DOSI
DEEP-OCEAN STEWARDSHIP INITIATIVE

POLICY BRIEF
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Monetary and non-monetary value of Marine Genetic Resources and Digital Sequence Information under the BBNJ Agreement

Key messages

- Marine Genetic Resources (MGR) and associated Digital Sequence Information (DSI) offer potential monetary and non-monetary benefits, spanning diverse sectors such as pharmaceuticals, nutraceuticals, and agriculture, as well as contributing to broader scientific advancements and informing broader conservation needs.
- Studies on the value of MGR and associated DSI analyse their economic potential while emphasising non-monetary benefits like capacity building and knowledge sharing.
- The BBNJ Agreement establishes a framework for equitable benefit-sharing from MGR and associated DSI, aiming to distribute both monetary and non-monetary benefits. This framework allows for linking benefit-sharing to the research pipeline, from collection to commercialisation.
- Effective implementation of the benefit-sharing framework under the BBNJ Agreement requires proactive engagement, inclusivity, encourages use of Findable, Accessible, Interoperable & Reliable (FAIR) data, and cross-sector collaboration.
- Key actors necessary to the continued development and assessment of the value of MGRs and their obligations under the BBNJ Agreement include researchers, industry, Indigenous Peoples and local communities.

Current uses and values of MGR

The BBNJ Agreement mandates fair and equitable sharing of benefits from MGR (and DSI on MGR) (Article 14), covering both monetary (e.g., milestones, tiered fees) and non-monetary benefits (e.g., data and specimen access and knowledge exchange, training). Implementation of this mandate is to be supported by the Access and Benefit-sharing Committee (Article 15).

Understanding the diverse values and uses of MGR in Areas Beyond National Jurisdiction (ABNJ) is essential for shaping effective benefit-sharing mechanisms.

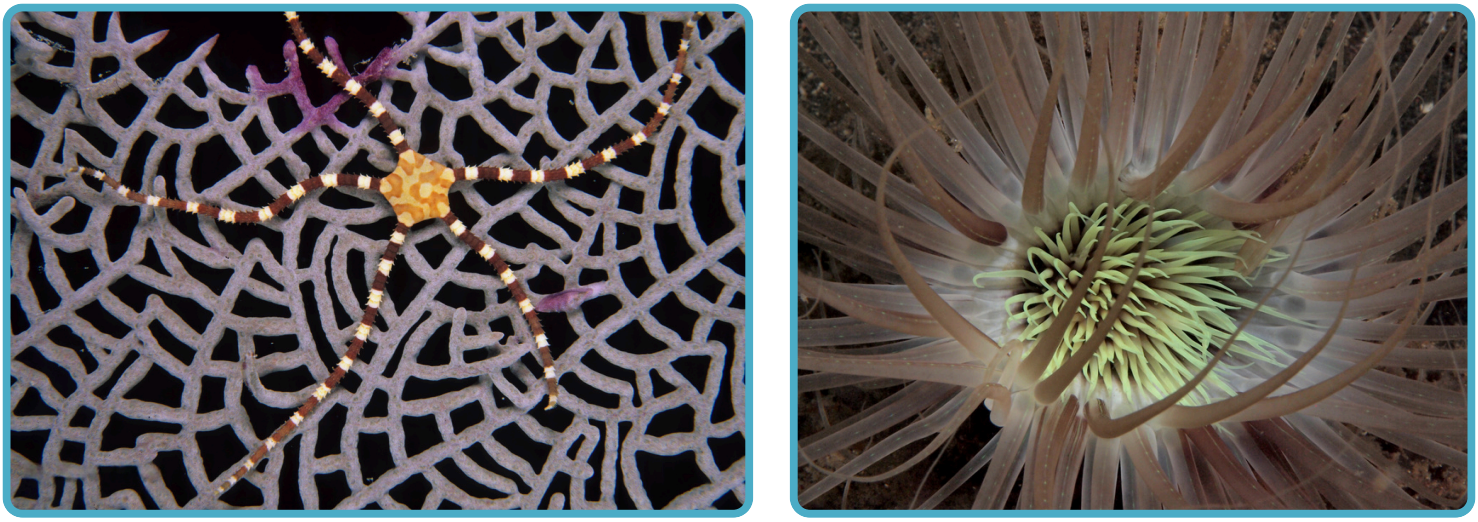
MGRs and associated DSI contribute to science and industry through:

