2021 2030 United Nations Decade of Ocean Science for Sustainable Development

2nd BBO Dialogue Forum
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Documentation

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Background: The BBO-Projects and the stakeholder dialogue fora

The BBO projects

The BBO project consortium comprises four projects funded under the Biodiversity in the Blue Ocean programme by the Federal Ministry of Education and Research (BMBF):

- AGELESS: Focuses on using geological information to assess and dynamically protect marine biodiversity in the face of future climate change.
- IMAPP: Develops decision-making tools for EBSAs (Ecologically or Biologically Significant Areas) and MPAs (Marine Protected Areas) in international waters.
- INDIFUN-AI: Captures plankton diversity and develops indicators for monitoring marine biodiversity.
- BEnToolsMaPs: Integrates seabed biodiversity into the management of marine protected areas.

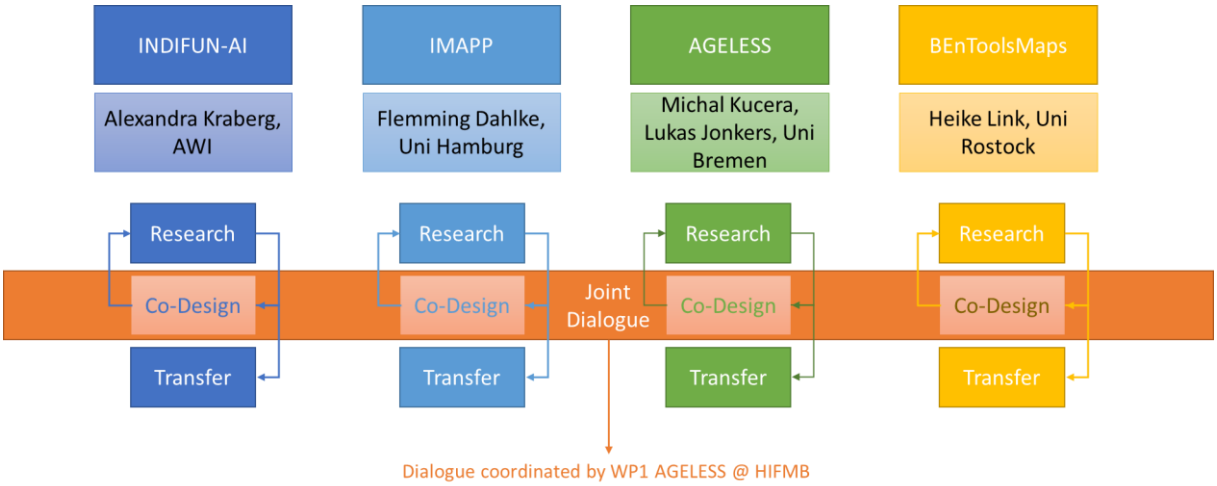

Figure 1: Joining of the four BBO projects on the topic of co-design and dialogue

These projects collaborate to develop innovative co-designed approaches for assessing and protecting marine biodiversity (Figure 1).

Three Dialogue Fora

The dialogue fora are central to the co-design process in the BBO projects and aim to establish a foundation for long-term collaboration between science and practice regarding marine biodiversity issues. They aim to engage stakeholders from various sectors and co-create solutions for marine biodiversity conservation challenges in three stages: co-design, co-production and co-evaluation (Figure 2). Three dialogue fora are planned within the projects' time frame:

- 2025: Co-design in Bremen
- 2026: Co-production in Berlin
- 2027: Co-evaluation in Bremerhaven

All three dialogue fora are held under Chatham House Rules - a set of guidelines that allow participants to use information from discussions without attributing it to specific individuals or organisations, promoting an open and honest dialogue.

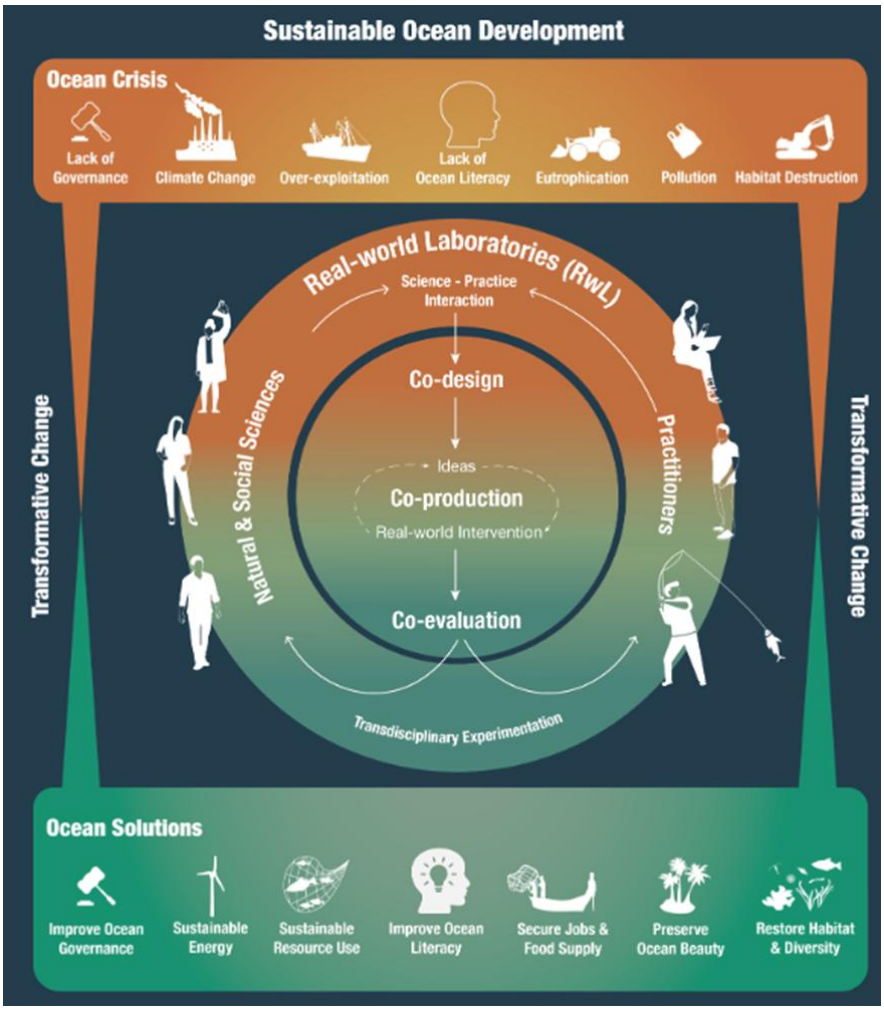

Figure 2: The three central processes to co-creation: co-design, co-production, co-evaluation that will form the three overarching topics of the three BBO dialogue fora; from Franke et al. 2023

Aims and agenda of the 2nd BBO dialogue forum

Aims

The second BBO Dialogue Forum (DF2) in Berlin in May 2026 focused on how scientific knowledge from the BBO projects can support the implementation of the BBNJ Agreement. Its core aim was to move from co-designed research questions (DF1) towards action-oriented cross-project inputs on research results, which are usable for a science-based implementation of the BBNJ Agreement. The forum brought together scientists from all four BBO projects and stakeholders from administration, policy and civil society organisations to jointly explore how existing data, methods and governance experience can be translated into practically usable advice for BBNJ processes.

A central feature of DF2 were four thematic presentations by BBO scientists: on climate change impacts on marine biodiversity, area-based management tools, indicators for marine biodiversity, and on science-policy interfaces and science communication. These presentations were prepared jointly across all four BBO projects to integrate research results for supporting the implementation of specific parts of the BBNJ Agreement. The presentation and discussion on climate change impacts specified the impacts and the need for climate-smart conservation strategies, particularly dynamic marine protected areas (MPA). The presentation and discussion on area-based management tools

addressed Part III of the BBNJ agreement and focused on useful criteria to identify areas for MPA in the High Seas. The presentation and discussion on indicators of marine biodiversity was particularly relevant for implementing Part III and IV of the BBNJ Agreement, for which indicators and their cost-effective measurement are essential. Finally, the presentation and discussion on science-policy interfaces and science communication mainly addressed question, what can be learned from previous experiences for establishing effective science-policy interfaces and science communication in the context of the implementation of the BBNJ Agreement.

Agenda

Day 1

- Welcome and introductory remarks by the funder and ministries, including a policy update on the status of ratification and national implementation of the BBNJ Agreement
- Thematic presentation 1 and plenary discussion: Climate change impacts on marine biodiversity and implications for climate-smart, potentially dynamic area-based management
- Thematic presentation 2 and plenary discussion: Area-based management tools in areas beyond national jurisdiction, with a focus on EBSAs as practical starting points and on integrated spatial analyses from the BBO projects
- Thematic presentation 3 and plenary discussion: Indicators for marine biodiversity in areas beyond national jurisdiction and their relationship to Annex I criteria of the BBNJ Agreement

Day 2

- Thematic presentation 4 and discussion: Science-policy interfaces and science communication for BBNJ, including options for future advisory structures and formats for science-policy interaction
- Co-production session on main policy implications of BBO results and on possible BBO outputs (e.g. fact sheets, policy briefs, criteria-indicator mapping and contributions to discussions on scientific advisory mechanisms)
- Closing discussion on next steps for the BBO projects in supporting BBNJ implementation, including how to further develop integrated, cross-project products.

Opening statement from the funder BMFTR

In her opening remarks (see Appendix) **Dr. Anne Parge** from Division F24 on Marine, Coastal and Polar Research at the Federal Ministry of Research, Technology and Space – the funder of the BBO projects – described the policy frameworks for the BBO research program, which all stress the importance of transferring research findings to industry, politics, and society.

In terms of generating practical relevance, the BBO dialogue fora and the usability of the BBO research results for supporting the implementation of the BBNJ Agreement are essential. As best practices for practically relevant research Dr. Parge presented the DAM missions SustainMare and mareXtreme in the North and Baltic Sea as well as the program JPI Oceans Mining Impact on Deep-Sea Mining. The projects in these funding schemes contributed to their relevance by various transdisciplinary formats, which are exemplary and a model also for the BBO projects.

BBNJ update – Current status of ratification and an insight into recent developments

In her **presentation** on the ratification of the BBNJ Agreement (see Appendix) **Anne Freiberger** from the Department for Ocean Protection at the German Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety described the adoption of this Agreement in 2023 by 145 Member States as a historical success for marine protection and multilateralism. Up until now there are 89 ratifications of the Agreement so that the necessary number of ratifications by 60 nations has been reached and the Agreement has formally taken effect.

The German ratification requires both a treaty and an implementing act, meaning that the ratification process is more complex and protracted than in many other countries. Nevertheless, Germany is thus immediately ready for the practical implementation of the agreement. The legislative process in Germany was completed on 27 March 2026. The German implementing act ("Hochseeschutzgesetz") transposes the provisions from three areas of the BBNJ Agreement into national law: (i) for the establishment of MPAs, (ii) for environmental impact assessments, and (iii) the management of marine genetic resources and digital sequence information. The procedures in Germany for the establishment of MPAs and environmental impact assessments are described in more detail in the presentation in the Appendix.

The next steps nationally are the issuance of the ratification instrument and its deposit at the United Nations in New York. The German implementing act will then enter into force 30 days after the deposit of the ratification instrument.

Internationally the next steps will be the first BBNJ-COP planned for January 2027 and establishing the BBNJ secretariat. Currently there are three candidates for the secretariat: Belgium, Chile and China. The decision about the location of the secretariat will be taken at the first COP.

The **discussion** following Anne Freiberger´s presentation addressed primarily the BBNJ secretariat and the Scientific and Technical Body (STB).

- It was made clear that the election processes for the BBNJ secretariat and the STB are two different processes. The Prep Com III report includes a draft decision of the modality of the voting on the secretariat seat. This decision would need to be adopted by COP in order for the modalities to be applicable. The draft decision suggests that Parties will first seek to decide the host location by consensus. In the absence of consensus, the decision will go to a secret ballot vote requiring a two-thirds majority of the Parties present and voting. If no candidate secures a two-thirds majority in the first round, successive rounds of voting will be held. The candidate with the fewest votes is eliminated after each round, until only two candidates remain and one achieves the required two-thirds majority. The STB members will be nominated for different UN regional groups (for equitable geographical representation). The exact date of election of the members of the STB is yet to be determined, as some scenarios of "early nomination and election processes" before COP 2 are discussed among delegations.
- At the moment, three proposals to host the seat of the BBNJ secretariat have been submitted by Chile, Belgium and China. One participating scientist expressed the concern, that China might want to use the secretariat to pursue national interests in ocean governance, while Belgium and Chile would both possess strong reputations for transparency-oriented ocean governance. The first BBNJ COP will also decide on an institutional model for the future secretariat, which could be either linked to the UN system or function independently. More information on this discussion can be found in the report of

the third meeting of the BBNJ Preparatory Commission (PrepCom III). All candidates for the secretariat are published on the UN BBNJ website and the bids by the different countries to host the secretariat can be found on the UN Web TV.

- Some aspects regarding the STB and international scientific cooperation remain unclear and a potential national science-policy interface for supporting BBNJ-related decision-making in Germany as proposed by the DFG (see Stellungnahme by the SKBV of the DFG) is still under consideration. In the BBNJ agreement it is required that parties shall promote international cooperation in marine scientific research (Article 8) and some options for this cooperation have been described in Part V of the agreement, but this cooperation has not yet been planned in detail. A cooperation of the STB with IPBES could be further explored, as well as synergies between scientific research and advice related to BBNJ and to CBD as a whole. The draft decision of Prep Com III on the collaboration with "International Frameworks and Bodies (IFBs)" includes the CBD. One first step to this international scientific cooperation for implementing the BBNJ agreement is the Living High Seas project, which supports countries from the global south in drafting their proposals for area-based management tools (ABMTs), including marine protected areas (MPAs).

Impacts of climate change on marine biodiversity

The **presentation** on climate change´s impacts on marine biodiversity (see Appendix) by **Prof. Dr. Helmut Hillebrand** is relevant for different parts of the BBNJ Agreement: Part II on Marine Genetic Resources, Part III on Area-Based Management Tools and Part IV on Environmental Impact Assessments. He firstly stressed that driven by rapid anthropogenic climate change, the current change in marine biodiversity is happening at an unprecedented rate (with complete turnover of biodiversity in decades instead of multi-million years) and that marine biodiversity responds to the changing climate much differently than biodiversity on land. In the following, he made clear - based on integrated results from various BBO projects (including results on fossil records covering plankton data spanning millions of years) - how exactly climate change impacts on marine biodiversity differ and how spatially variable they are. On the one hand, there is a projected general trend of species moving away from the equator, because the conditions (especially the water temperature) become inhabitable for them, resulting in a massive reduction of species around the equator and a loss of specialist species and gain of species number in polar regions. On the other hand, fossil records of marine plankton communities show marked spatial differences in impacts of past climate change (e.g. between the Atlantic and the Pacific).

Besides the recommendations to reduce climate change by climate change mitigation as much as possible (since the faster temperature changes, the faster biodiversity changes) and to reduce other stressors on biodiversity (such as pollution or fishing) as much as possible Prof. Hillebrand´s main conclusion was that there is a need for dynamic area-based management tools (ABMTs) in BBNJ, including dynamic marine protected areas (MPAs). Furthermore, networks of MPAs would be needed to allow species to migrate from one protected area to the next one. If MPAs were to remain static and disconnected, this would severely increase the risk of species and entire marine ecosystems being lost, as species will be forced to migrate from these areas to unprotected areas because climate change impacts would change the conditions in these static MPAs to a degree that they are no longer suitable for them to survive.

The **discussion** following Prof. Hillebrand´s presentation focused on the topics of dynamic ABMTs/MPAs and the areas of the oceans mostly in need of marine biodiversity protection (including a more general discussion on the *goals* of biodiversity protection and the goals of establishing MPAs):

Discussion on dynamic ABMTs

- There was broad agreement that BBNJ implementation will likely require not only static MPAs, but also more dynamic or adaptive forms of area-based management, especially in light of climate-driven species shifts and changing ecosystem conditions.
- Participants pointed to existing examples of dynamic management, such as seasonal fishery closures, species-tracking approaches and review-based management systems in which MPAs are reassessed after implementation and adapted if necessary.
- At the same time, the discussion stressed that it is important to distinguish between dynamic MPAs and MPAs with dynamic management, as changing management measures within a fixed area may often be more feasible than changing the legal geographic boundaries of the whole MPA every few years.
- A recurring discussion point was that protection measures always need a clear objective: Protection goals may differ depending on whether the aim is to conserve species, habitats, ecosystem functioning (e.g. regarding resilience), migratory pathways, or fish stocks. Management design should follow from these goals rather than the other way around.
- It was emphasised that MPAs are only one type of ABMT and should be considered alongside with Other Effective Area-based Conservation Measures (OECMs), such as bottom-trawling bans, port monitoring and landing restrictions, seasonal closures and other sector-specific management tools.
- Several participants highlighted the importance of connectivity between protected areas, including stepping stones or migration corridors, while also noting that such connections may have risks, for example by facilitating invasive species or conflicting with existing offshore infrastructure.
- Adaptive management was seen as requiring stronger monitoring and assessment, because infrequent observation is likely to be insufficient for deciding whether measures need to be adjusted. However, participants also noted that ecosystem-level decisions are often based only on statistical averages and uncertain evidence, which raises difficult questions about the degree of confidence decision-makers require.
- From a policy perspective, the discussion underlined that in situations of uncertainty, the precautionary principle remains important. At the same time, adaptive or dynamic management must be judged against legal and institutional constraints, including existing sectoral rules, shipping interests, offshore wind development and the BBNJ duty not to undermine existing bodies and frameworks.
- Overall, the discussion suggested that future protection under BBNJ should not focus on MPAs alone, but on a broader toolbox of complementary measures, chosen according to clearly defined conservation objectives, ecological dynamics and governance feasibility.

Discussion on areas of the oceans mostly in need of marine biodiversity protection and on goals of biodiversity protection / establishing MPAs

- The discussion stressed that maps of projected biodiversity change should not be read as “blue is safe, red is risky”. While projected losses are particularly high in the tropics, polar regions and many mid-latitude areas (e.g. the Mediterranean) are also under pressure, so spatial priorities cannot be inferred from one colour scale alone.
- Participants agreed that MPAs can reduce non-climate pressures and thereby make species and ecosystems less susceptible to climate change, but noted that reasons for protection (high pressure, high biodiversity, or irreplaceable features) often do not overlap neatly in space, which complicates site selection and goal-setting.

- Several contributions highlighted that protection priorities should not focus only on where impacts are worst, but also on where protection would be most effective in practice, considering feasibility, data availability and political context. In some cases, areas with lower economic interest may offer more realistic opportunities for effective protection.
- A recurring theme was the need to clarify what exactly should be protected: species, habitats, ecosystem functions, regions with species loss or regions with species gain and over what time scales. Participants underlined that functional change could differ from taxonomic change and that "protect something rather than nothing" may be a pragmatic starting point in the face of uncertainty.
- Data gaps, especially in data-poor or politically inaccessible regions, were noted as a major constraint on identifying priority areas and assessing the effectiveness of measures, suggesting that any protection strategy must work with incomplete information while still aiming for meaningful impact.
- The group questioned whether the 30% global protected area target (formulated in the Kunming-Montreal Global Biodiversity Framework) alone is sufficient to address climate change, emphasising that such percentage goals are political numbers that only translate into real protection if management measures are effective and enforced and if MPAs are designed with clear objectives.
- Existing EBSAs were discussed as a pragmatic starting point for prioritisation, particularly if combined with information on changing species distributions, but participants also asked whether and how the roughly 8% of the high seas already covered by EBSAs can actually be protected in practice.
- Finally, the discussion pointed to the need for a network of MPAs and other area-based tools, some of them potentially dynamic or containing dynamic elements, with migration pathways and connectivity explicitly considered. Establishing such a network would require more coordinated proposals by groups of countries, supported by scientists, rather than the current largely uncoordinated pattern of individual MPA initiatives.

Area-Based Management Tools (ABMT)

In his **presentation** (see Appendix) **Prof. Dr. Flemming Dahlke** focused even more on the topic of ABMTs (addressed in Part III of the BBNJ Agreement), which has already been discussed in the session on climate change impacts before. His presentation was relevant for Part III on Area-Based Management Tools of the BBNJ-Agreement.

The presentation started from the observation that only a few MPAs have so far been designated in areas beyond national jurisdiction and that most of these offer relatively low levels of protection. Against this background, he framed the overarching goal as developing guidelines that help to balance conservation priorities with economic and legal interests in the high seas, drawing on integrated results from all four BBO projects. A central element of this work is the use of existing EBSAs as practical templates for future MPAs and other ABMTs: using BBO data, the team has refined maps of deep-sea habitats that combine information on biodiversity, geomorphology and climate into a regionalisation that can support spatial prioritisation and climate-smart design. Building on this, a more systematic EBSA characterisation has been developed that integrates diversity, food webs, human use and governance structures, thereby providing a richer knowledge base for ABMT design that goes well beyond the narrative descriptions currently available in the CBD EBSA repository. Because existing EBSA information is difficult to use systematically – basic items such as

shapefiles are not easily accessible – IMAPP has created an EBSA Shiny app that harvests species records from OBIS and GBIF, harmonises taxonomic information and links species to geomorphological features, allowing users to explore biodiversity patterns and conservation criteria across 27 Atlantic high-seas EBSAs and to identify similarity-based clusters relevant for MPA networks. AGELESS will contribute a complementary EBSA app that uses machine-learned environmental signatures to assess how habitat conditions within EBSAs change under different climate scenarios, highlighting cases where "EBSA-signature" habitats may move away from current boundaries and illustrating why future ABMTs need to be climate-smart and potentially dynamic. Additional work by BEnToolsMaPs on bioregionalisation in polar regions and by other BBO teams on improving plankton and deep-sea diversity data further enriches this multi-layered evidence base. Together, these cross-project efforts feed into a planned BBO perspective paper on Annex I criteria of the BBNJ Agreement, which will prioritise key criteria, explicitly account for dynamic pressures and propose ways to match criteria with operational indicators.

Key messages were that existing ecological, economic and legal information needs continued harmonisation, that EBSAs are a practical starting point but must be translated into accessible, indicator-ready knowledge products and that genuinely climate-smart MPAs and other ABMTs will require refined criteria, robust indicators and designs that explicitly consider climate-driven change.

The **discussion** following Prof. Dahlke´s presentation focused on criteria to be used for assessing suitability of areas in the high seas for MPAs and on EBSAs as a potential starting point for BBNJ MPA designation:

- Participants emphasised that MPA designation under BBNJ will require a multi-criteria assessment, combining ecological, economic and legal considerations (including interactions with existing international frameworks and bodies), and that these criteria need to be linked back to clearly defined conservation goals as discussed after Helmut Hillebrand´s presentation on climate change impacts.
- Furthermore, discussants noted that data availability and data access remain major constraints. While the EBSA Shiny app by IMAPP already compiles around 6,000 species records for the Atlantic high sea, important dimensions such as temporal dynamics are still missing, and many regions remain data-poor, making it difficult to base decisions purely on data-driven approaches.
- In this context, it was argued that expert-driven processes such as the EBSA descriptions will continue to play an important role, and that interdisciplinary expert groups – not only biologists, but also legal, economic and social science expertise – are needed to weigh biodiversity, legal and economic aspects when preparing MPA proposals for BBNJ.
- There was broad agreement that EBSAs provide a pragmatic starting point for BBNJ MPA designation, especially because Annex I criteria largely mirror EBSA criteria and are regarded as rather legally binding (despite some formulations in the BBNJ Agreement indicating possibilities for further development and revision). Furthermore, EBSAs are already anchored in the CBD framework. At the same time, participants highlighted that the current EBSAs are biased (many EBSAs are in the North), their data base is partly non-transparent and incomplete and that additional areas will be needed for reaching the 30% target formulated under the Kunming-Montreal Global Biodiversity Framework.
- Several contributions underlined the institutional and political complexity surrounding BBNJ implementation: existing regional and sectoral bodies have specific, sometimes conflicting mandates, changes to Annex I criteria would require lengthy negotiations, and "first movers"

for proposing MPAs in the context of BBNJ might set important benchmarks for how EBSAs and other information will be used in practice without considering the best available science.

Indicators for marine biodiversity

In their **presentation** (see Appendix) **Dr. Alexandra Kraberg** and **Prof. Dr. Heike Link** focused on useful indicators and measurement procedures for assessing marine biodiversity in the high seas – a topic relevant for Part III (ABMTs) and IV (Environmental Impact Assessments) of the BBNJ Agreement.

The presentation – building on results from several BBO projects – started from the observation that the complexity of biodiversity, especially in areas beyond national jurisdiction, makes it essential to work with clear, well-designed metrics rather than relying on ad-hoc or single-dimension measures. The presenters then proposed the DPSIR framework (Driver-Pressure-State-Impact-Response) as a useful organising concept for indicator development, because it links human activities and environmental change to management responses and thus mirrors the structure of many policy processes under the BBNJ Agreement, in particular processes on Part III (area-based management tools) and Part IV (environmental impact assessment). They highlighted that many different actors already use biodiversity indicators, but often with very different approaches, and that this diversity is compounded by major gaps in data availability, comparability and taxonomic knowledge, as well as high costs of traditional sampling and analysis. Against this background, the presentation showed how BBO projects are experimenting with low-cost monitoring technologies, such as the planktoscope that can generate "good enough" plankton data much faster and cheaper than classical microscopy, and how ongoing work on food-web modelling and bioturbation potential illustrates both the analytical promise and the data limitations in areas beyond national jurisdiction (ABNJ).

Key messages were that robust indicators are needed to operationalise the Annex I criteria of the BBNJ Agreement, that there will inevitably be a "diversity of diversity indicators" because ABNJ encompasses a wide variety of ecosystems and no single metric can capture all relevant aspects, and that strategically deployed low-cost monitoring, informed by cross-project BBO research, can play an important role in closing critical data gaps and making indicator-based assessments more feasible in practice.

The **discussion** following the presentation by Dr. Kraberg and Prof. Link focused on the topic of improving indicators for being used in the various assessments (e.g. of areas´ suitability as MPAs) and monitoring needs in the implementation of the BBNJ Agreement:

- Indicator development in the context of BBNJ was described as a gap-analysis exercise, arguing that improving and harmonising underlying data sources should be the first priority and that modelling or new indicators should build on a stronger data foundation rather than adding complexity on top of weak input data.
- Participants agreed that BBNJ will require data-based indicators and approximations but warned against the search for a single "super-indicator". Instead, reflecting earlier discussions on goals and biodiversity change, a bouquet of complementary indicators was seen as more appropriate than a one-size-fits-all metric.
- The ecosystem-based approach was described as conceptually attractive but difficult to operationalise and highly data-intensive, echoing experience from fisheries management where an ecosystem approach would have been pursued for decades without clear consensus on ecosystem-based methods or communication to decision-makers.

- The discussants highlighted the value of a systematic mapping of existing indicators against the Annex I criteria of the BBNJ Agreement, which could help to identify priority indicators and clarify where genuine knowledge gaps remain, rather than creating entirely new metrics by default.
- Several contributions stressed that international cooperation and expert groups (e.g. in the context of MSFD, regional sea conventions, NEAFC or ICES) will be essential for aligning indicators and sharing experience, while low-cost monitoring tools may change who can contribute data and how indicators are discussed, noting that sampling is becoming easier, but data analysis remains a bottleneck.
- The discussion also touched on the need for institutional and financial support for low-cost methods and indicator work, with suggestions that national mandates and alliances (e.g. the German Marine Research Alliance) could play a role and that EBSAs and existing directive frameworks offer logical starting points for indicator development under BBNJ.

Science-policy interfaces and science communication

In their **presentation** on science-policy interfaces and science communication (see Appendix) **Dr. Jan-Claas Dajka** and **Dr. Torsten Grothmann** examined how science can best support the implementation of the BBNJ Agreement and where key gaps remain. Building on an analysis of the Agreement text, the presentation firstly highlighted that using “best available science” and relevant traditional knowledge are referenced repeatedly, while international cooperation in marine scientific research is encouraged but not directly funded, placing particular importance on effective science communication and collaboration formats.

Drawing mainly on results from DF1 and stakeholder interviews, the talk outlined central research needs for better protection of marine biodiversity in the high seas: closing biodiversity knowledge and data gaps through better use of existing data and models, understanding and addressing governance fragmentation (including clarification of how new BBNJ institutions will interact with existing organisations), and generating more site-based ecological knowledge for largely untested concepts such as dynamic ABMTs and migratory corridors. It also stressed the importance of viewing indicators and monitoring as complementary rather than competing, of aligning work with SDG processes, and of paying attention to political timing, stakeholder acceptance and participation. From a stakeholder perspective, key gaps were grouped around governance and management, the ambition and application of the precautionary principle, and long-term climate-driven trends, pointing to a need for further interdisciplinary research.

The presentation then summarised effective formats for science communication including policy briefs, fact sheets, executive summaries, infographics and audio-visual products – and stressed that communication channels must be tailored to different audiences.

Finally, based on a systematic literature review of scientific publications on science-policy interfaces (SPI) relating to marine biodiversity in the AGELESS project and an empirical study on science-stakeholder interactions in the INDIFUN-AI project challenges and conditions for success of marine biodiversity SPI (e.g. including diverse knowledges, being free from political influence) were presented, which can be used as guidelines for setting up new science-policy interfaces (such as the “Scientific and Technical Body”) in the context of implementing the BBNJ Agreement. Some experiences from SPI studies are also available regarding specific approaches required in the BBNJ Agreement (such as the “ecosystem and precautionary approach”) but these experiences are limited, so that potentially new methodologies and procedures are necessary (e.g. for applying the precautionary principle in MPA designation) in BBNJ´s implementation.

