actors. A large number of start-ups are emerging (e.g., Running Tide, Project Vesta), while larger philanthropic organisations like Ocean Visions are working to catalyse the development of various mCDR methods, including alkalinity enhancement (whereby silicate minerals such as lime and olivine, which react with seawater to bind CO₂, are added to the ocean) or artificial upwelling (whereby nutrient-rich deep waters are pumped up – this has a fertilising effect on

algae and other upper-ocean life forms, meaning that more CO₂ can be fixed in their biomass). With the new actors emphasising the high theoretical carbon drawdown potential and the monetisation opportunities presented by marine approaches, there is a risk of the potential of mCDR being vastly exaggerated to attract venture capital and of commercial interests pushing the launch of projects without adequate governance.

All these developments suggest that it is important to consider how using the ocean as a carbon sink may interact with other ocean governance objectives.

Global ocean governance between use and protection

The ocean is not an “open frontier”; rather, it is a domain filled with overlapping jurisdictions. Owing to the many conflicting rights and obligations in international ocean governance, there are different inter-

pretations regarding the legality of the different types of mCDR.

Having been developed without mCDR in mind, most international ocean governance mechanisms focus primarily on marine protection. The only attempt to directly govern mCDR is through the 2013 amendment to the London Protocol, which prohibits large-scale ocean fertilisation (adding nutrient-rich substances such as iron to the ocean to increase algal growth) and provides guidance for regulating other mCDR activities that would involve placing matter into the marine environment. The primary aim of the London Protocol is, however, to protect the marine environment rather than regulate the use of the ocean as a common-pool resource for climate change mitigation. As of January 2023, there were 53 Contracting Parties to the Protocol, including Germany and China but not the US. Moreover, the amendment pertaining to mCDR is not yet in force, as it has still to be ratified by the prerequisite two-thirds of Contracting Parties.

In 2018, negotiations started on a new international legally binding instrument under the UN Convention on the Law of the Sea that will address the conservation and sustainable use of marine biodiversity of areas beyond national jurisdiction (BBNJ). This instrument has the potential to strengthen links between climate and ocean governance. Its focus is on balancing the risks of various ocean activities: it aims to provide signatory states with more detailed processes, thresholds and guidelines for environmental impact assessments in the marine environment, includes provisions on considering cumulative impacts of multiple activities and proposes detailed monitoring and reporting obligations. The draft agreement also proposes rules to promote capacity building and technology transfer and recommends the establishment of a clearing house mechanism that could facilitate the sharing of marine data, promote collaborations, facilitate requests for capacity building and enhance research transparency.

While mCDR is not the focus of the BBNJ negotiations, a key impetus for the new

treaty was concern about human interventions in the high seas. For this reason, it may become another instrument for governing mCDR activities beyond national jurisdictions.

As the above shows, the idea of using the ocean as an enhanced carbon sink plays into fundamental tensions between the two main paradigms of ocean governance: the one emphasises the sovereign right of states to *use* ocean resources within their exclusive economic zones and the other highlights the international obligation to *protect* the ocean as a global commons. Although some existing and emerging international ocean governance mechanisms have relevance for mCDR, there is currently a significant international governance gap regarding what role the ocean's carbon sink potential can play in climate-change mitigation strategies.

The nascent role of the ocean in EU climate policy

The role of the ocean in the climate policy of the EU is largely undefined. There was no mention of the ocean's carbon drawdown potential in either the European Commission's 2018 long-term strategy for a climate neutral society or the European Green Deal Communication published by the Commission in 2019. It is true that the ocean's carbon drawdown potential was referred to in the Commission's 2021 Communication on carbon farming, which pointed to the opportunities offered by blue carbon farming, including through the regeneration and expansion of seagrass beds. But there was no mention of geochemical approaches to increasing the marine carbon removal potential — for example, via ocean alkalinity enhancement.

The following year, references to marine carbon drawdown were included in the 2022 joint Communication by the Commission and the EU High Representative on the EU's international ocean governance agenda. That Communication highlighted that there is growing interest in mCDR activities and reiterated that while the

London Convention, together with its Protocol, allows and regulates carbon capture and sequestration in sub-sea geological formations, it prohibits ocean fertilisation except for research purposes. The communication further emphasised that before the EU advances any new mCDR approaches, it must be ensured that there is an adequate scientific basis on which to justify such activities and that the associated risk and impacts have been appropriately considered. However, the Communication also pointed out that mCDR methods – such as expanding seagrass beds and algae fields – can help mitigate climate change by increasing carbon uptake and storage.