- Discovery of novel products (e.g., compounds) and processes (e.g., enzymes) contributes to various industries (e.g., pharmaceutical, nutraceutical, agricultural, biotechnological).
- Advancement of global research networks (e.g., the production and use of open-access DSI).
- Contribution of biodiversity data, ecosystem understanding and taxonomic knowledge.
- Informing conservation and monitoring of human impact and providing baselines to understand ocean biodiversity and evolution, and their implications for ecosystem functioning and change. This subsequently increases the potential for commercial applications, as greater understanding promotes targeted biodiscovery.

Table 1 presents a selection of studies that demonstrate the diverse monetary and non-monetary values of Marine Genetic Resources (MGR) in ABNJ, informing benefit-sharing under the BBNJ Agreement.

Challenges

- Difficulty in quantifying monetary value due to long research and development timelines, market uncertainties, fiscal barriers (e.g., variability by product type), and limited availability of data on private sector activities and product development.
- Despite how critical they are, particularly for developing states, non-monetary benefits are regularly undervalued and inconsistently assessed and implemented.
- Limited awareness among stakeholders about the full scope of benefits under the BBNJ Agreement.
- The referenced studies of **Table 1** underscore the dual nature of MGR value, with monetary gains tied to markets and non-monetary gains supporting global equity, as well as the advancement of marine scientific research and biodiversity conservation measures.
- Fragmented approaches to benefit-sharing exist between international frameworks such as BBNJ and the Convention on Biological Diversity (CBD) and across their mechanisms, including formal treaty bodies (COPs) and voluntary initiatives like the Cali Fund, particularly in relation to DSI of MGR.
- Extensive research and discussions are taking place across various fora, including science, policy, and NGO communities. However, a gap remains between the discussion points and practical implementation, risking that valuable insights fail to translate into effective action.



Examples of marine organisms that may hold MGR value. Left: Brittle star. Right: Anemone. Image credit: Jason Croop, Marine Environmental Consultant and Photographer

Table 1: Summary of key studies supporting valuation of Marine Genetic Resources (MGR) in Areas Beyond National Jurisdiction (ABNJ).

KEY FINDINGS	IMPLICATIONS FOR BBNJ
A review of MGR valuations Analysis of MGR valuations in literature, using the IPBES Values Assessment framework to categorize and understand the different approaches to valuing these resources, and subsequent gaps and challenges in how MGR value is currently assessed.	
1. MGR valuations are overwhelmingly dominated by a narrow, market-driven approach, focusing on the economic and monetary benefits of marine drug discovery. 2. There is significant underrepresentation of non-monetary, sociocultural, and ecological values. 3. Lack of transparency and a clear methodology for attributing value.	1. Underscores need for a more holistic and equitable framework for valuing MGRs and sharing derived benefits. 2. Current narrow focus on monetary value does not align with the overarching goals of the Agreement text to ensure fair and equitable benefit-sharing from the utilization of MGR from areas beyond national jurisdiction.
Study on 'MGR' market value and state of the art of commercialisation of related products in the context of the BBNJ negotiations A comprehensive analysis of the market value and commercialization potential of MGRs from ABNJ. Maps marine scientific research and patenting activities related to ABNJ organisms, assessing their commercial value, and proposing modalities for monetary benefit-sharing.	
1. Identifies a growing trend in patent activities related to marine organisms, with stronger presence in developed countries. However, definitive evidence for ABNJ-derived research and products remains low in patent references. 2. Challenge in definitively attributing commercial products to MGR from ABNJ due to lack of origin information in documentation and the repeated discovery of similar compounds from different environments and organisms. 3. The study identified nine organisms linked to 74 products that could have come from ABNJ, with a total estimated annual revenue between $400 and $650 million. However, only one of these products can be attributed to an MGR from ABNJ with 100% certainty. 4. Both coupled (e.g., royalties) and decoupled (e.g., flat fees) monetary benefit-sharing models have significant challenges. Coupled models face issues with tracking and unpredictable revenue, while decoupled models may not capture the full value from high-profit activities and require careful calibration to avoid hampering R&D.	1. The study supports future negotiations on potential benefit-sharing modalities under the agreement by providing a comprehensive overview of the actual and potential value of MGR from ABNJ. 2. Analyzes various monetary benefit-sharing mechanisms (coupled and decoupled) and their subsequent technical and legal requirements for implementation. 3. Develops a methodology to support defining what potentially originates from ABNJ. The BBNJ Standardised Batch Identifier will be a critical tool for more definitively identifying what comes from ABNJ. 4. Identifies challenges, (i.e., certainty of ABNJ origin and financial reporting schemes) making reliable data to leverage for future benefit-sharing schemes difficult. 5. A hybrid monetary benefit-sharing model should be considered. Since no single option is without shortcomings, combining a coupled mechanism with a decoupled one could balance the potential for returns with the need for a stable and predictable revenue stream.

