



European Marine Board Expert Working Group
Deep Seas and Ocean Health
Terms of Reference
June 2022

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1. Background and rationale

Background

There are several definitions for where the deep sea begins, but for the purposes of this work, the deep sea will be defined as the water column and seabed below 200 m. This follows the definition by Gage & Tyler (1991) as was used in the previous EMB publication on this topic.

Despite significant research in recent years, the deep sea remains the largest (>1.2 billion km³) and least well-explored global region. It covers most of the habitable volume of the Ocean and is the home for a myriad of unique and endemic species, habitats and ecosystems such as hydrothermal vents and seamounts, many of which still need to be discovered and understood. The deep sea is a critical part of the wider Ocean-climate-biodiversity nexus, and plays a key role in the processes that are critical for supporting life on Earth (e.g. nutrient and carbon cycles, climate regulation) (Snelgrove et al., 2017). The deep sea also contains resources that are of interest to various (Blue Economy) sectors and industries, e.g. fisheries, biotechnology, energy, and mineral resources.

As most deep-sea regions are outside National Exclusive Economic Zones (EEZs), policy and governance of deep-sea regions are mostly addressed globally (not just at the European level). The foundations of deep-sea governance and the use of deep seabed resources are encompassed in the United Nations Convention on the Law of the Sea (UNCLOS)¹. UN-level discussions on developing a High-Seas treaty as a legally binding framework to cover all marine and maritime activities in the high seas including Biodiversity Beyond National Jurisdiction (BBNJ)² and the establishment of Marine Protected Areas (MPA's) beyond the EEZ are ongoing, with progress delayed by COVID-19. The BBNJ agreement aims to ensure environmental impact assessments are carried out for industrial activities in the high seas and that the benefits gleaned from marine genetic resources are shared. It should be noted, however, that the current draft treaty text does not explicitly refer to the deep sea or the deep-water column, but rather the high seas in general, which covers the seas that are not included in national EEZs, implicitly including the deep sea. Some Blue Economy sectors operating in the deep sea are governed on a sectoral basis (Danovaro et al., 2017). For instance, the International Seabed Authority (ISA)³, an intergovernmental body established by UNCLOS, organizes, regulates and controls all mineral-related activities on the seabed in areas beyond the limits of national jurisdiction. Fisheries in the deep sea are regulated by the corresponding Regional Fisheries Management Organisations (RFMOS), such as the General Fisheries Commission for the Mediterranean (GFCM)⁴ or the North-East Atlantic Fisheries Commission (NEAF)⁵. There are limited other policies or clear strategies linked to the deep-sea at either international or national level, however an approach similar to that applied in the EU Marine Strategy Framework Directive⁶ (MSFD) has been proposed as appropriate for managing the deep-sea in a more holistic manner with clear indicators for Good Environmental Status (GES) (Orejas et al., 2020). It has also been proposed that the MSFD itself should be expended to include the deep

¹ https://www.un.org/depts/los/convention_agreements/texts/unclos/unclos_e.pdf

² <https://www.un.org/bbnj/>

³ <https://www.isa.org.im/>

⁴ <https://www.fao.org/gfcm/en/>

⁵ <https://www.neafc.org/about>

⁶ https://ec.europa.eu/environment/marine/eu-coast-and-marine-policy/marine-strategy-framework-directive/index_en.htm

sea (Danovaro et al., 2020a), and more integrated in the context of maritime spatial planning (Manea et al., 2020). It has been suggested that the development of further and more detailed policy and legislation is hindered by ongoing research and knowledge gaps, a lack of more holistic research (Folkersen et al., 2019), as well as other challenges such as financing and availability of capacity. There are also growing calls for not only deep-sea protection but also restoration (e.g. Da Ros et al. (2019)), which also align well with objectives of the current UN Decade for Ecosystem Restoration⁷.