The **discussion** following the presentation by Dr. Dajka´s and Dr. Grothmann focused on science-policy interfaces in the context of BBNJ:

- NGOs can act as boundary organisations in science-policy interfaces, but their role depends strongly on context: in some settings they are perceived as trusted intermediaries, in others as lobby groups with clear interests, so transparency and trust were seen as crucial preconditions for their effective involvement.
- Participants agreed that SPIs need to acknowledge that scientists and NGOs alike have values and agendas. Rather than aiming to be "free from political influence", SPIs should be designed to be "ergebnisoffen" (open-ended with no fixed expected outcome), and to encourage (self-)reflection on the role and personal commitments of the scientists involved.
- The requirement of "the use of the best available science" in the BBNJ agreement was described as both central and contested: it is a legal term that can underpin court rulings and give science a formal role in negotiations, but it can also be weaponised in political debates (e.g. for justifying postponing action based on the lack of available science), and there are important distinctions between "best available science" and "best available advice", as illustrated by experiences from ICES and other science-policy processes.
- Several contributions stressed that it matters greatly which scientists are "in the room" (i.e. included in the SPI), and that politicisation of SPI´s can lead to cherry-picking of evidence or avoidance of contentious topics by researchers, which reinforces the need for inclusive, well-structured advisory processes and for formats that allow for face-to-face dialogues.
- In the discussion several challenges for scientists involved in SPI were identified:
    - Being objective / neutral and strongly caring about biodiversity at the same time
    - Being "thick-skinned" against sometimes manipulative attempts to exert political influence on scientific assessments
    - Dealing with the fact that there is not the science, but multiple sciences / knowledges
    - Choosing what is the best available science / advice
    - Dealing with biased research results (e.g. research funded by business)
- Furthermore, the group of DF2 participants noted a gap in institutionalised scientific work specifically on BBNJ criteria and implementation and discussed whether existing structures (such as SCOR-type working groups or other expert bodies) could provide a more systematic framework for developing and debating criteria, indicators and advice in support of BBNJ.

Co-production of (policy) implications for science-based BBNJ implementation

The last session of DF2 developed (policy) implications from the discussions of the previous sessions, particularly to clarify which scientific inputs might be useful from the BBO projects to support an implementation of the BBNJ Agreement, which is based on sound scientific knowledge. The co-developed implications related to the following identified challenges: unclear goals for biodiversity protection in ABNJ, addressing climate change impacts in climate-smart ABMTs and establishing effective science-policy interfaces for supporting science-based BBNJ implementation.

Development of more specific goals of marine biodiversity protection for BBNJ implementation

Throughout the whole dialogue forum, a question recurred repeatedly: What should be the goals of protecting marine biodiversity in ABNJ? The BBNJ Agreement does not provide much clarity on this question and combines in its objectives – due to a necessary compromise in the BBNJ negotiations –

the unspecific, undefined and partly contradicting goals of "conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction". However, as stressed by a participant, concrete protection measures always need clear and specific goals, also to be able to evaluate goal attainment and success of the measures based on indicators developed from the specific measures´ goals. As highlighted by other participants, there are several aspects to be considered when setting objectives for protection of marine biodiversity from a scientific point of view:

- Protection of what?
    - Should communities of species or specific species or ecosystem functioning (e.g., resilience to any kind of pressure) or habitats be protected?
    - Should areas with species loss or areas with species gains or both be protected?
- It is clear that protection goals need to be differentiated to fit the specifics of the marine biodiversity addressed, but along which dimensions or criteria should they be differentiated?
    - Different from area to area? Here it was stressed that there is not *the* MPA but in some cases no-take MPAs and in other cases multi-use MPAs have to be created.
    - Different from protection measure to protection measure?
- How to measure success? Or in other words: How to measure goal attainment? By
    - number of species saved or
    - number of ecosystems saved?

Based on these discussions it was recommended by the DF2 participants to produce a BBO fact sheet or policy brief on suitable goals in implementing the BBNJ Agreement, potentially co-designed with policy-makers to address not only relevant scientific aspects but also legal aspects and policy needs for the formulation of specific goals for protecting / using marine biodiversity in the context of implementing the BBNJ Agreement. For the content of such a document it was recommended

- to stress that protection goals (e.g., protection from fishing of a marine area) have the advantage that protection increases resilience of marine ecosystems and thereby helps marine biodiversity to better cope with the impacts of climate change
- to not only provide ideas or solutions for specifying BBNJ goals but also make potential contradictions between different goals transparent
- to potentially relate to the Annex I criteria of the BBNJ Agreement and discuss in which ways they help in formulating specific goals for ABMTs
- to address and relate to existing goals for (marine) biodiversity protection (e.g., 23 targets and 4 goals of the Kunming-Montreal Global Biodiversity Framework including the 30 % protected area target, objectives of CCAMLR Conservation Measure 91-04) and discuss how they might help for formulating suitable objectives for BBNJ implementation
- to learn from the goals formulated in the Marine Strategy Framework Directive (MSFD) by the European Union, since this framework includes specific goals for conservation and for sustainable use of marine biological diversity
- to learn from short and policy-relevant products such as the five statements for addressing climate change from Scientists for Future.

Development of ABMTs in BBNJ implementation

Needs for and challenges of implementing ABMTs under BBNJ were discussed both in the first session on climate change impacts regarding climate-smart ABMTs and in the second session on criteria for choosing marine areas for establishing ABMTs. Main conclusions of these discussions were the following:

- Due to climate change impacts on marine biodiversity, there is a need for a global network of partly dynamic ABMTs, but more research is needed where stable ABMTs and where dynamic ABMTs are needed. Furthermore, more research is needed to, whether ABMTs should focus on "climate change hot spots" such as tropical and polar regions. Whether and how this research can be realised to act as a framework for ABMT proposals under the BBNJ Agreement is largely unclear.
- EBSAs are a suitable starting point for placing MPAs under the BBNJ Agreement, also because the Annex I criteria for proposing ABMTs under the BBNJ Agreement are largely based on criteria, that were used for selecting EBSAs, and the Annex I criteria are regarded as rather legally binding. Nevertheless, which of the EBSAs are suited to become MPAs considering climate change impacts (potentially making some EBSAs uninhabitable for many species) is a question of ongoing research in the AGELESS project.
- Proposals for ABMTs under the BBNJ Agreement should be based not only on available ecologic but also on economic, legal and social scientific information. However, the existing ecological, economic, legal and social scientific information needs to be further harmonised. How to realise this interdisciplinary integration and combine it with the transdisciplinary negotiations with policy makers is a question for future research, but has been started in the IMAPP project.
- MPAs are only one type of ABMT and should be considered alongside with OECMs, such as bottom-trawling bans, port monitoring and landing restrictions, seasonal closures and other sector-specific management tools.

The discussion on the (policy) implications of these ABMT-related aspects focused on the question *where* to put ABMTs (including MPAs):

- It was recommended to better start with a regional network of MPAs (e.g., building on existing regional network in Asia) or start with EBSAs instead of trying to build science-based "masterplan" for a climate-proof global MPA network, which would probably not be feasible based on the state of research on marine biodiversity in the high seas. Nevertheless, the idea of an assessment based on science and other knowledge to design a climate-proof global network of MPAs could be brought to the first COP of the BBNJ Agreement in January 2027 to investigate whether an international collaboration for such an assessment could be initiated to. Another option for bringing the idea of a global climate-proof MPA network forward would be to make use of the SCOR working group structure for coordinating scientific marine research (also including researchers from the Global South) and create a working group to coordinate scientific research relevant for BBNJ and for creating a global assessment of a global MPA network suitable to address climate change impacts in the high seas.
- Furthermore, the participants recommended to consider the following existing analyses and proposals regarding High Seas MPAs when discussing ABMTs under the BBNJ Agreement:
    - The High Seas Alliance has already identified eight "Biodiversity Hotspots in the High Seas that deserve Priority Protection and could become the first generation of High Seas MPAs under the new High Seas Treaty".
    - Also, in the IKI project "living high seas" and the older IKI project "strong high seas" recommendations for High Seas MPAs were developed.
    - The BBNJ First Movers initiative, a global coalition led by the Chilean government to fast-track the creation of the first Marine Protected Areas (MPAs) in the high seas, is already developing concrete ideas for BBNJ MPAs.
    - The MPA atlas includes existing and proposed MPAs.

- Similar to EBSAs also "key biodiversity areas" (including marine and terrestrial areas) might be suited as pragmatic starting points for designing MPAs under the BBNJ Agreement.

Development of science-policy interfaces for BBNJ implementation

Building on the session on science communication and science-policy interfaces mainly the question was discussed whether a German national scientific advisory committee for BBNJ is needed:

- The DFG working group on BBNJ strongly recommended such a national scientific advisory committee already in 2024 in their statement on the German ratification process of the BBNJ agreement but negotiations in BMUKN and BfN are still ongoing. It was recommended that also the BBO projects should issue a statement that there is a need for such a national scientific committee. Regarding the question, how it should be implemented, clarification is needed whether only scientists or also practitioners and/or policy makers should be included in such an advisory body. By the planned involvement of scientists in the German delegation for the first BBNJ COP in January 2027 some form of a German science-policy interface for the BBNJ Agreement will be created.
- For a systematic learning from the successes and failures of previous science-policy interfaces on marine biodiversity it was recommended to involve or conduct interviews with representatives of DOSI, the IUCN High Seas Specialists, SCOR, ICES, NAFO, OSPAR. These interviews are planned as part of the AGELESS project.

Next steps

This last session of DF2 focused on how the BBO projects could bring their BBNJ work more visibly into political and diplomatic arenas, and how to prepare for upcoming milestones such as COP1 and DF3 in 2027. Participants explored different event formats in Berlin, weighing a higher-profile parliamentary evening against a more compact "breakfast" format with a short presentation, targeted opening remarks and focused discussion among parliamentarians who are genuinely interested in the topic. While some argued that an evening event could attract a broader mix of actors, others stressed the higher organisational effort, competition with other events, and the need for very careful targeting and a strong political host, suggesting that a smaller, well-curated format might be more realistic for a specialised topic such as BBNJ.

Several contributions highlighted opportunities to engage not only members of parliament but also embassies and their scientific advisers, for example by linking BBO activities to the Berlin Science Week or similar existing formats where ambassadors and science-policy actors already meet. In this context, BBNJ was framed as a rare example of a recent multilateral success story that could be used to attract attention and open doors, provided the BBO projects offer "nice visuals" and clearly framed scientific messages that speak to political audiences. Alongside these Berlin-based ideas, the group noted that ongoing AGELESS-led sessions and the planned BBO workshop in Davos will provide further occasions to test and refine key narratives and science-policy products (such as fact sheets and briefings), which can then feed into a more consolidated outreach strategy.

Looking ahead, the DF3 in 2027 will use this dialogue forum to co-evaluate what the BBO projects have delivered for BBNJ processes, how their integrated products have been received by stakeholders, and where remaining research gaps and new research questions lie. DF3 is envisaged

as a space to assess the effectiveness of the BBO projects´ science-policy engagement – including events in Berlin, Davos and other venues – and to jointly discuss with stakeholders how the project results and formats can continue to support BBNJ implementation beyond the lifetime of the current funding phase.

Contacts

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Appendix: Presentations at the 2nd BBO dialogue forum

1. **Opening statement from the funder BMFTR** (Dr. Anne Parge)
2. **BBNJ update – Current status of ratification and an insight into recent developments** (Anne Freiberger) (in German)
3. **Impacts of climate change on marine biodiversity** (Prof. Dr. Helmut Hillebrand)
4. **Area-Based Management Tools (ABMT)** (Prof. Dr. Flemming Dahlke)
5. **Indicators for marine biodiversity** (Dr. Alexandra Kraberg & Prof. Dr. Heike Link)
6. **Science-policy interfaces and science communication** (Dr. Jan-Claas Dajka & Dr. Torsten Grothmann)

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BBO Dialogue Forum Berlin

Dr. Anne Parge – Federal Ministry of Research, Technology and Space
Division F24 – Marine, Coastal and Polar Research



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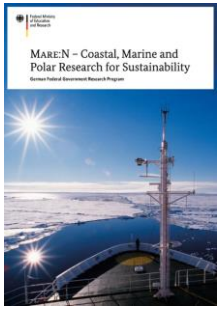
Science –Policy context of “Biodiversity in the Blue Ocean”

Policy framework:

- Research program MARE:N
- FONA strategy
- High-Tech Agenda Germany

→ Transferring research findings to industry, politics, and society







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Science –Policy context of “Biodiversity in the Blue Ocean”

Policy framework:

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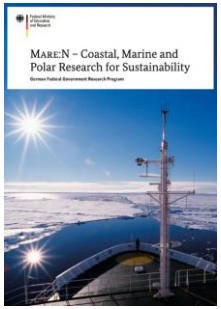





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BBNJ

Policy challenges

Protection of marine habitats in the high seas by

- the designation of marine protected areas based on science-based decisions



Contribution of science

- Knowledge gain, dialogue with stakeholders
- Transferring findings to society and the political sphere, and providing support for their implementation

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Best Practice I – North & Baltic Sea

DAM missions SustainMare and mareXtreme:

- Recommendations on trawling (MGF North& Baltic Sea)
- Training tools for the fishing industry (SpaCeParti)
- Dealing with old ammunition sites (CONMAR)

sustainMare

- Early warning systems for dangerous vibrio bacteria (PrimePrevention)

mareXtreme

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Best Practice II – Deep-Sea Mining

Program JPI Oceans Mining Impact (2015- 2029)

- Research on the environmental impacts of potential deep-sea mining for manganese nodules
- Objective: recommendations for action (for national and international authorities)
- 2025: Project presentation at the 30th session of the International Seabed Authority (ISA) in Kingston, Jamaica



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BBO Dialogue Forum - State of Implementation

- Early interdepartmental coordination during the selection process
- Kickoff
- BBO co-design
- BBO co-production
  - → Interim results and next steps



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Das UN-Hochseeschutzabkommen

- eine historische Chance für den Meeresschutz



Dialogforum, Berlin, 11. Mai 2026
Anne Freiberger, Referentin, Marine Biodiversität, BMUKN

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und nukleare Sicherheit

UN-Hochseeschutzabkommen (BBNJ)

- Abkommen Ergebnis **von über 20 Jahren internationaler Verhandlungen**
- Beschluss 2023 war ein **historischer Erfolg** für den Meeresschutz und den Multilateralismus
- Erstmals gibt es **allgemeine Natur- und Umweltschutzregeln** für die Hohe See und damit für die Hälfte der Erdoberfläche
- Deutschland hat als einer der ersten Staaten das Abkommen unterzeichnet und beteiligt sich intensiv an den Vorbereitungen für die **schnelle und effektive Umsetzung**



Quelle: https://www.bundesumweltministerium.de/themen/meeresschutz/un-hochseeschutzabkommen

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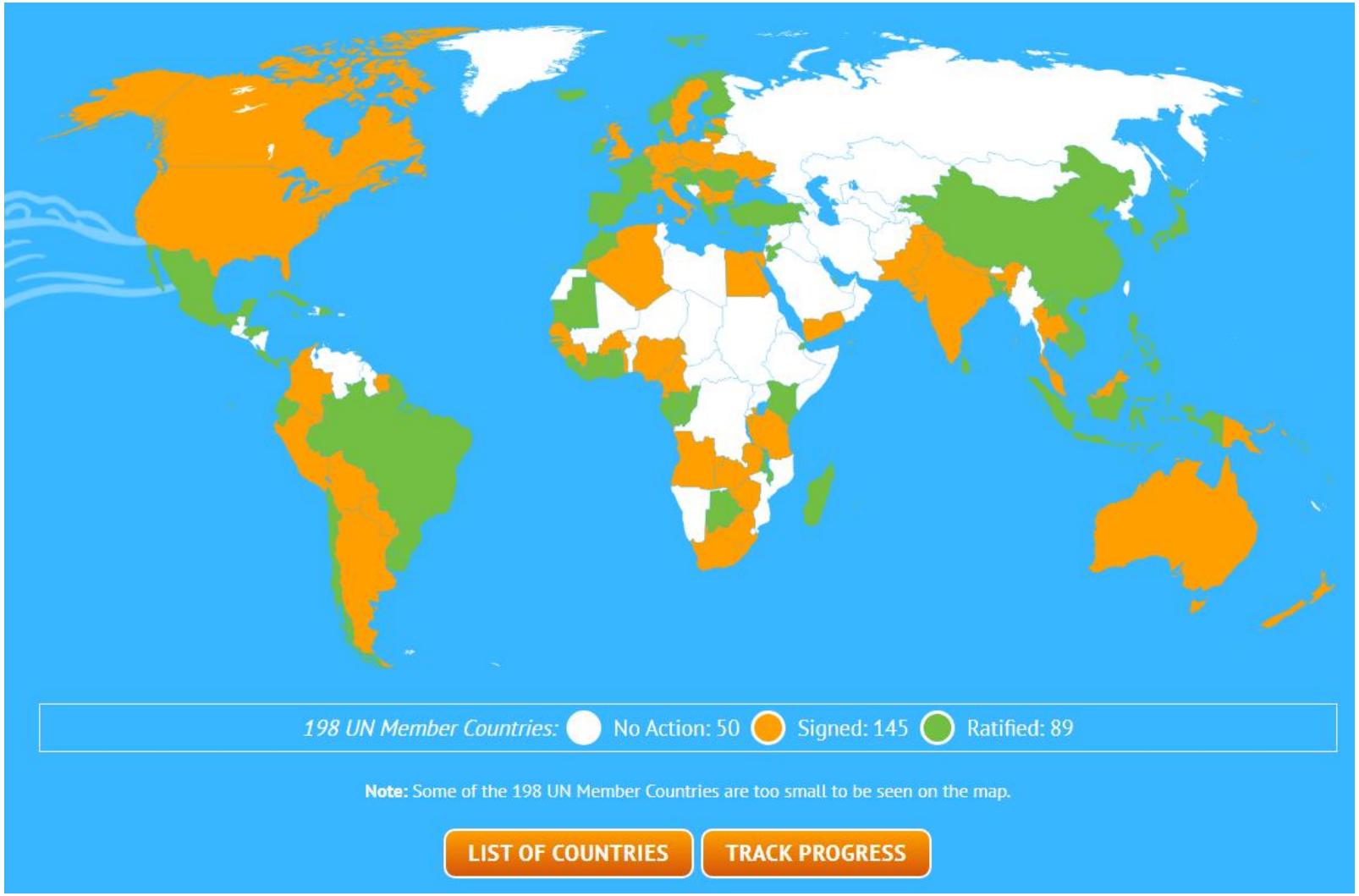
60plus: Stand der Ratifizierungen



Quelle: https://highseasalliance.org/treaty-ratification/map/

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Ratifizierung durch Deutschland

- Die deutsche Ratifizierung setzt ein **Vertrags- und ein Ausführungsgesetz** voraus

→ Prozess komplexer und langwieriger als in vielen anderen Staaten, aber Deutschland ist damit direkt bereit für die **praktische Umsetzung** des Abkommens

- Das Gesetzgebungsverfahren wurde am 27.03.2026 abgeschlossen.

- Das Ausführungsgesetz bzw. **Hochseeschutzgesetz** setzt die Vorgaben aus drei Bereichen des BBNJ-Abkommens in nationales Recht um:

  - Einrichtung von Meeresschutzgebieten
  - Durchführung von Umweltverträglichkeitsprüfungen
  - Regelung Umgang mit marin-genetischen Ressourcen (MGR)



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Ausführungsgesetz

Das Ausführungs- oder Umsetzungsgesetz BBNJ im Einzelnen mit den Vorgaben für:

I. Ausweisen von Meeresschutzgebieten
II. Umweltverträglichkeitsprüfungen
III. Umgang mit marin-genetischen Ressourcen (MGR)



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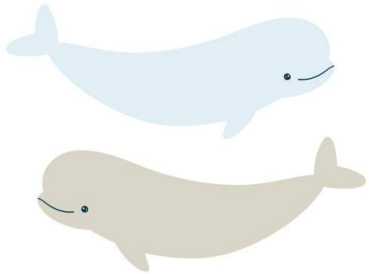
I. Ausweisen von Meeresschutzgebieten

- Vertragsparteien erarbeiten Vorschläge für die Ausweisung von Meeresschutzgebieten inkl. weiterer gebietsbezogenen Maßnahmen
- fachliche Mitarbeit und Einschätzung in DE durch BfN
- ***Zusammenarbeit*** *mit deutscher Meeresforschung – Vorschläge müssen* ***wissenschaftsbasiert*** *sein*

Vorlage der Vorschläge durch einzelne Vertragsparteien oder eine Gruppe von Vertragsparteien

Meeres-COP entscheidet über Ausweisung



Umsetzung durch Rechtsverordnungen

Managementpläne gelten für deutsche Akteure

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II. UVP - Ausnahme für dte. Forschungsschiffe

- Umweltverträglichkeitsprüfungen inklusive Genehmigungspflichten für bestimmte Tätigkeiten
- Unterschiedliche Verfahren je nach Grad der Auswirkung auf die Meeresumwelt
- *Für Aktivitäten von **deutschen Forschungsschiffen im Staatsdienst** gilt **Ausnahme** aus BBNJ-Abkommen*

Umgesetzt durch § 3 Absatz 3 Satz 2 HochseeSchG





= keine Genehmigungs- oder Anzeigepflicht

1:1 Umsetzung

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Nächste Schritte I

National:

- Ausstellung der **Ratifizierungsurkunde** und **Hinterlegung** bei den Vereinten Nationen in New York
- Hochseeschutzgesetz mit Pflichten für dt. Akteure **tritt 30 Tage nach der Hinterlegung der Ratifizierungsurkunde in Kraft**



Photo by IISD/ENB

International:

- **Ausblick: Erste Meeres-COP** – Januar 2027 in New York
- Aufbau auf Ergebnissen der **dritten BBNJ-Vorbereitungskommission** (fand statt vom 23.03.26 – 02.04.26)

Nächste Schritte UN-Ebene

- **Meeres-COPs** als neues Mitglied in der Familie der UN-Umweltabkommen zukünftig eigenständiger Ort der internationalen Meers-Community für:
  - weitere Umsetzung des Abkommens inkl. Gremienarbeit u.a. wissenschaftlich-technischer Ausschuss
  - Schaffen öffentlicher Aufmerksamkeit für Meere und Meeresschutz
  - Netzwerken und Verbindung von Umsetzungsebene und multilateraler Ebene



BBNJ-Sekretariat

- BBNJ-Sekretariat zentral für Organisation der COPs sowie des Prozesses und damit für das Gelingen der Umsetzung des Abkommens
- Sitz der Sekretariats noch offen, drei Bewerberländer mit Belgien, Chile und China
- Entscheidung wird bei 1. COP getroffen; DE unterstützt verlässliche Bedingungen in einem transparent arbeitenden unabhängigen Sekretariat

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Vielen Dank für Ihre Aufmerksamkeit!

Fragen?

Anne.Freiberger@bmukn.bund.de

Impacts of climate change on marine biodiversity

Insights from the BBO projects for the implementation of the BBNJ agreement

Helmut Hillebrand, HIFMB

on behalf of the BBO project cluster scientists

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

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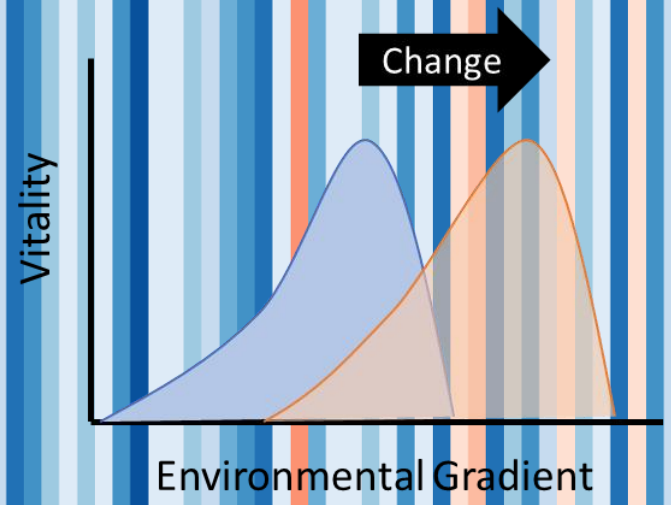
Biodiversity of the Blue Ocean

Biodiversity responds to changing climate in many different ways





Adapt

- Rate of adapation vs rate of change
- Availability of genetic diversity
- Life history constraints

Move

- Microclimate availability
- Dispersal ability
- Co-shift of interacting species

… or die?

1890 1920 1950 1980 2010

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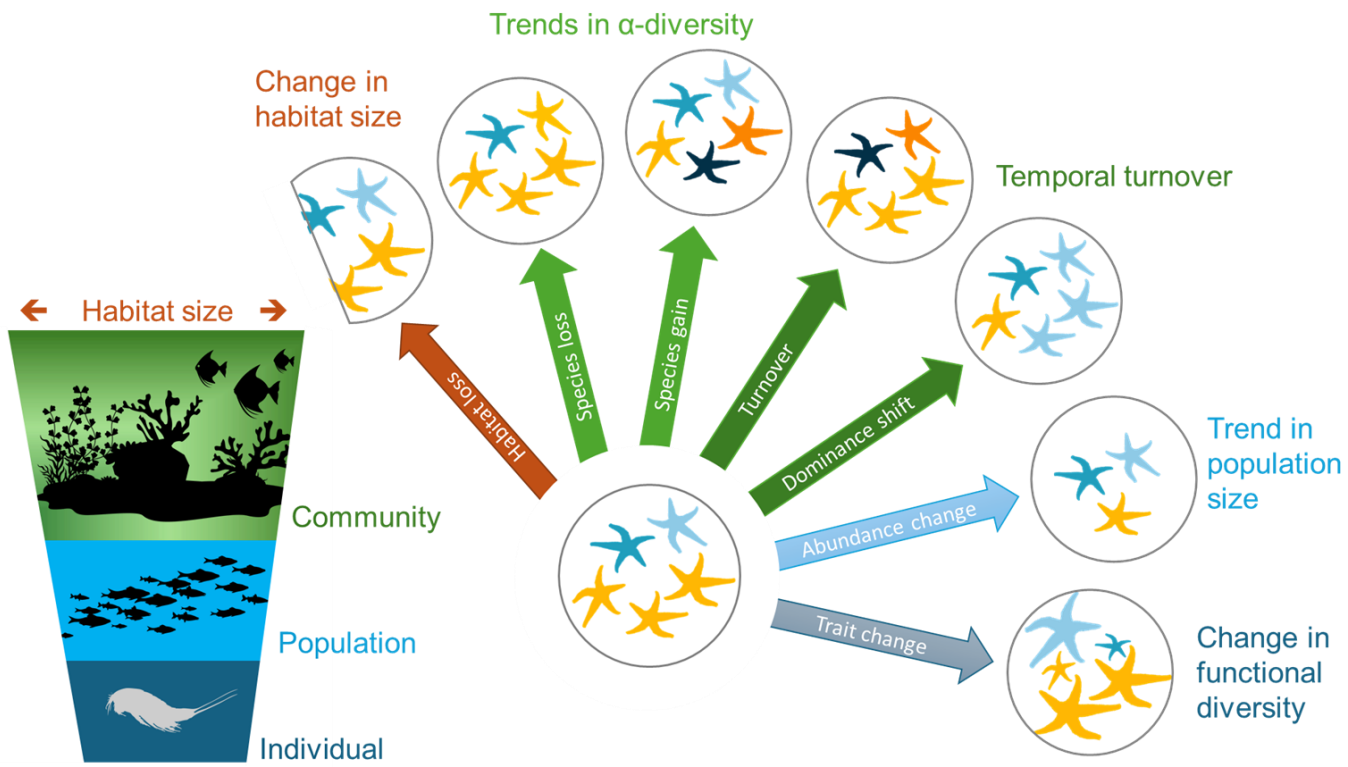
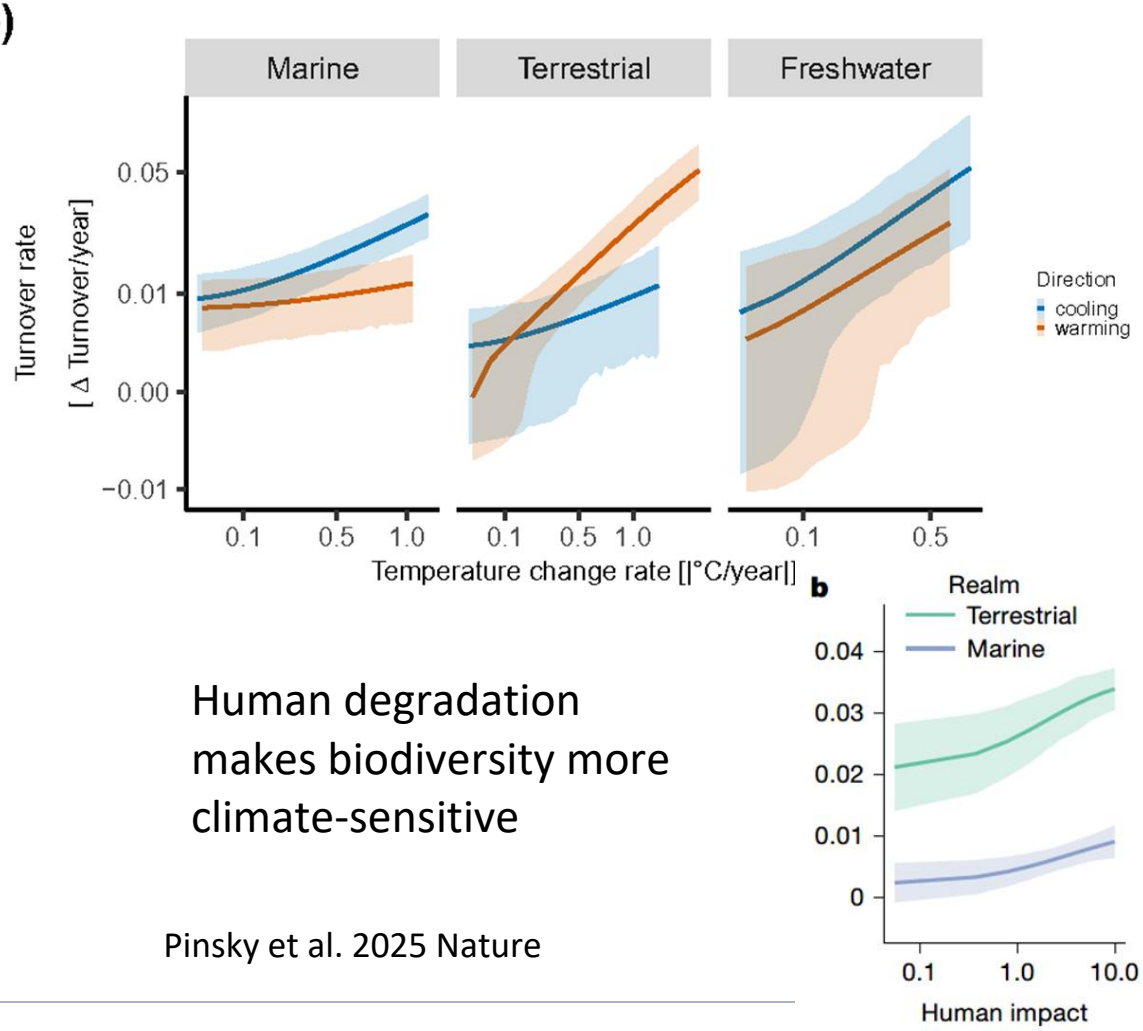
Biodiversity responds to changing climate in many different ways