Conducting marine genetic research for whom? Mapping knowledge flows from science to patents

This study maps the flow of scientific knowledge from MGR research to patents, identifying the countries that provide the research and those that benefit from resulting patents. It highlights potential global inequalities in intellectual property rights related to MGR.

1. Molecular biological studies attracted the most patenting interest.
2. Some countries (i.e., US) benefit significantly more from available research than it provides.
3. Science from least developed states sees limited uptake in patents, indicating a concentration of intellectual property in developed states.

1. Inform upon the equitable distribution of economic, socio-cultural, and ecological benefits from MGR.
2. Underscores the need for mechanisms to address existing inequities in capacity building and benefit-sharing.

Growing prominence of deep-sea life in marine bioprospecting

Introduces a comprehensive database of marine genes referenced in patent filings to map and analyze the commercial use of MGR and their sources, particularly focusing on the growing prominence of deep-sea life in marine bioprospecting.

1. The database includes over 92,000 protein-coding sequences associated with nearly 4,800 patent filings.
2. Reveals that microbial life in the deep sea, largely ABNJ-derived, is attracting substantial economic interest, with top patent holders referencing deep-sea sequences.
3. Highlights that only a small percentage of all sequences and species in patents are marine-derived, indicating significant untapped potential.

1. There is a need for policymakers to ensure the stewardship of deep-sea ecosystems and to establish effective benefit-sharing mechanisms for MGR from ABNJ.
2. Suggests that monetary benefit-sharing schemes from MGR utilization should include a feedback loop into conservation projects aimed at protecting at-risk deep-sea habitats.

Global distribution of deep-sea natural products shows environmental and phylogenetic undersampling and potential for biodiscovery (*in review*)

This study provides the first global analysis of compounds from deep-sea organisms as potential resources for medicinal chemistry and drug discovery. The database of ~3,000 deep-sea Marine Natural Products (MNPs) was analysed to assess data gaps and evaluate possible relationships between phylogeny, environmental conditions, structural chemistry, and bioactivity.

1. This study shows the potential of the largely unexplored deep-sea to provide unique chemistry that could generate substantial pharmaceutical benefits in the future, thus the value of protecting deep-sea biodiversity from human impacts.
2. Microorganisms dominate the phylogenetic distribution of deep-sea MNP sources (76%). The most highly reported bioactive properties in the deep sea were antibacterial and cytotoxic and polyketides are the most prevalent recorded structure.
3. Phylogeographic analysis of deep-sea bioactivity to aid targeted biodiscovery is not yet possible due to data scarcity.

1. The Clearing House Mechanism (CHM) should encourage systematic sampling and consistent data reporting, including genetic analyses and reporting the absence of evidence (e.g., negative bioactive results) to better understand potential phylogeographic relationships, which could guide future targeted biodiscovery efforts in Earth's largest biome.
2. There is a need for high-seas bioactivity records to follow FAIR principles to provide opportunities for interdisciplinary analyses and the future design of targeted biodiscovery approaches by any nation.

Recommendations for Policymakers

Short-term goals:

- **Integrate Benefit-Sharing into the Clearing House Mechanism (CHM) from the start:** The CHM is projected to play a centralised role in facilitating collaboration, knowledge sharing, and practical implementation. As conversations evolve throughout the development process, it is critical to ensure the design of the CHM is capable of accounting for both monetary and non-monetary outcomes as it evolves. This includes:
  - Encouraging linking/referencing of existing data sources (e.g., patent registries, physical repositories, DSI databases) to the extent possible, allowing discretion. This can be strengthened as the implementation of the Standard Batch Identifier (SBI) develops. Particular attention should be given to patent registries, which often represent a critical breakpoint in transparency across the research-to-commercialisation pipeline.
  - Supporting adherence to FAIR principles and internationally recognised metadata standards for all data submissions linked to and within the CHM, to maximise data accessibility, interoperability, and long-term reusability.

