Supplementary information:

Governing open ocean and fish carbon: perspectives and opportunities

# SI1. Interview guide

I. Starter

□ In which ways does your work relate to the governance of ocean and fish carbon?

□ In which governance fora do you regularly participate?

II. Timeline

□ How (in which context) did the discussion on ocean carbon and species contributions to carbon cycling first come up?

□ From back then how would you describe the change that happened until today?

□ Which dialogues and events were important to advancing the governance of ocean carbon?

(*Timeline of dialogues and events, also those planned to occur in the future*)

□ Were there any major events during the timeline that shaped the discussion?

III. Processes

□ Which individuals and organizations did you perceive to be influential in the timeline?

□ How did they (individuals and organizations) bring themselves in to the process? What makes them influential?

(Leads for the interviewer: they provided information/knowledge*: generate new knowledge, organize research & working groups, share information;* they collaborated*: formed coalitions, organized events & dialogues, conflict/resolution;* theyinfluenced: *influenced politicians and administrators, informal contacts with policy sector, give advice;* used their public voice*: media campaigns, demonstrations, protests*)

□ What kind of policy-relevant information has been provided in the course of the timeline? By which actors? When? How did it shape the debate around ocean carbon?

□ Were there any important coalitions? Which issues do they promote?

□ Were there any conflictual issues? In what way? What were the sides of the conflict?

IV. Future

□ How do you think carbon sequestration services from fish should best be governed?

□ What do you think will happen with regard to governance of ocean carbon in the near and mid-term future (2050)?

□ Under which framework? And using which management tools?

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# SI2. Key actors and in which fora they have strongholds

Most of the key actors we identified had a stronghold in UNFCCC processes (n=5; Table 4). Table 4 contains the key actors in the debate that were identified by the interviewees and that were interviewed by us, their main links to the (policy) issue as well as the key international fora they interact with. Seas at Risk, OurFish, and University of British Columbia collaborated to organize side events alongside the climate COPs. For instance, at the 2019 COP under the presidency of Chile and hosted in Madrid the focus of their side event was ‘[Ending overfishing can mitigate impacts of climate change](https://our.fish/wp-content/uploads/2019/09/Sumaila_Our_Fish_Webinar_Sep_2_2019final.ppt)’. The Ocean Climate Platform engages in the UNFCCC for instance by providing policy recommendations. Conservation International has promoted issues of coastal blue carbon at the UNFCCC by engaging with champion countries such as Fiji. The CBD is the second most addressed platform by the key actors. IUCN and Conservation International for instance engaged in the Blue Carbon Partnership. Also in the CBD, the Ocean Climate Platform provides policy recommendations. Grid Arendal is strongly linked to the UNEP under which the CBD is organized. BBNJ agreement and UNGA each had two key actors that were engaged in both: Seas at Risk and the Global Ocean Alliance. Seas at Risk promoted the BBNJ agreement with countries without access to the ocean. The Global Ocean Alliance for instance supported the initiation of the High Ambition Coalition which is a biodiversity related action platform.