There is currently no accounting for carbon fluxes in marine and coastal zones in European land use, land-use change and forestry (LULUCF) reporting; indeed, including such data would be technically and politically challenging. However, in the adopted 2022 revision of the LULUCF regulation under the “Fit for 55” package, EU policymakers emphasised the possible consideration of accounting for CO₂ removals in marine ecosystems in the future.

The focus on biological approaches to increasing carbon uptake in the ocean is also evident in other EU initiatives. For example, in summer 2022, the European Commission, the European Climate, Infrastructure and Environment Executive Agency and a consortium of sustainability consultants and algae organisations launched a European algae stakeholder platform – EU4Algae. In a November 2022 Communication, the Commission highlighted the role that macro algae (seaweed) cultivation can play in climate change mitigation through carbon sequestration and set out targeted actions to support the upscaling of algae cultivation throughout the EU.

The European Parliament’s Intergroup on Climate Change, Biodiversity and Sustainable Development has an “Ocean Governance Working Group”. The focus of its climate-change policy is on the protection of the ocean from impacts. But it has recently begun to engage with the idea of the ocean as an enhanced carbon sink.

The option of storing CO₂ in sub-seabed geological formations is also being considered. For example, there are new efforts under way to ratify the relevant London Protocol amendment and to enable transboundary CO₂ transport and storage while preparations are being made for a Communication on carbon capture and storage. An analysis of the legal framework under the Protocol provided by the Commission indicates that the current EU Carbon Capture and Storage Directive could serve as an agreement which, in line with the London Protocol, would provisionally allow the transboundary transportation of CO₂ (between EU Member States and European Economic Area countries, including Norway) for sub-seabed storage.

In 2022, the Commission published a legal proposal to establish a Carbon Removal Certification Framework (CRC-F). Although this proposal does not explicitly include or exclude the various CDR methods, the debate around the CRC-F continues to focus on land-based carbon removal approaches. However, the fact that the initial wording was left open and references to the potential of blue carbon drawdown were included in the Commission’s 2021 Communication on carbon farming, suggests this focus could be expanded during negotiations between the European Council and Parliament to include ocean-based approaches in the future.

The broader paradigms of international ocean governance relevant for balancing consideration of the risks and benefits of mCDR have also been incorporated into EU marine policy – for example, the Marine Strategy Framework Directive (MSFD), which, adopted in 2008, takes an ecosystem approach to the management of human activities that have an impact on the marine environment and thereby integrates the concepts of environmental protection and sustainable use. However, as is the case at the international level, there is a governance gap regarding the role of the ocean in the EU’s climate strategy. This suggests that when considering using the ocean as an enhanced carbon sink, the EU and its Member States need to clarify the balance between the protection

and use paradigms in ocean governance. The ongoing review of the MSFD, which is scheduled to be completed in 2023, will coincide with the negotiations on the proposed EU CRC-F. These two processes may provide an opportunity to reduce the disconnect between marine and climate policy and at the same time reveal both common and diverging interests across Member States and within the European Parliament.

Developments in Germany

The current German government highlighted the need for carbon removal in its coalition agreement of 2021. That document promised the development of a long-term strategy to counterbalance residual emissions that takes into account not only “natural sinks” but also “technological CO₂ removal” and storage approaches. The challenges associated with geological carbon storage in Germany (see, for example, the Carbon Dioxide Storage Act) have started to fuel interest in the sub-seabed storage of CO₂ outside Germany’s marine exclusive economic zone, especially following Norway’s and Denmark’s recent offers to import and store carbon in the areas of the North Sea over which they have jurisdiction.

In 2021, the German Ministry of Education and Research, in collaboration with the German Marine Research Alliance, launched a marine carbon dioxide research mission (CDR_{mare}), which aims to research whether and to what extent the marine environment can play a role in removing and storing CO₂ to help achieve the long-term temperature goal of the Paris Agreement. The mission examines both biological and geochemical approaches to mCDR and assesses the potential for storage of CO₂ under the seabed. The latter is not a carbon dioxide removal approach unless the stored CO₂ has been captured at a bioenergy plant (bioenergy with carbon capture and storage) or drawn directly from the atmosphere (direct air carbon capture and storage).

