AUGUST 2022

InterGovernmental Conference on Marine Biodiversity of Areas Beyond National Jurisdiction (5th Session) (BBNJ IGC-5)

MARINE GENETIC RESOURCES OF AREAS BEYOND NATIONAL JURISDICTION

Perspectives on Research, Data Management, and International Scientific Collaboration

Fondation tara océan explore and share

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This document is an information paper on an international legally binding instrument 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 (ABNJ).

This information paper is an output of the workshop organized in early June 2022 in Paris by the Tara Ocean Foundation and the Girguis Lab at Harvard University, with support from the French Facility for Global Environment (FFEM).

Leading scientists (i.e., University of Harvard, European Bioinformatics Institute (EBI) / European Molecular Biology Laboratory (EMBL), Ecole Normale Supérieure (ENS), CEA/Genoscope and University of São Carlos), experts on traditional knowledge, and select representatives from various regional groups involved in the Biodiversity Beyond National Jurisdiction (BBNJ) Treaty negotiation participated in the workshop. The workshop focused on the topic of marine genetic resources (MGRs), including the questions on benefit sharing, based on the further revised draft text issued by the President of the Intergovernmental Conference (IGC).

The opinions herein are presented for consideration by the delegates and reflect the authors' perspectives on how the Treaty may be implemented to ensure efficient, fair, and equitable sharing of benefits associated with marine genetic resources of areas beyond national jurisdiction while minimizing unintended effects such as the impediment of scientific exploration, discovery, and collaboration.

The co-authors (listed at the end of this paper) hope that the knowledge gained from the workshop will further the work of the fifth session of the InterGovernmental Conference and look forward to engaging in dialogue.

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Recommendations on the Draft Text

The contributions below are on select sections of the Draft Text concerning matters that were the focus of discussions at the workshop. The relevant sections of the text are reproduced in orange, comments are in blue, and suggested text is in blue italics below.
Please note that not all the paragraphs/subparagraphs from the Draft Text are included.

Part I - USE OF TERMS

11. Option B: "Marine genetic resources" means any material of marine plant, animal, microbial or other origin containing functional units of heredity of actual or potential value.

The definition in Option B focuses on the physical materials of marine genetic resources (MGRs). Combining physical materials and data/information in one definition (i.e., Option A) would severely complicate the text, which could lead to unintended noncompliance. Further, the definition in Option B is complementary to the understanding of genetic resources in the Convention on Biological Diversity (CBD). Therefore, Option B is preferable. Focusing on physical materials in the definition of MGRs does not necessarily exclude digital sequence data to be part of the benefit sharing scheme. See the section below regarding Article 11.2 and Article 13 Option I for further discussion on sharing data via publication.

19. Option B: "Utilization of marine genetic resources" means to conduct research and development on the genetic and/or biochemical composition of marine genetic resources, including through the application of biotechnology.

Option B is preferable because it is complementary to the understanding of utilization of genetic resources in the Convention on Biological Diversity (CBD). See the section below regarding **Articles 11.2** and **Article 13 Option I** for further discussion on the definition of "utilization of marine genetic resources."

PART II - MARINE GENETIC RESOURCES, INCLUDING QUESTIONS ON THE SHARING OF BENEFITS

Article 10 - Collection in situ of marine genetic resources of areas beyond national jurisdiction

10.2 Collection in situ of marine genetic resources within the scope of this Part shall be subject to self-declaratory notification to the clearing-house mechanism.

Scientists welcome a simple online notification procedure, which we believe is the desire of the Member States. For that reason, before "self-declaratory," the text could include "a simple" to emphasize that the notification is to be simple. The use of the clearinghouse mechanism, which

allows the notifications to be made freely available to all, can provide transparency and promote scientific collaboration around regions/topics.

10.3 - Parties shall ensure that the following information is transmitted to the clearinghouse mechanism at least six months prior to the collection in situ of marine genetic resources of areas beyond national jurisdiction:
(b) The resources to be collected, if known, and the purposes for which the resources will be collected;

The phrase, "if known," is a critical element of this text for the following reason: research on planktonic ecosystems, ocean microbiomes, and even marine animals cannot define precisely what organisms will be collected before the first analyses of the samples. It is not possible to know in advance which organisms/communities will be studied/collected (such as for metagenomics methods).

10.3 (c) The geographical areas in which the collection is to be undertaken;

Before a cruise, a research vessel can inform a region where it intends to sample, but the precise position with GPS coordinates is informed at the moment of the collection. In addition to the lack of precise knowledge in advance, there are some cases where the research vessels will purposefully follow a particular water body, hydrology/weather event, migrating community, etc., with course not set in advance. Therefore, the text could state "general geographical areas." The specific collection areas can be disclosed in the post-collection notification.

10.3(g) Indication of opportunities, for scientists of all States, in particular for Scientists from developing countries to be involved/associated in the project;

Scientists welcome opportunities for collaboration and this text provides a way to communicate opportunities in an easy-to-use, and publicly accessible platform.

10.3 (h) The extent to which it is considered that States that may need and request technical assistance, in particular developing countries, should be able to participate or to be represented in the project.

Scientists welcome opportunities for collaboration, and the above text provides a way to communicate opportunities in a an easy-to-use, and publicly accessible platform. That said, this subparagraph could be clarified to state:

Indication of opportunities for States that may need and request technical assistance, in particular developing countries, to be involved/associated in the project.

