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# The potential of the BBNJ clearing house mechanism to enhance knowledge pluralism in marine carbon dioxide removal assessment

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As the global community intensifies efforts to achieve net-zero greenhouse gas emissions, active carbon dioxide removal (CDR) is being planned alongside emission reductions. The open ocean, which already absorbs a substantial portion of anthropogenic carbon dioxide, is increasingly seen as a promising site for various types of marine CDR (mCDR). All of these approaches are in the preliminary stages of development, and many questions remain with regard to their assessment and governance. This paper discusses the potential role of the newly established *Agreement on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction* (BBNJ Agreement) in assessing and governing mCDR. A step-by-step mapping of the various stages of the BBNJ environmental impact assessment process shows that the new Clearing House Mechanism (CHM) could facilitate knowledge pluralism and contribute to the holistic assessment of mCDR proposals. The paper concludes by identifying challenges in operationalizing the CHM and putting forward recommendations to strengthen its capacity for fostering knowledge pluralism in decision-making on mCDR research and implementation.

KEYWORDS

**ocean governance, carbon dioxide removal, environmental impact assessment, clearing house mechanism, biodiversity beyond national jurisdiction, law of the sea**

## 1 Introduction

Since the establishment of net-zero greenhouse gas emissions targets by various states worldwide, there has been a growing understanding that it will be necessary to actively remove carbon dioxide from the atmosphere alongside deep and rapid emission reductions. The ocean, which currently fulfills a pivotal role in global climate regulation by absorbing a considerable portion of anthropogenic carbon dioxide emissions, is increasingly being acknowledged as a 'new frontier' for carbon removal (Boettcher et al., 2021). In recent years, there has been a substantial increase in both public and private funding for marine carbon dioxide removal (mCDR) research initiatives (Ocean Visions, 2024; GESAMP, 2024). Key mCDR techniques currently under investigation include, among others; (1) Nutrient fertilization, which involves the addition of micronutrients (e.g., iron) and/or macronutrients (e.g., phosphorus or nitrogen) to the surface ocean to increase photosynthesis by marine phytoplankton and thus enhance uptake of CO2; (2) Ocean alkalinisation, which comprises adding carbonate-containing minerals – like lime or olivine - to the ocean, which then react with CO2 and water

to form bicarbonate and carbonate ions, thus potentially enhancing the carbon storage capacity of seawater; (3) Artificial upwelling, which enhances the upward transport of nutrient-rich deep waters using pipes or wave pumps, which has a similar fertilizing effect on surface waters to direct nutrient fertilization; (4) 'Blue carbon enhancement', which involves enhancing biological CO2 drawdown by expanding marine biomass such as seagrasses closer to shore, or open ocean macroalgae (seaweed) growth for use in bioenergy production with carbon capture and geological storage, or for subsequent sinking into the deep ocean (GESAMP, 2019; NASEM, 2022). Private companies are also investigating whether sinking wood or agricultural waste in the deep ocean could be used to store carbon (Sidik, 2023). All of these approaches are in the preliminary stage of development, and they present many environmental, technological, political and societal unknowns that are yet to be comprehensively researched, assessed and governed. Apart from coastal blue carbon, mCDR approaches could be deployed in high seas areas. There is also the potential for activities conducted in coastal waters or countries' exclusive economic zones to affect high seas areas.

Therefore, as researchers and private actors push ahead with plans for field trials of various mCDR approaches, there is a need to understand how the new *Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction* – often called the BBNJ Agreement, or the High Seas Treaty - may contribute to the governance of mCDR.

The BBNJ Agreement clarifies and elaborates on the rights and obligations of states regarding the marine environment of high seas areas under the *United Nations Convention on the Law of the Sea* (UNCLOS). This includes waters that extend beyond the territorial sea and exclusive economic zones of coastal states, as well as the deep seabed, ocean floor and its subsoil (the "Area"). After nearly two decades of meetings and negotiations, the BBNJ Agreement was adopted and opened for signature in 2023 (UN, n.d.). As of October 2024, 105 states have signed the Agreement, but with only 14 ratifications it is unclear when it will enter into force. Nonetheless, BBNJ has the potential to strengthen international ocean governance by enhancing the normative weight of the obligation to prevent significant harm to the marine environment beyond the jurisdiction of states (Kim, 2024, pp. 5–6). By elaborating on this obligation, including expounding detailed environmental impact assessment (EIA) procedures, BBNJ has the potential to also enhance international governance of mCDR activities, including research in and/or affecting the environment of high seas areas (Brent et al., 2019; Webb, 2024).