In 2015, EMB published Position Paper 22 “Delving Deeper: Critical challenges for 21st century deep-sea research” (Rogers et al., 2015), followed by the accompanying Policy Brief 2 “Delving Deeper: How can we achieve sustainable management of our deep sea through integrated research?” (European Marine Board, 2015). These documents provided a comprehensive overview on the knowledge and research needs, policy gaps and societal needs that exist for deep-sea regions, their ecosystems, their management, and their governance. They also presented the relevance of this knowledge in the context of the growing industrial interest and pressure (i.e. mining, oil and gas exploitation), from blue economy sectors.

Since 2015, a significant body of knowledge has been gathered regarding the deep sea, its inhabitants and ecosystems, how they connect, and how they are or may be impacted by human activities such as mining (Costa et al., 2020). However, it is not clear from the literature how well the currently available data for different parameters is distributed over different spatial regions (both horizontally in space as well as vertically through the water column), and over time. Given the complexity and scale of the deep-sea environment, it appears from the literature that studies often focus on limited regions, parameters or species, and broader perspectives have not been published in the literature. It is important to gain comprehensive data for all deep-sea areas, as these are necessary inputs for modelling and forecasting exercises, which in turn inform policy and decision-making to identify priority areas for deep-sea conservation (Fanelli et al., 2021). There is also large variability between different areas in terms of e.g. their climate variability and ecosystem services. It has been suggested that Essential Ocean Variables⁸ (EOVs, e.g. sea surface temperature and Oxygen) and Essential Biodiversity Variables⁹ (EBVs, e.g. community abundance and primary productivity) relevant for the deep sea should be identified and studied (Danovaro, Fanelli, Aguzzi, et al., 2020).

Ongoing deep-sea research has been supported, and in some cases enabled, by ongoing technological development, both in the water, and in terms of data analysis and sharing. However deep-sea research and suitable equipment is typically very costly (Ruth, 2006). Technological development alone does not equate to availability and equal access to deep-sea capable infrastructures such as research vessels and equipment (Nieuwejaar et al., 2020). There is limited published discussion on the wider needs for deep-sea technology, beyond a few proposals for specific technologies. This gap needs to be filled to help provide clarity on what technology and innovation is needed to support ongoing and future deep-sea research.

⁷ <https://www.decadeonrestoration.org/>

⁸ https://www.goosocean.org/index.php?option=com_content&view=article&layout=edit&id=283&Itemid=441

⁹ <https://geobon.org/ebvs/what-are-ebvs/>

In the context of the UN Decade of Ocean Science for Sustainable Development¹⁰, the revised Ocean Decade Roadmap document calls for research and technology that will help to “better understand the functioning of deep-sea ecosystems, measure the cumulative impacts of Ocean stressors and define the carrying capacity of Ocean ecosystems to sustain human impacts and economic development”¹¹. The Ocean Decade offers an interesting opportunity (Howell et al., 2021), and the deep sea is already a prominent part of several already endorsed Ocean Decade activities (as of early 2022) aiming to address these objectives, including:

- Seabed 2030¹²
- Joint Exploration of the Twilight Zone Ocean Network¹³
- Deep Ocean Observing Strategy (DOOS)¹⁴
- Challenger 150 - A Decade to Study Deep-Sea Life (Howell et al., 2020)¹⁵

The 2021-2030 decade is also dedicated to Ecosystem Restoration¹⁶ aiming to halt the degradation of ecosystems, which is increasingly needed to also recover damaged deep-sea habitats and ecosystems.

Rationale for the Working Group

It is timely to now revisit this topic to take stock of where we are, to highlight the progress that has already taken place, and to make recommendations to take deep-sea research forward.

