REPORTING FORM 2025

Innovation Challenge 6: Sustainable management of Blue Carbon ecosystems

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Operating Period as an IMBeR Member:

- *Start Year:*
- *End Year:*

List of Authors

1. Ongoing activities, in line with the IMBeR Grand and Innovation Challenges

(Among other uses, information will be used to update the IMBeR Annual Report to SCOR)

1.a. Grand Challenge I

Understanding and quantifying the state and variability of marine ecosystems - with focus on Research Objectives 1 to 3:

***Research Objective 1**. Evaluate and predict the cumulative effect of multiple stressors*
***Research Objective 2**. Integration of climate change and climate variability*
***Research Objective 3**. Impacts on society – preparation for a changed future*

Add text…

1.b. Grand Challenge II

Improving scenarios, predictions and projections of future ocean-human systems at multiple scales - with focus on Research Objectives 4 to 6:

***Research Objective 4**. Development of integrated data systems and approaches for predictions and projections*
***Research Objective 5**. Development of predictive models and projections for use at regional scales*
***Research Objective 6**. Development of alternative scenarios to bridge the gap between physical climate sciences and humanities*

Add text…

1.c. Grand Challenge III

Improving and achieving sustainable ocean governance - with focus on Research Objectives 7 to 9:

***Research Objective 7**. Develop knowledge on best practices for multilevel governance approaches to ocean climate adaptation and mitigation*
***Research Objective 8**. Develop understanding on key ingredients for transformation towards more sustainable, equitable and inclusive governance approaches to fisheries and aquaculture*
***Research Objective 9**. Support implementation of post-2020 biodiversity targets for marine spatial planning and marine protected areas*

Add text…

1.d. Innovation Challenge 3

To advance understanding of ecological feedbacks in the Earth System

Add text…

1.e. Innovation Challenge 4

To advance and improve the use of social science data for ocean management, decision making and policy development

Add text…

1.f. Innovation Challenge 5

Interventions to change the course of climate impacts

Add text…

1.g. Innovation Challenge 6

Sustainable management of Blue Carbon ecosystems

The preservation, conservation and creation of marine ecosystems such as mangroves, seagrass beds and saltmarshes, which remove and store 'blue' carbon from the atmosphere for decades to centuries, provides an important means of mitigating climate change for countries where such ecosystems cover a significant area. Blue carbon ecosystems also make an important contribution to the social and economic development of coastal communities, whose role in the in-situ preservation and conservation of blue carbon is substantial.

However, there are major uncertainties in quantifying the global extent of blue carbon ecosystems. There is even more uncertainty about less conventional blue carbon habitats, such as intertidal sand- and mudflats and kelp beds. Further major unknowns are the mechanisms and extents of offshore carbon export from these systems, and the degree to which it joins medium- to long-term carbon sinks, in the deep-water dissolved organic carbon pool or burial in shelf, slope or deep-sea sediments. Finally, understanding of how climate change influences carbon accumulation in mature and restored blue carbon ecosystems is still lacking. Reducing these uncertainties and knowledge gaps is

important to inform valuation of blue carbon ecosystems and thus their inclusion in policy and management scenarios, and is a central objective of the IMBeR BCWG.

In addition to economic value, the social and cultural value of blue carbon ecosystems are important, including how blue carbon facilitates Nature's Contribution to People and a range of Ecosystem Services in a variety of coastal-marine social-ecological systems. The assessment of current policy and management actions in terms of how well they enable the maintenance and development of the services provided by, and economic value of, blue carbon ecosystems including their use in accounts of natural capital, is important.

The main research questions of IC6:

1. *How does the ocean act as a sink for carbon and how might this change in a changing ocean?*
2. *What is the economic, social and cultural value of this ecosystem service?*
3. *How can we improve policy, management and governance approaches to prioritise and protect this offshore ecosystem service?*
4. *How can we include blue carbon in statutory monitoring initiatives and national inventories of sinks versus sources of CO2*

2. Selected highlights

2.a. Selected scientific highlights since last report (1-5)

Last report was submitted to SCOR, August 2024

Add text…

2.b. Publications since last report

Please add all publications since last report to the table below (see notes for details on "Class" and "Activity" fields).