This perspective focuses on the potential of a new institutional mechanism established under of the BBNJ Agreement to enhance mCDR governance: the Clearing House Mechanism (CHM). A key challenge for mCDR assessment and governance is ensuring knowledge pluralism, being the inclusion of diverse ways of knowing and worldviews. In addition to providing an overview of the CHM and EIA process, we specifically consider the extent to which the CHM may play a role in facilitating knowledge pluralism and contribute to holistic assessment of mCDR (research and implementation) proposals in or affecting areas beyond states' national jurisdiction (Webb, 2024).

We begin in section 2 by explaining the importance of bringing diverse knowledge types into mCDR assessment processes. Section 3 explains the role of the CHM in new EIA rules established under BBNJ, and in doing so maps the role that the CHM could play in facilitating knowledge pluralism. There will likely be future opportunities to strengthen the CHM's role in this regard. The BBNJ Conference of the Parties (COP) is yet to develop the precise modalities of the CHM platform, and may cooperate with other treaty bodies, international and regional organisations in its management. An initial scoping report on the modalities of the CHM is currently being commissioned, which may provide opportunities to reflect on its potential operation in relation to mCDR (UN, 2024). We therefore conclude by identifying some challenges and gaps in the operationalisation of the CHM for mCDR, and recommend how knowledge pluralism could be strengthened in the future.

## 2 Significance of knowledge pluralism for mCDR assessment

All mCDR approaches are in the very early stage of development. They present many environmental, technological, political and societal unknowns that are yet to be comprehensively researched and assessed (GESAMP, 2019; NASEM, 2022). It is essential to adopt a broad, plural approach to assessing marine-based activities given the inherently fluid and interconnected nature of marine ecosystems, the potential for conflicts with other marine activities and marine protection, as well as concerns about the possible effects on social and cultural relationships with the ocean (Fawkes et al., 2021; Pereira et al., 2023).

Knowledge pluralism in assessment processes involves bringing together diverse knowledge types, disciplines, and stakeholders to inform or co-produce decision-making about environmental issues in a comprehensive, transparent, and reflexive manner. This approach highlights the potential for complementarity, synergy and cross-fertilization between knowledge systems, diverse sources of information, expertise, and perspectives. The call for knowledge pluralism recognizes that assessments are complex and multifaceted endeavors that require input from various disciplines, stakeholders, and knowledge systems (Dias et al., 2015; IPBES, 2016; White and Lidskog, 2023).

There are several interconnected rationales for increasing knowledge pluralism in environmental assessment and decision-making processes; normative, substantial and instrumental [see, e.g., Stirling (2008), Stilgoe et al. (2013), Caniglia et al. (2021), and White and Lidskog (2023)].

The key normative argument for knowledge pluralism in assessment processes is that it enhances *inclusivity*, ensuring a broader range of knowledges are represented in environmental decision making. This can help fulfill an ethical obligation to involve diverse perspectives, particularly those of marginalized and affected communities, in shaping policies that impact their lives and ecosystems. Such inclusivity can be also be a means of enhancing procedural justice, ensuring that decision-making processes are *accessible, transparent, and representative* of a wide array of knowledge systems.

From a substantive perspective, knowledge pluralism can foster the creation of more robust, solutions-oriented, and contextually relevant decisions. By involving real-world practitioners and local stakeholders, knowledge pluralism encourages inter- and transdisciplinary collaboration, which is increasingly considered crucial for addressing complex socio-ecological issues. The resulting

assessments and governance decisions are thus thought to be not only scientifically sound, but may also result in outcomes that are *responsive* to the needs of a wider range of stakeholders, as well as to changing circumstances.

Thinking more instrumentally, involving a wide array of knowledge types can enhance the legitimacy and acceptance of assessment outcomes and governance decisions by fostering a sense of ownership and shared responsibility among those involved.