Hillebrand et al. 2026 Mar Biodiv



Human degradation makes biodiversity more climate-sensitive

Pinsky et al. 2025 Nature

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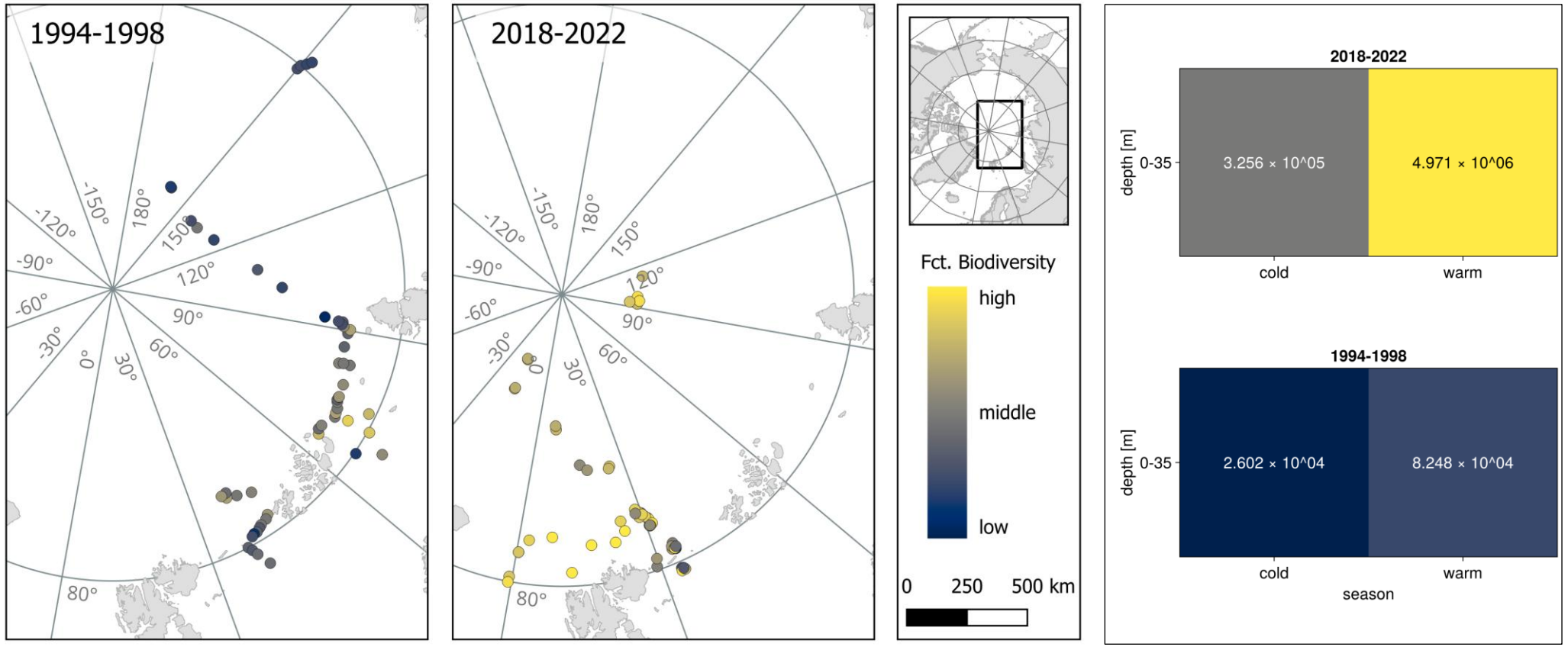
Biodiversity responds to changing climate in many different ways

Example: Functional Biodiversity of Phytoplankton in the Arctic - 20 years difference



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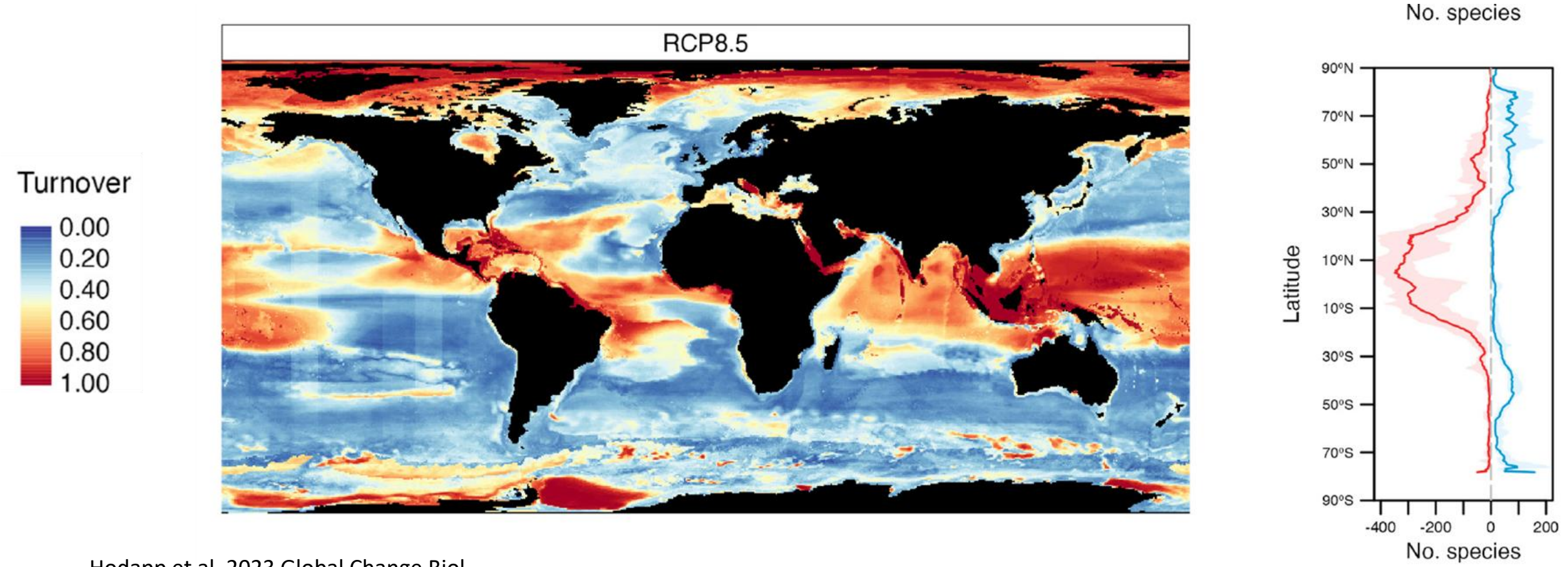
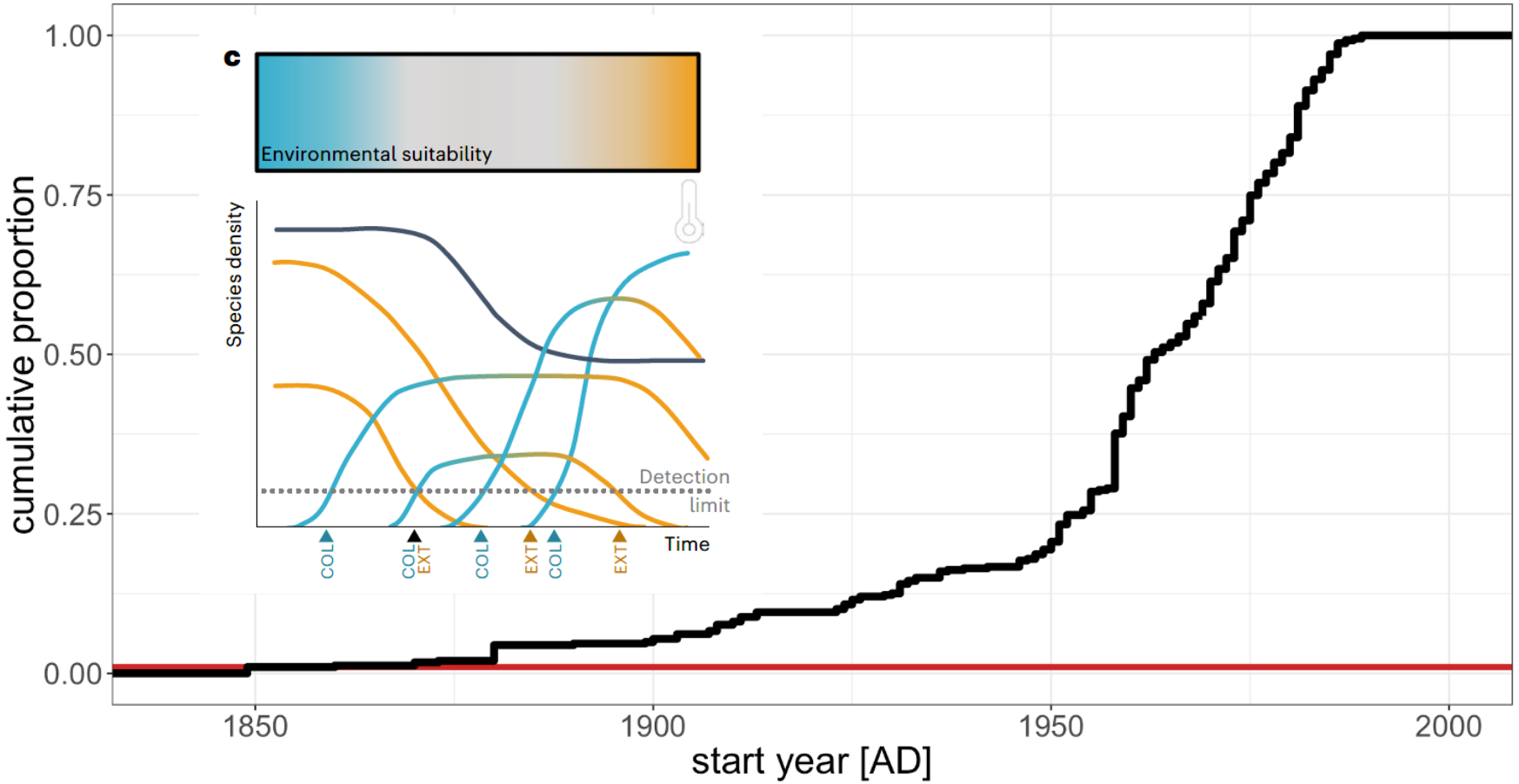
Biodiversity responds to changing climate in many different ways

and will continue to do so



Hodapp et al. 2023 Global Change Biol

The curse of short time series and transient dynamics



Most of our time series are short and start when climate was already shifting (Poloczanska et al. 2013)

Biodiversity response to climate change is delayed by extinction debt and immigration credit (Kuczynski et al. 2023)

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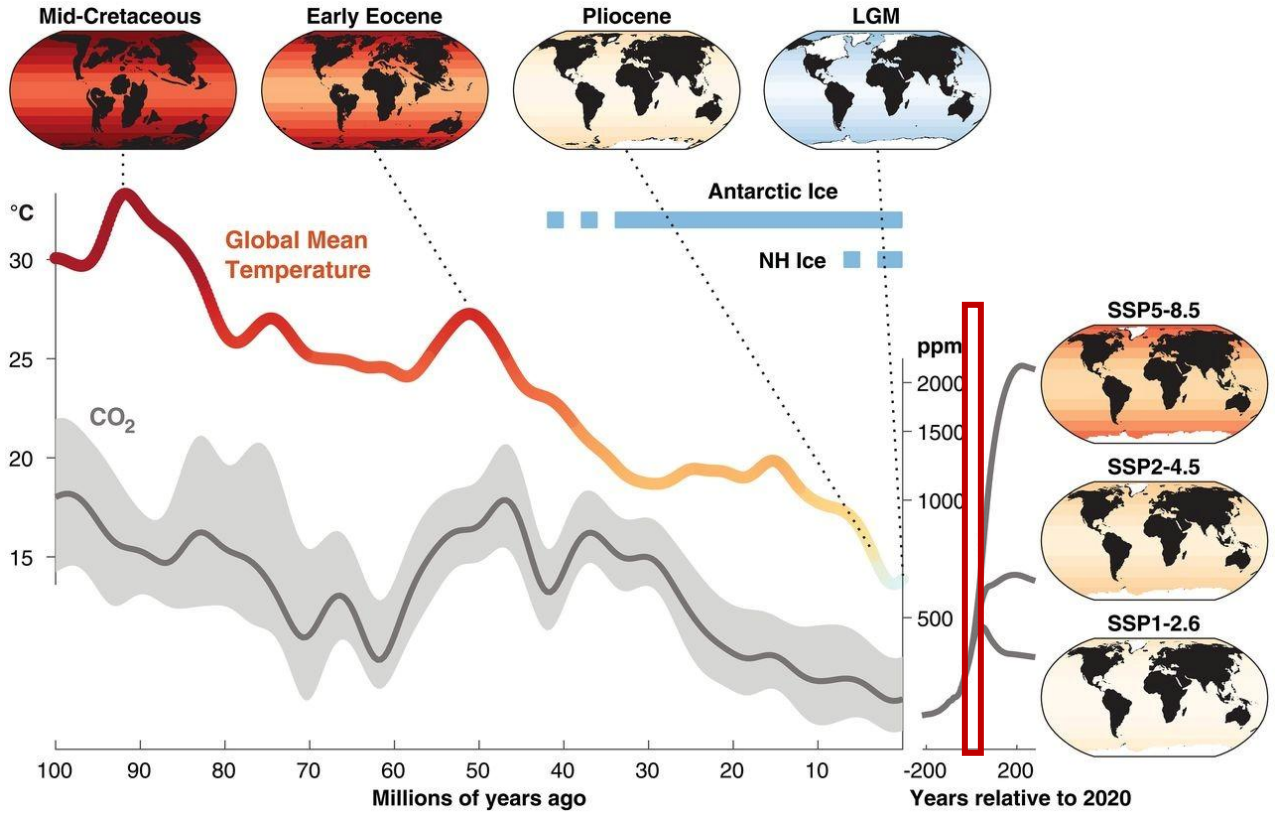
AGELESS links biodiversity change with climate change



Tierney et al. 2020

Period of direct climate and biodiversity observations

- To **protect marine biodiversity** in a changing world, we need to know how marine communities respond to climate change.
- To **predict the response** of marine biodiversity to climate change we need:
- An estimate of **baseline turnover**
- Knowledge on the **long-term response**
- Identify the **mechanisms** of change
- **Only the fossil record can provide observational constraints on these processes.**

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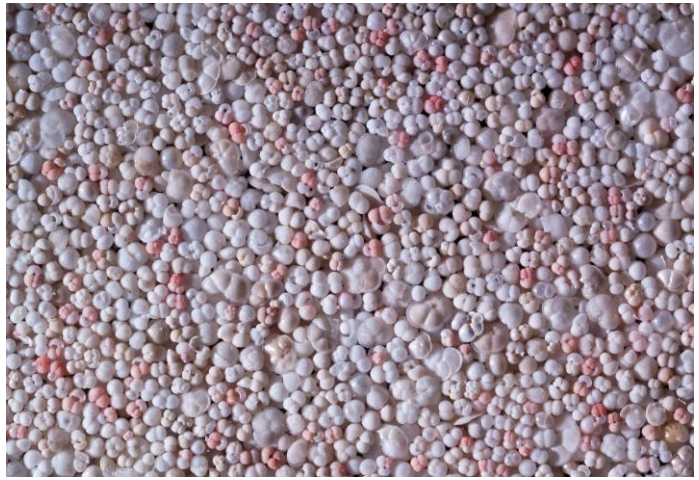
Move: lag phases and asynchrony

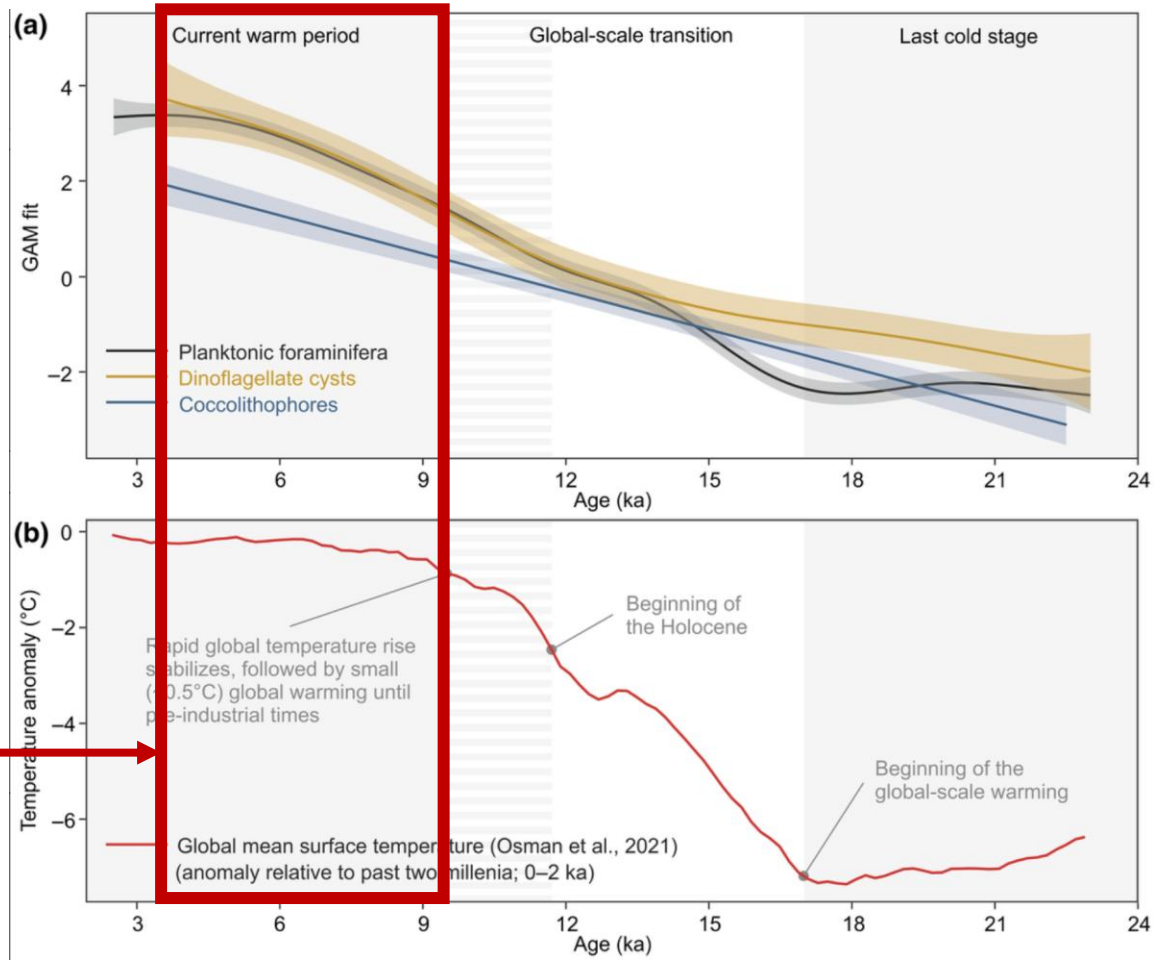
Picture: Wilfried Rönnfeld



Marine plankton communities track climate change but show long-lasting effects.

Strack et al. 2024, GEB

5,000 years of biodiversity change following climate perturbation of a magnitude comparable to expected Anthropogenic warming



Biodiversity change

Climate

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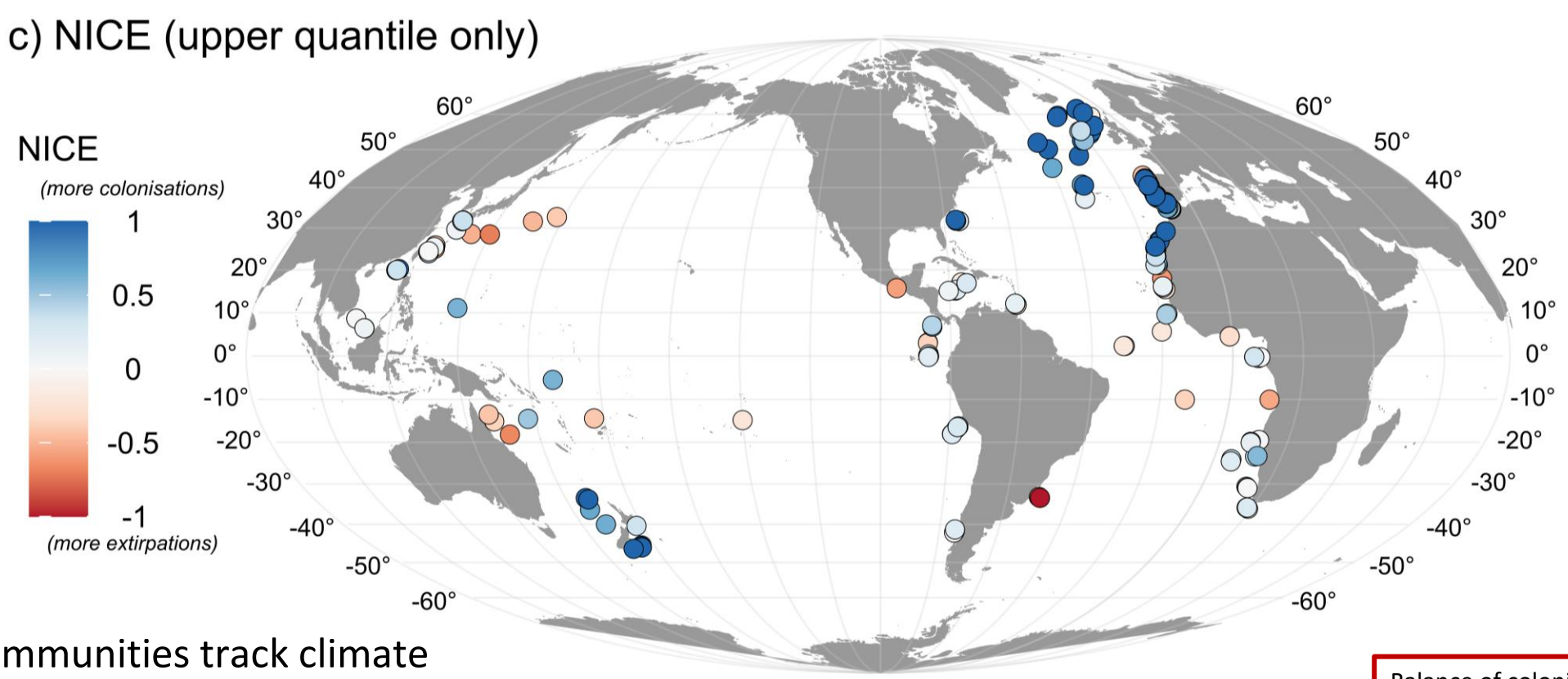
Move: spatially variable response to climate change



Marine plankton communities track climate change but show spatially variable response.

Ming et al. (in review)

Balance of colonisations vs extirpations since ice age

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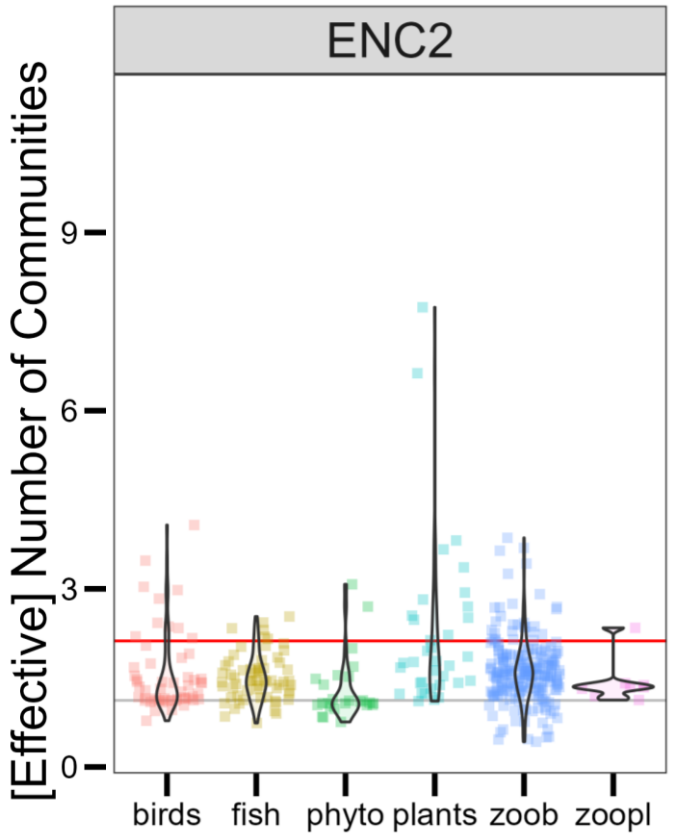
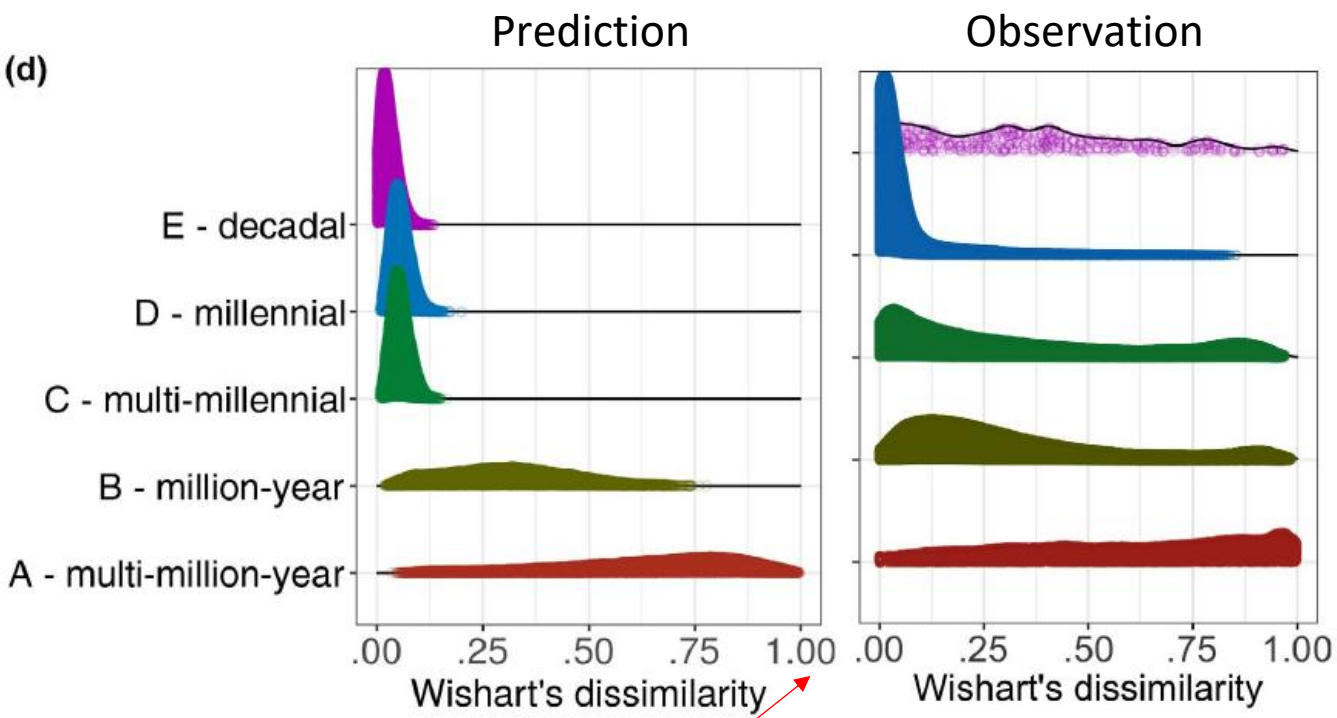
Fast current temporal turnover unpredicted by fossil record





Full exchange of community

Hillebrand et al. (in revision)

Lewandowska et al. 2020 GEB

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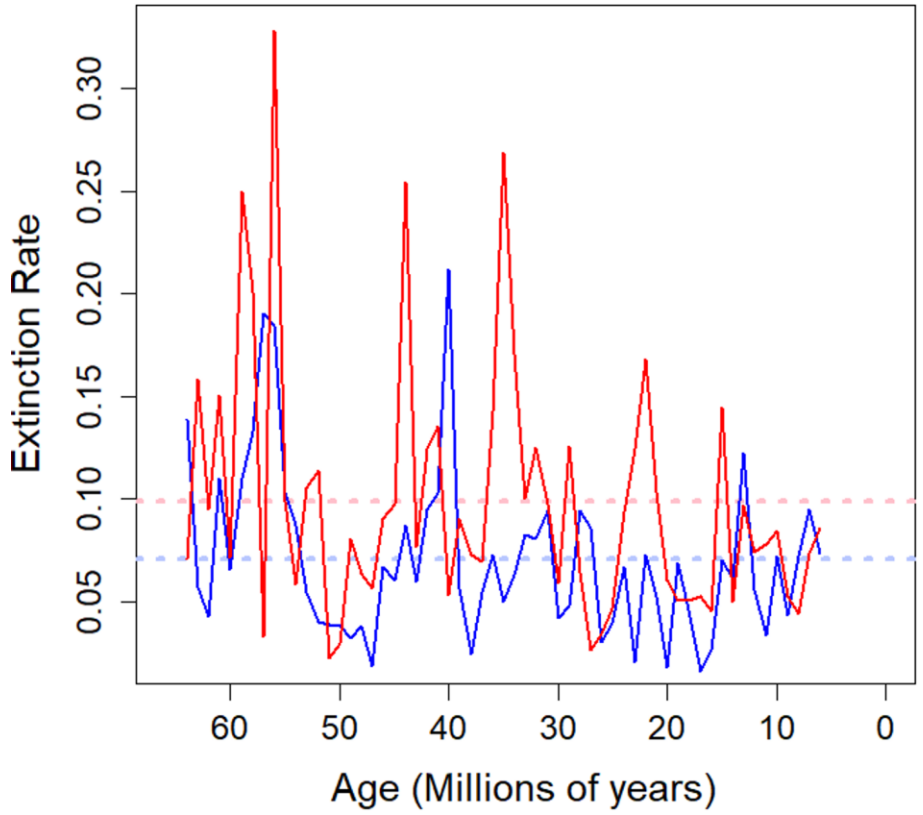
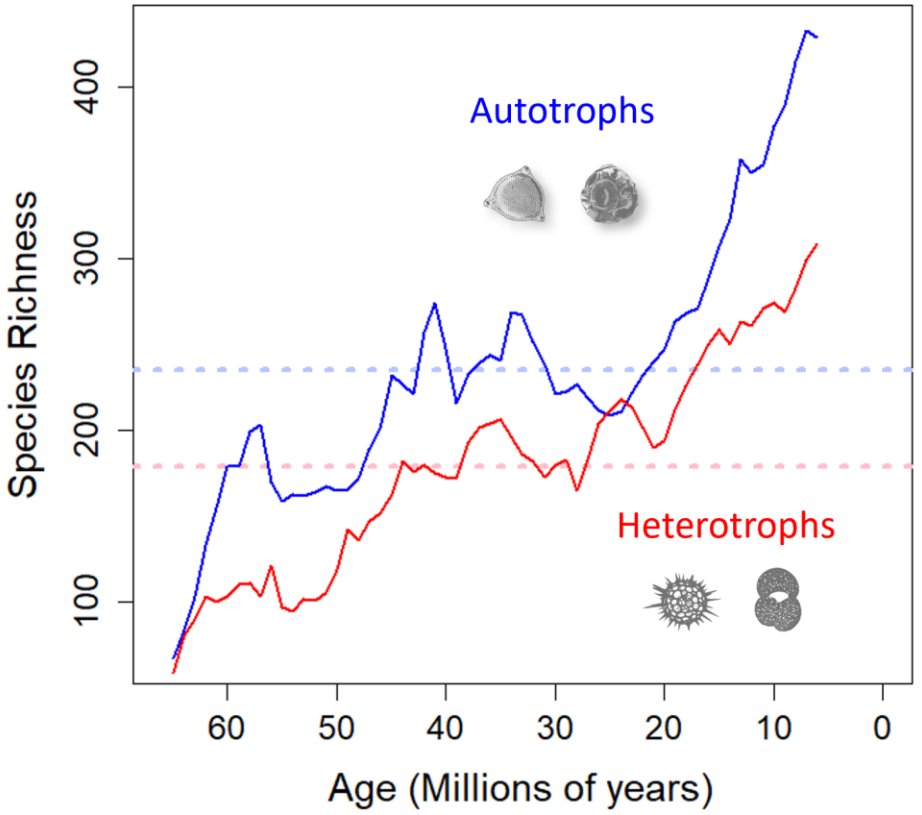
Die: extinction risk can only be assessed from past data

Zooplankton have been more vulnerable to extinction than phytoplankton over the last 66 million years.