Discussions on the impact of climate change, industrial fisheries on the deep-sea ecosystem, on deep-sea mining and other impacts, microplastics included, are becoming more commonplace in scientific and political circles are becoming more commonplace in scientific, economic, and political circles, and are reaching public conversations, partly thanks to significant science communication efforts in this area. There is however still work to do in going beyond engagement and encouraging non-scientists to care for the deep sea in the same way as they might for other environments (Jamieson et al., 2021). There are also many stakeholders in the deep-sea field with varying agendas and perspectives, including from natural and social science governance, industry and NGO's, each conducting their own discussions, research and data collection. For this reason, **it would be of significant benefit for all stakeholders to develop a document that takes an overarching view, to outline what the current state-of-the-art is, and what the next steps need to be for sustainable development in terms of scientific research and governance of the deep sea. This document should not focus on any specific sector or field, but take a holistic view of the deep sea, and highlight how the deep sea contributes to overall Ocean health, and what research is needed to ensure sustainable management of its resources.**

2. Working Group Objectives

¹⁰ <https://www.oceandecade.org/>

¹¹ <https://unesdoc.unesco.org/ark:/48223/pf0000265141>

¹² <https://seabed2030.org/>

¹³ <https://jetzon.org/>

¹⁴ <https://deepoceanobserving.org/>

¹⁵ <https://www.dosi-project.org/challenger-150-decade-for-deep-sea-life/>

¹⁶ <https://www.decadeonrestoration.org/>

The aim of the working group will be to produce a Future Science Brief outlining the current policy- and research funding status and future recommendations in relation to the deep sea.

The document will be primarily written from a European perspective, but due to the nature and location of the deep-sea (joining several overseas territories), as well as the global operation of European industry (mining and fishing), the document will have global relevance. It could also provide future direction for non-European states for their engagement with the deep sea.

As noted previously, there are many stakeholders involved in deep-sea topics; therefore, it will be important for the working group to be aware of current activities and conversations, and to avoid duplication of efforts where possible. This includes both European initiatives such as JPI Oceans' ongoing work on deep-sea mining¹⁷, the iAtlantic project¹⁸, global initiatives such as the Deep-Ocean Stewardship Initiative (DOSI)¹⁹, and the Scientific Committee on Oceanic Research (SCOR) Working Group 159 on Deep-sea Biology²⁰.

The WG will also take note of recent and ongoing EMB activities, including on marine geohazards²¹, marine habitat mapping, and Ocean oxygen to explore synergies and ensure that information is not unnecessarily duplicated.

Specific objectives could include but are not limited to:

- Providing an updated state-of-the-art on deep-sea natural and social science research, focussing on progress since 2015;
- Looking into the narratives around the deep-sea, to note what has been successful, to identify other stories which could be attractive to a wider audience, and to debunk myths or misleading communications;
- Discussing strategic next steps for deep-sea research in the context of:
 - Outlining the governance and enforcement, monitoring, research needs for successful conservation, management, protection and restoration, while also considering equity for all nations, given that the high seas as a global commons;
 - Understanding the connectivity (3D protection, 4D Ocean, cycles, climate change) between the deep sea and wider Ocean health (ecosystem services);
 - Considering deep-sea challenges (e.g. impacts of blue economy sectors, impact of decarbonisation strategies, restoration of degraded ecosystems) and management approaches (e.g. MPA's, holistic Environmental Impacts Assessments (EIAs)) in the wider context of human-centric global impacts (e.g. climate change, pollution, deoxygenation, overfishing, biodiversity);
 - Expanding studies to consider human deep-sea impacts beyond a single area, the short-term and/or a single industry to consider human-induced (cumulative) impacts and multiple stressors on Ocean ecosystems over longer time-scales;

¹⁷ <https://www.jpi-oceans.eu/ecological-aspects-deep-sea-mining>

¹⁸ <https://www.iatlantic.eu/>

¹⁹ <https://www.dosi-project.org/deep-ocean-stewardship/>

²⁰ <https://scor-int.org/group/159/>

²¹ <https://www.marineboard.eu/marine-geohazards-blue-economy>

- Mapping and bringing deep-sea stakeholders together in transdisciplinary, inclusive and sustainability science research contexts;
- Highlighting the role and further needs for technology to enable the deep-sea research needs;
- Considering the monitoring and observation needs to support research;
- Outlining the needs for capacity development to support deep-sea research and technology innovation;
- Exploring the need for, and current progress towards, monetary and non-monetary valuation of the deep-sea and its resources and services, to support decision-making;
- Where appropriate, proposing updates to the recommendations presented in EMB PP 22 “Delving Deeper: Critical challenges for 21st century deep-sea research” (Rogers et al., 2015).