Knowledge pluralism has often been highlighted as being essential for the comprehensive assessment and governance of mCDR approaches. The 2019 GESAMP report which attempted to undertake a first assessment of marine 'geoengineering' interventions, including mCDR, highlighted that there was a need to "[f]oster the development of socio-economic, geopolitical and other relevant societal aspects of marine geoengineering assessments, including societally relevant metrics where possible, to ensure a holistic approach to subsequent assessment process(es)" (GESAMP, 2019). Likewise, a recently published Code of Conduct for mCDR research highlighted that "assessment of mCDR research requires a process in which a wide range of individuals, communities, and types of knowledge are involved in assessing, approving, planning, implementing and evaluating the success of the mCDR activity. This includes the integration of people with a full range of subject expertise, along with other forms of knowledge, such as local and indigenous knowledge" (Boettcher et al., 2023a). The inclusion of diverse knowledge types in mCDR assessment processes also aligns with principles of responsible research and innovation (Stilgoe et al., 2013). In addition to promoting *inclusion* of public and stakeholder voices, it is fundamental to enable *responsiveness*, being the capacity for innovation to 'change shape or direction in response to stakeholder and public values and changing circumstances' (Stilgoe et al., 2013, p.1572).

While the BBNJ agreement does not directly address mCDR, a key impetus for the development of the new treaty was the need to assess and govern human interventions on the high seas. As mentioned above, it is envisaged that many large scale mCDR research and implementation activities would take place on, and/or affect, the high seas. For this reason, it may become a key instrument for assessing mCDR activities beyond national jurisdictions (Boettcher et al., 2023b). In the next section, we map how the BBNJ CHM may play a role in facilitating knowledge pluralism in general, and in relation to mCDR assessment in particular.

## 3 Mapping the role the BBNJ CHM may play in promoting knowledge pluralism in mCDR assessment

The CHM is a central component of the institutional arrangements for the BBNJ Agreement. The CHM is established under article 51(1) and will consist of an open access platform that the Conference of the Parties will develop in the future (art 51(2)). The CHM is to "[s]erve as a centralized platform to enable Parties to access, provide and disseminate information with respect to activities taking place pursuant to the provisions" of the BBNJ Agreement, including environmental impact assessments (art 51(3)(a)(iii)). Further objectives of the CHM include enhancing transparency between parties and relevant stakeholders (art 51(3)(e)), and facilitating international cooperation and collaboration, including on scientific and technical matters (art 51(3)(f)). The BBNJ Secretariat is responsible for managing the CHM (art 51(4)). However, there is scope for other treaty bodies and international organisations to cooperate in this regard, such as the International Seabed Authority and the International Maritime Organization (art 51(4)). Indeed, the involvement of these international organisations and others as hosts/co-hosts of the CHM was mooted during treaty negotiations (Langlet and Vadrot, 2023).

A further institutional component relevant in the context of the CHM and EIA processes is the Scientific and Technical Body (STB). This body is established under article 49, with members serving in an expert capacity. Members are to be nominated by Parties and elected by the Conference of the Parties (COP). The COP is yet to develop guidelines for the selection process and other terms of reference for the operation of the STB. However, in electing STB members, the COP is to not only consider the qualifications of nominated experts, but also "the need for multidisciplinary expertise, including relevant scientific and technical expertise and expertise in relevant traditional knowledge of Indigenous Peoples and local communities, gender balance and equitable geographical representation" (art 49(2)). This wording could enable the *inclusion* of plural knowledge holders in the STB, going beyond scientific and technical expertise to encompass a wider range of local, traditional and indigenous ways of knowing about marine environments.

The CHM is imbedded throughout Part IV, which establishes rules for environmental impact assessment. Under article 206 of UNCLOS, proponent states (the state with jurisdiction and control over an activity) have an obligation to conduct an EIA for activities that may cause "substantial pollution of or significant and harmful changes to the marine environment." International courts and tribunals have also recognized that states have an obligation under customary international law to conduct an EIA for activities that present risks of significant transboundary harm to the territory of other states or areas beyond national jurisdiction (Brent, 2017). Many mCDR research and implementation activities could fall within one or both of these categories.

While the obligation to conduct an EIA is well established, there has been considerably less clarity regarding how states should implement this obligation (Craik and Gu, 2023, p. 428). Neither UNCLOS nor customary international law establish a process for conducting an EIA (Tanaka, 2024, p. 4). Part IV of BBNJ seeks to address this gap for high seas areas by providing "processes, thresholds and other requirements for conducting and reporting" EIAs (art 27(a); Bodansky, 2024, p. 314). The CHM plays a role at various stages of the EIA process. To evaluate the significance of the CHM in relation to mCDR governance, we briefly explain the EIA process and identify when the CHM is invoked under Part IV.