Publication *with DOI*	***Class 1, 2, 3***	***Activity****
Wahyudi, A. J. *(2024). Potential of Organic Carbon Pool in the Ocean: Approaches for Naturally and Artificially Capturing and Retaining Carbon. IOP Conference Series: Earth and Environmental Science, 1350(1), 012021. https://doi.org/10.1088/1755-1315/1350/1/012021*	*3*	*-*
Felgate, S. L., Aldridge, J., Bolam, S. G., Breimann, S., de Borger, E., Claes, J., Depestele, J., Epstein, G., Garcia, C., Hicks, N., Kaiser, M., Laverick, J. H., Lessin, G., O'Neill, F. G., Paradis, S., ***Parker, R.,*** *Pereira, R., Poulton, A. J., Powell, C., … Sciberras, M. (2024). Investigating the effects of mobile bottom fishing on benthic carbon processing and storage: a systematic review protocol. Environmental Evidence, 13(1), 1–10. https://doi.org/10.1186/S13750-024-00348-Z/TABLES/1*	*3*	*-*
Borja, A., Berg, T., Gundersen, H., Hagen, A. G., Hancke, K.,	*3*	*-*

*Korpinen, S., Leal, M. C., **Luisetti, T.**, Menchaca, I., Murray, C., Piet, G. J., Pitois, S., Rodríguez-Ezpeleta, N., Sample, J. E., Talbot, E., & Uyarra, M. C. (2024). Innovative and practical tools for monitoring and assessing biodiversity status and impacts of multiple human pressures in marine systems. Environmental Monitoring and Assessment 2024 196:8, 196(8), 1–32. https://doi.org/10.1007/S10661-024-12861-2*		

**If appropriate, please list the IMBeR activity through / by / from / during which the publication arose*

*******Notes on publications********

Publications are logged in the IMBeR Zotero library which is publicly accessible online –

Publications since 2016 | Publications prior to 2016

Publications are categorised by "Class" and linked to "Activities":

Class 1 publications are specifically generated through/by/from/during ***IMBeR activities*** - for example, arising from IMBIZOs and IMBeR conferences such as the IMBeR open science meeting and the IMBeR West Pacific symposia and from the activities of the working groups, regional programmes and the SPIS scoping teams.

Class 2 publications are on topics relevant to the IMBeR Science Plan that benefitted from some interaction with IMBeR or ***IMBeR activities***, for example by IMBeR symposium attendees, past and present SSC members, working group, regional programme and endorsed project members, or national contacts.

Class 3 publications are on topics relevant to the IMBeR Science Plan but for which there is no direct link to or benefit from an IMBeR activity. These might include publications by SSC members, working group, regional programme or endorsed project members or members of the IMBeR international community that were written as part of the normal scientific activity of the authors and would have occurred irrespective of IMBeR's existence. You can report Class 3 publications, but they will no longer be logged in the IMBeR database.

[See "What is an IMBeR publication?" for further information]

Why list 'Class' and 'Activity'? This helps us to declare authentically which publications IMBeR has helped to generate, and it makes it easier for us to demonstrate the value of the Regional Programmes, the Working Groups, and IMBeR in general, and it helps us to justify support for IMBeR activities when we can list tangible outputs.

2.c. Events, Meetings, and Workshops

List all international and national events, meetings and workshops. Describe the level of participation: e.g. chairing session/workshop, organising meeting. Include Endorsed Projects committee meetings and workshops.

Format: Title of event. Date. Location. Description of participation. Any other pertinent details.

Add text…

3. International collaboration and links

Add text…

4. Input to management, policy and SOCIETY* over the last year

Add anything that is not covered under "1.c. Grand Challenge III"
**As previous reporting forms requested 'input to management and policy' only, please add any 'input to society' not captured in previous reports*
Add text…

5. Education, outreach and Capacity Development

IC6 group invited early carrier professionals/scientists to join the blue carbon working group. From 30 applicants, we shortlisted 11 people. They are from Kenya, New Zealand, Nigeria, Norway, Sweden, UK, and USA. We are still discussing to narrow it down to 3-5 people as suggested by BCWG members.