Smith et al. (in revision)

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Dynamic MPAs/ABMTs for climate change adaptation

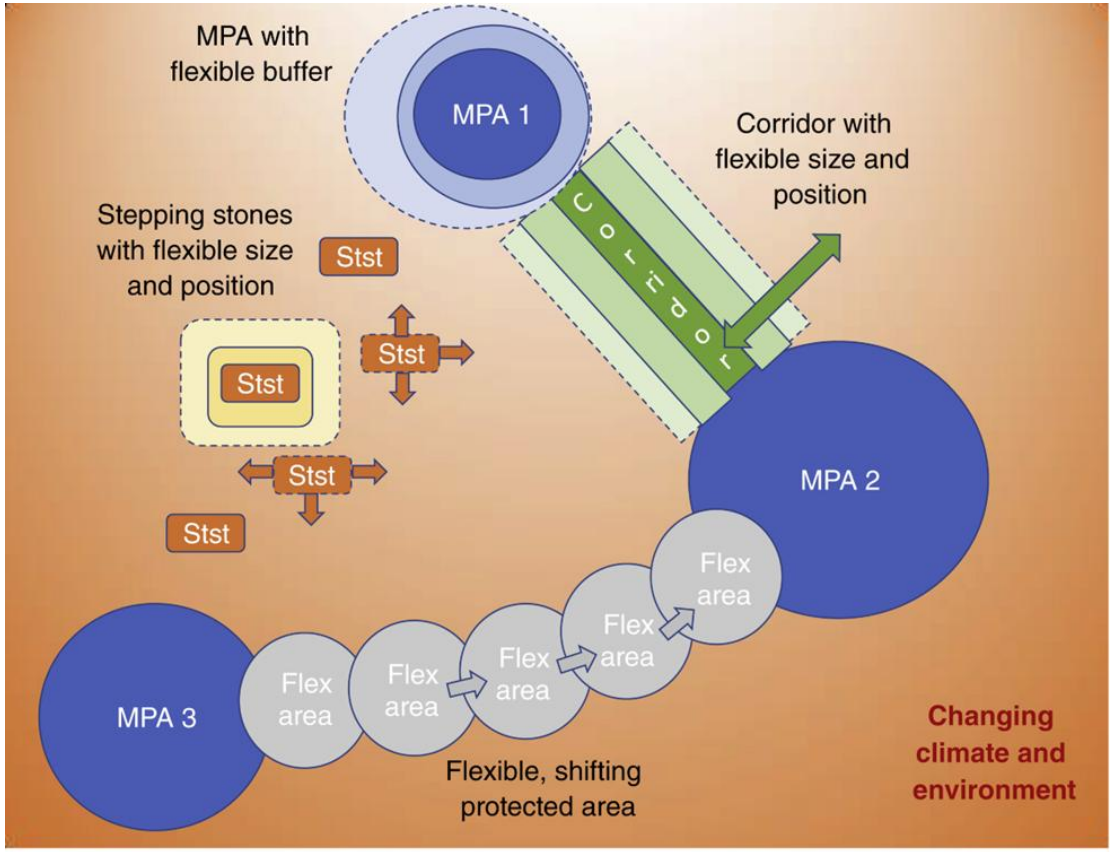
- Analysis of **MPA management plans**: **Only 4,7% of analysed climate change actions address biodiversity protection** (Corelli et al. (2024)

  4Need for more climate-smart solutions and more "climate-smart MPAs" (Brito-Morales et al., 2022)

- **Necessity of networks of marine reserves** that are functionally interconnected and large enough to protect the underlying biophysical processes that maintain species distribution and composition (Arafeh-Dalmau et al., 2023)

- **But**
  - dynamic MPAs difficult to implement
  - not all species can migrate (e.g. corals)

Options for making MPAs dynamic / climate-smart



Current Biology

Figure from Lotze, 2021

Questions for discussion

1. Can we view biodiversity protection separate from mitigating climate change?
2. What is our biodiversity management goal – let change happen or conserve species identity?
3. How can static instruments (such as MPA) be made adaptive or climate-resilient and how can we reflect the spatial and temporal heterogeneity of climate impacts? Which ABMTs align with long-lasting and lagged responses of biodiversity to climate change?

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Area-Based Management Tools (ABMT)

How can biodiversity protection become operational in a changing ocean and complex governance landscape?

Flemming Dahlke (IMAPP coordinator)

Institute of Marine Ecosystem- and Fisheries Science, Hamburg University
on behalf of the BBO project cluster scientists

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

With funding from the:
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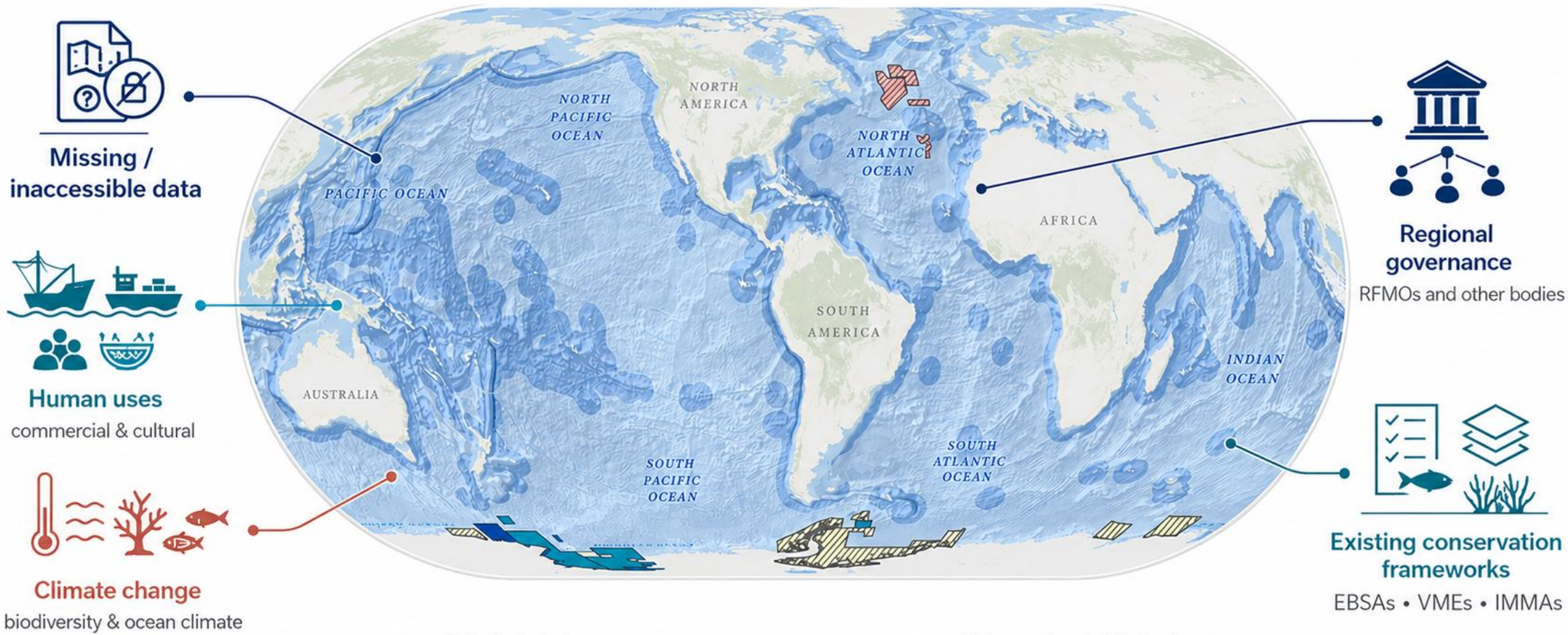
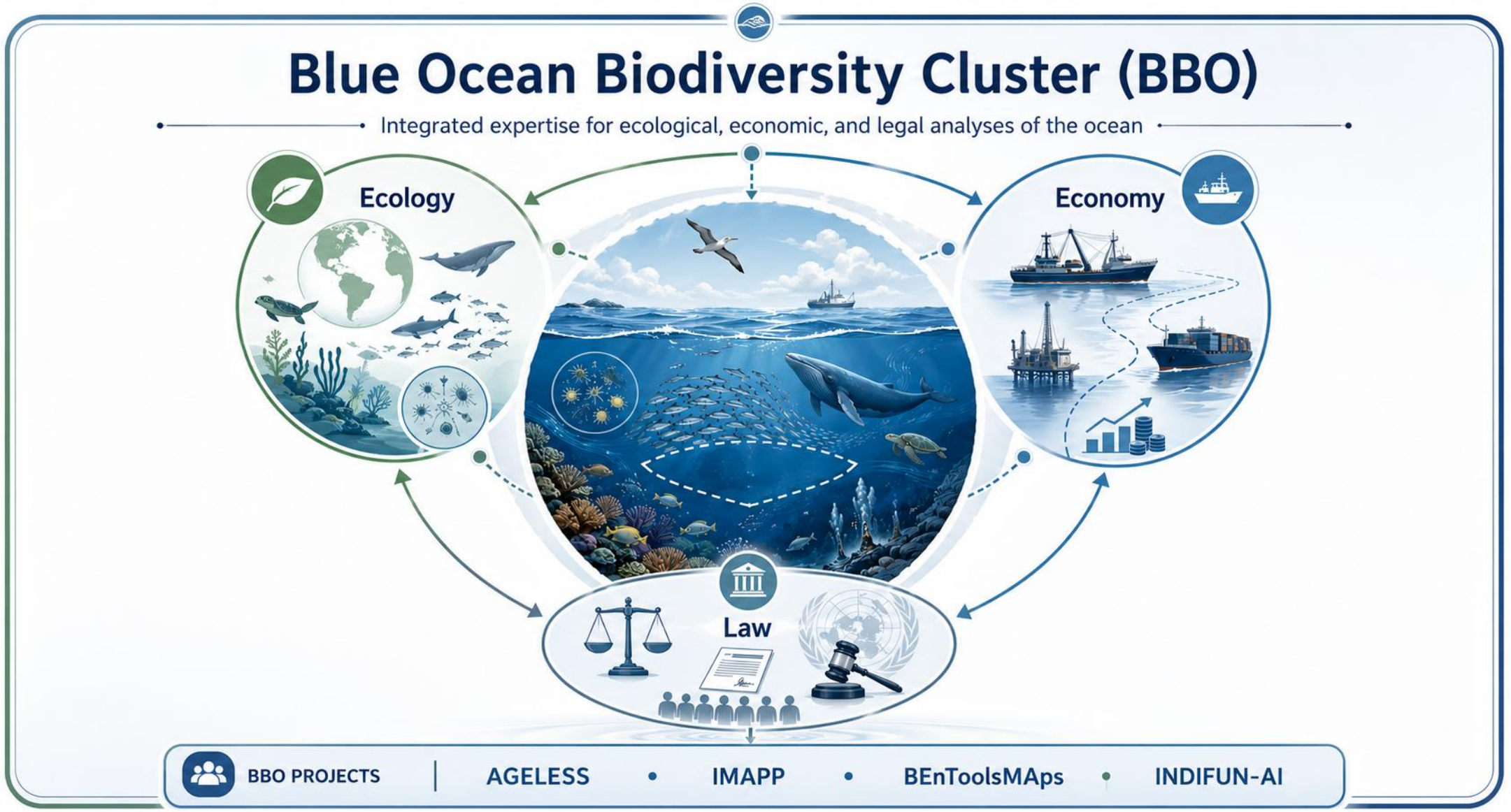
Biodiversity of the Blue Ocean

Challenges for MPA implementation in areas beyond national jurisdiction

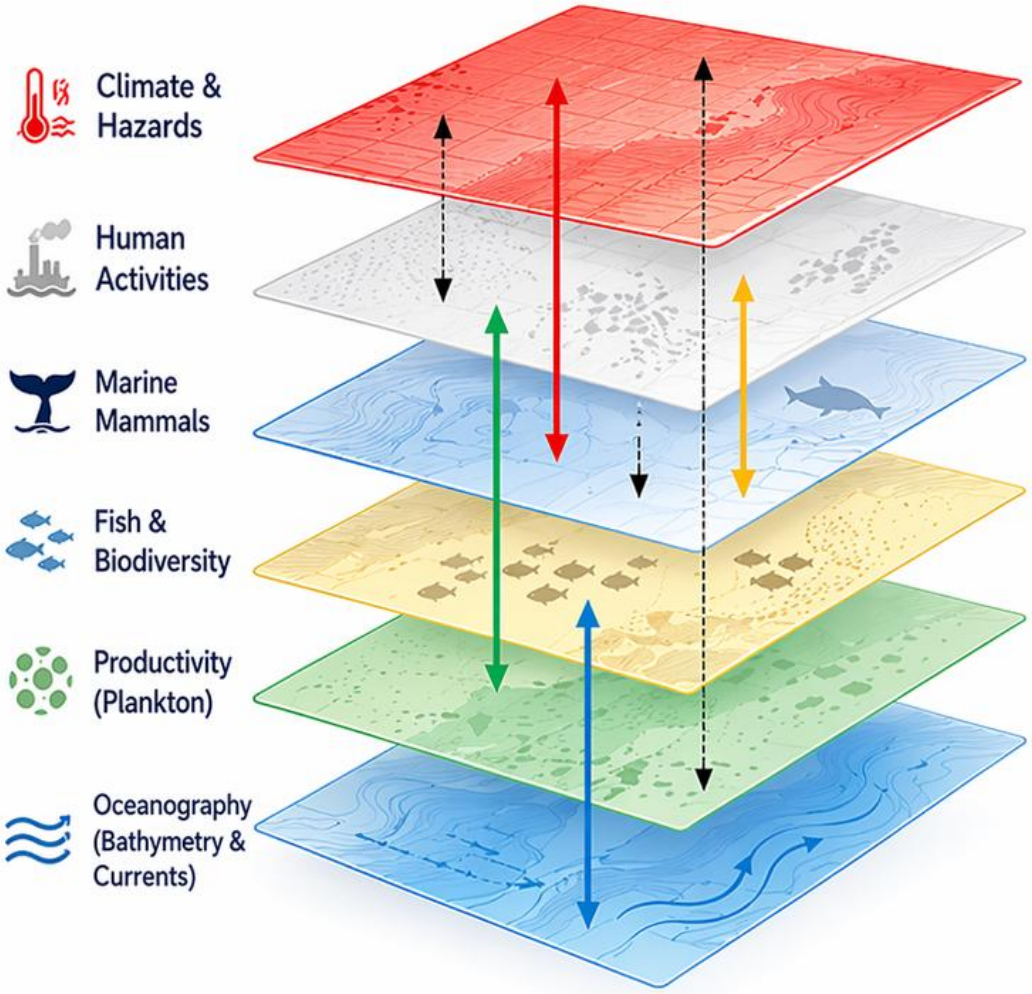


Goal: Guidelines for balancing conservation priorities with economic and legal interests in the high seas

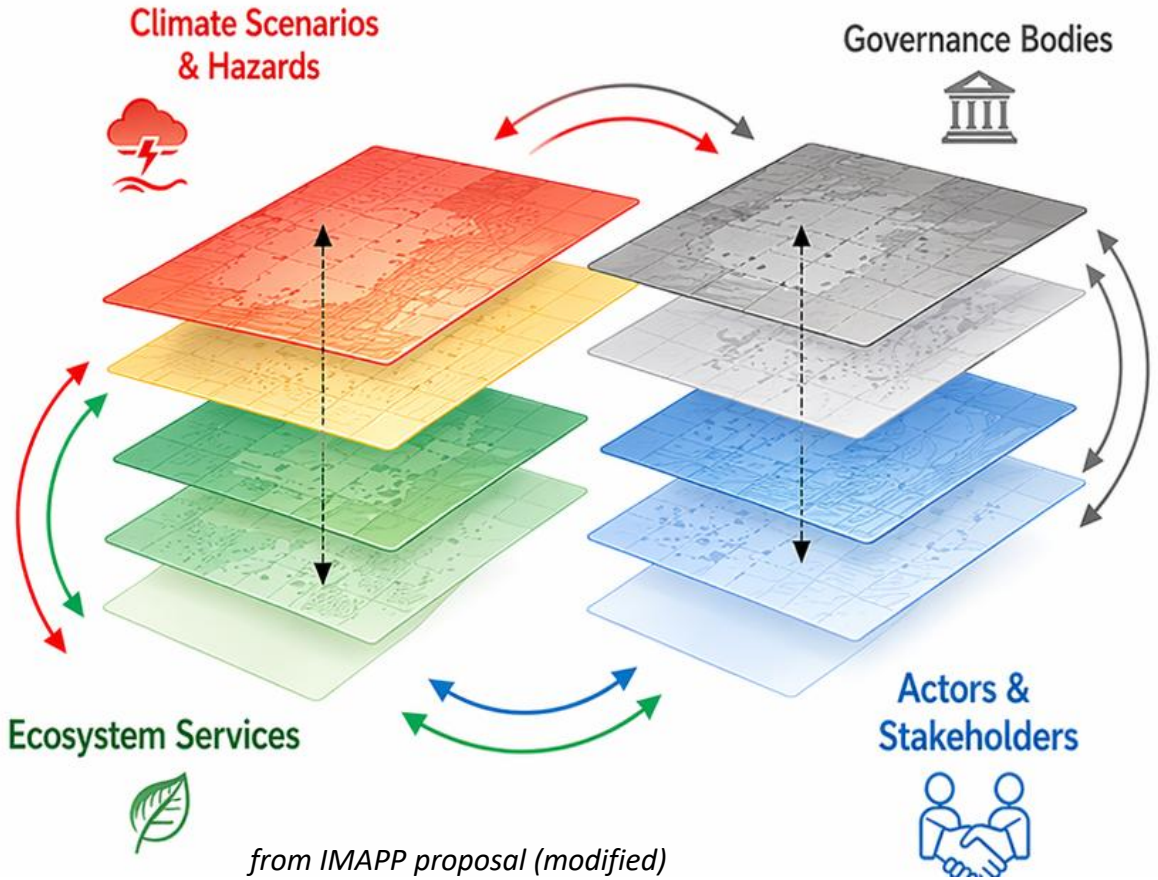


Integrated spatial analyses for ABMT prioritization

Step 1:Map ecological, environmental and human-use layers…



Step 2: Integrate evidence to inform ABMT location and design



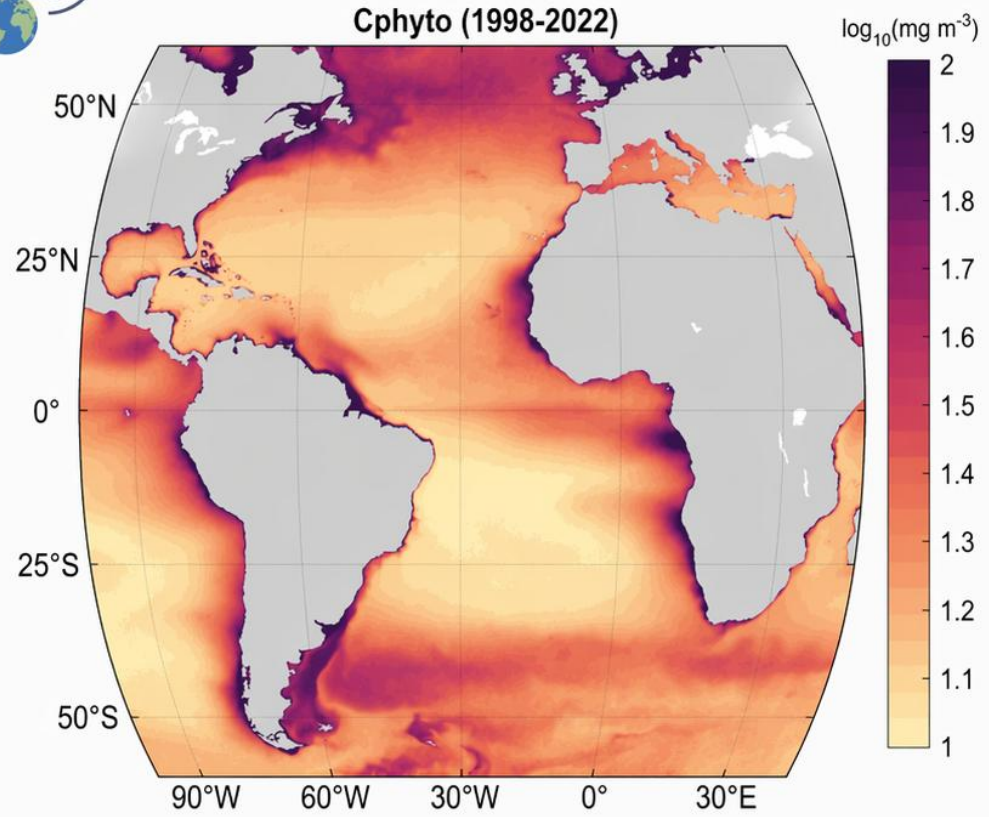
from IMAPP proposal (modified)

Improving data coverage: plankton productivity and biodiversity data



Remote sensing data + numerical modelling

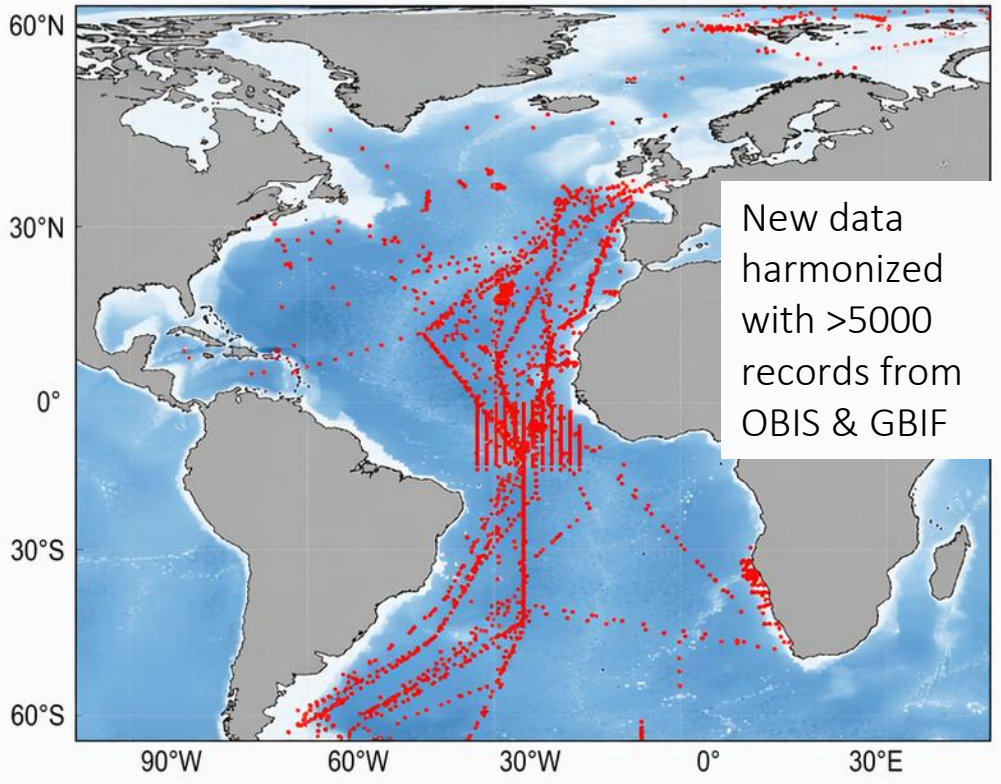
Phytopl. Biomass



Dong et al (in prep)



105 unpublished data sets from expeditions

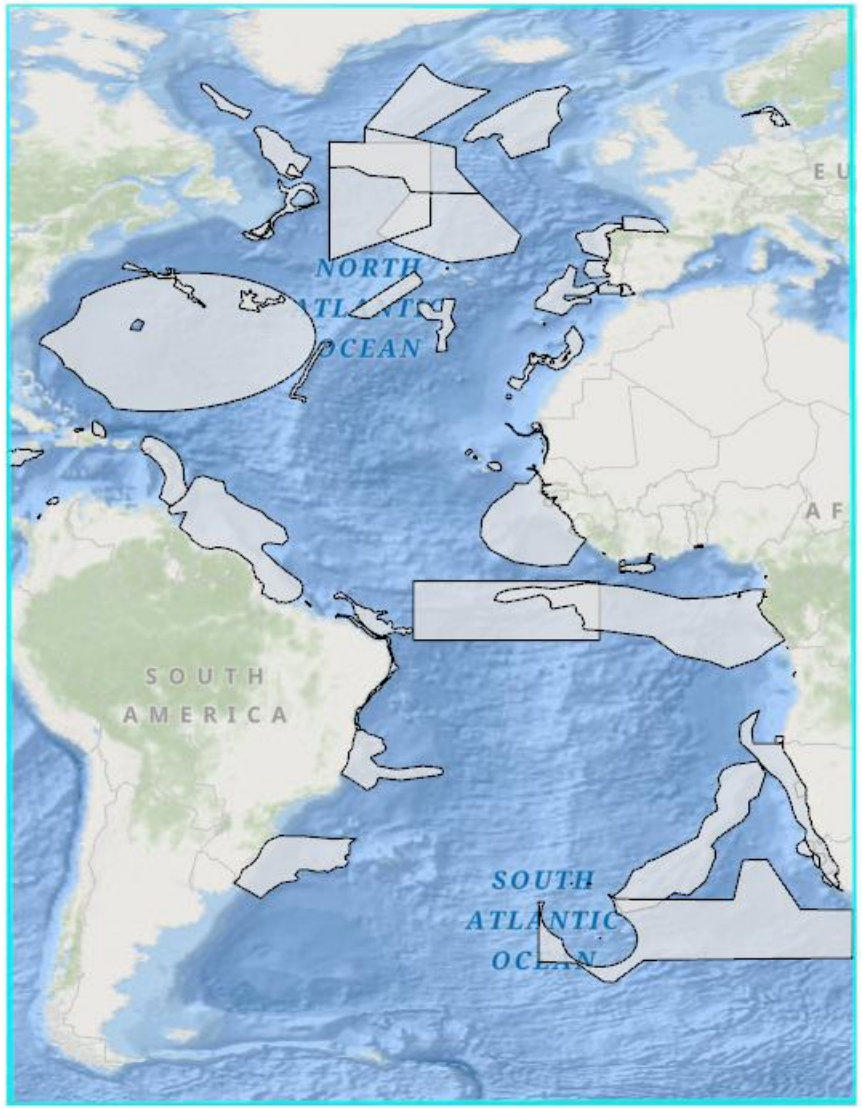


New data harmonized with >5000 records from OBIS & GBIF

Horn et al (in prep)