Part IV provides two EIA pathways for mCDR depending on where an activity is to take place. The first pathway applies to mCDR activities conducted in areas beyond national jurisdiction (art 28(1)). The bulk of rules under Part IV fall under this pathway and are triggered by activities that "may have more than a minor or transitory effect on the marine environment" or "unknown or poorly understood" effects (art 30(1)). We discuss these in further detail below. The second pathway concerns mCDR activities conducted within the national jurisdiction of states that "may cause substantial pollution of or significant and harmful changes to the marine environment" of high seas areas (art 28). In these instances, Parties can elect to follow the EIA process set out in Part IV, or an EIA process

under their own national laws (art 28(2)). Where a party elects to follow a national EIA process, they still have obligations concerning the CHM. During the national EIA process, parties must make relevant information available through the CHM "in a timely manner" (art 28(2)(a)). Parties must also make EIA reports and monitoring reports available through the CHM. In such instances, the CHM would play a role in enhancing transparency and information sharing for mCDR activities. However, where a proponent state elects to follow a national EIA process, there are no formal opportunities for other Parties, non-state actors and the STB to comment on the activity through the CHM. Under this second pathway, the CHM may provide for greater transparency and for knowledge sharing regarding a proposed mCDR activity, but the integration of diverse knowledges and perspectives would be contingent on the proponent state's domestic EIA rules and processes.

The first pathway, for mCDR activities conducted in areas beyond national jurisdiction, provides greater opportunities for knowledge pluralism. For these activities, BBNJ provides a seven-stage EIA process (Tanaka, 2024). Figure 1 illustrates these stages and the corresponding obligations that states have to make information available through the CHM. We note that this figure only maps rules that *expressly* mention the CHM. However, proponent states have a general obligation to provide timely public notification about a planned activity and provide opportunities for all states and relevant stakeholders to participate in the EIA process (art 32(1)). Stakeholders are broadly defined to include "Indigenous Peoples and local communities with relevant traditional knowledge, relevant global, regional, subregional and sectoral bodies, civil society, the scientific community and the public" (art 32(3)). This definition is especially significant in the context of mCDR research and deployment activities, as it creates obligations for proponent states to engage broadly with the international community beyond other BBNJ Parties, opening possibilities for diverse perspectives and knowledge to play a role in the EIA process (Webb, 2024). Under article 38, the Scientific and Technical Body (STB) shall develop standards/guidelines regarding notification and consultation processes and in doing so may further clarify when and how parties are to engage with the CHM across the EIA process.

If an mCDR activity may have more than minor or transitory impacts, or if there is limited understanding as to its impacts (art 30(1)) (**preliminary** stage 1, see Figure 1), the proponent state must undertake a **screening** process (stage 2) to determine if an EIA is required (art 30). Given the currently limited understanding of mCDR proposals and their impacts, it is likely that large-scale mCDR research and deployment activities in areas beyond national jurisdiction (ABNJ) will trigger the EIA screening process. The purpose of the screening process is to assess whether there are "reasonable grounds" to believe that the activity "may cause pollution of or significant harm to the marine environment" (art 30(1)(a)). At a minimum, the proponent state must consider the type of technology used, location and duration of the activity, and ecosystem characteristics (i.e., vulnerability) (art 30(2)(a)-(d)). Parties must also consider potential impacts, including cumulative impacts and impacts to EEZ and