Chair and member of IC6 group are actively contributes to outreach activities, in his/her capacity as a member of IMBeR as well as personally. Tiziana Luisetti provided training on blue carbon accounting economics at the Global Dialogue on Sustainable Ocean Development (https://www.oceanaccounts.org/global-dialogue-sustainable-ocean-development/) in Bali, July 2024.

Gihoon Hong presented a keynote speech at the International Conference on Marine Biodiversity, Socio-Environmental Aspects & Technology. He emphasized th eimportant of coastal blue carbon ecosystem. The International Conference on Marine Biodiversity, Socio-Environmental Aspects & Technology (ICMBSEAT) was successfully held from April 28 to 30, 2025, at the Chinese Teachers Memorial Auditorium, University of Karachi.

6. Planned activities

6.a. Activities and Outreach and how they link to the Challenges (including, but not limited to convening sessions, meetings, summer schools, workshops, etc)

i. *Online meeting for the Working Group will be conducted twice a year.*

ii. *Meeting and engagement with the early carrier professional.*

iii. *Exploring collaboration opportunities with UNESCO's Intergovernmental Oceanographic Commissions.*

iv. *Exploring the funding opportunities and future direction of the working group.*

6.b. **Upcoming papers** (Community-Position-Review-etc)

Add text…

7. Funding

7.a. Funding from external sources

Add text…

7.b. Funding proposals in progress or planned

Add text…

8. Changes to Organisational Structure

In light of the declining activity and engagement within the IC6 group, a proposal has emerged to reformulate its structure and reconsider its relevance moving forward. We intend to consult the current members to determine whether the group remains necessary and how it might be revitalized to better serve its intended purpose.

Similarly, the Biogeochemistry Working Group (BCWG) has shown signs of reduced motivation and limited participation among its members. This lack of momentum raises important questions about the group's functionality and future direction. As such, we believe it is timely to evaluate whether the BCWG should continue in its current form or undergo a strategic reorganization.

This reflection also coincides with broader discussions on the future directions and structure of IMBeR, especially as we explore ways to enhance our thematic working groups' impact and alignment with IMBeR's evolving priorities. To ensure the BCWG remains relevant and effective, we propose a reorganization that includes:

a. *Reassessing the group's objectives and deliverables*
b. *Reinviting expressions of interest from committed members and potential new contributors*
c. *Identifying clear thematic priorities aligned with IMBeR's new science plan*
d. *Enhancing coordination and communication among members through more regular activities (e.g., webinars, collaborative writing, synthesis outputs)*

We welcome input from current and past members and encourage an open discussion on how best to move forward.

9. Images / Figures

*****It is always good to have some recent photos / figures / infographics to create more exposure for the Regional Programmes, Working Groups, etc. These can range from those suitable for a very*

scientific audience, to those that would engage the general public. IMBeR would use these, on the website (e.g. http://www.imber.info/ and http://www.imber.info/en/news), in tweets (@imber_ipo), in presentations, etc. In addition, Future Earth (one of our sponsors) regularly asks us to provide high quality images for their glossy reports. These can highlight the activities of IMBeR and their other Global Research Projects (see pdfs of past Future Earth reports here https://futureearth.org/publications/annual-reports/)

*So, please provide any images that you might think are useful. These can be pasted in this document or emailed as an attachment to imber@ecnu.edu.cn.*****

10. Notable achievements over the IMBeR decade (2016-2025)

10.1…

10.2…

10.3…

10.4…

10.5…

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10.x…

11. A list of Synthesis Products

Add text…

11. Reflections

Add text…

12. Recommendation for future work

Add text…

13. Anything not covered above

Add text…

14. Appendices

Add appropriate meeting / workshop reports and include URLs (this helps to track where online content is missing)

Add text…