Improving data coverage: benthic deep-sea diversity and habitats

Focus on CBD's "Ecologically or Biologically Significant Areas" (EBSAs)



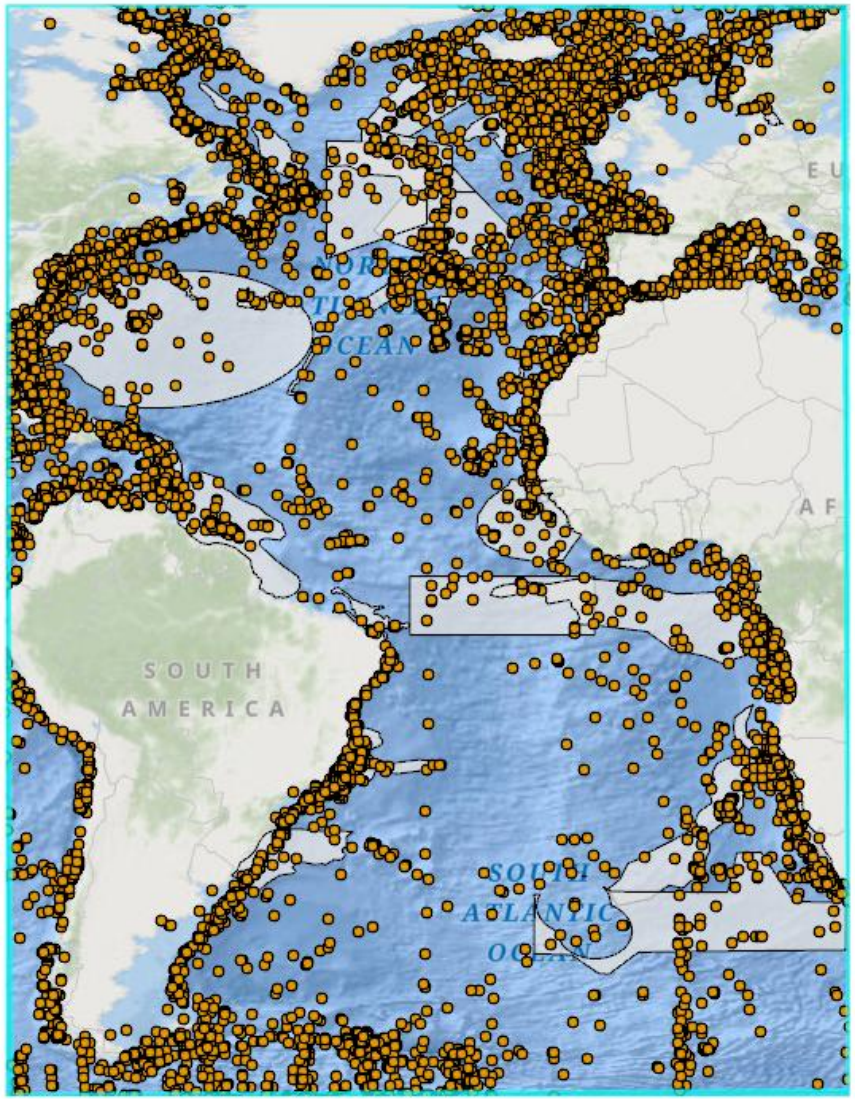
Mapping of benthic deep sea habitats:

- Diversity
- Geomorphology
- Climate
- ➢ Regionalization

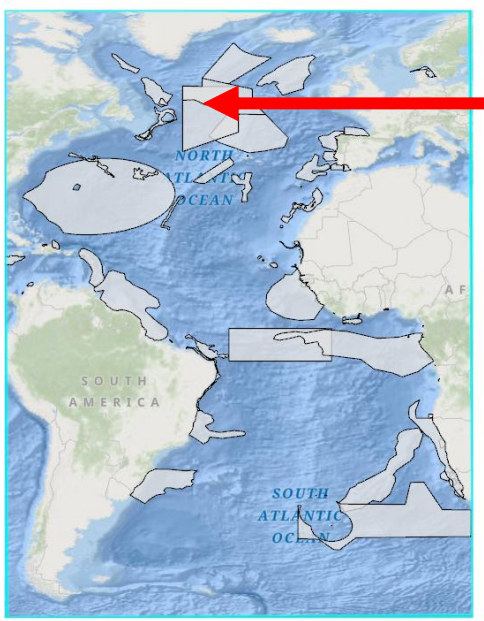
In collaboration with
Prof. Dr. Saskia Brix

SENCKENBERG
world of biodiversity

Geschwender et al (in prep)



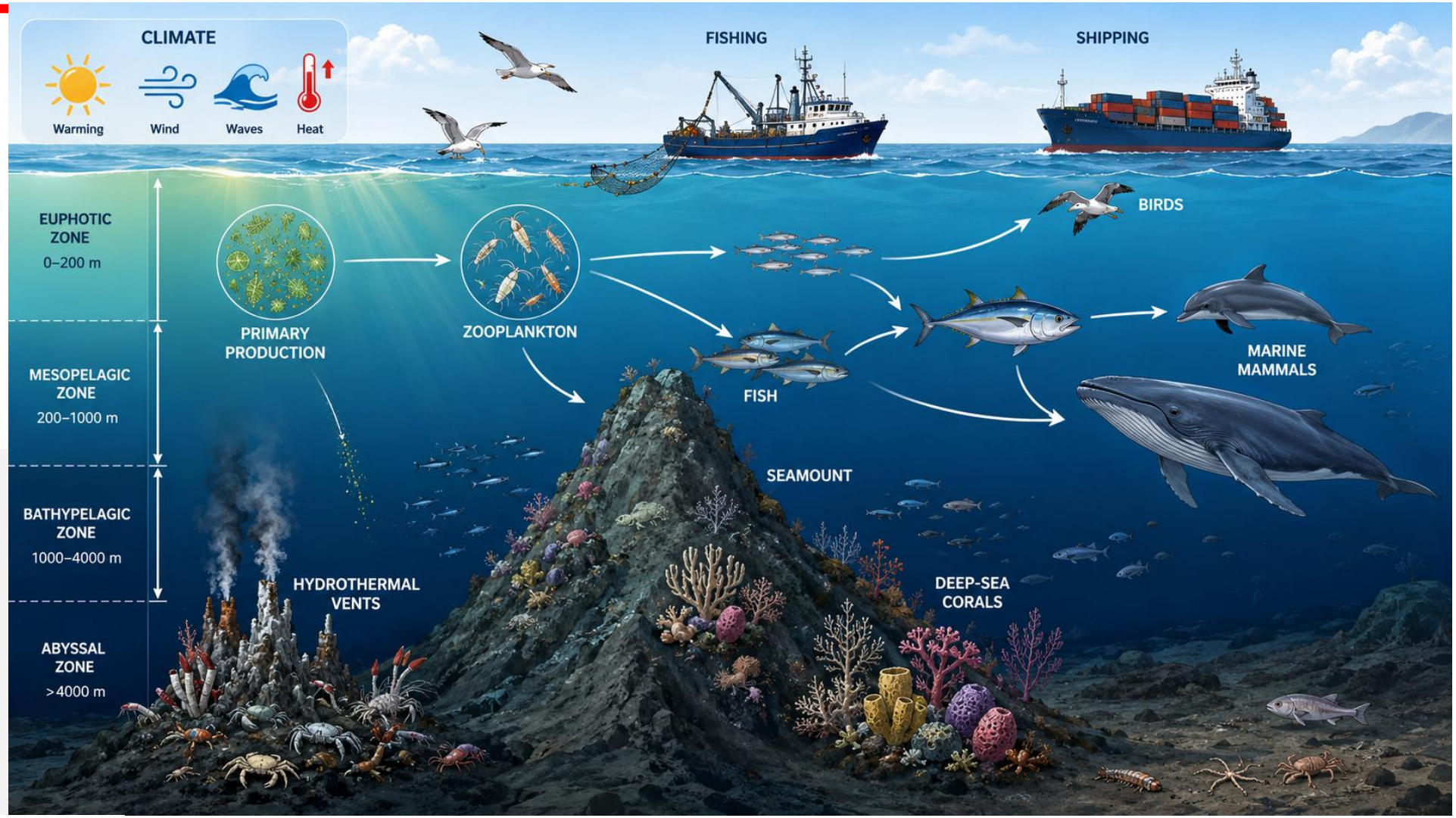
Improving data coverage: Integrated EBSA characterization



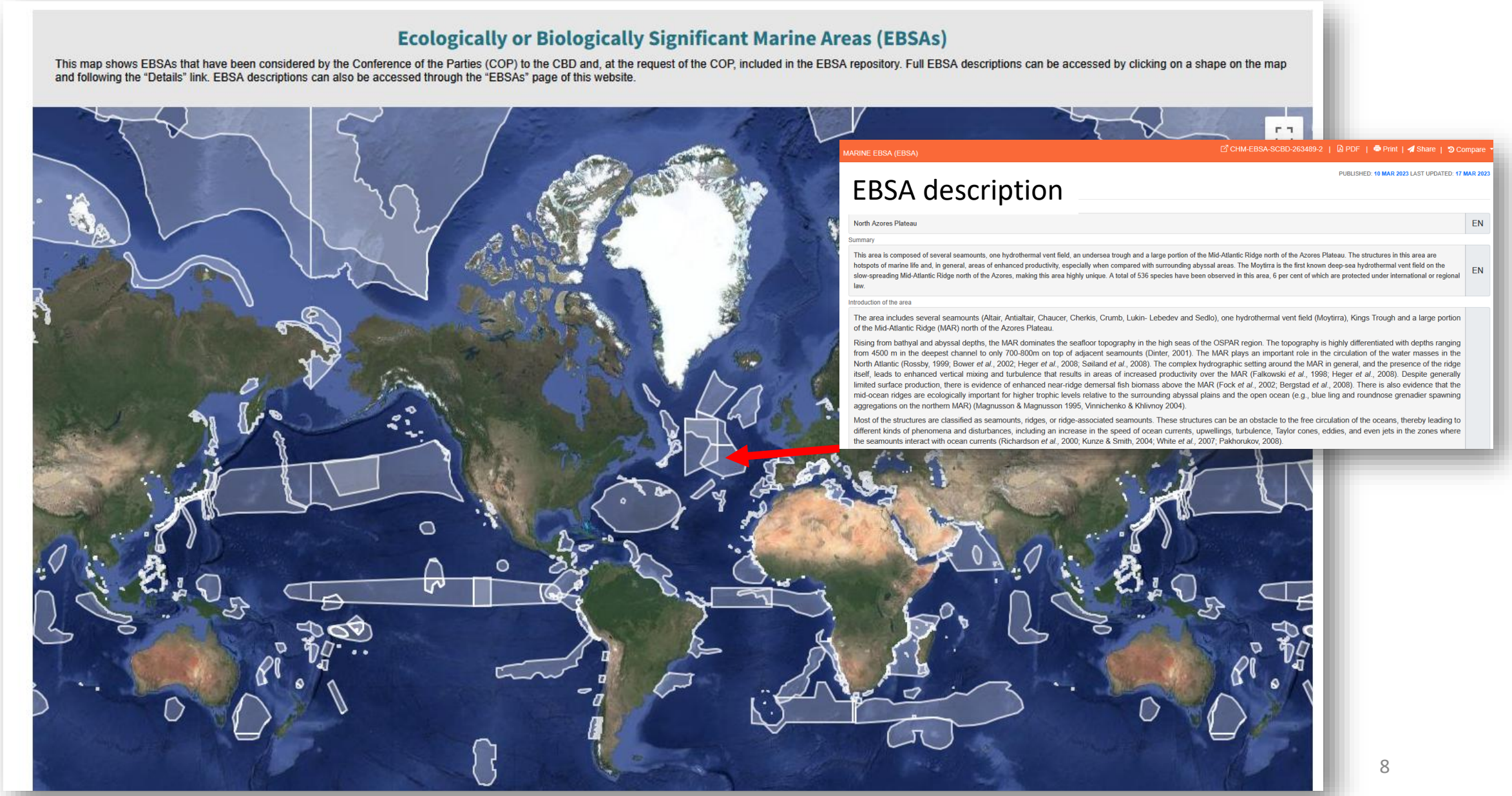
Better knowledge base for ABMT design, with focus on existing EBSAs

Characterize:

- Diversity
- Food webs
- Human use
- Governance structures

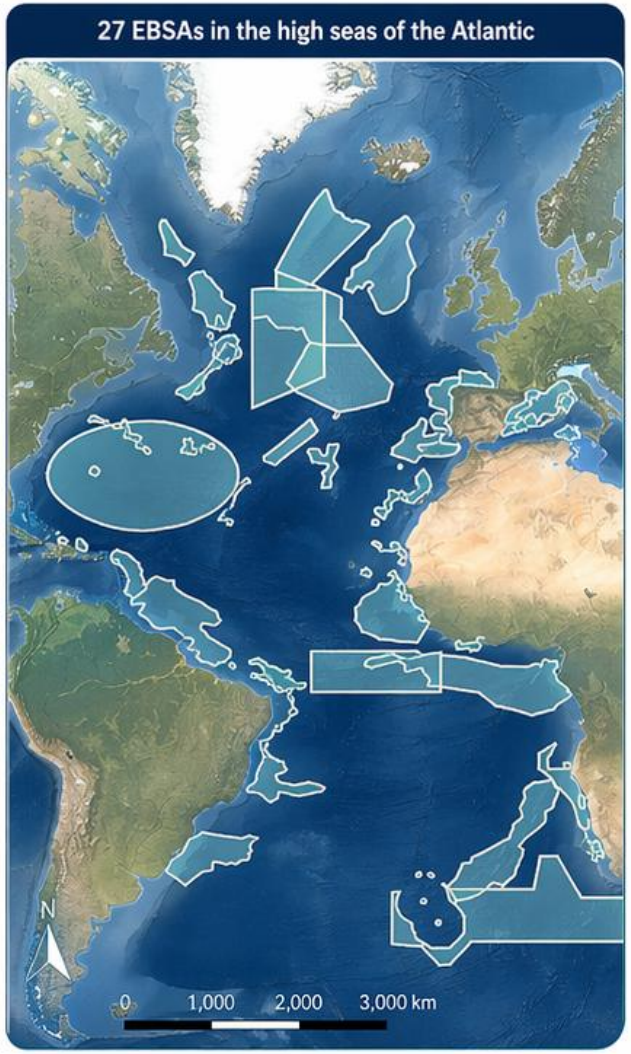


Existing EBSAs descriptions are hard to use systematically



Improving the completeness and accessibility of EBSA descriptions

EBSA Shiny-App by IMAPP



1 Source information from the CBD EBSA repository

- CBD EBSA repository
- Conservation criteria
- Species, habitats, geomorphological features

2 Extend biodiversity information with OBIS and GBIF

- OBIS + GBIF
- Additional biodiversity records
- > 6,000 species across 27 EBSAs

3 Data harmonization and quality control

- Taxonomic cleaning
- Standardization
- Quality check
- Linking species and geomorphology

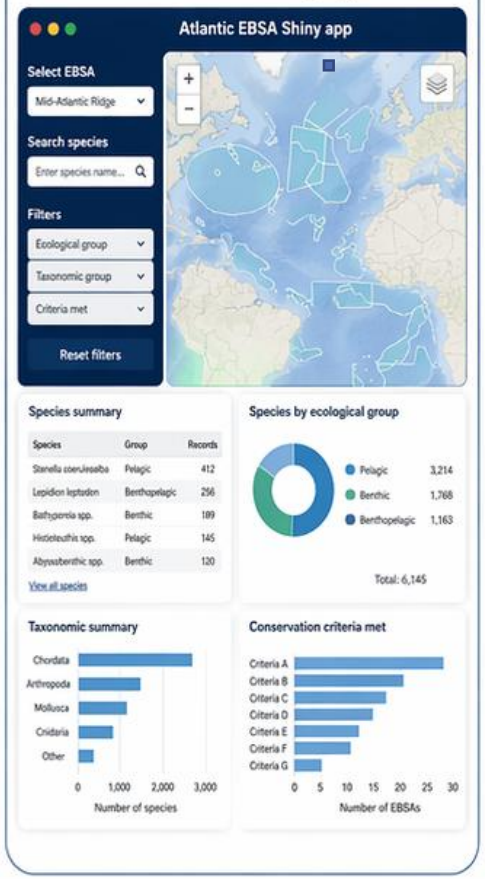
4 Structured EBSA information products

Taxonomy — Pelagic | Benthic | Benthopelagic

Geomorphological features — Pelagic | Benthic | Benthopelagic

Conservation criteria met — Pelagic | Benthic | Benthopelagic

5 Shiny app output



Next step: Integration with BBO-Dashboard!

Chaudhary et al (in prep)

EBSA Shiny-App by IMAPP

Chaudhary et al (in prep)

Atlantic High Seas EBSA Exploration

Choose rows to display:

- [ ] OBIS
- [ ] CBD
- [ ] Matches
- [x] All

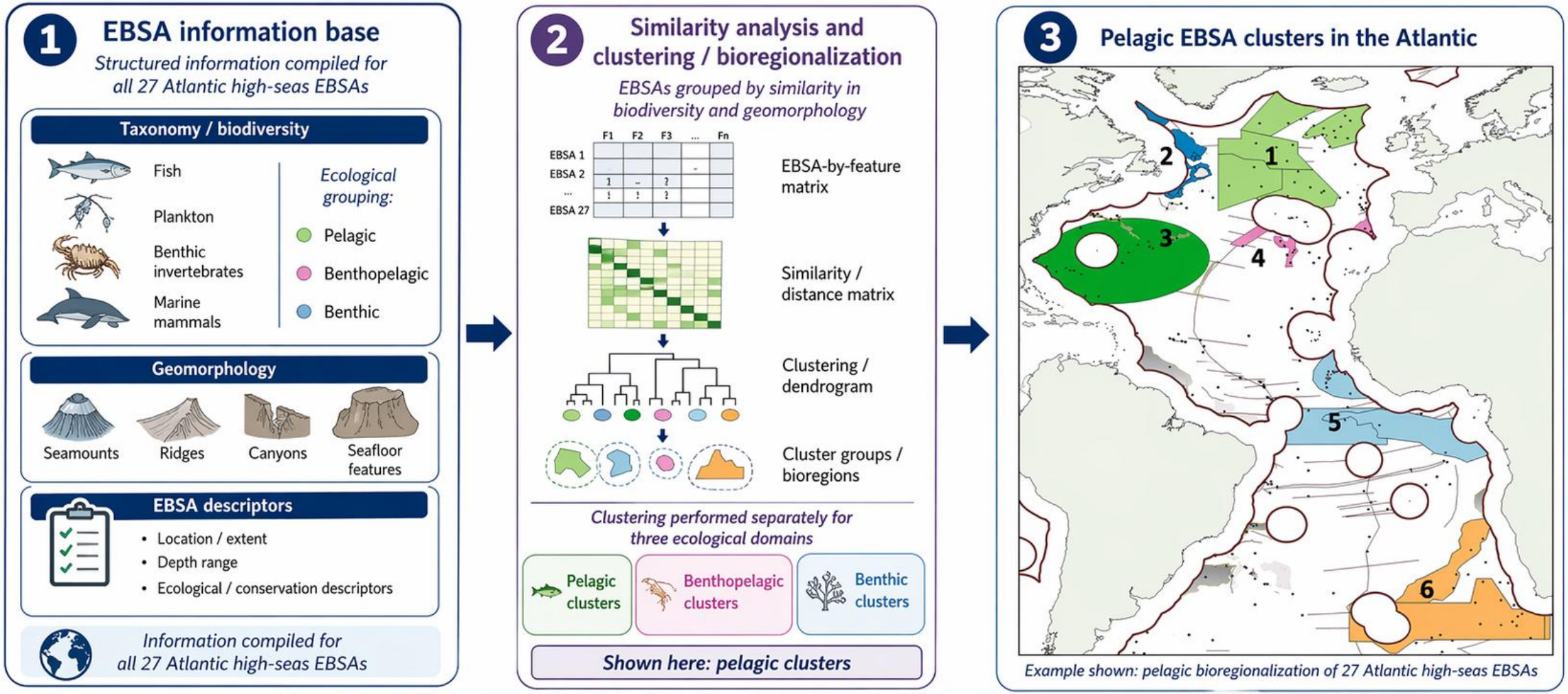
Select EBSA:

- [ ] All
- [ ] Abrolhos Bank and Vitória-Trindade Chain
- [ ] Amazonian-Orinoco Influence Zone
- [ ] Atlantic Equatorial Fracture Zone
- [ ] Atlantis-Meteor Seamount Complex
- [ ] Benguela Upwelling System
- [ ] Charlie-Gibbs Fracture Zone
- [ ] Hatton and Rockall Banks and Basin
- [ ] Hydrothermal Vent Fields
- [ ] Labrador Deep Sea Convection Area
- [ ] Madeira - Tore
- [ ] Mid-North Atlantic Frontal System
- [ ] Multi-Year Ice of the Arctic Ocean
- [ ] New England and Corner Rise Seamounts
- [ ] North Azores Plateau
- [ ] Orphan Knoll
- [ ] Ridge South of the Azores
- [ ] Sargasso Sea
- [ ] Seabird Foraging Zone in the Southern Labrador Sea
- [ ] Slopes of the Flemish Cap and the Grand Bank
- [ ] Southeast Shoal and Adjacent Areas on the Tail of the Grand Bank
- [ ] Southern Brazilian Sea
- [ ] Southern Reykanes Ridge
- [ ] Subtropical Convergence Zone
- [ ] Tropic Seamount
- [ ] Walvis Ridge
- [ ] Zone de convergence des courants de Canarie-Guinée
- [ ] Zone de production équatoriale de thons

EBSA Taxa Table | Taxa Sunburst Plots | Geomorphology

Bioregionalization of Atlantic high-sea EBSAs

Using taxonomic and geomorphological information to identify similarity-based EBSA clusters

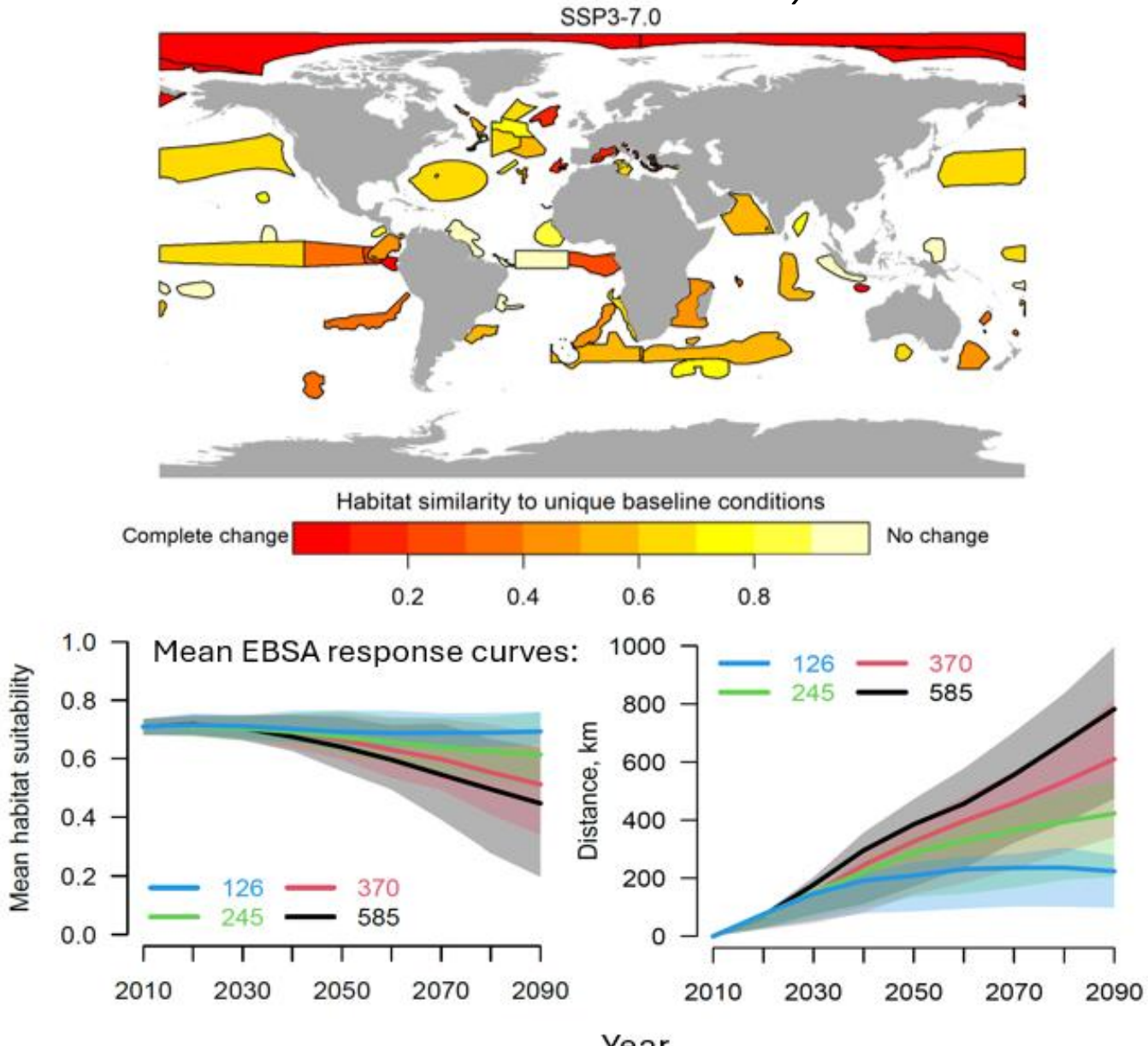


Relevance: Similarity-based based clusters can support MPA networks

Chaudhary et al (in prep)

Can High Seas EBSAs keep up with climate change?

by AGELESS



What was done

- Machine-learned present-day EBSA environmental signatures
- Signatures projected under four SSP scenarios.
- Map: relative change in EBSA-signature habitat; line plots: EBSA-signature habitat score and distance moved through time.