SI Table 1. Timeline of milestones

|  |  |
| --- | --- |
| **Year** | **Events, publications, working groups** |
| 1992  | UNFCCC article 4.1B promotes sustainable management and conservation appropriate sinks and reservoirs of all 11 GHGs and oceans as well as terrestrial coastlines and marine ecosystems |
| 2009 | In the run-up to the 2009 Copenhagen conference, an intergovernmental “Manado Ocean Declaration” had sought to include coastal and ocean themes in the COP15 outcome & a fisheries-focused partnership of NGOs and international organizations similarly sought to secure recognition of the sector in adaptation processes, both were unsuccessful  |
| 2009 |  Since 2009 “Ocean Action Day” at COP |
| 2011 | A first effort in 2011 to formally consider the potential of blue carbon with the UNFCCC process failed to gain consensus, and was confined to the “research and systematic observation” workstream  |
| 2011 | Blue Carbon Initiative started |
| Before 2013 | Mangrove forests were also included within the Clean Development Mechanism's project category of habitat afforestation and reforestation  |
| 2013 | The wetland supplement was updated to include coastal ecosystems. Providing an approved methodology to calculate carbon stocks and flows |
| 2015 | An informal declaration at COP21 was led by Monaco and Chile, arguing that “Because the Ocean” was so important to the climate system, it needed to be more systematically discussed in the UNFCCC process |
| 2015 | International Partnership for Blue Carbon founded at Paris agreement |
| 2015 | NDC development and mentionings of Blue carbon |
| After 2013 | The US administration included coastal ecosystems in national inventory |
| 2017 | Fiji during its presidency of COP23 in 2017, launching an “Oceans Pathway Partnership” “to encourage the climate negotiations process to address the relationship between climate change and the ocean”.  |
| 2018 | High level panel for a sustainable ocean economy report on the ocean as a solution to climate change  |
| 2019 |  IPCC report on oceans & cryosphere |
| 2019 | [IMF report on whales](https://www.imf.org/external/pubs/ft/fandd/2019/12/natures-solution-to-climate-change-chami.htm#:~:text=Whales%20accumulate%20carbon%20in%20their,of%20CO2%20a%20year.) & WEF discussing whale contribution to ocean carbon |
| 2019 | UN climate change conference “Blue COP.” in Madrid, under Chilean presidency. Seas at Risk event at COP “end overfishing as climate action” |
| 2019 | Pacific Islands Forum 2019 summit declaration, similar calls about “including the ocean” in the climate process  |
| 2019 | The inclusion of “ocean and coastal zones” as one of seven focus areas for the Marrakesh Partnership for Global Climate Action, a platform for mobilizing non-state climate initiatives which has been guided by the High-Level Champions appointed by successive COP presidencies  |
| 2019 | International Court of Justice - Certain Activities, Valuation (Costa Rica v Nicaragua) - a case in which the court acknowledged the value of carbon sequestration ES from mangroves stolen by Nicaragua |
| 2020 | Ocean dialogues in UNFCCC  |
| 2020 | Blue manifesto |
| 2020 | The verified carbon standard released a module that allowed for full integration of coastal wetlands into carbon crediting methods (VERRA; 2020) |
| 2021 | Seaspiracy documentary mentioning blue carbon  |
| 2021 | [Our Fish symposium](https://our.fish/news/symposium-delivering-on-climate-biodiversity-targets-through-better-fisheries-management/) on Climate and Biodiversity targets through better fisheries management |
| 2021 | Our Fish key recommendations to European Commission action plan conserving biodiversity in the Ocean, signed by 15 E-NGOs |
| 2020 | Global Ocean Science Report published by IOC-UNESCO |

