

## **Review of Ocean Decade White Paper: 'Unlock ocean-based solutions to climate change'**

### **Background**

The Ocean Decade has a Vision 2030 to work on 10 challenges, including challenge 5 'Unlock ocean-based solutions to climate change'.

For each challenge, [a white paper has been developed](#) to 'outline a comprehensive approach to user needs, priority datasets and residual gaps in science, and outline the strategic measures required to fulfil the objectives of each Challenge by the end of the Ocean Decade.'

The draft versions of the white papers are currently open for public review until 22 February 2024.

### **What we want to do**

The current draft of challenge 5 is thin on the role of the deep sea in ocean-based solutions to climate change, with a lack of consideration of both positive and negative effects those solutions may have on deep habitats. We want to provide a DOSI review of this draft by collecting expertise and submitting a combined response.

### **Is the strategic ambition clear and comprehensive? Are there major issues that have not been considered that should have been included?**

Consolidated version (<1000 chars):

The value of mCDR is affirmed in absence of validation and due consideration of the deep sea. We suggest discussion of the complexity and uncertainty of environmental impacts and effects on chemistry, biology and ecosystem services. Deep-sea ecosystems will be receiving various forms of exported carbon in most of the proposed technologies. Please consider including potential impacts as outlined in Levin et al. 2023 in sections 2.1 and 3.1.1.4 (par 4).

The concept of preserving the ecosystem integrity to maintain the carbon cycle and natural carbon sequestration is not but should be included. The maximum capacity of coastal blue carbon storage is limited (< 1 % of required, Williamson & Gattuso 2022). Deep-sea systems have naturally occurring large C stocks (e.g. soft sediments, methane hydrates, pelagic biomass) that can potentially release greenhouse gases through disturbance and thus require thoughtful governance. Please consider this in sections 3.1.1.3 and 3.1.2.

### **Are the specific data, knowledge, and information requirements required to address the Challenge's strategic ambition identified, as well as the technological and infrastructure needs?**

Consolidated version (<1000 chars):

Pls consider changing 2.1 'solutions can complement' to 'solutions may complement [...] but require verification of effectiveness'. Examples of deep-sea impacts include: additional turbidity, light limitation, acidification, deoxygenation, altered mesopelagic vertical migrations, smothering, potential greenhouse gas release, biodiversity losses, altered food webs, carbon cycle changes etc. Pls recognize current (deep) hotspots of existing carbon services (transport, storage, sequestration) and how their preservation helps mitigate climate change. Examples to achieve this are: incorporating carbon services into MPA design (bottom to surface, e.g. see webinar <http://tinyurl.com/3evz3dvj>), avoiding carbon release via industrial activities (such as trawling and mining), conserving mesopelagic systems (e.g. no fisheries), regulating pollutants etc. Not

only national, but also international legislation must be considered for governance as impacts may occur beyond national jurisdiction.

**Are the necessary resources, such as partnerships, funding, expertise, and technology, identified in the White Paper?**

Consolidated version (<1000 chars):

Further UN ocean instruments that intersect with pollution, carbon cycle, and climate could be mentioned in 3.1, including the London Convention on marine pollution (relevant for e.g. ocean fertilisation, macroalgal waste dumping and injection of liquid CO<sub>2</sub>), seabed mining regulations from the ISA, RFMO management of bottom fisheries and protection of VMEs, Convention on Migratory Species and the Whaling Commission as they relate to recovery of carbon stores and movement. Also 3.1, the global population will be affected by climate change thus the statement '*The primary beneficiaries [...] are populations threatened [...].*' is odd. Section 3.2 and Table 1 hold ideas which are not yet worked out, and we suggest adding information on funding (currently not mentioned anywhere) and resources required to study complex environmental impacts. Also, DOSI has a climate change working group, and specifically a subgroup on ocean-based climate solutions, which could be mentioned as a partnership.