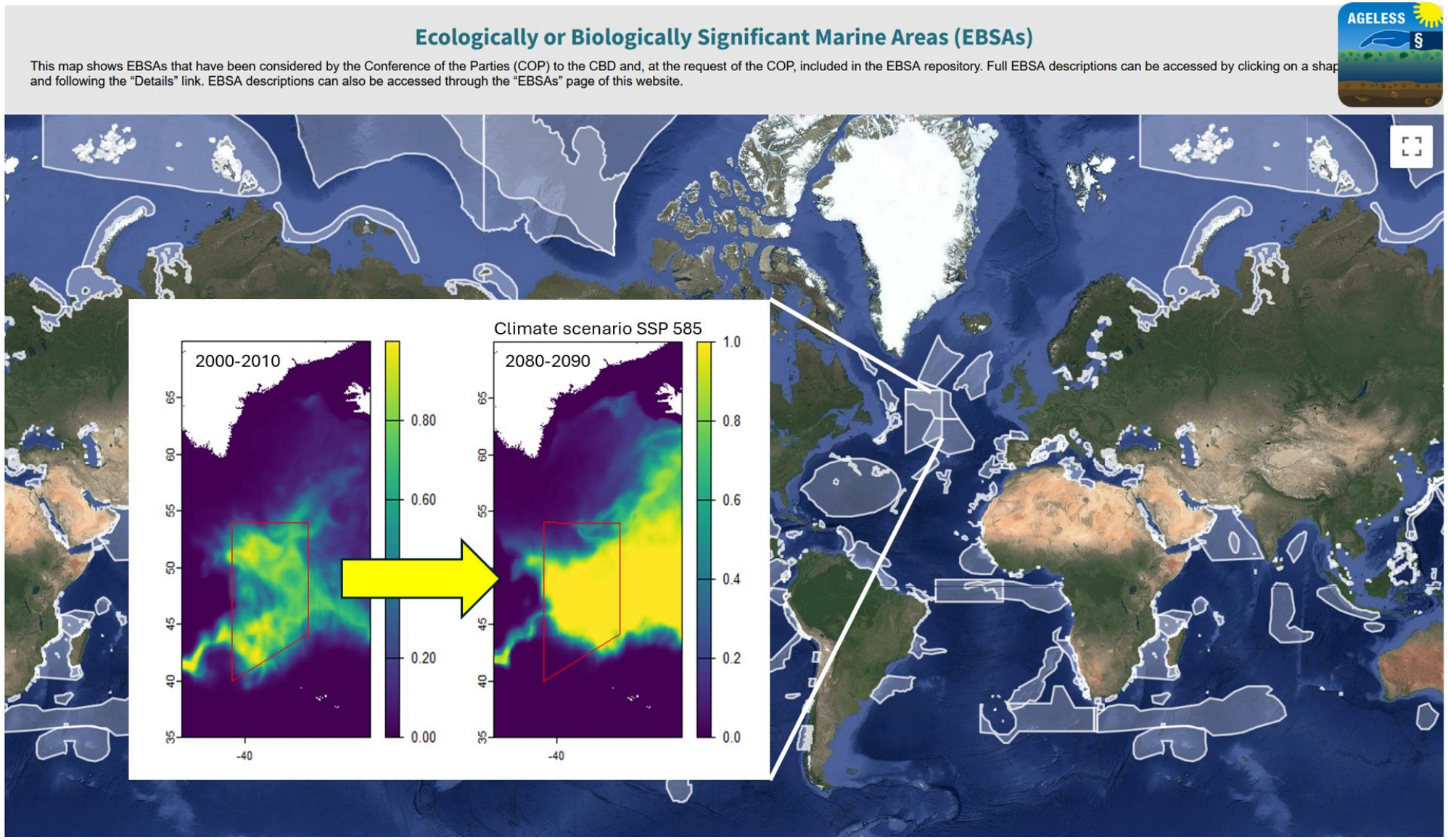
What this means

- Most EBSAs show declining habitat scores over time.
- Habitat analogues may move elsewhere while conditions deteriorate within the original EBSA, highlighting the need for climate-smart, potentially dynamic ABMTs.
- Some ABMTs may no longer protect the habitat they were initially designed to protect

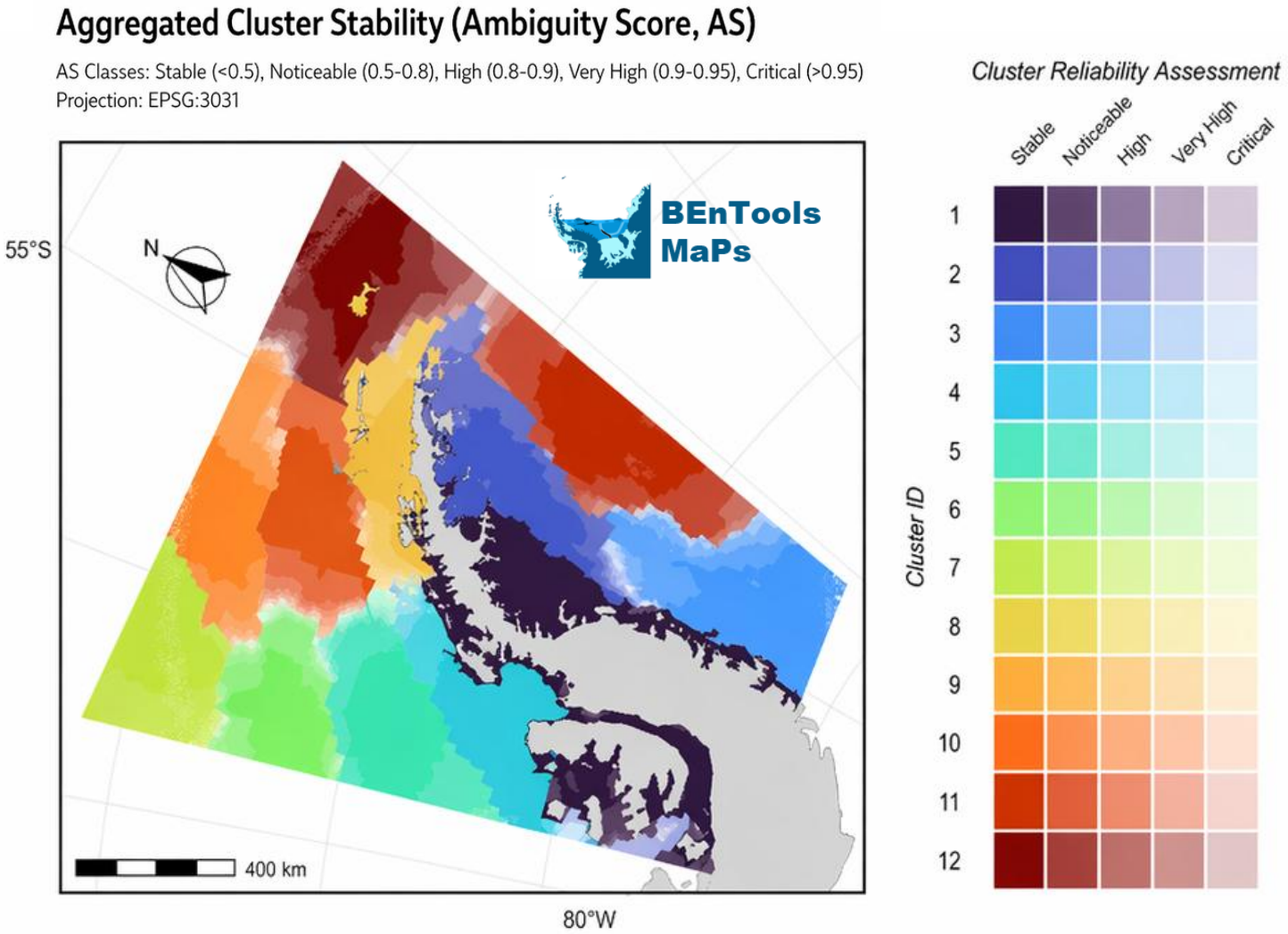
Reddin et al. (in prep)

EBSA Shiny-App by AGELESS

EBSA-specific climate change analyses will be accessible via Shiny-App



BEnToolsMaPs: Bioregionalization for climate-smart MPAs in polar regions



Weith, Pehlke, Jerosch et al. (in prep)

Data-driven bioregionalization of the Antarctic Peninsula

- Integrated abiotic, benthic, water-column, and sea-ice data to identify environmentally coherent marine regions.
- The analysis reveals distinct regional cores and transition zones across the Antarctic Peninsula.
- This provides a spatial baseline for bioregionalization, climate-change assessment, and climate-smart area-based management tools, including dynamic protection areas.

From BBNJ Annex I criteria to operational indicators

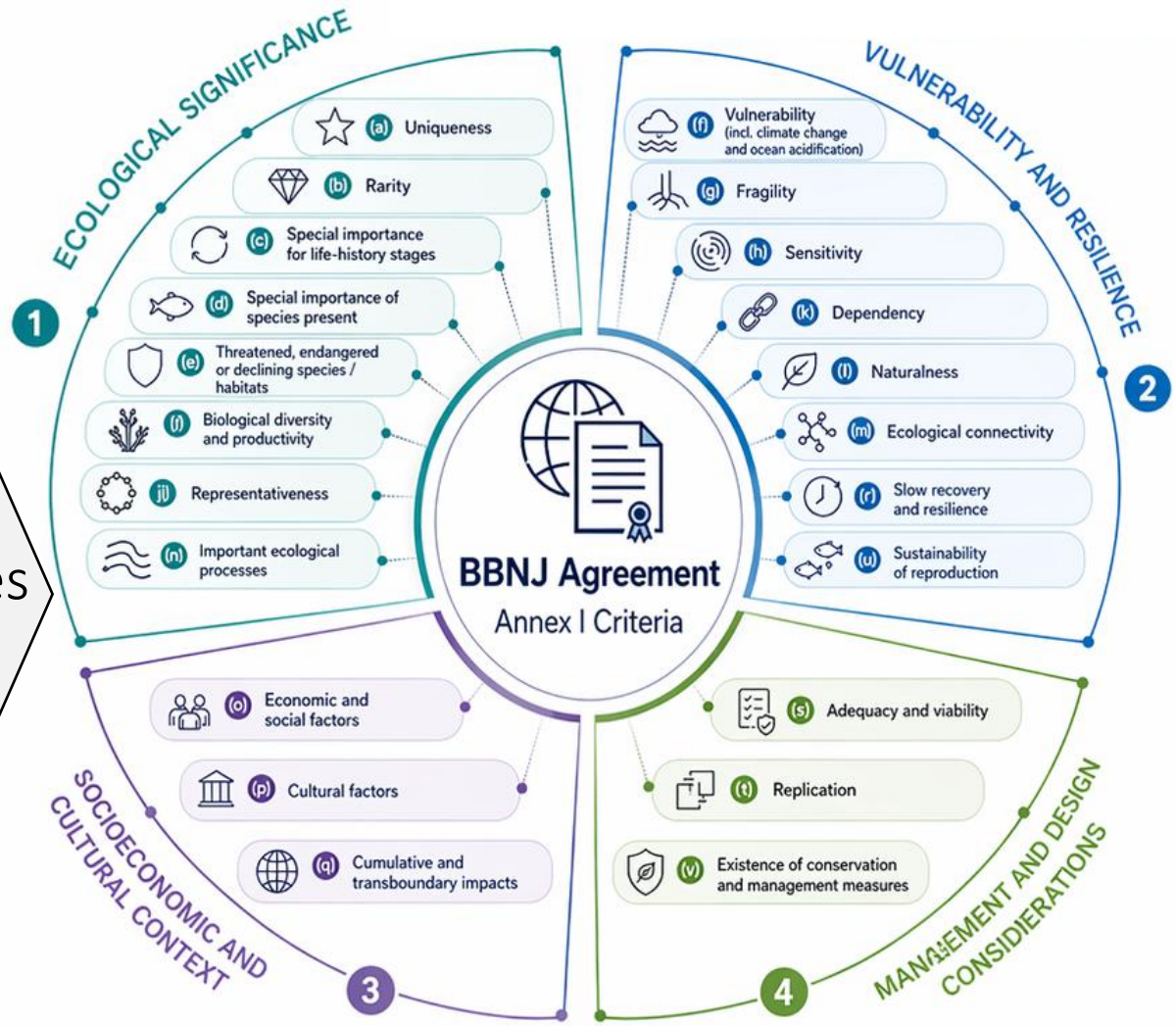
Analysis of BBNJ conservation criteria for BBO perspective paper

22 Criteria from BBNJ Annex-1

Indicative criteria for identification of areas

(a) Uniqueness;
(b) Rarity;
(c) Special importance for the life history stages of species;
(d) Special importance of the species found therein;
(e) The importance for threatened, endangered or declining species or habitats;
(f) Vulnerability, including to climate change and ocean acidification;
(g) Fragility;
(h) Sensitivity;
(i) Biological diversity and pr
(j) Representativeness;
(k) Dependency;
(l) Naturalness;
(m) Ecological connectivity;
(n) Important ecological proce
(o) Economic and social factor
(p) Cultural factors;
(q) Cumulative and transboundary impacts;
(r) Slow recovery and resilience;
(s) Adequacy and viability;
(t) Replication;
(u) Sustainability of reproduction;
(v) Existence of conservation and management measures.

- Prioritize key criteria
- Account for dynamic pressures
- Match criteria with indicators



Take Home Messages

- Existing ecological, economic and legal information needs continued harmonization to support robust and transparent ABMT design.
- EBSAs are a practical starting point, but need to be translated into operational indicators and accessible knowledge repositories.
- Climate-smart ABMTs require refined criteria and indicators that can support adaptive or dynamic management.

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Discussion Questions

- Are EBSAs - also in your opinion - suited as a good starting point for MPA designation in BBNJ implementation? Are alternative approaches discussed in the „policy sphere“?
- Can the Annex I criteria of the BBNJ agreement be changed for MPA designation? And if yes, how and to what degree?

Indicators for marine biodiversity

Insights from the BBO projects for the implementation of the BBNJ agreement

Alexandra Kraberg, AWI
Heike Link, Rostock University

on behalf of the BBO project cluster scientists

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

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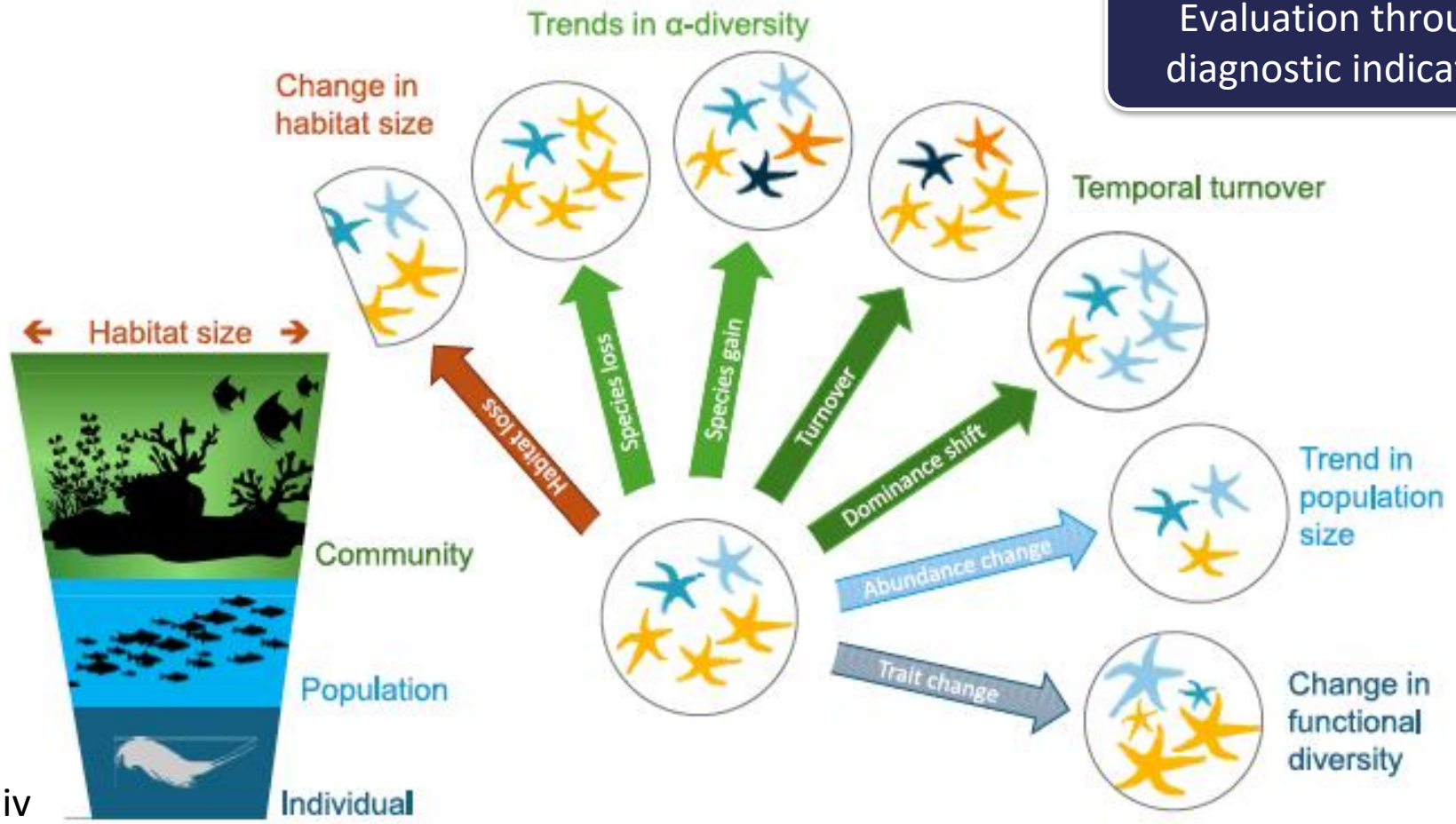
Biodiversity of the Blue Ocean

Why is biodiversity important?

Evaluation through diagnostic indicators



Hillebrand et al. 2026, MarBiodiv

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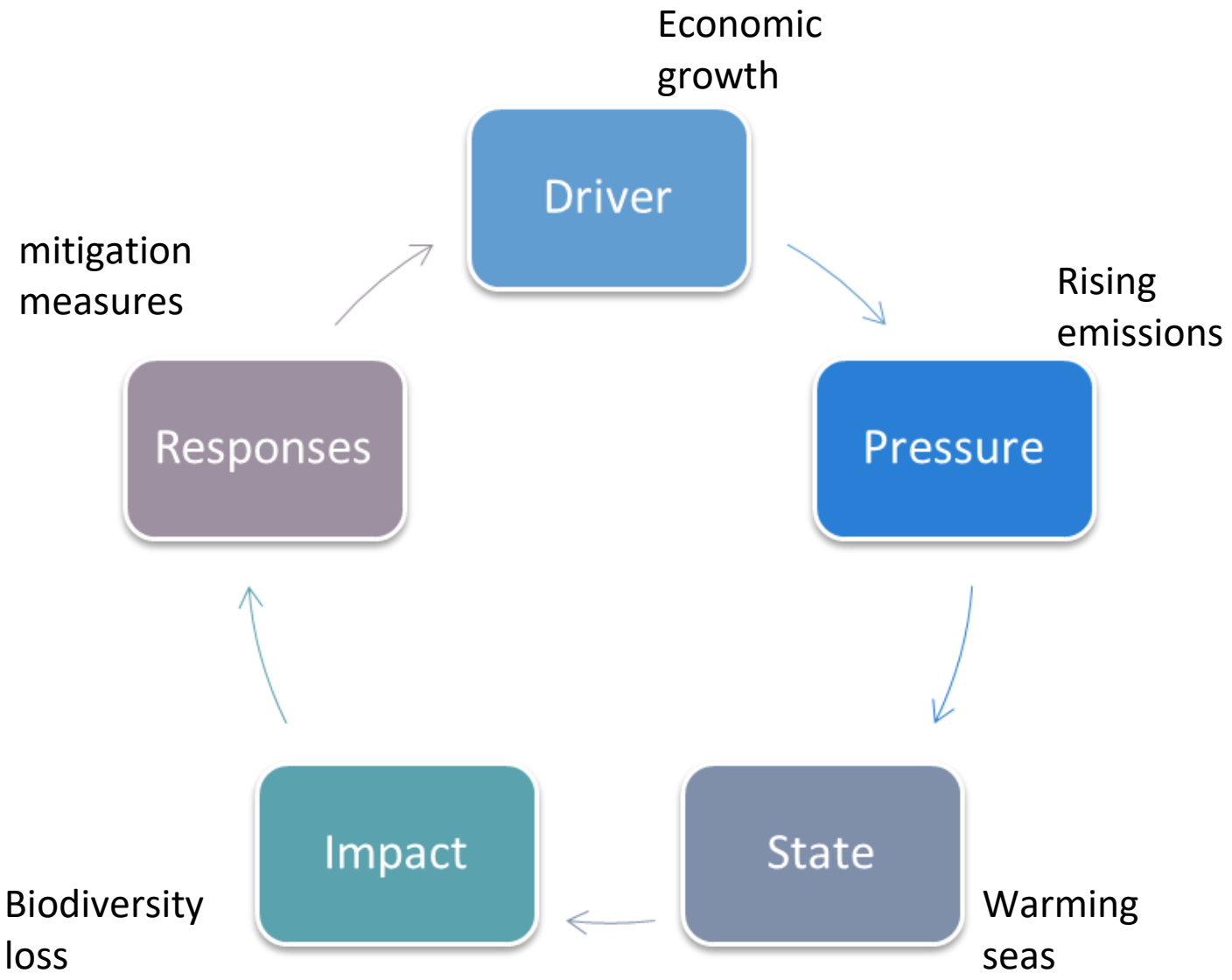
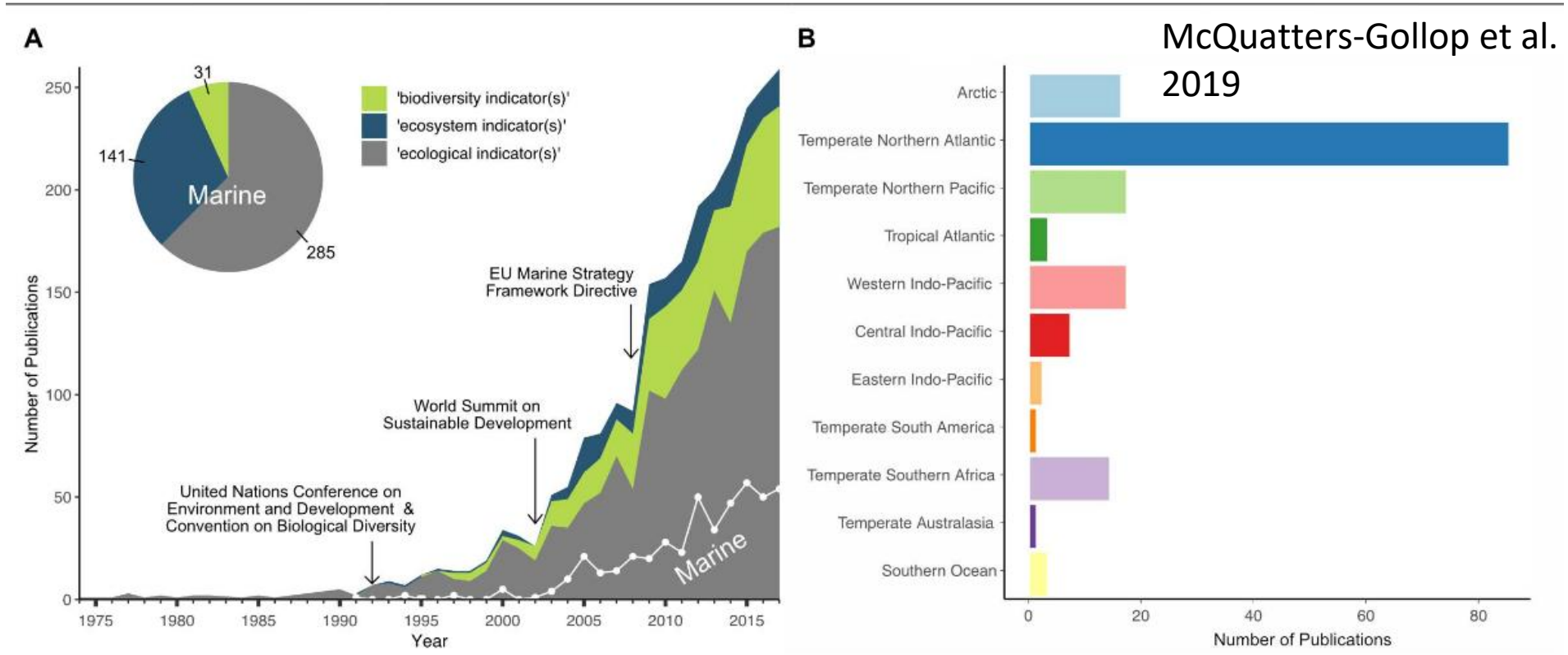
DPSIR Concept

- Used by European Environment Agency
- DIPSIR desribes interlinkages between society and environment
- Basis for indicator development
- Indicators usually developed for a subset of DPSIR components
  - Pressure-state
  - Pressure-state-response (OECD)





McQuatters-Gollop et al. 2019

- Indicator literature underrepresented for the marine realm
- Activities concentrated in temperate Northern Atlantic, other ocean areas underrepresented

Who needs/uses indicators?

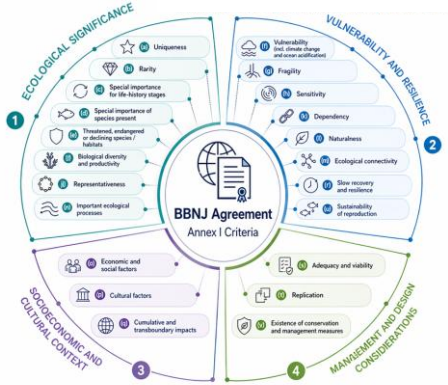
MSFD: 11 descriptors to assess Good Environmental Status (GES)

Sea floor integrity 6.

National and global indicators, produced list of tested indicators, e.g.

- Species threatened with extinction; number of endemic/threatened/ endangered/vulnerable species by group

Regional indicators for the Baltic, based on thresholds or data ceilings (https://helcom.fi/wp-content/uploads/2021/01/BSEP175.pdf)



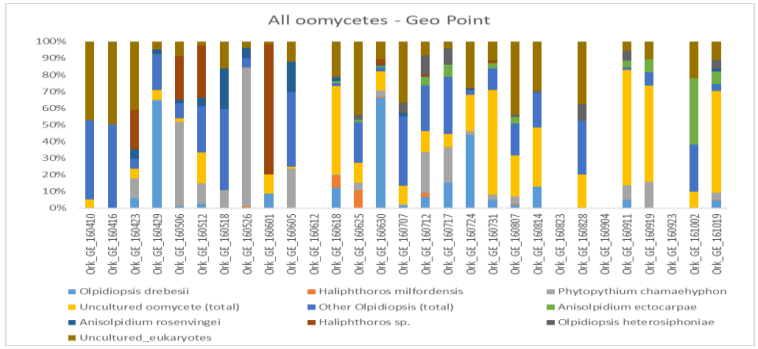
BBNJ: Part III: Area-based management tools, incl. monitoring (article 26)

Part IV: Environmental impact assessments

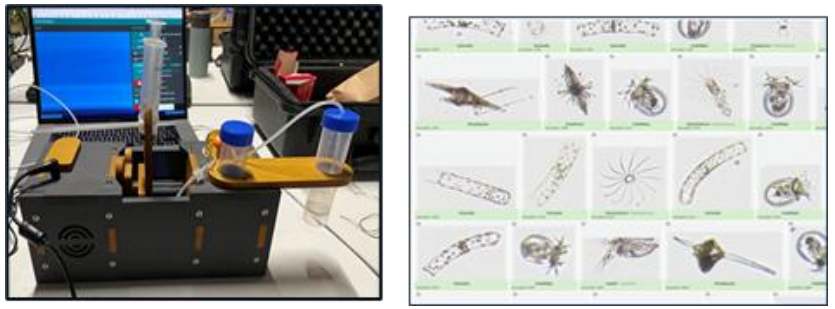
=> indicators for criteria assessments of ecological significance and vulnerability and resilience will be necessary, but baseline data for many groups are lacking

Indicator development: Potential data sources and issues

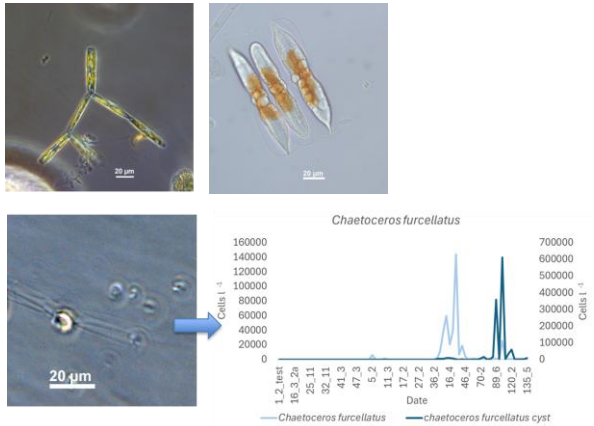
Molecular, e.g. metabarcoding



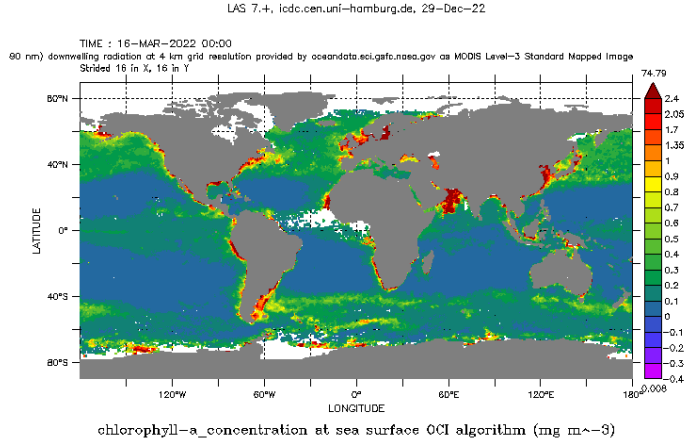
Semi-automated Imaging (AI-based)



Traditional microscopy



Remote sensing



Methods could be complementary, but.....

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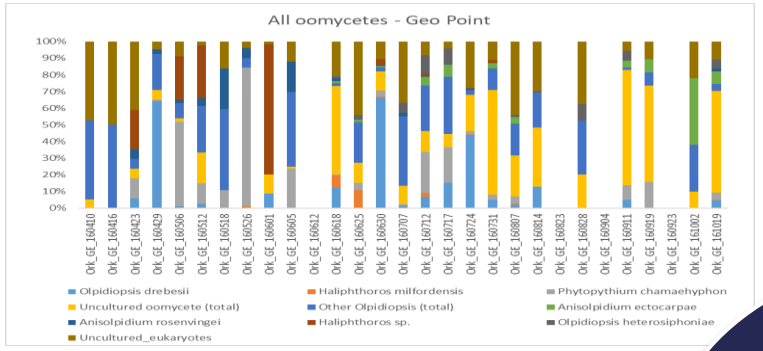
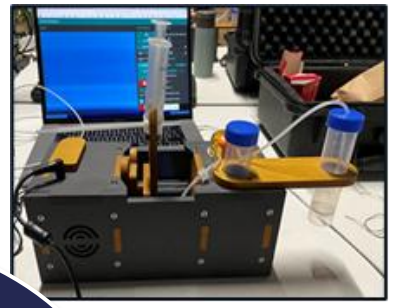
Indicator development: Potential data sources and issues

Molecular, e.g. metabarcoding

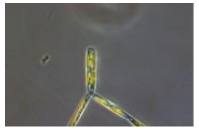


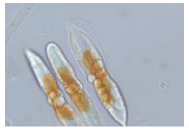
Semi-automated Imaging (AI-based)





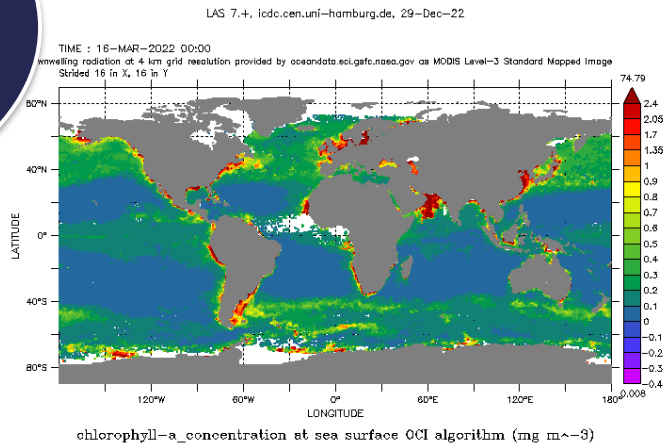
Traditional microscopy





Different granularity
Different taxonomic or spatial resolution

Remote sensing



- Problems to overcome for the Blue Ocean:
- Lack of comparability between methods
- lack of taxonomic knowledge for interpreting data
- Costs

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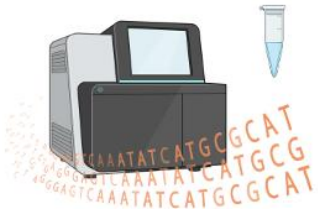
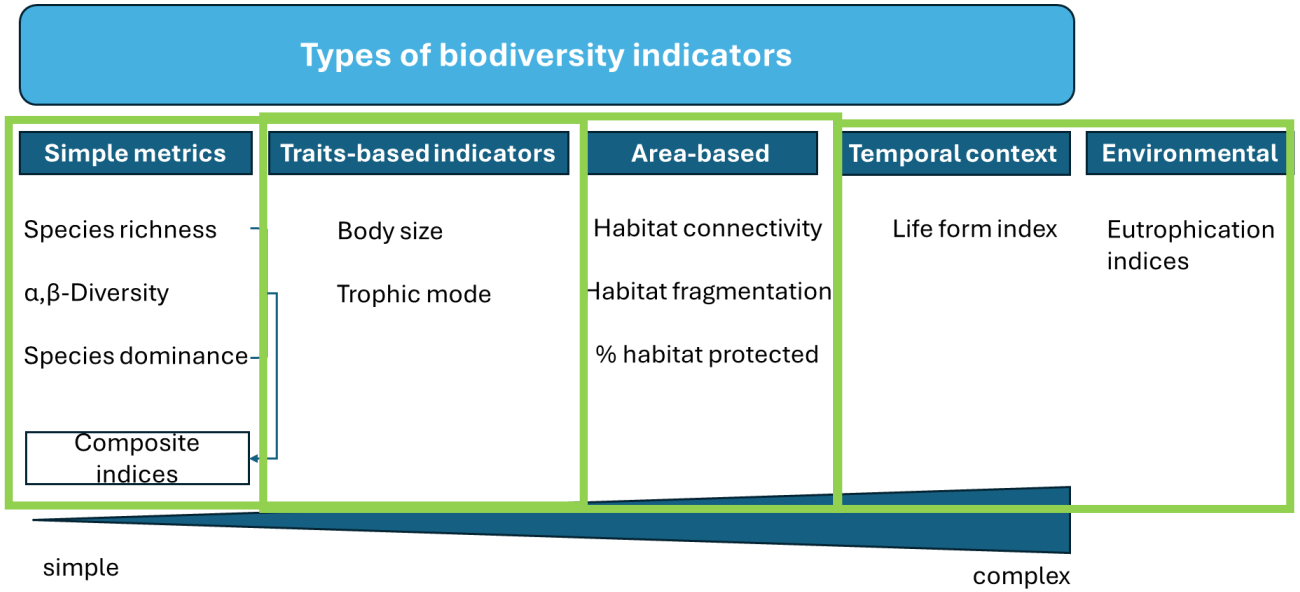
How the BBO projects address these issues?