\*Blue leaders pledge

\*Global ocean alliance

# SI Table 2. Supplementary interview quotes

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| Quote 1 | *“I think this whole process of pushing and pushing for ocean climate-nexus, has also raised attention in the different programs. What is the link here and what could we do further?*” (Policy maker, interviewee nr. 8). |
| Quote 2 | “*The ocean absorbs so much CO2 [...] and there's a lot of talk about the impacts on the ocean and maybe not so much [until now] on how the ocean contributes to the carbon cycle or to absorbing the CO2. In the sense that if we have a healthy ocean maybe [this role] can be stronger*” (IGO representative, interviewee nr. 16) |
| Quote 3 | “*REDD+ is a program that has been established 50 years ago, and integrating a tree that just happens to grow in the coastal wet tidal area is something that a lot of countries and governments and practitioners could immediately understand.”* (ENGO representative, interviewee nr. 1).” |
| Quote 4 | "*A lot of this feels like it's quite new and we need more studies confirming and quantifying previous results.*" (Policy maker, interviewee nr. 8). |
| Quote 5 | “ *Some delegates feel that the BBNJ agreement shouldn't go into issues that are tackled under other agreements because there is this clause that says the BBNJ agreement should not undermine existing arrangements. There is still much debate on what that terminology means "not undermine". Some existing arrangements may not be functioning as effectively as they should and there are also a lot of gaps that need to be filled, which the BBNJ can potentially do, but some negotiating states are using the "not undermine" clause to prevent this from happening*.” (Academic, interviewee nr. 14). |
| Quote 6 |  “*The community has come out strongly for 30 by 30. The risk is that we get a lot of paper parks. It’s good to see that countries are getting behind the global ocean alliance [...]. I see this as the way to protect ecosystems as a whole and services and if you build your networks well you’ll also protect those [ecosystem] processes.*” (ENGO representative, interviewee nr. 5) |
| Quote 7 | *“I don't think that's because people think that there is no carbon impact from biodiversity, but because we can't measure it or allocate it or enforce it at this point or at least well enough. They [those working on climate policies] are very concerned it would be a gigantic loophole. It would be a way to say you're doing something without actually being able to lead to a real-world effect”* (ENGO representative, interviewee nr. 13).  |
| Quote 8 | “*They [RFMOs] haven’t really used their full capacity to sustainably manage fisheries for the important reason of food security. Why would a climate change argument change their practises now*?*”* (IGO representative, interviewee nr. 20). |
| Quote 9 | “*In the EU Common Fisheries Policy article 17 preferences quota allocation to those parts of the fleet that could provide the most social, environmental and economic benefits. Essentially the idea was if you do an impact assessment* [including carbon] *they gather data on the economics and social elements and then they allocate quota based on the least* [environmental] *impact and the most benefits.*” (ENGO representative, interviewee nr. 19) |

# SI Table 3. Key papers on (ocean) blue carbon mentioned by interviewees, the link to (ocean) blue carbon.

|  |  |  |
| --- | --- | --- |
| **Year** | **Key publication** | **Link to Topic** |
| 2013 | IPCC wetland supplement update:https://www.ipcc-nggip.iges.or.jp/public/wetlands/ | Method to quantify blue carbon offsets from coastal ecosystems |
| 2014 | Grid Arendal report on Fish Carbon:https://www.grida.no/publications/172 | Helped to mainstream the link fish play in the carbon cycle (even if the science underlying this report is much older) |
| 2016 | Blue carbon NDC inventory<https://bluecsolutions.org/dev/wp-content/uploads/Blue-Carbon-NDC-Appendix.pdf> | How NDC’s mention blue carbon (mostly coastal) |
| 2018 | High level report on ocean climate mitigation options: https://oceanpanel.org/sites/default/files/2019-10/HLP\_Report\_Ocean\_Solution\_Climate\_Change\_final.pdf | Ocean climate mitigation strategies, includes carbon at seafloor |
| 2019 | IPCC report on oceans and cryosphere | IPCC special report on impact of climate change on oceans, highlighting how vulnerable marine ecosystems and communities depending on their contributions are to climate change |
| 2019 | IMF report on whale carbon: https://www.imf.org/external/pubs/ft/fandd/2019/12/pdf/natures-solution-to-climate-change-chami.pdf | Role of whales in ocean biological pump |
| 2019 | High Level Panel Report on Ocean Mitigation Solutions:https://oceanpanel.org/sites/default/files/2019-10/HLP\_Report\_Ocean\_Solution\_Climate\_Change\_final.pdf | Mentions the role of carbon stored in the seabed (and its) protection for climate action |
| 2020 | IDDRI report on fishing in the twilight zone (2020):https://www.iddri.org/en/publications-and-events/study/fishing-twilight-zone-illuminating-governance-challenges-next | Calls for moratorium on mesopelagic fishing in international waters under BBNJ, amongst others due to the uncertainty regarding their role in the global carbon cycle |
| 2021 | IPBES-IPCC report on links between climate and biodiversity:https://ipbes.net/sites/default/files/2021-06/20210609\_workshop\_report\_embargo\_3pm\_CEST\_10\_june\_0.pdf | Complex interlinkages between biodiversity and climate, mentions the role fish and whales play in the carbon pump. |