3. Working Group Composition

Working Group Chair and co-Chair

The Working Group (WG) Chair and Co-Chair represent the WG and take responsibility for its deliverables.

Profile

The Working Group (WG) Chairs should be persons with significant experience and expertise and a leading role in the working group topic at national and/or European level. It is important that the Chair and Co-Chair have a big picture approach to ensure a focused and balanced view on the topic, and that they fully commit to facilitating the writing of this document.

Selection process

The Working Group (WG) Chair and Co-Chair will be selected as a result of a call for WG members' nominations issued by the European Marine Board Secretariat. The European Marine Board Secretariat in consultation with the ExCom, make the selection of the Chair from the pool of nominations received. A WG Co-Chair will be selected by the WG Chair with assistance from the EMB Secretariat.

Roles and responsibilities of Working Group Chairs

The Working Group (WG) Co-Chairs are responsible for ensuring the scientific quality of the WG output(s) and its timely delivery according to the WG Terms of Reference and as agreed at the kick-off meeting. The WG Chairs provide scientific leadership and act as the driving force for the WG activities with the support of a dedicated European Marine Board Science Officer who acts in the capacity of WG facilitator (see below). **The time contribution estimated for the Chair and Co-Chair is 15 days per year per person**, considering the roles listed here below.

The WG Chairs (lead Chair primarily and Co-Chair when the lead Chair is not available):

- Chair WG meetings, i.e. moderate discussions and ensure delivery of meeting outputs;
- Coordinate the scientific contributions to the document draft according to the objectives defined at the kick-off meeting;
- Maintain an overview of the content and quality of the various inputs and requests additional expertise if necessary;

- Ensure timely delivery of the WG document; and
- Enhance the document's strategic impact by promoting WG activities and the output.

Working Group Members

A Working Group of approximately 12 members is proposed.

Profile

The selected working group members will preferably have a background in at least one of the following fields:

- Deep-sea sciences including biology and ecology, chemistry, physics, and geology;
- Marine social science;
- Deep-sea engineering and technology, exploration and observing;
- Blue economy, industry and their impacts;
- Marine law and governance;
- Marine economy and valuation;
- Philosophy and ethics;
- (Marine) science communication.

Working Group Member selection process

The Working Group (WG) experts will be selected as a result of a call for WG members' nominations issued by the European Marine Board Secretariat to the European Marine Board Member Organizations. WG Members may be drawn *inter alia* from EMB Member Organizations, national research institutes and universities as well as relevant European projects and initiatives, industry and non-profit organizations.

The co-Chairs will select the WG Members from the proposed nominations. If the Chair and co-Chair believe that external expertise are needed they can propose additional experts. Decisions on the composition of the WG are guided primarily on the basis of achieving the correct balance of expertise required to comprehensively address the topic at hand. When the expertise criterion has been exhausted, decisions between candidates can be made on the basis of ensuring a broad geographical representation and gender balance for the WG. Non-selection of some nominated candidates is therefore normal and bears no relation to the scientific excellence of those candidates not selected.

Roles and responsibilities of Working Group Members

Working Group (WG) Members are responsible for ensuring the scientific quality of their inputs and their timely delivery according to the WG Terms of Reference. **The time contribution estimated for the Working Group Members is 7,5 days per year per person**, considering the roles listed here below.

WG Members:

- Prepare for and attend the WG meetings;
- Submit written contributions in a timely manner as agreed at the kick-off meeting;
- Guide and adhere to the high-level strategic objectives of the publication;
- Promote the resulting publication at national level and European levels;

- Provide feedback on dissemination activities and opportunities, impact and uptake to the EMB Secretariat.

Engaging the wider community

During the course of the Working (WG), members may invite a selection of stakeholders or observers from the wider community to participate (e.g. from science, industry, policy, funding agencies).