- Developing low-cost monitoring tools with high taxonomic resolution

PlanktoScope
Frugal quantitative imaging platform



- Ecosystem-based perspective (required in BBNJ)
  - Environmental data for Biodiv Modelling and ABMT
  - Developing indicators for sediment habitats

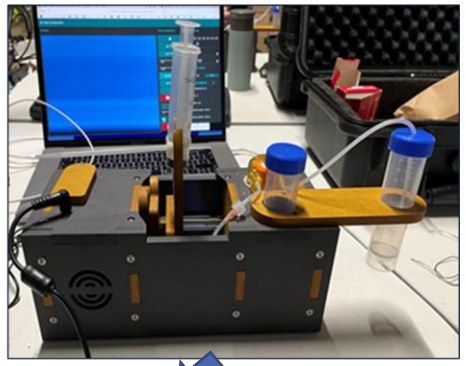


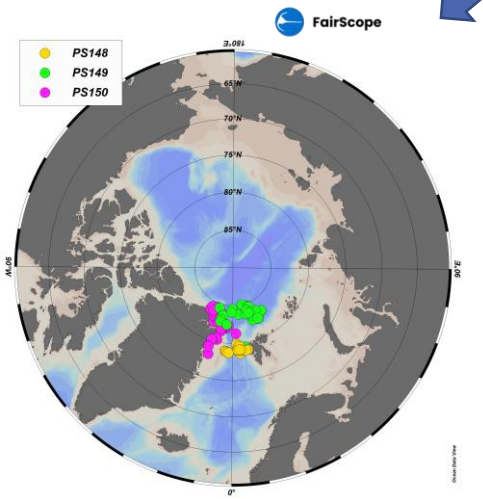
- Developing indicator models adaptive to future scenarios

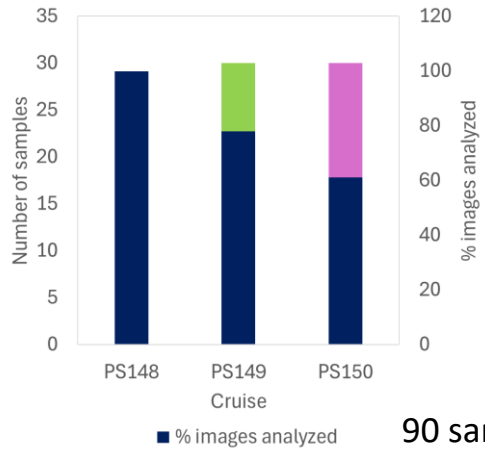
Low-cost monitoring with high taxonomic resolution - PlanctoScope

- Use of low cost devices that are easy to use
- Standardized methods
- Scalable methods (small to large spatio-temporal scales)
- sampling platform independent

Case study INDIFUN-AI: PLANKTOSCOPE Imager







90 samples

Advantage: Can quickly address data gaps in data poor areas e.g. in the open ocean,
Issues: Comparison with legacy data e.g. microscopy

- baseline data for testing existing and developing novel indicators

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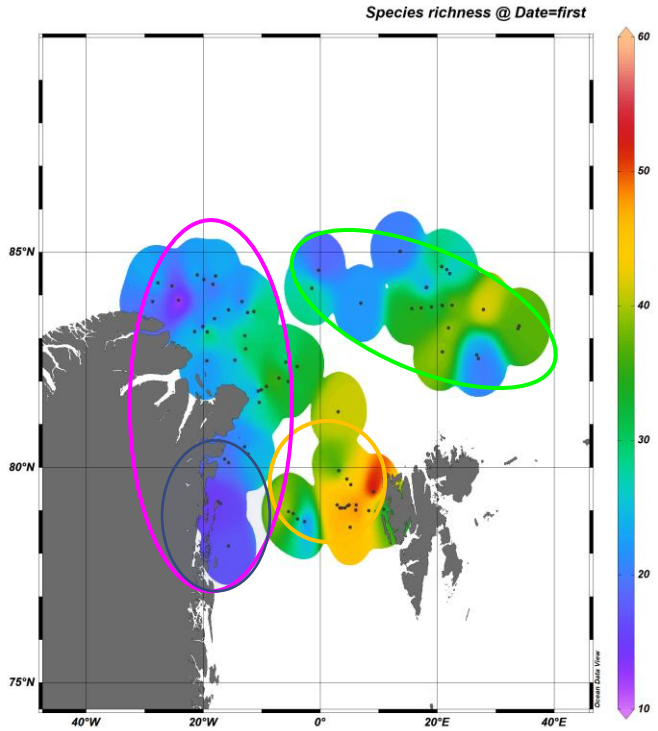
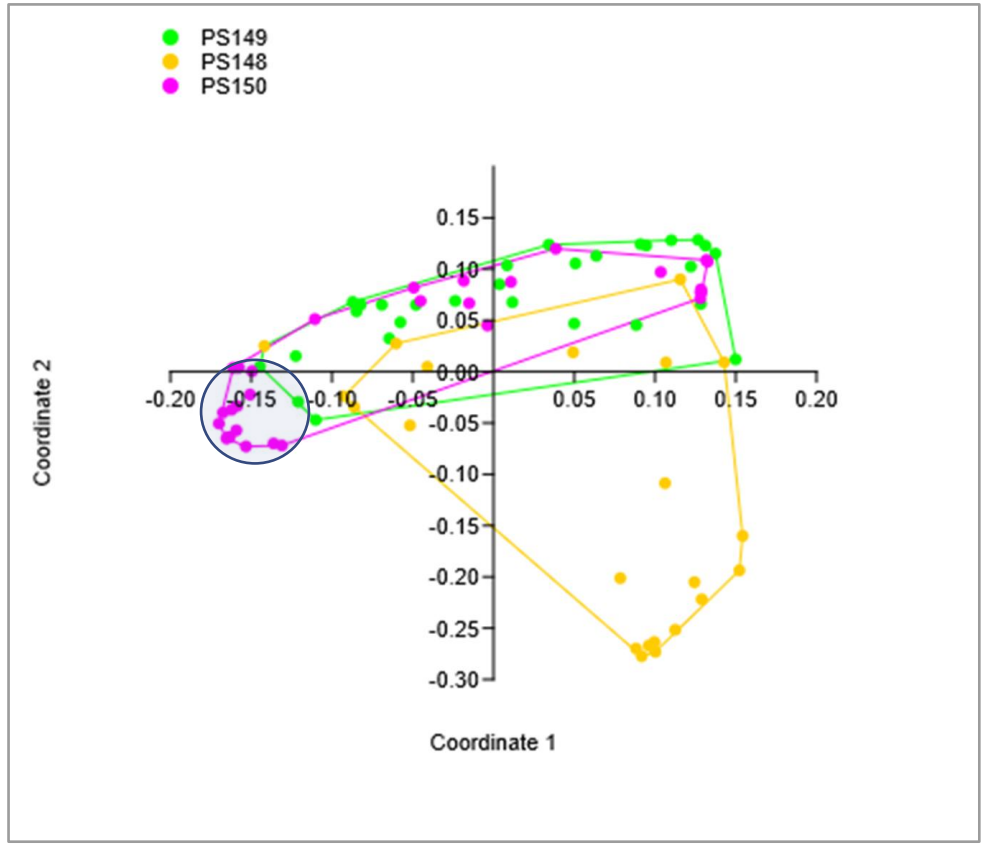
Preliminary results: INDIFUN-AI Case study





Species richness:

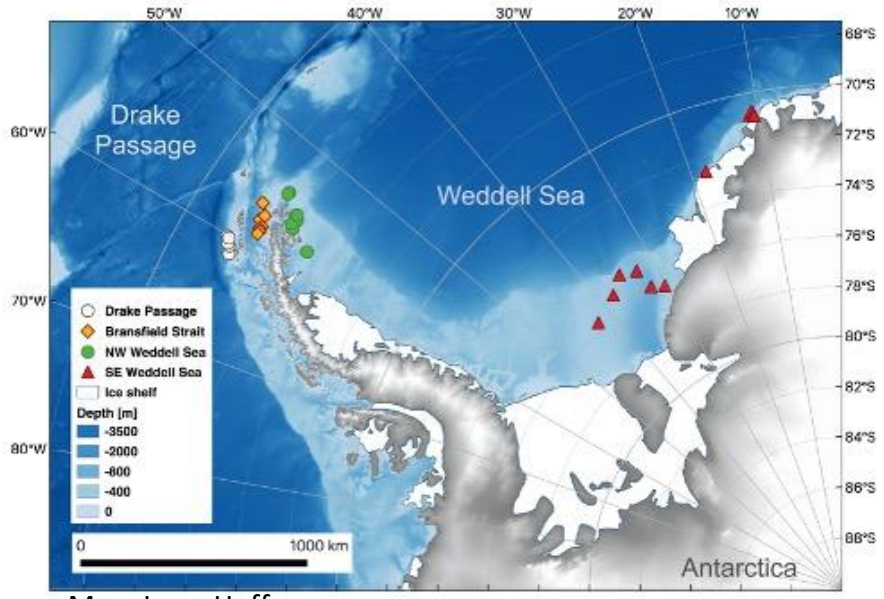
- Highest in eastern FramStrait.
- Lowest in East Greenland (based on 90 imaged samples)

Multivariate analysis of raw data for three cruises:

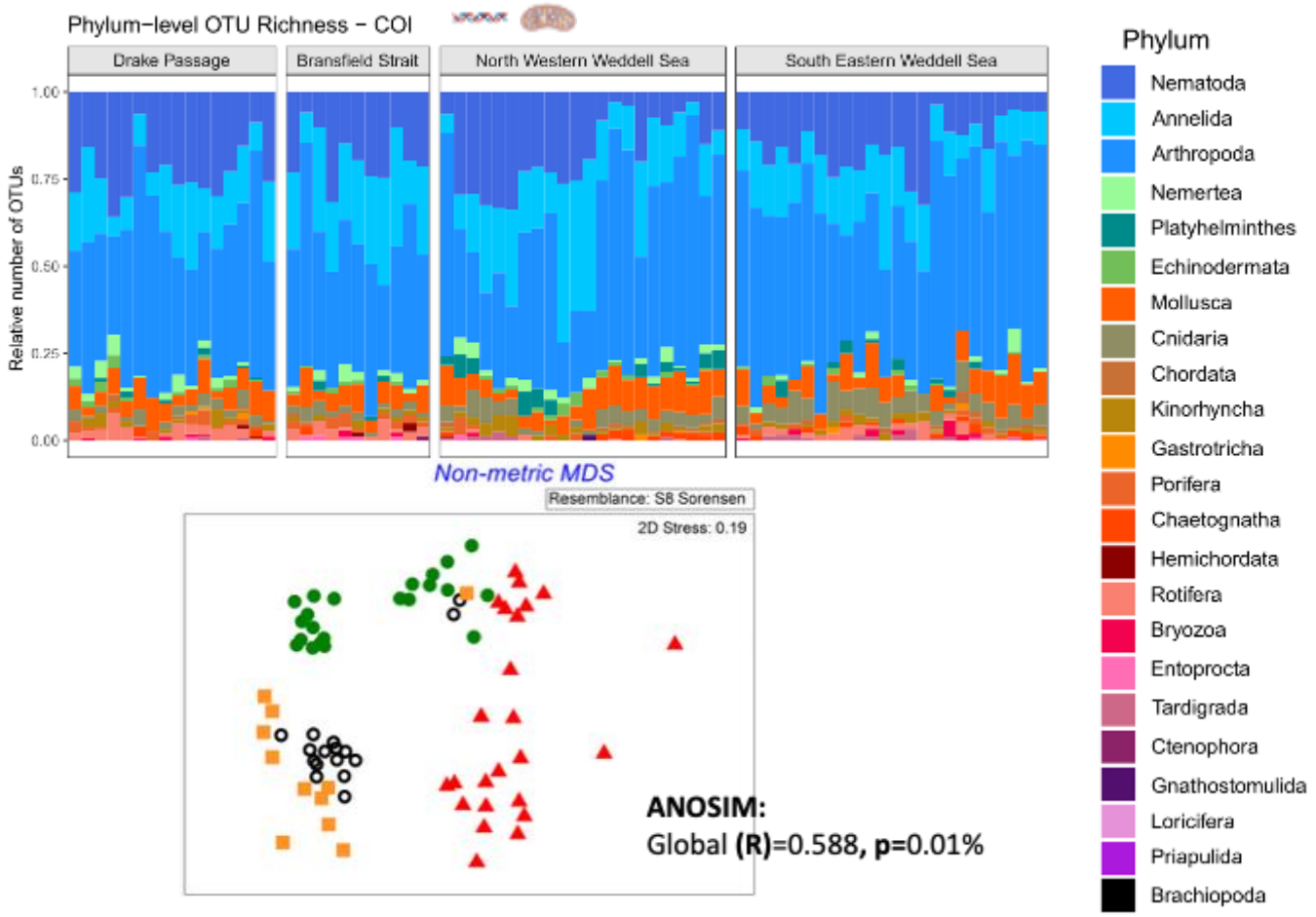
- Greater variability in Fram Strait samples
- much overlap between PS148 and PS150
- coastal stations form a separate cluster

Low-cost monitoring tools with high taxonomic resolution – Infauna Metabarcoding

Metabarcoding using COI:
2809 OTUs in Antarctic sediments



Map: Leon Hoffmann



Uzun et al. (in prep)

Metabarcoding can resolve regional differences in small infauna biodiversity

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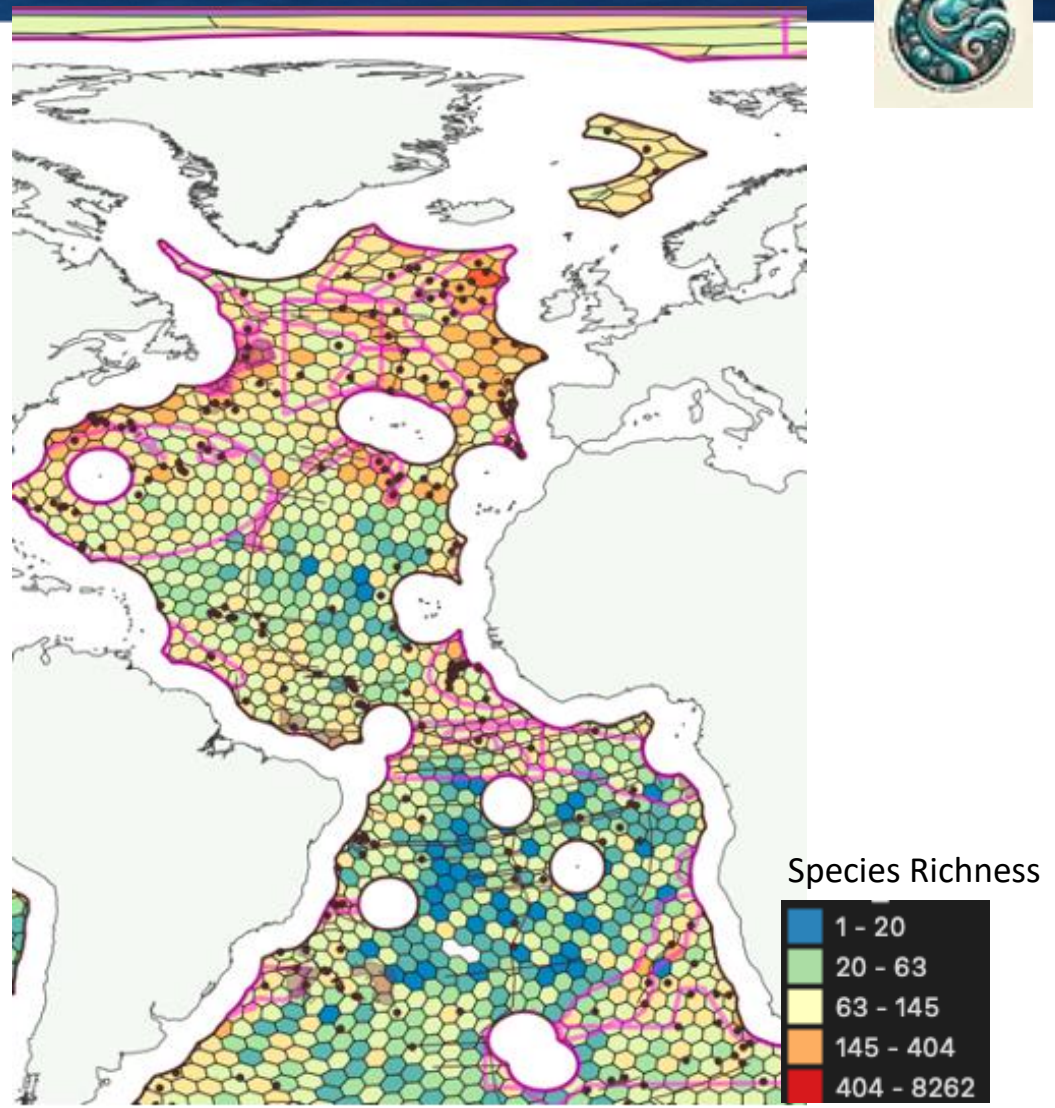
More and robust data sources facilitate geographic scaling-up

species richness (chao index) within the Hexagons of nearly 50,000 sq. km.

based on occurence data from **OBIS** for nearly 21,000 species of animalia for the estimations.

Even after spatial thinning, there are regions of very few records that appear as with least species richness.



Map of Atlantic High seas EBSA (pink lines) and estimated species richness red to blue (indicating low to high), gridded in hexagonal cells of nearly 50,000 sq.km.

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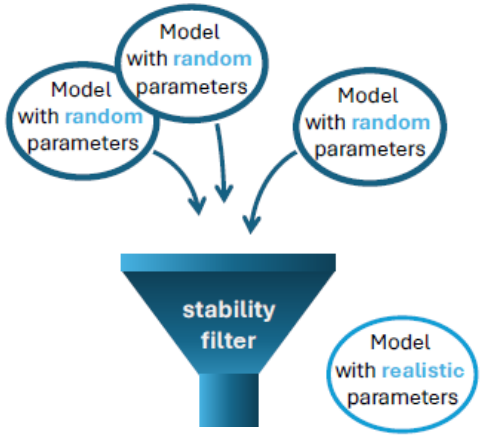
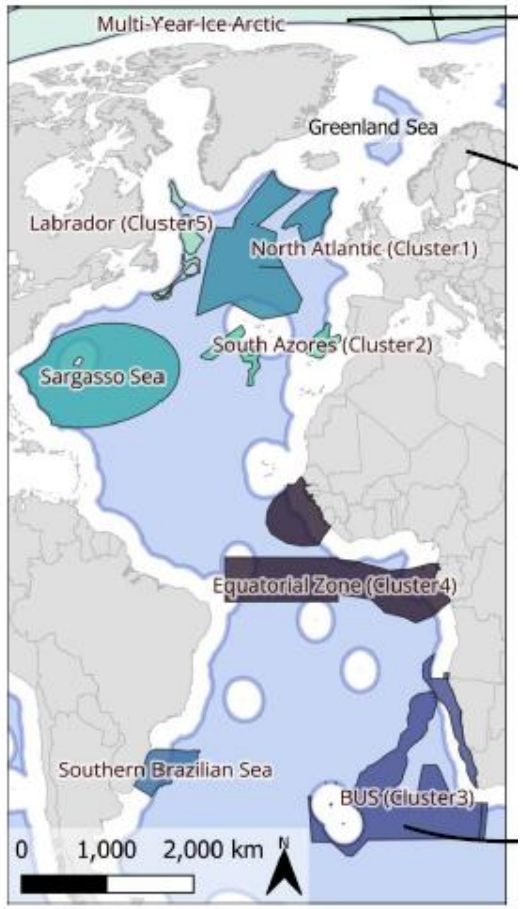
Ecosystem-based approach
- Atlantic food web modelling for Biodiversity Indicators

model constructed based on parameters of carbon flow selected through stability filter

=> overcomes data gaps differing between regions



Enzian, Gross et al. (in prep)



- 9 regions

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Ecosystem-based approach
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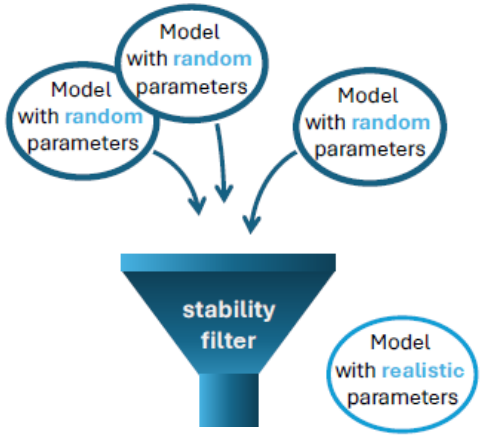

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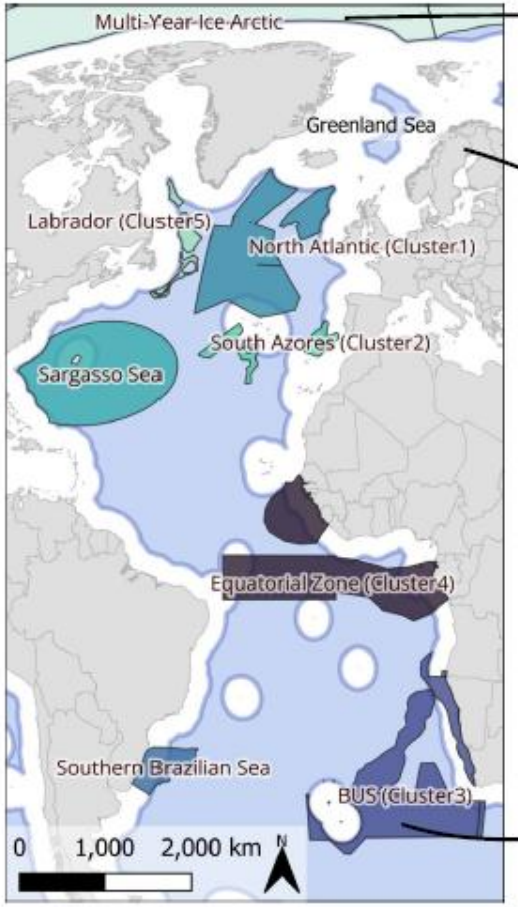

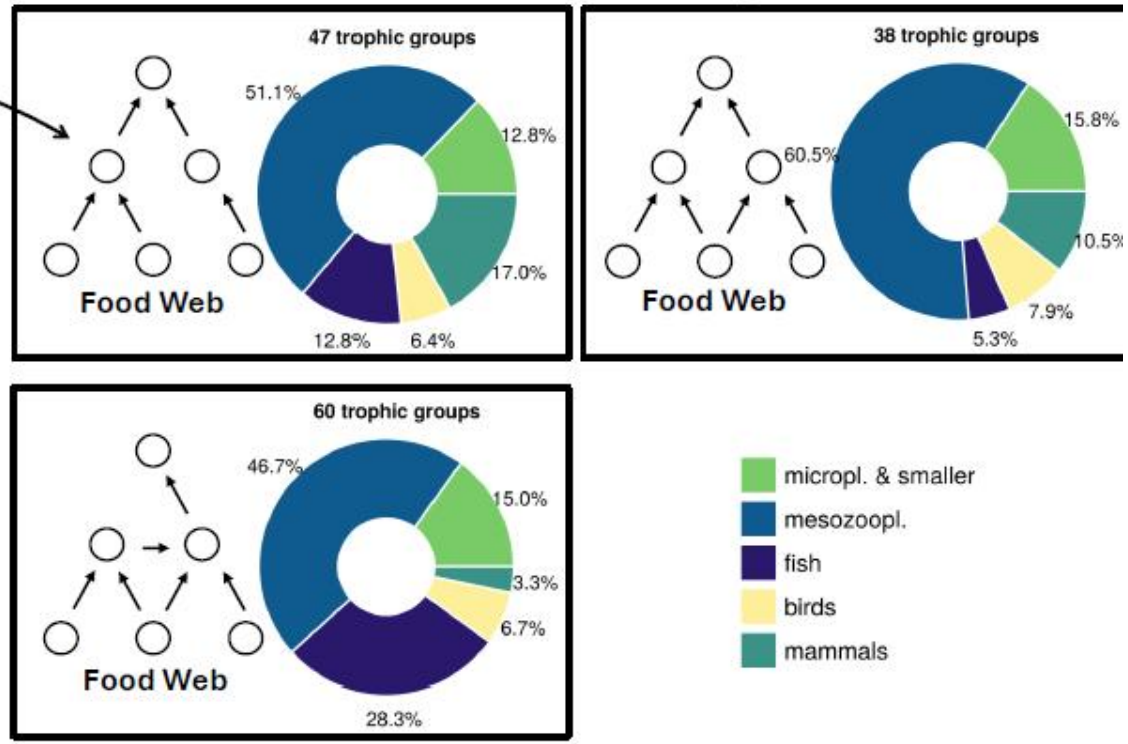

- 9 regions

each trophic group assigned to taxon

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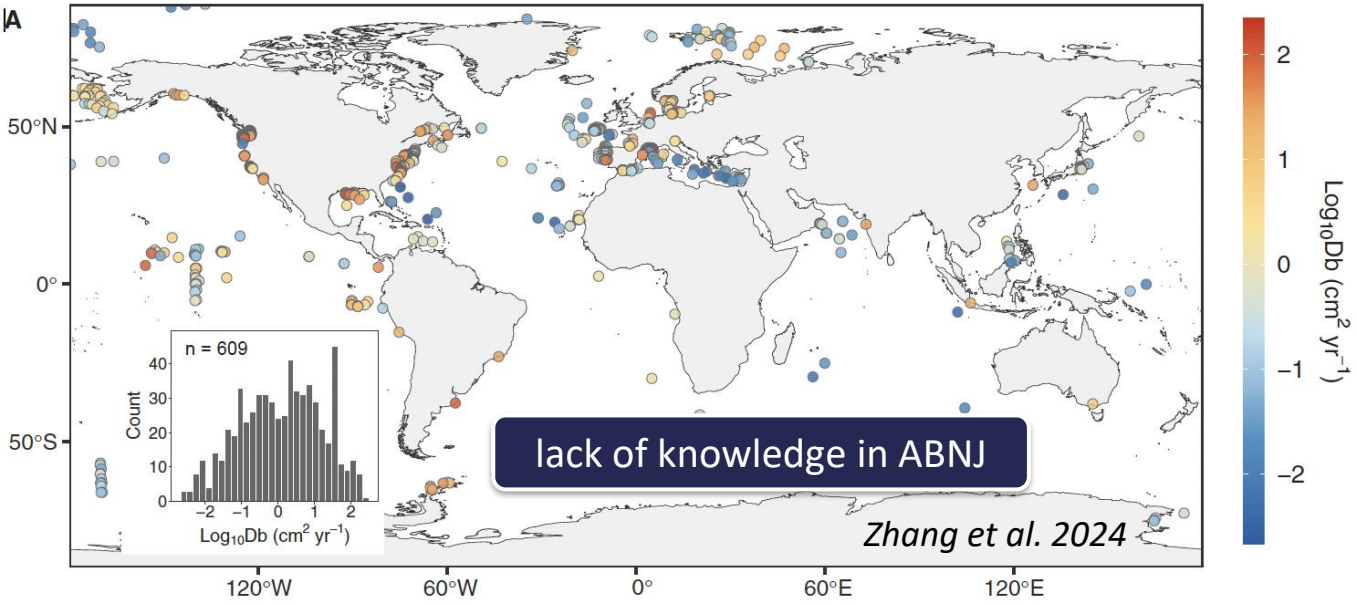
Ecosystem-based approach
- BP_c – community bioturbation potential (sediment reworking)



measured sediment reworking
⇒ enhancement of biogeochemical fluxes

$$BP_{pi} = \left({}^{B_i}/_{A_i}\right)^{0.5} * Ai * Mi * Ri$$

B_i wet biomass (g)
A_i abundance (ind/m²)
M_i mobility trait
R_i sediment reworking trait