**Are the critical needs for capacity development and knowledge sharing for enhancing skills, awareness, and understanding related to the challenge identified?**

Consolidated version (<1000 chars):

No, see previous answer about 3.2 and table 1. Additional other comments: Section 3.1.1.1 only mentions examples of technologies related to shallow waters (tidal, wave energy, wind farms, solar panels). Ocean thermal energy conversion (OTEC) is an example of hydropower technique that would directly affect deeper waters. A lot of useful information to refer to in 3.1.1.1 can be found in Haugan et al. 2020 ([www.oceanpanel.org/blue-papers/ocean-energy-and-mineral-sources](http://www.oceanpanel.org/blue-papers/ocean-energy-and-mineral-sources).)

**Have the links between the specific Challenge and other Ocean Decade Challenges been identified, including opportunities for collaboration and cross-cutting approaches to maximize the impact of actions?**

No comments.

**Are the proposed milestones and indicators for monitoring and evaluating progress realistic and sufficient to measure the success of the strategic ambition?**

Consolidated version (<1000 chars):

- *For Milestone 1: Enhanced Ocean Data Accessibility and Availability.* Please add environmental risk to this list of improved understanding needs.
- *For Milestone 4. Sustainable Policy and Governance Implementation.* Please consider adding: 'Avoidance of action-induced conflicts between climate, biodiversity and social well being. Seek solutions with sustainable (win-win-win) outcomes that don't undermine global biodiversity, pollution goals or SDGs.'
- There are currently no milestones specified for general milestones 6, 7, 8 and 10, which we feel are all relevant to the challenge addressed in this White paper draft, and we would like to see specified.

- Indicator '*Integrated assessments of vulnerability and risks for different regions and sectors.*' Please clarify what this refers to. Is this vulnerability and risk from impacts of climate change? Or from mCDR deployments?

**Are the recommendations actionable and scalable, including the identification of potential pathways for implementation and integration into policies and practices?**

*Consolidated version (<1000 chars):*

- *Under Priority datasets to unlock or to generate:* Please consider adding; 'Identification and quantification of current hotspots of C sequestration worthy of protection to prevent release of C and greenhouse gases.'
- *Under Knowledge to Generate or Share:* Please consider adding: 'Improved understanding of the marine Carbon cycle and effects of human activities, alongside knowledge of the ocean's role in climate regulation.'
- *Under Capacity development and exchange needs:* Please consider adding: 'Extent of inclusion of ocean-based solutions to climate change in national and international policy and governance negotiations.'

**Do you have any additional comments or insights regarding the content, approach, or potential impact of the White Paper? Is there any specific aspect that you believe deserves particular attention or improvement to enhance development of the strategic ambition for this Challenge within the framework of the UN Decade of Ocean Science for Sustainable Development?**

*Consolidated version (<1000 chars):*

Please feel free to contact us for any clarifications or detailed comments: Danielle de Jonge: [mail@dswdejonge.com](mailto:mail@dswdejonge.com); Lisa Levin: [llevin@ucsd.edu](mailto:llevin@ucsd.edu) from the DOSI climate change working group .

References:

- Lisa A. Levin et al., Deep-sea impacts of climate interventions. *Science* 379, 978-981 (2023). DOI:[10.1126/science.ade7521](https://doi.org/10.1126/science.ade7521)
- Williamson & Gattuso 2022. Carbon Removal Using Coastal Blue Carbon Ecosystems Is Uncertain and Unreliable, With Questionable Climatic Cost-Effectiveness. *Front. Clim.*, 28 July 2022. Sec. Carbon Dioxide Removal Volume 4 - 2022. <https://doi.org/10.3389/fclim.2022.853666>
- Haugan, P.M., L.A. Levin, D. Amon, M. Hemer, H. Lily and F.G. Nielsen. 2020. What Role for Ocean-Based Renewable Energy and Deep Seabed Minerals in a Sustainable Future? Washington, DC: World Resources Institute. [www.oceanpanel.org/blue-papers/ocean-energy-and-mineral-sources](http://www.oceanpanel.org/blue-papers/ocean-energy-and-mineral-sources).