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# Table S4. Strategies used by ENGOs to affect policy change

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| **Strategy**  | **Type of Activity** | **Example** |
| Public campaigning  | Interventions at negotiations  | During UNFCCC negotiations publicly shaming country that is not progressive in climate targets |
| Informing public/reporting | Sharing a new report on social media; highlighting activities of “champion countries”  Many of the ENGOs we spoke to have good links with the journalists and ensure this way that events can have a higher public reach |
| Informing / discussion with decision makers | Establishing informal relationships | Informal chats during conferences, coffee machine chats. Someone from a government delegation is more likely to ask someone they know for advice, especially if they don’t have all the expertise on board |
| Sign-on letters | Coalitions establish a letter to a government addressing blue carbon issues, which is then sent for scientists endorsing the issue to sign, and sent to the government or UNFCCC with signatures. |
| Providing information to decision makers  | E.g. gathering funds and write reports both information is also given informally.  |
| Commenting on agreements with possibility for open peer-review  | The CBD is open to comments from environmental NG’s before being published  |
| Enhance capacity/unified message | Finding “champion countries” and supporting their activities | Small island developing states may have limited resources to embellish their own push for climate action, their voice is enhanced by ENGOs support, by e.g. giving them a stage |
| Form coalitions, formally and informally | Collective call for action to protect ocean ecosystems for EU biodiversity strategy, undertaken by 15 ENGO’s (Our fish and allies, ‘shadow action plan’) |
| Collaborate with scientists that are motivated to create more environmentally friendly. Policies, some of which have a foothold in policy for & connections to policy makers (push also comes from scientists) Blue carbon topics have a high technical nature so the link with science is very tight. ENGOs can for instance organize space in the EU parliament for MEP’s to hear science talks on the topic.  |

# Table S5. Key civil organizations on (ocean) blue carbon mentioned by interviewees and spoken to in this study and their link to (ocean) blue carbon and policy fora

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| --- | --- | --- |
| **Key actor mentioned by interviewees** | **Link to the topic** | **Policy fora** |
| Grid Arendal & Blue Climate Solutions | Blue Carbon - focus on ocean & fish carbon | UNEPUNFCCC |
| Our Fish | Aim to stop overfishing and destructive fishing practices. Several policy briefs/ outputs, Organized symposium: https://www.climateocean.com/ | UNFCCC ClimateOcean |
| H[igh seas alliance](http://www.highseasalliance.org/), (coalition, very important for BBNJ) | BBNJ - focus on biodiversity, carbon mentioned as another reason to protect and rebuild marine populations | BBNJ |
| [Blue carbon initiative](https://www.thebluecarboninitiative.org/) (coalition, Include conservation international) | Focused on coastal blue carbon ecosystems, restoration & conservation (mangroves, seagrasses, saltmarshes)  | UNFCCC |
| Conservation international | Focused on coastal blue carbon ecosystems, restoration & conservation (mangroves, seagrasses, saltmarshes)  | UNFCCCWashington DC |
| Some “champion” countries: Fiji, Sweden, Chile, Australia, Costa Rica, Monaco, Indonesia | Blue carbon, mostly coastal, some of islands interested in ocean carbon | Fiji, Costa Rica,Sweden, Chile (in UNFCCC) |
| [Ocean climate platform](https://ocean-climate.org/en/home-2/) (coalition) | Forms a broad coalition for ocean and climate interactions  | UNFCCC, CBD |
| IUCN | Focused on coastal blue carbon ecosystems, restoration & conservation (mangroves, seagrasses, saltmarshes)  | UNFCCC |
| Seas at Risk | Protecting fish, functions in ocean biological pump | EU, ISA, UNGA, UNFCCC |
| IPCC | Research on link between climate and ocean, regulating functions of ocean, climate impact on ocean | UNFCCC |