It is especially actors in the north German federal states that are positioning

themselves as pioneers in the development of sub-seabed carbon storage infrastructure. In Wilhelmshaven, for example, planning is under way by Wintershall Dea for the development of infrastructure allowing the transportation of CO₂ to sub-seabed storage locations in Norway. Similarly, a Norwegian company (Equinor) has teamed up with a German gas importer (VNG) in Rostock to investigate the use of technologies to capture, utilise or transport and safely store CO₂ offshore on an industrial scale.

At the same time, the German government is becoming increasingly engaged with the idea of sub-seabed carbon storage. A 2022 joint statement by the Norwegian Prime Minister and the German Minister for Economic Affairs and Climate Action, which refers to the two countries playing a “leading role in managing carbon emissions”, was followed up by a German-Norwegian declaration in January 2023 about the intention to “discuss various options for CO₂ infrastructure and value chains, including a CO₂ pipeline from Germany to Norway”. Such statements indicate increased federal-level interest in cooperation on carbon storage under the North Sea. In addition, in December 2022, the federal government approved the evaluation report on the Carbon Dioxide Storage Act, which recommends the development of a comprehensive carbon management strategy, including sub-seabed carbon storage, and the adaptation of legal and regulatory frameworks to make such storage possible. This would mean the German ratification of the amendment to Article 6 of the London Protocol that would allow the transboundary transportation of CO₂ for sub-seabed storage.

In parallel to developments in the climate policy space, there have been signs that ocean governance is becoming more central to German environmental policy. The 2021 coalition agreement was the first such document to have an explicit chapter on marine protection. It also referred to the need to “create opportunities for the sustainable use of the ocean” and to “improve the natural CO₂ storage capacity of the ocean”. And re-

cently, the federal government announced the appointment of the first national marine protection commissioner as part of the Environment Ministry's push for better protection of the North and Baltic Seas.

Finally, the G7 ocean deal, which was reached under the German Presidency in 2022, has a strong focus on marine protection, too. It also emphasises "limiting the catastrophic impacts of climate change on the ocean" and mentions "marine Nature-based Solutions that deliver for people, biodiversity and climate".

All these developments indicate that ocean governance is becoming a politically salient topic for the German government and that there is a growing coalition of actors pushing for the prioritisation of marine protection. At the same time, environmental organisations have warned that the German government risks rolling back marine protection measures by prioritising various kinds of ocean use in marine spatial planning. They are also critical of the government considering the possibility of sub-seabed CO₂ storage within Germany's marine exclusive economic zone. Furthermore, environmental organisations are concerned that risks to marine biodiversity may be accepted in the name of climate change mitigation and have emphasised the need to overcome the disconnect between climate and marine protection policy.

Linkages to overcome the disconnect

The discussion above highlights that while the German government is paying more attention to marine policy, there is still a lack of coherent linkages to climate policy. At the same time, tensions are emerging between marine *protection* and the *use* of the ocean as a carbon sink and storage site, echoing the broader conflict between two paradigms of ocean governance (protection

vs use) in both the EU and the broader international context. These tensions are already playing out among the actor groups engaged in marine protection (environmental organisations, coastal communities) and use (fisheries, tourism, shipping, offshore wind, military operations); and the explicit linking of marine and climate policy can be expected to further deepen these conflict cleavages. There is a need for an open discussion on how to balance trade-offs and identify potential synergies in order to achieve these two ocean governance objectives.

Clarification at the EU level of how to balance the protection and use paradigms in ocean governance when considering using the ocean as an enhanced carbon sink would provide guidance for the development of a coherent German government position on the role of the ocean in climate policy.

A first opportunity to reduce the disconnect between marine and climate policy on the EU level is approaching: in 2023, the EU MSFD – which takes an ecosystem approach to the management of human activities that have an impact on the marine environment and thereby integrates the concepts of environmental protection and sustainable use – will be reviewed by the European Commission and the proposed EU CRC-F will be negotiated between the European Parliament and Member States. Facilitating procedural and substantive linkages could help foster exchanges between these two often separate policy communities and processes, while paving the way for debate on potential trade-offs and synergies in marine ecosystem protection and use.

Dr Miranda Boettcher is a researcher in the ASMASYS project. Felix Schenuit is a researcher in the CDRSynTra project. Dr Oliver Geden is a Senior Fellow in the EU/Europe Research Division and leads the SWP contribution to these research consortia, which are funded by the Federal Ministry of Education and Research (BMBF).

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Stiftung Wissenschaft und Politik
German Institute for International and Security Affairs

Ludwigkirchplatz 3–4
10719 Berlin
Telephone +49 30 880 07-0
Fax +49 30 880 07-100
www.swp-berlin.org
swp@swp-berlin.org

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