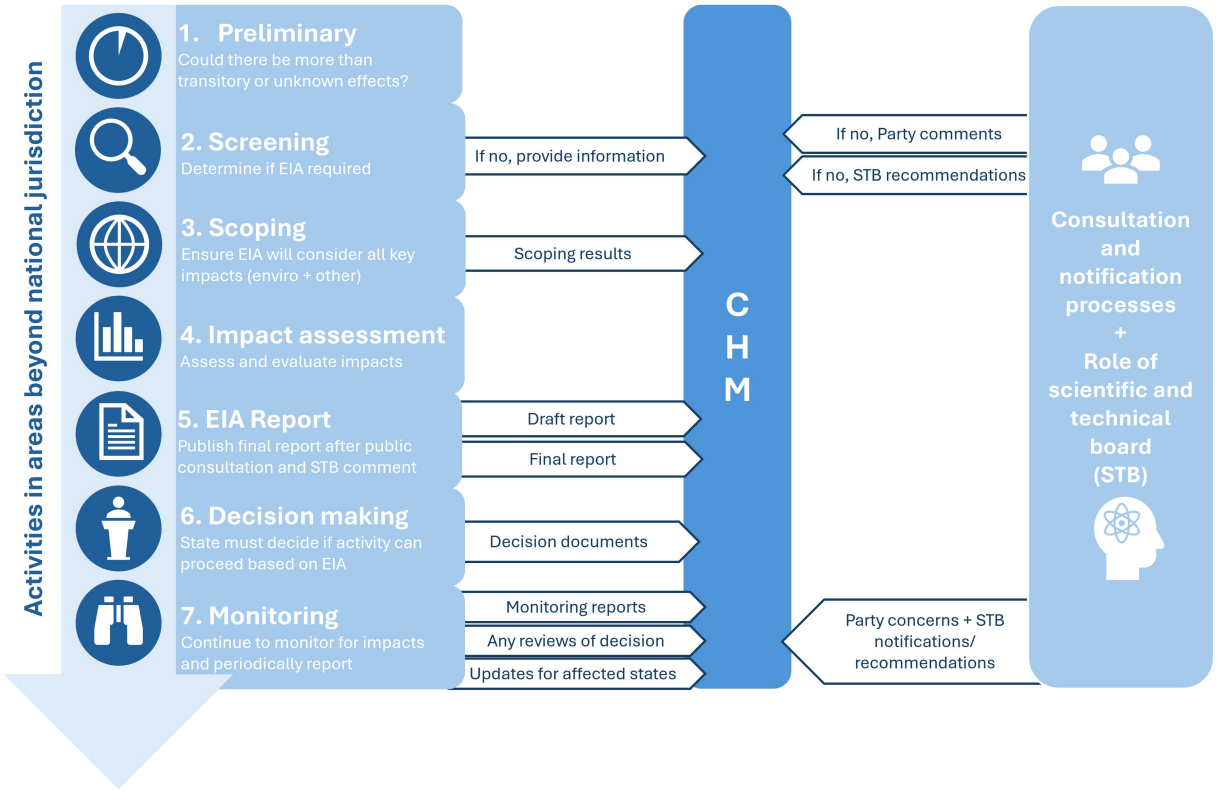


FIGURE 1
Map of CHM requirements across the seven-stages of the BBNJ EIA process.

territorial sea areas, the extent of any uncertainty regarding potential impacts, and "other relevant ecological or biological criteria" (art 30(2)(e)-(g)).

If, based on this screening, the proponent state decides that an EIA is not required for an mCDR activity, they must make the information that this decision is based on publicly available through the CHM (art 31(a)(i)). Other Parties have 40 days to comment on the potential impacts (art 31(1)(a)(ii)). While there are no options for other stakeholders to directly contribute, Parties are to base their comments on the best available science and relevant traditional knowledge of Indigenous Peoples and local communities. This wording provides the basis for the potential inclusion of a wide range of knowledges – going beyond the purely scientific – in the first screening assessment of mCDR activities that take place in areas beyond national jurisdictions. The Scientific and Technical Body (STB) is also to take such knowledge into account when considering comments and evaluating the potential impacts of a project. All comments, as well as any recommendations from the STB, are to be made publicly available through the CHM (art 31(1)(a)(vi)), further enhancing transparency. If through this screening process, another Party raises concerns regarding potential impacts of an activity, the proponent state is required to take those concerns into consideration, however it is not required to review the original determination (art 31(1)(a)(iii)).

These stipulations outline ways in which the CHM could facilitate more diverse stakeholder and public input into the decision as to whether an EIA should be conducted for a proposed mCDR activity in areas beyond national jurisdiction. However, the ultimate decision as to whether an EIA is required remains with the state proposing the activity, and feedback on a negative determination from stakeholders and wider publics can only be provided indirectly, mediated through the Parties' comments.

In the third **scoping** stage the proponent state must identify the impacts to be considered by the EIA. This includes environmental impacts as well as economic, social, cultural, human health and cumulative impacts, and impacts within national jurisdiction (art 31(1)(b)). In scoping potential impacts, proponent states are required to use "best available science and scientific information and, where available, relevant traditional knowledge of Indigenous Peoples and local communities." During the scoping stage, proponent states must consult with adjacent states and stakeholders that may be affected by the activity and provide scoping results to the CHM (art 32(1)); (Kachelriess, 2023). This wording provides another entry point for more-than-techno-scientific, plural knowledge types when identifying the types of impacts that a proposed mCDR activity may have.