Interaction with relevant international and European initiatives working in this field should be explored. This could be achieved through informal interactions during the writing process, through consultation and/or workshops held during the lifetime of the activity, by engaging key people as external reviewers, or by selecting several key experts to serve as members of the WG.

EMB Secretariat facilitation

The European Marine Board Executive Director is an *ex officio* Working Group (WG) manager. S/he nominates one or two Secretariat officers to support and facilitate the WG.

The EMB Secretariat will coordinate this activity with the Chair and Co-Chair. A dedicated EMB Science Officer will act in the capacity of facilitator and other EMB Secretariat staff may be involved depending on the specific topic for each WG activity.

- WG manager: Sheila Heymans, EMB Executive Director
- WG facilitator: Ángel Muñoz Piniella, Science Officer

4. Mode of Operation

Work programme

The work programme for the Working Group (WG) will consist of:

- One kick-off meeting and at least two additional meetings (remote meetings via video conference or in-person, to be considered by the working group);
- Writing assignments;
- Regular email interactions and online progress meetings (as agreed by the WG);
- Editing to publication standard by the WG Chair/Co-Chair and EMB Secretariat;
- Revisions based on peer review comments (see Section 5); and
- Final copy-editing and design by the EMB Secretariat and WG Chair /Co-Chair.

Support from the EMB Secretariat includes:

- Organizational support for WG meetings;
- Cost of all catering associated with WG meetings, including a WG dinner where possible;
- Costs of publication (including design and printing), communication items including images, videos and/or infographics, and dissemination of the document to relevant stakeholders; and
- Writing and disseminate of meeting minutes, and maintenance of regular dialogue with the WG Chair and Co-Chair to ensure timely delivery of the document.

Note: WG members and Chairs are not financially supported by the EMB (unless an extraordinary contribution is secured by one or more EMB Member Organizations). WG member participation (e.g. travel costs) is normally funded by their institution or the EMB member that proposed them for the WG. The establishment of a WG is for a limited duration and the WG should be disbanded by the Board when it has fulfilled its mandate.

General Data Protection Regulation (GDPR) policy for EMB Working Groups

Personal data for EMB Working Group (WG) Members and those involved in other EMB core activities is used for internal communication with the activity as well as external communication of the EMB activity via publications, the EMB website and EMB social media outlets.

For any new EMB activities, consent is sought at the kick-off of the activity to cover all relevant use and storage of personal data. The personal data of the working group members is retained beyond the end of the activity to enable follow-up communications for impact reporting and on related topics, and thus their data will continue to be stored, unless consent is later withdrawn. A template consent form can be found in Annex 1.

Reviewers are also contacted within the context of EMB activities. The template email they receive clearly outlines their right to act such that their input remains anonymous, in which case the reviewer would simply be listed as “Anonymous”. The reviewer will be informed of how and where their personal data will be stored. The consent of the reviewer will also be specifically sought for their personal data to be used outside of any activities directly relating to their role as reviewer, using the template text included in this document.

The [EMB privacy policy](#) contains information about our compliance with GDPR (data protection law). In this document you can find how to send us a request to let you access your data that we have collected, request us to delete your data, correct any inaccuracies or restrict our processing of your data. Please contact us at info@marineboard.eu for more information or concerns. You have the right to lodge a complaint about the way we handle your data with [Belgian Data Protection Authority](#).

5. Deliverables

The output of this Working Group (WG) is expected to be a Future Science Brief. EMB Future Science Briefs are typically around 36 pages long, and will outline the state of the art, and future research and policy needs, based on comprehensive existing literature on the topic.

The document will be peer-reviewed by a minimum of two external reviewers (one European and one international) selected from proposals by the WG members, and will be coordinated by the EMB Secretariat. In accordance with the EMB procedures, the document will also be sent to EMB Member organizations for internal review and approval prior to finalization and publication.