  These steps will strengthen the CHM's role as the central tool for coordination and practical implementation of the agreement text across governance levels.
- **Provide guidance and tools to stakeholders:** Develop and disseminate practical guidance from all stakeholder groups on the value of MGRs and their obligations under the BBNJ Agreement.
- **Prioritise novel modalities and/or enhancement of non-monetary benefit sharing:** Parties should prioritise further exploration of non-monetary benefits like tangible skills training (i.e., capacity building workshops on MGR research and access and benefit-sharing concepts). Article 14 mandates technology transfer for developing countries and outlines non-monetary benefits such as research involvement, data sharing, and capacity building. Additional benefits may include access to samples, DSI, and opportunities for collaboration.

Long-term goals:

- **Enhance Valuation Frameworks:** Continue to develop methods to assess both monetary and non-monetary benefits, building on insights from the studies seen in **Table 1**, in partnership with scientists, national authorities, industry and other relevant actors.
- **Create synergies between UN bodies:** Establish a formal process led by respective Secretariats to align efforts across UN bodies and effectively translate the BBNJ conversations into practice.

Examples of deep-sea organisms, including sponges and corals, that may hold MGR value. Image credit: NOAA Office of Ocean Exploration and Research, 2017 Laulima O Ka Moana.

Recommendations for MGR users

Short-term goals:

- **Proactive Transparency and Compliance:** Encourage early documentation and reporting of benefit-sharing outcomes, including non-monetary contributions, to build impact metrics. Aligning with funder reporting requirements and corporate Environmental, Social and Governance frameworks, such as the Taskforce on Nature-related Financial Disclosures, can enhance credibility and support access to future funding.
- **Industry Engagement:** Industry actors are encouraged to contribute knowledge and data to the development of MGR valuation frameworks. This ensures that benefit-sharing mechanisms are grounded in real-world practices, reliable data, and support equitable implementation under the BBNJ Agreement. Industry has been a key driver of global bioinformatics capacity. Collaboration with academic, public, and community partners is also essential in co-developing capacity-building initiatives, including joint training, infrastructure support, knowledge exchange, and regional research participation.
- **Academic Contribution to Non-Monetary Benefit Sharing:** Academic institutions can leverage their expertise to play a leading role in advancing non-monetary benefit-sharing by enhancing access to knowledge, samples, and collaborative research. Through initiatives such as training programs and data-sharing partnerships, they can ensure robust, relevant metrics that support inclusive scientific networks and capacity building.

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About DOSI

The Deep-Ocean Stewardship Initiative is a global network of experts that integrate science, technology, policy, law and economics to advise on ecosystem-based management of resource use in the deep ocean and strategies to maintain the integrity of deep-ocean ecosystems within and beyond national jurisdiction.

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https://www.dosi-project.org/wp-content/uploads/Value-of-MGR-Policy-Brief.pdf

Further reading

Broggiato et al. (2024) Monetary and non-monetary benefit sharing under the BBNJ Agreement

Harris et al. (2025) Global distribution of deep-sea natural products shows environmental and phylogenetic undersampling and potential for biodiscovery

Laird et al. (2008) Queensland Biodiscovery Collaboration: The Griffith University AstraZeneca Partnership for Natural Product Discovery An Access & Benefit Sharing Case Study

Nunez-Vega et al. (2025) A new indicator for the Kunming–Montreal Global Biodiversity Framework: Capturing non-monetary benefit data from access and benefit-sharing agreements

Rabone et al. (2025) BBNJ Agreement: Considerations for Scientists and Commercial End Users of MGR at Research, Development and Commercialization Stages

UN (2023) Agreement under the United Nations Convention on the Law of the Sea on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction

Vince et al. (2025) Breaking Through Biology's Data Wall: Expanding the Known Tree of Life by Over 10x using a Global Biodiscovery Pipeline