After scoping, the proponent state must **conduct the EIA** (stage 4) and **prepare a report** (stage 5). Under article 33(3) and as part of their public consultation obligations under article 32, proponent states must make a draft of the EIA report available through the CHM. Following public consultation (per art 32) and considering any comments by the STB, the proponent state must also publish the final EIA report through the CHM. At the end of the day, it is up to the proponent state to decide whether the proposed activity should go ahead based on the results of the EIA (Tanaka, 2024). Other Parties or affected stakeholders do not have any further say in this decision, though there are opportunities for comment during the monitoring and reporting stages (below). The **decision** (stage 6) to conduct an activity must be made in accordance with article 34, which holds that the proponent state can only authorize the activity if it has "made all reasonable efforts to ensure that the activity can be conducted in a manner consistent with the prevention of significant adverse impacts on the marine environment." The proponent state is also required to submit decision-making documents to the CHM setting out "any conditions of approval related to mitigation measures and follow up requirements", ensuring an additional level of transparency (art 34(3)).

The stipulation requiring the proponent state to first publish a draft EIA for comment by the STB, adjacent states and stakeholders provides another opportunity for plural knowledge types to feed into the final EIA report for an mCDR activity. This opportunity could be all the more significant if the STB includes plural knowledge holders, as suggested in article 49(2).

Importantly, this is not the end of the EIA process. If a proponent state approves an mCDR activity, they have ongoing **monitoring and reporting** obligations (art 35 & 36) (stage 7). Parties are required to monitor the impacts of the activity using "the best available science and scientific information and, where available, the relevant traditional knowledge of Indigenous Peoples and local communities" (art 35). Once again, this includes economic, social, cultural and health impacts. They must prepare periodic reports and make them publicly available through the CHM (art 36). The STB will take these reports into account to identify best practices and develop future monitoring guidelines.

If, through this process, the proponent state identifies significant adverse impacts, either unforeseen or because of a breach of the approval conditions, they are required to review their decision, and "notify the Conference of the Parties, other Parties and the public, including through the [CHM]" (art 37(2)). This includes publishing review reports and any subsequent decisions (art 37(6)). There are no direct mechanisms for stakeholders to make further submissions at this stage. However, other Parties may raise concerns based on "best available science and scientific information and, where available, relevant traditional knowledge of Indigenous Peoples and local communities" (art 37(4)(a)). Any concerns raised by other Parties, as well as any recommendations made by the STB will also be made publicly available through the CHM (art 37(5)(d)).

These stipulations provide indirect mechanisms for plural knowledge holders to provide feedback on the monitoring and reporting of mCDR activities. However, whether stakeholders' and others' perspectives are taken into consideration is reliant on Party states including them when raising concerns.

## 4 Discussion and conclusion

As the above overview shows, the BBNJ CHM has the potential to promote knowledge pluralism during the assessment, approval and monitoring of mCDR activities. Not only will the CHM facilitate the transparent dissemination of knowledge to stakeholders, it will also allow for direct and indirect input of a range of knowledge types during the seven stages of the EIA process that would apply to all mCDR activities proposed in areas beyond national jurisdiction. Throughout the various stages of the EIA process, states will be required to assess not only the potential environmental impacts, but also economic, social, cultural, human health and cumulative impacts of proposed mCDR activities. To conduct this broad impact assessment, states are required to draw on knowledge from a wide range of academic disciplines, as well as the knowledge of Indigenous Peoples and local communities.

In addition, at multiple points during the EIA process, stakeholder consultations are mandated. In particular, the broad definition of stakeholders as including "Indigenous Peoples and local communities with relevant traditional knowledge, relevant global, regional, subregional and sectoral bodies, civil society, the scientific community and the public" (art 32(3)) creates obligations for states proposing mCDR to engage with a range of entities, opening up possibilities for diverse perspectives and knowledges to play a role in assessing proposed mCDR activities.

However, there are some remaining challenges to be addressed. One key issue is that consideration of wider knowledge types (i.e., local and indigenous knowledge) is largely reliant on Party states including them in screening, scoping, assessment and feedback processes. There are few direct mechanisms for plural inputs outside of consultation processes. One exception to this is the wording regarding the inclusion of plural knowledge holders in the STB, suggesting this body will go beyond scientific and technical expertise to encompass a wider range of local, traditional and indigenous ways of knowing about marine environments. Given that the STB plays a key role in commenting and providing recommendations based on the information provided by the proponent states through the CBM, this has the potential to provide the greatest opportunity for knowledge pluralism in the assessment, approval and monitoring of mCDR activities under the BBNJ. For this potential to be realized, the STB should be assembled in a way that brings together wide range of knowledge types. It is essential that Parties factor in the need for diverse expertise when nominating STB members (art 49(2)).