The impact of the publication will be achieved *via* a targeted dissemination strategy as described below. WG members will be required to make suggestions on how to reach end-user contacts and to contribute to the dissemination. Promotion of the document may include dedicated presentations at stakeholder events. WG members will also be asked to notify the Secretariat of any dissemination activities or observed uptake / impact for up to two years following publication, for future impact

reporting. A full outline of the decision-making procedure and system for WG operations is outlined in Annex 2.

6. Target Audience and Expected Impact

This specific publication/event targets the following key stakeholders:

- European and International policy-makers, who will be able to use this document to understand the wider context of deep-sea research and development and apply this knowledge in developing policies and strategies;
- European and national research funders, who will be able to use this document to understand priority directions for research in relation to the deep sea, the blue economy and wider Ocean health;
- The marine science community, both those specifically active in the deep-sea field and those who are not, to help indicate the connectivity between fields, sectors and disciplines, and to highlight areas where collaboration is required; and
- Technology developers, who will be able to use the document to identify critical areas and types of innovations needed to support deep-sea research.

In addition, the document might be of interest to science communicators and the media, citizens, industry and anyone else with an interest in the deep-sea and our current understand of it, its resources and services, and the areas where further development is required.

7. Communication and Dissemination Strategy

The targeted dissemination strategy includes, but is not limited to:

- Development of infographics to communicate key concepts and main messages from the document;
- Collection of photographs and other graphics to include in the document, social media, and other communication activities;
- A dedicated launch event;
- A news release on the EMB website and shared with EMB member organizations to share on their websites;
- Social media content leading up to, for launch, and following publication of the document;
- A printed version of the document sent to relevant stakeholders; and
- Presentation of the document by WG members and EMB Secretariat at relevant national and European events.

8. Indicative Timetable

The Working Group (WG) activities are foreseen to start in autumn 2022 and continue for 18-24 months from kick-off, including three meetings. It is foreseen to publish the final document in spring-summer 2024, which can include a dedicated launch event (tbc), and electronic and hard copy dissemination to relevant stakeholders. The European Marine Board conduct impact reporting, based on feedback from WG members and wider stakeholders, for a period of at least two years following publication.

An indicative timetable and order of activities is presented below.

Tasks (2022-2024)	2022										2023										2024						
	A	M	J	J	A	S	O	N	D		J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M
Approval of ToR by EMB member organizations	█																										
Nominations and expert selection		█	█																								
Appointment of WG co-Chairs				█																							
WG member list confirmed, invitations and planning for kick-off meeting					█	█																					
Kick-off meeting <ul style="list-style-type: none"> ▪ present expertise ▪ discussion of ToR ▪ objectives and scope ▪ discussion and agreement on table of contents and work plan ▪ allocation of writing assignments ▪ dissemination and communication opportunities 							█																				

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Annex 1: Consent form for Core Activities

EMB holds personal data for anyone involved in core EMB activities, including Working Groups.

The following personal data may be held by the EMB Secretariat:

- Name
- Title
- Job title
- Areas of expertise and research interests
- Previously held roles
- Institute
- Country
- Institutional email address
- Institutional postal address
- Institutional telephone number
- Photographs
- Video

This information is stored in a secure spreadsheet and folder locations, and only EMB Secretariat staff have access to this.

EMB may:

- Contact you regarding the EMB activity that you are directly involved with
- Contact you regarding other EMB activities
- Add you to the EMB stakeholder mailing list
- Make your name, institution and country publicly available on the EMB website, in EMB communications, e.g. presentations regarding the activity you are involved in, and in EMB publications
- Take your photograph during EMB activities and use these pictures in publications, on the EMB website and on EMB social media outlets
- Take video footage during EMB activities and use these pictures in publications, on the EMB website and on EMB social media outlets

The data held may be reviewed and revised by the subject, and consent for any or all of the above may be withdrawn at any time.

Please tick this box to confirm that you understand the above, and that you give EMB permission to obtain, use and store your personal data as outlined above.

Name:

Date:

Annex 2: Decision Making Procedure

EMB Working Groups & Publications

Decision making procedures