Solan et al. 2004

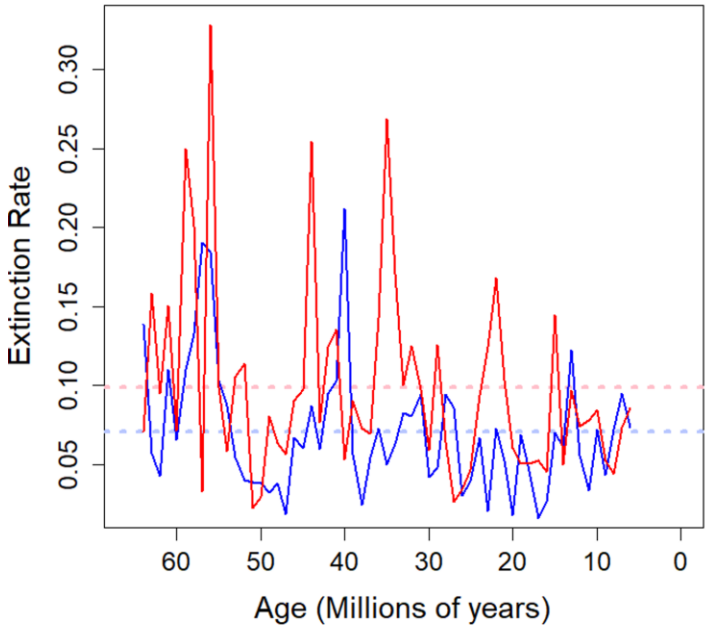
- indicator based on traits
- currently testing true, environmentally influenced rates vs. BP_c in Weddell Sea

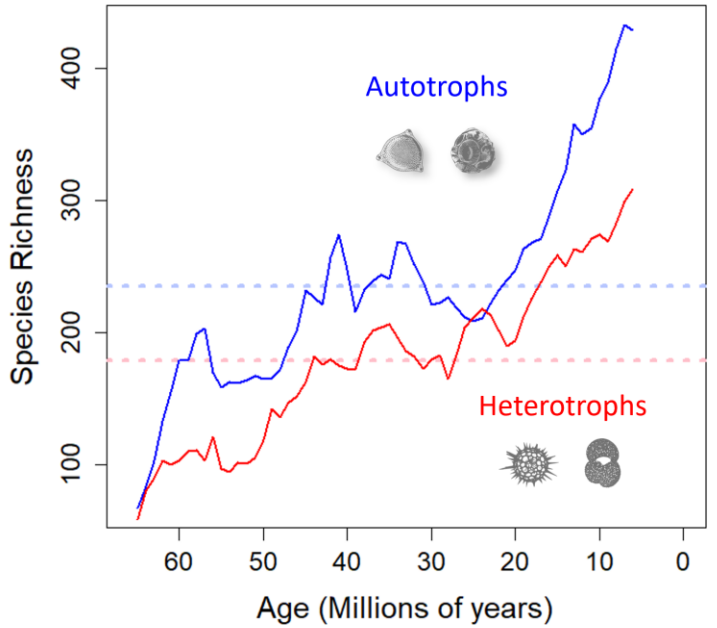
Developing indicator models adaptive to future scenarios - key influences on extinction rate in the Blue Ocean

Increasing extinction rates in photosynthetic plankton vs.

non-photosynthetic plankton could indicate growing ecological instability

Mean extinction rate (last 66 Ma)	
Phytoplankton (photosynthesizers)	**Zooplankton (non-photosynthesizers)**
0.07 ± 0.01	0.10 ± 0.01





Smith et al. (in revision)

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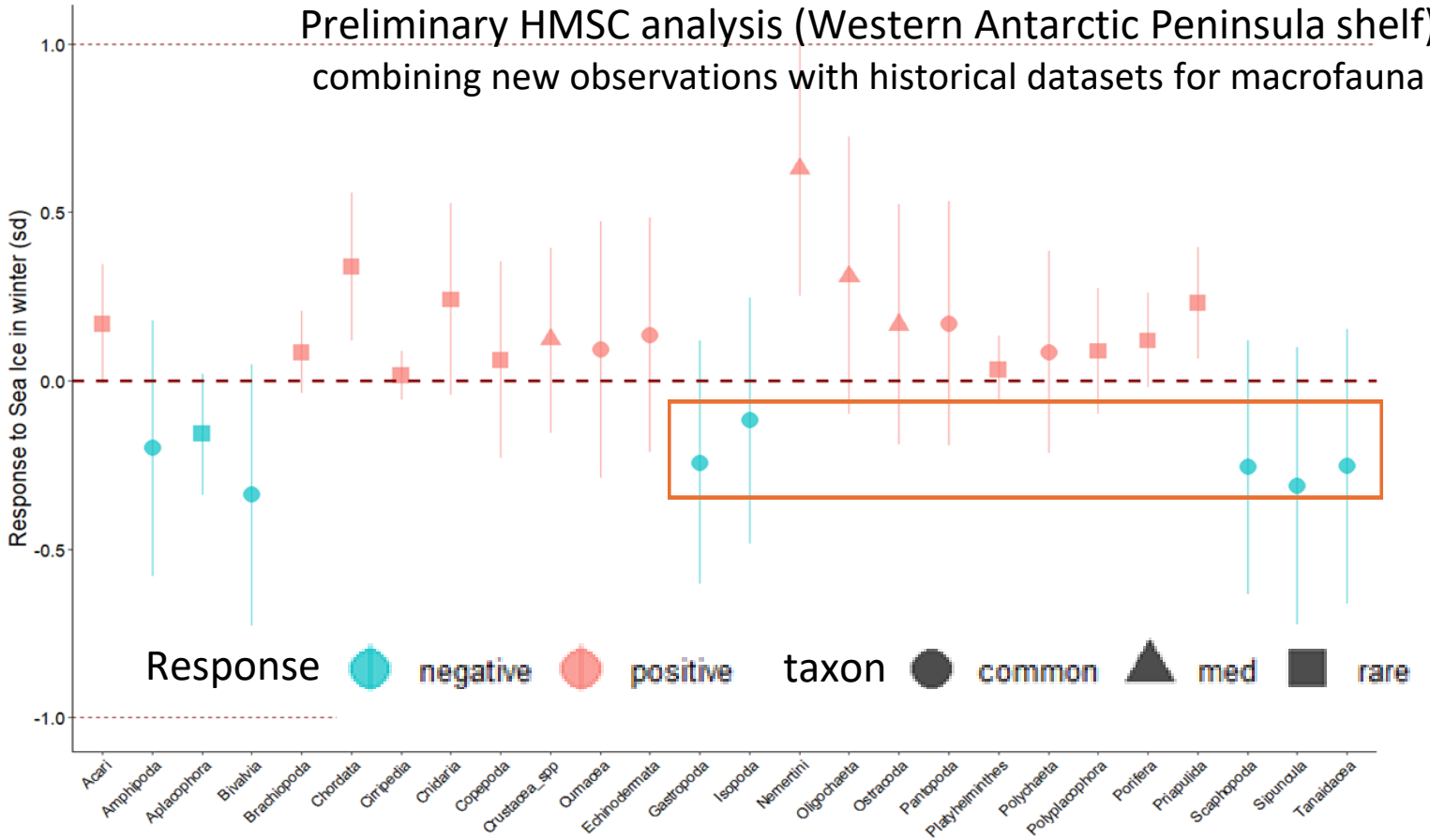
Developing indicator models adaptive to future scenarios - modelling benthic communities under sea-ice loss

- common taxa show decreasing abundance with increasing variability in winter-sea ice
- rare taxa show positive responses to winter sea-ice variability

Preliminary HMSC analysis (Western Antarctic Peninsula shelf)
combining new observations with historical datasets for macrofauna



Weith, Piotto, Pehlke, Jerosch et al. (in prep)

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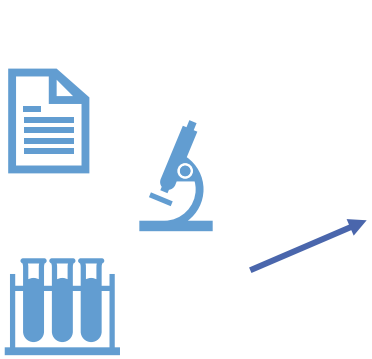
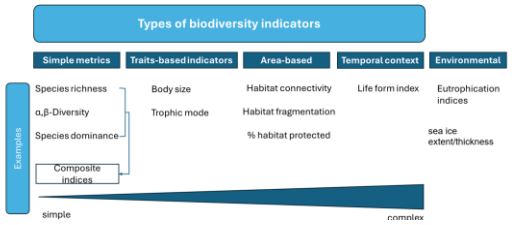
Developing indicator models adaptive to future scenarios - Indicator quality assessment

- **Challenge**: Indicators may loose meaning
- **Idea**: Develop detection system for indicator usability/quality



Data from monitoring



Computation of indicators



Usage for interpretation of environmental status

Update standard indicators

Ease-of-use

Scope

Information content

Quality aspects of indicators



Update/Repeated optimisation of indicators





Steinmann & Plum et al. (in prep)

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Take Home Messages

- Marine indicators will be the tools to assess the criteria of BBNJ
- Considerable diversity of diversity indices
  - no commonly applied rules or concepts due to variety in target diagnosis
  - ABNJ represents a variety of ecosystems
- Low-cost monitoring tools with high taxonomic resolution and AI-supported data integration can help closing gaps in data poor areas (ABNJs)
- Environmental data for ecosystem-based approaches support modelling indicators
- Ecosystem-based approaches and time-series strengthen development of marine indicators adaptive to future scenarios

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Questions for discussion

- Can routine deployment of low cost biodiversity monitoring tools on German research vessels be implemented?

- What are stakeholder needs for the use of biodiversity indicators in marine monitoring?
- Which priorities can help choosing suitable indicators for BBNJ criteria?
- Can functional diversity be more useful?

- How can we ensure that indicators remain valid in the long-term?
  - can data for adaptive indicators be provided?

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Science-policy interfaces and science communication

Insights from the BBO projects for the implementation of the BBNJ agreement

Jan-Claas Dajka, HIFMB
Torsten Grothmann, Carl von Ossietzky University of Oldenburg

on behalf of the BBO project cluster scientists

2021 2030 United Nations Decade of Ocean Science for Sustainable Development

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Biodiversity of the Blue Ocean

BBNJ Tasks for science: Research, science communication and science-policy interfaces

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Central role of science in BBNJ-Agreement

PART I GENERAL PROVISIONS

- Article 7 General principles and approaches
  - (i) The **use of the best available science** and scientific information
    ► **task for science communication**
  - (j) The **use of relevant traditional knowledge** of Indigenous Peoples and local communities
    ► **task for social sciences to provide valid methods for identifying/including traditional knowledge**

„Using the best available science and scientific information“ and „relevant traditional knowledge“ often mentioned regarding marine genetic resources (Part II), area-based management tools (Part III) and environmental impact assessments (Part IV)

- Article 8 International cooperation
  - 3. Parties shall promote **international cooperation in marine scientific research**
    ► **task for scientific research and cooperation**

But BBNJ neither requires nor facilitates direct investment in scientific research (Mendenhall & Helm 2024).

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Central role of science in BBNJ-Agreement

Central Science-Policy Interface in BBNJ: „Scientific and Technical Body“ (STB)

Tasks for STB regarding <u>area-based management tools</u> (BBNJ Part III)

„taking into account the precautionary approach and an ecosystem approach“ often mentioned as relevant

- Potentially further development of **criteria for the identification of areas for protection** (Art. 19, 5)
- Preliminary **review of proposal** (Art. 20)
- Final **assessment of proposal** and giving recommendations to the Conference of the Parties (Art. 21, 7)
- **Monitoring and review** of implemented area-based management tools (Art. 26, 3) and giving advice and recommendations to the Conference of the Parties regarding amendments of tools (Art. 26, 4)

Central role of science in BBNJ-Agreement

Tasks for STB regarding <u>environmental impact assessments</u> (BBNJ Part IV)

- Developing or updating **standards or guidelines** for the conduct of environmental impact assessments of activities in areas beyond national jurisdiction (Art. 29, 3)
- **Consideration and eventually evaluation of potential impacts** of the planned activity on the basis of the best available science and scientific information (Art. 31, 1a iv),
- **Creation of roster of experts** under the Scientific and Technical Body to give advice for screenings and environmental impact assessments (Art. 31, 3)

BBNJ tasks ► Structure of following presentation

- **Scientific research:** Research needs identified in BBO dialogue forum 1 and expert interviews
- **Science communication:** Effective communication formats
- **Science policy interfaces**: Recommendations from AGELESS literature review and experiences from INDIFUN-AI study

Scientific research:

Research needs

identified in BBO dialogue forum 1 and expert interviews
and in a survey of high seas researchers

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1. Biodiversity knowledge and data gaps (ABNJ)

- **Baseline data** in **ABNJ** remain **sparse**, especially for **deep-sea**, **sediments** and **plankton**; expeditions are expensive ► **research** agendas must be **prioritised** and **coordinated**
- **Long-term data** on ecosystem **responses** to combined **stressors** (warming, acidification) and on **connectivity** and dispersal are particularly **lacking**, yet **crucial** for designing **networks** of **ABMTs**

Researchers´ perspective (Jarvis & Young 2023: survey of high seas researchers)

- Prioritise mapping **patterns** of biodiversity (spatial, vertical, temporal), identifying **key biodiversity areas** & understanding **high seas ecosystem services**
- Emphasise major unknowns in **deep-sea** ecosystems, **connectivity**, **drivers** of species **distributions** & **resilience** to disturbance

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2. Use of existing data & models

- Existing **long-term datasets** from coastal and **national waters** could be **used more systematically** to **infer** likely patterns in **ABNJ**, rather than treating the high seas as entirely data-poor
- Need to **better exploit existing models** and comparative datasets to inform **climate-driven** species shifts, **connectivity** and **SLOSS**-type (single large vs several small) design questions

Researchers´ perspective (Jarvis & Young 2023)

- Call for new research on **climate impacts**, future **shifts**, **redistribution** of resources and **carbon cycling**, largely framed as **new questions needing dedicated studies**

3. Governance landscape and fragmentation

- The high seas are **not** a **“wild west”** but governed by a **fragmented patchwork** of **regimes** (fisheries, shipping, cables, seabed mining etc.); the **key gap** is **coherence**, not total absence of rules
- A major **expectation** for the **BBNJ** Agreement is to **enhance coherence across existing bodies** and **regimes**, but **how** this will work in practice is still **unclear**

Researchers´ perspective (Jarvis & Young 2023)

- Identify **fragmented governance** as a **core problem**

4. Implementation, institutions and compliance

- Biggest uncertainties: **How** institutional **structures** under BBNJ (e.g. Scientific and Technical Body, clearing-house, finance, secretariat) will be **set up** and **interact with existing organisations**
- **Compliance** and **enforcement** in ABNJ are recognised as **open** questions: There are **experiences** with **monitoring fleets** and **stocks** within **national jurisdiction**, but it is **unclear** whether similar **tools** and **incentives** will **suffice** far offshore, and how costly systems can be **sustainably financed**
- **Monitoring** and **compliance** are expected to **require adaptive approaches** that can be adjusted as experience is gained

Researchers´ perspective (Jarvis & Young 2023)

- Ask how to **design effective compliance/enforcement** mechanisms, how to **limit flag-state jurisdiction**, and what arrangements guarantee operationalisation of the ILBI

5. Area-based management tools (MPAs, ABMTs, corridors)

- More **site-based ecological knowledge** is **needed** for potential ABMT sites, especially in the deep sea, but this **should not be interpreted as a reason to postpone action**
- Strong interest in understanding **connectivity**, **dispersal** and how close protected areas need to be to function as a **network**; includes renewed relevance of **SLOSS** debates
- **Dynamic ABMTs** are seen as **conceptually possible** but largely **untested**; their added **value must be demonstrated** case by case, and **early proposals** are **expected** to focus on more **stable**, site-linked conservation features
- **Migratory corridors** and other **connectivity-oriented measures** are considered **promising** avenues, but scientific work is still **limited** and objectives would need to be clearly defined

Researchers´ perspective (Jarvis & Young 2023)

- Identifying **high-biodiversity areas for MPAs**, evaluating **MPA/ABMT effectiveness**, designing **high-seas MPA networks** that balance conservation and sustainable use,
- Determining **who governs** and **finances high-seas MPAs**

6. Indicators, monitoring and SDG linkages

- **Indicators** of **biodiversity status** and indicators of **management** processes are viewed as **complementary, not competing**; management priorities depend on underlying monitoring
- **Linking high-seas biodiversity indicators to SDGs** and human wellbeing is recognised as analytically **complex** and in **need of further work**, especially regarding deep-sea–coastal linkages (e.g. food production, climate regulation)

Researchers´ perspective (Jarvis & Young 2023)

- Indicators of **“good environmental status” for the high seas**
- Better observation and **monitoring** of **deep sea** and **ABNJ**
- Use of **big data**, **satellites**, **autonomous vehicles** and “**dark data**” (corporate data)
- **Capacity building** and **inclusive access** to data and technology

7. Political processes, timing and quality of science

- **Urgency to act** after decades of negotiation, but also a strong emphasis on **not compromising scientific quality and due process for the sake of speed**
- **Poorly founded** or **weakly reviewed science used in negotiations risks undermining credibility** and future influence; **robust evidence** and **transparent consultation** are seen as **essential**
- **Science is understood** and **used on a daily basis** for proposals within **EU** institutions; new research will generally be picked up, but **targeted communication** (sending results, summaries, policy briefs) **helpful**

Researchers´ perspective (Jarvis & Young 2023)

- Implicitly assume that **more and better research is key** to **supporting negotiations** and the Ocean Decade; **urgency is acknowledged**, but the main response is to **identify more questions across themes**

8. Stakeholder acceptance and participation

- **Acceptance** of **ABMTs** seen as **driven less by science itself** and **more** by how proposals and consultations are conducted: **inclusiveness**, genuine **listening**, and visible **adaptation to stakeholder input** are key
- Level of **human use** allowed **in MPAs** is therefore viewed primarily as a **socio-political design issue** grounded in science, **not as a purely scientific uncertainty**

Researchers´ perspective (Jarvis & Young 2023)

- Address **participation** mainly under “human rights and equity” and “science & innovation”:
- **Benefits, access and equity**, **human-rights abuses**, and **inclusion** of developing countries and marginalised groups
- Call for **more inclusive and diverse science** and **capacity building**

Gaps in BBNJ-Research from stakeholders´ perspective *Summarised & Ranked*

- Governance and Management Research Gaps (1st)
- Ambition and Use of the Precautionary Principle (2nd)
- Long-Term Data and Climate-Driven Trends (3rd)
- Indicators and Monitoring Approaches (3rd)
- Knowledge Gaps in Marine Biodiversity (ABNJ) (4th)
- Science-Policy Interface and Communication (4th)

HIFMB Helmholtz Institute for Functional Marine Biodiversity at the University OLDENBURG

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Science communication:

Effective formats
for supporting evidence-based BBNJ implementation

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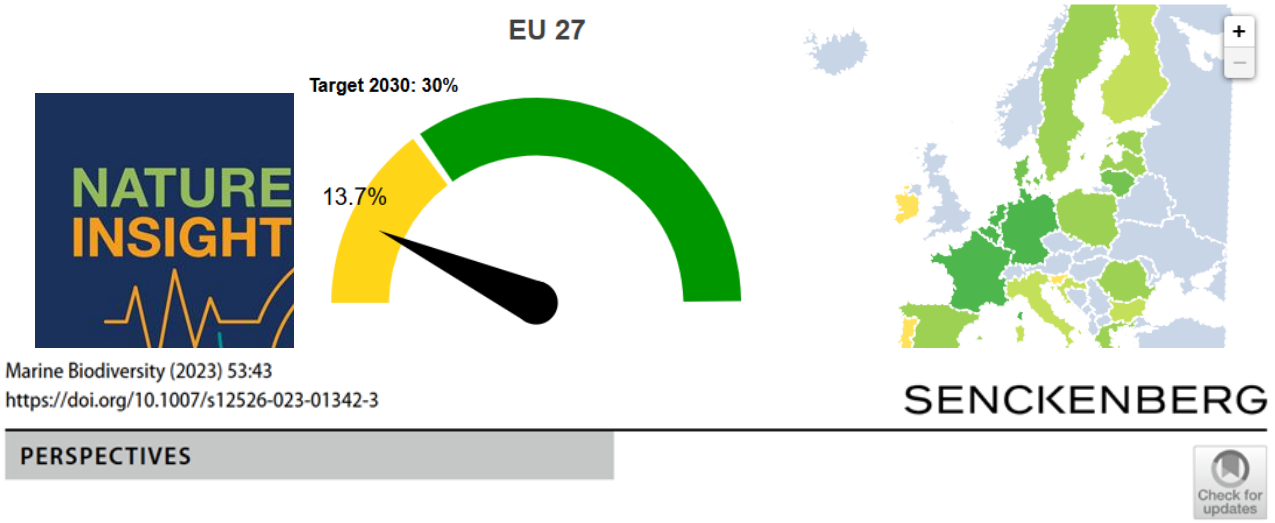
Preferred formats for science communication: Results from BBO dialogue forum 1

- From interviews and the previous dialogue forum, diverging stakeholder opinions on best communication formats
  - Policy briefs (max 2 pages)
  - Fact sheets (max 2 pages)
  - Executive summaries & associated reports



Preferred formats for science communication: Results from BBO dialogue forum 1

- From interviews and the previous dialogue forum, diverging stakeholder opinions on best communication formats
  - Policy briefs (max 2 pages)
  - Fact sheets (max 2 pages)
  - Executive summaries & associated reports
  - Infographics
  - Podcasts & video briefs
  - Interactive dashboards
  - Policy oriented scientific articles



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Preferred formats for science communication:



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Science-policy interfaces for BBNJ:

Recommendations from AGELESS literature review and **experiences** from INDIFUN-AI study

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Literature Review: Conditions for success of science-policy interfaces (SPI) on marine biodiversity

Only **few empirical studies on success and/or conditions for success of SPI on marine biodiversity** (e.g. Cvitanovic et al. 2021; Eck et al. 2024; Gardiner et al. 2024; Karcher et al. 2022, 2024).

Available empirical studies indicate following **general conditions for success of marine biodiversity SPI** (preliminary results):

- process of **knowledge exchange** between scientists and decision-makers must engender **mutual trust**, be **transparent** and **free from political influence**
- **individuals involved in the SPI** should be **diverse** (diverse knowledge systems: natural and social sciences, traditional knowledge), **skilled** (including communication / relationship skills), **committed/motivated,** and should include **skilled leaders/facilitators**
- the **SPI-organisation** should have a **positive and inclusive culture,** a **clear mission and strategy** but should also be **flexible and adaptable** to changing needs
- the SPI should have **long-term and flexible financial funding** as well as **political support**

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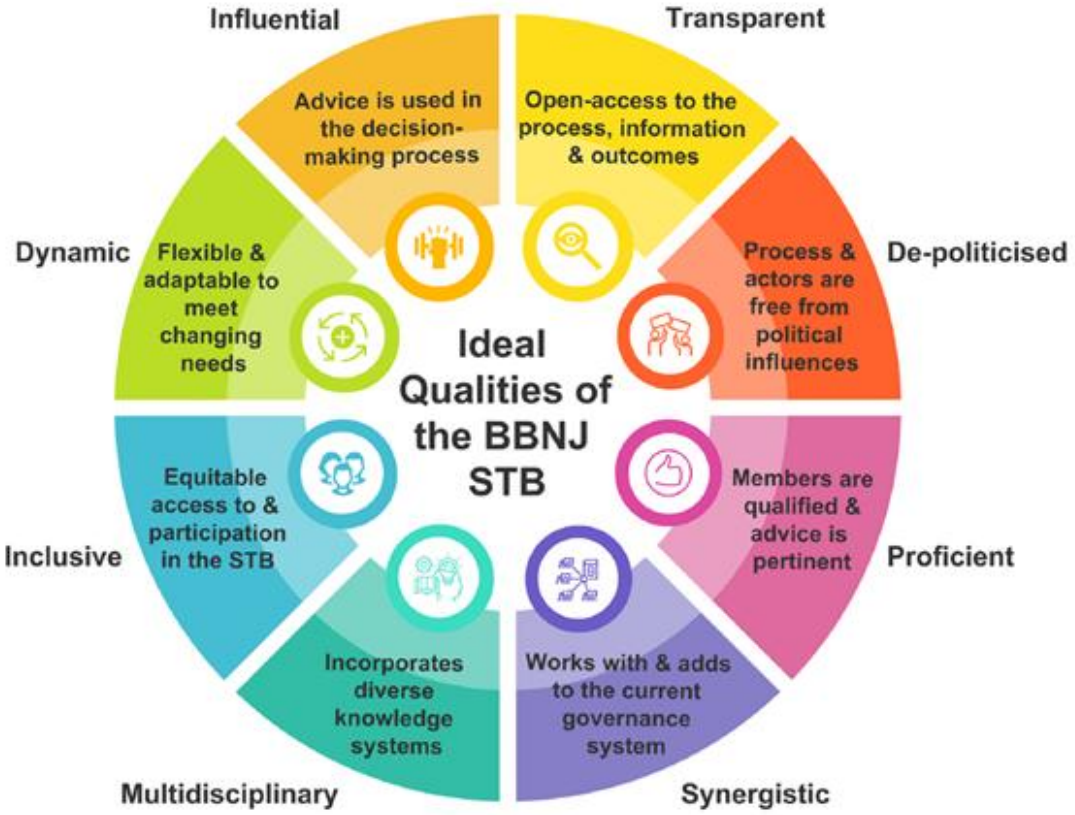
Literature Review: Conditions for success of science-policy interfaces (SPI) on marine biodiversity

- **General conditions for success of marine biodiversity SPI** identified from available empirical studies
  similar to general recommendations for BBNJ SPI developed by Gaebel et al. (2024), who identified 8 desirable characteristics for „Scientific and Technical Body“ (STB) of BBNJ based on 40 interviewed BBNJ stakeholders



Literature Review: Conditions for success of science-policy interfaces (SPI) on marine biodiversity

Specific recommendations for BBNJ SPI
(cf. Gaebel et al. 2020)

- **Apply**
  - **precautionary approaches** when data are insufficient (necessary due to climate change and significant data gaps in ABNJ)
  - **ecosystem-based approaches**

Required in BBNJ Part III

Publications on marine biodiversity SPI:

► Very few publications on how to make decisions under uncertainty on marine biodiversity protection

► CCAMLR as “best practice example”, many publications with recommen-dations for specific methods such as Ecosystem-Based Management

Consistent with identified research need in BBO DF1

- **Overcome disagreements,** e.g. on possibility of biodiversity protection in current sectoral governance structure (‘duty to not undermine’) and on ‘conservation’ or ‘sustainable use’ of ABNJ

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INDIFUN-AI

Study on science-stakeholder interactions

- **Background: Shift toward participatory science communication**
- **Questions:** What aspects consider actors **important, urgent, legitimate**?
  What counts as **valid** knowledge / who as **legitimate** knowledge holder?
  How do **values and epistemological beliefs** shift through interaction?
- **Empirical entry point: The PlanktoScope,**
  a low-cost plankton imaging system, analyzed as a potential site for social learning
- **Methods:**
  - surveys
  - semi-structured interviews with stakeholders
  - focus groups
  - thematic analysis and depth-hermeneutic analysis



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Study on science-stakeholder interactions

Preliminary insights

- Interviewees describe **inter- and transdisciplinary collaboration** as **challenging due to differences in disciplinary backgrounds, values and epistemological beliefs**; trust emerges over time, often in the context of social learning.
- **Participatory formats** reveal **tensions between democratic aspirations and persistent hierarchies**, alongside resource constraints (especially highlighted by researchers).
- **Tools and technologies** (such as the PlanktoScope) can act as **sites of social learning** in participatory settings, with social learning particularly occuring where values and epistemic tensions are made visible and negotiable (cf. Reed et al., 2010).
- **Low-cost monitoring** may support more **inclusive participation and distributed knowledge production**, particularly in data-poor regions. Its broader implementation depends on structural and financial support, as well as greater awareness. (► previous presentation on indicators)

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Take Home Messages

- **Further research needed** for BBNJ but precautionary action is needed due to risk of serious or irreversible harm to marine biological diversity; identified research priorities:
  - Governance and Management Research Gaps (1st)
  - Ambition and Use of the Precautionary Principle (2nd)
- **Science communication** for BBNJ should
  - make use of various established science communication formats and
  - be tailor-made for different target / user groups (nationally and internationally)
- **Science-policy interfaces** for BBNJ should
  - build on existing knowledge / studies regarding
    - conditions for success of marine biodiversity SPI and
    - ecosystem-based approaches (CCAMLR as “best practice example”) and precautionary approaches (but further research needed)
  - overcome disagreements (e.g. on possibility of biodiversity protection in current sectoral governance structure and on ‘conservation’ or ‘sustainable use’ of ABNJ)

Questions for discussion

- Further tasks for **scientific research** for supporting BBNJ?
  - Further research on how to make decisions under uncertainty / apply precautionary principle?
- Ideas for **science communication** for supporting BBNJ?
  - How to communicate results to / include researchers from Global South?
- Ideas for **international and national science-policy interfaces** for supporting BBNJ?
  - Do we need a national scientific advisory committee for BBNJ?
  - How to address and overcome disagreements in SPI? How to represent and include different opinions in BBNJ SPI?