Despite the treaty's promising wording, it remains to be seen exactly how the modalities of the CHM for promoting knowledge pluralism will be operationalized in practice. This is not only an issue for mCDR governance, but for high seas governance more broadly. As it is currently described, the CHM would provide a structured process for making information widely *available* via an open access platform. However, this does not necessarily mean that information will be *accessible*. A key issue will be how proponent states, STB and other stakeholders present information that is uploaded to the CHM – if it is highly technical, without clear overviews or summaries that are accessible to a wide audience, then the CHM's capacity to provide for plural knowledge synthesis will be limited. In operationalising the CHM, the COP should consider how the STB or other organizations can help make information more accessible on this platform, for example by providing for plain-language summaries to allow a wider range of knowledge holders to engage with the information provided.

In a similar vein, making information publicly available and assessable to a wide range of audiences is often not enough to encourage substantive engagement. The CHM will only be as good as consultation processes that underpin it. Currently, the treaty text provides proponent states with limited guidance on how notification and consultation is to be conducted. However, article 38 stipulates that the STB shall develop standards/guidelines regarding notification and consultation processes. The STB therefore has an important opportunity to establish "best practice" standards for consultation and engagement for activities in areas beyond national jurisdiction, including mCDR. In addition to assisting proponent states to interpret and apply their legal obligations under BBNJ, such guidelines could be instructive to other treaty bodies and contribute to states' understandings of consultation and notification obligations under customary international law.

A final challenge especially pertinent to mCDR is the relationship between the EIA process under BBNJ, and specific assessment frameworks for mCDR activities under the London Protocol (LP). Article 29 of the BBNJ agreement is designed to manage the relationship between BBNJ and EIA processes under other agreements, including the LP. Proponent states can elect to follow an EIA process under another agreement so long as it is "equivalent to" the EIA requirements under BBNJ Part 4, or more stringent in that it is "designed to prevent, mitigate or manage potential impacts" below the threshold for EIAs under BBNJ (art 29(4)(b)). Unfortunately, the BBNJ agreement does not clarify when another EIA process will be considered equivalent (Tanaka, 2024). In determining the equivalency of existing assessment processes for mCDR activities, it is important that states take into consideration opportunities for knowledge pluralism throughout the EIA process. If Parties elect to follow other assessment processes, such as those under the LP, they continue to have obligations under BBNJ. These include publishing the EIA report through the CHM (art 29(5)) and complying with monitoring and reporting requirements. To avoid confusion and promote opportunities for knowledge pluralism for mCDR activities across both BBNJ and the LP, the BBNJ COP and STB should seek to collaborate with the LP to develop clear standards or guidelines for what constitute 'equivalent' levels of knowledge pluralism in mCDR assessment processes under the LP, in accordance with art 29(2)–(3) [see also (Tanaka (2024)].

In sum, while the BBNJ CHM has the potential to promote knowledge pluralism in the assessment and approval of mCDR activities, this potential could be improved as the COP and the STB move toward the implementation of the treaty. We have outlined several recommendations for how this could be done: (1) The STB should include not only representatives with scientific and technical expertise, but also those with local, traditional and indigenous ways of knowing about marine environments; (2) the COP should consider how information submitted to the CHM can be made accessible to a wide range of knowledge holders; (3) the STB should establish best practice standards for what constitutes adequate stakeholder consultation, and; (4) the COP and the STB should collaborate with the LP to develop clear guidelines for what constitutes 'BBNJ-equivalent' levels of knowledge pluralism in (mCDR) assessment processes.

The BBNJ CHM has the potential to play a key role in the future of mCDR on the high seas. Navigating the above-mentioned challenges during the implementation of this landmark agreement could help set global standards for knowledge pluralism in marine assessment and governance writ large.

## Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

## Author contributions

MB: Conceptualization, Formal analysis, Writing – original draft, Writing – review & editing. KB: Conceptualization, Formal analysis, Writing – original draft, Writing – review & editing.

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## Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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## Publisher's note



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