10.4 - Parties shall ensure that the following information is transmitted to the clearinghouse mechanism as soon as it becomes available but no later than six months from the collection in situ of marine genetic resources of areas beyond national jurisdiction:

For the post-collection notification, 1 year is far more reasonable than 6 months, as it takes ample time to curate any research results. This is also consistent with best practices among many national research agencies.

10.4 (a) The repository or database where environmental meta-data, taxonomic information and digital sequence information related to marine genetic resources, where available, are or will be deposited;

Digital sequence information (DSI) is used in this subparagraph and other parts of the text. There is an active discussion about the scope of what constitutes DSI at the Convention on Biological Diversity. Deleting DSI from the text will allow scientists to understand the scope of the requirements associated with data, while avoiding inconsistencies in the definition of DSI in multilateral environmental agreements. To avoid unintended noncompliance, it is preferable to delete the term DSI throughout the text, including in this subparagraph.

10.4 (c) The results of the project, including a report detailing the geographical area from which marine genetic resources were collected, including information on the latitude, longitude, and depth of collection, and, to the extent available, the findings of the activity undertaken.

In most cases, scientists are unable to present "results" or "findings" after 6 months or 1 year because the analyses typically take much longer to complete (e.g., several years or more). The lead-time for producing the results of the project is particularly lengthy for microbiologists, as opposed to other researchers who collect animals. For example, one milliliter (or approximately a teaspoon) may contain millions of microorganisms, many of which we know little about. Moreover, nearly every animal in the ocean has its own microbiome, which means that each animal collected is itself an assemblage of organisms. Many completely new species, both microbes and animals, are discovered during many collection activities in ABNJ, and these new species take years to describe. Finally, the very concept of species (established by Carl Linneaus in the 18th century) does not easily translate to microorganisms, and our understanding of marine microbial diversity is still in its infancy (Murray et. al. 2020). Such aspects create significant difficulties for microbiologists to identify and catalog microorganisms in the same manner as animals.

Therefore, it is reasonable to ask for progress updates (e.g., a precise geographical area, the fate of samples collected, etc.). Scientists may be able to declare precise geographical areas, the fate of samples collected, and further identifiers for samples/data records, but it is broadly acknowledged that results will likely be limited at this point. For the above reasons, the text could include the following:

"If results of the project are not available 1-year post-collection, provide a brief progress report annually thereafter until the results of the project are available: both reports are to be submitted to the clearing house mechanism."

10.6 - Parties shall take the necessary legislative, administrative or policy measures, as appropriate, to ensure that activities with respect to marine genetic resources of areas beyond national jurisdiction that may result in the utilization of marine genetic resources found in areas both within and beyond national jurisdiction are subject to the prior notification and consultation of the coastal States and any other relevant Parties concerned with a view to avoiding infringement of the rights and legitimate interests of those Parties.

While Article 10 is intended to be a self-declaratory notification system (i.e., not a permit system), this sub-article would turn the system into an ad-hoc permitting system that could be controlled by the coastal States and/or "other relevant Parties." It is unclear from the text how the researcher would identify the coastal States and any other relevant Parties that would have "rights and legitimate interests" that could pose unanticipated delays or become a reason for research projects in ABNJ not to go forward. Further, there could be disputes associated with various claims of "rights and legitimate interests" that could pose unanticipated delays or become a reason for research projects in ABNJ not to go forward.

Article 10bis - Access to traditional knowledge of indigenous peoples and local communities associated with marine genetic resources of areas beyond national jurisdiction

Parties shall take legislative, administrative or policy measures, as appropriate, with the aim of ensuring that traditional knowledge associated with marine genetic resources of areas beyond national jurisdiction that is held by indigenous peoples and local communities shall only be accessed with the free, prior and informed consent or approval and involvement of these indigenous peoples and local communities. Access to such traditional knowledge may be facilitated by the clearinghouse mechanism. Access to and utilization of such traditional knowledge shall be on mutually agreed terms.

Scientists welcome the opportunity to collaborate while respecting the rights of the indigenous peoples and local communities. For that reason, it would be helpful for such connections to be facilitated via the clearing house or any other way(s) the interested indigenous peoples and local communities request.

Article 11

OPTION II - Fair and equitable sharing of benefits

6. Access to the original samples, data and information in the databases, biorepositories, gene banks or other collections described in paragraph 4 may be subject to reasonable conditions, including but not limited to those related to:
(a) The need to preserve the physical integrity of original samples;
(b) The reasonable costs associated with maintaining the relevant database, biorepository or gene bank in which the sample, data or information is held;
(c) The reasonable costs associated with providing access to the sample, data or information.

The consideration for "reasonable conditions" associated with samples, data, and information in the above text is of utmost importance, not only for the scientists but also for those who maintain the databases, biorepositories, gene banks, or other collections that would need to comply with the requirements.
The "reasonable conditions" considerations are especially important for developing country scientists, where resources are scarce. As such, the phrase "may be subject to" could be replaced by "shall be subject to" to ensure scientific research and development are not impeded.

Regarding tracing of data and notification of commercialization

ARTICLE 11 - OPTION II - Fair and equitable sharing of benefits

4. Where marine genetic resources of areas beyond national jurisdiction are subject to utilization by natural or juridical persons under the jurisdiction of a Party, that Party shall ensure that:
(a) The following information is provided to the clearing-house mechanism:
(i) An indication of where the results of the utilization can be found, including any digital sequence information;
(ii) Where available, details of the post-collection notification to the clearinghouse mechanism related to the marine genetic resources that were the subject of utilization;
(iii) An indication of where the original sample that was the subject of utilization, if available, is held;
(iv) An indication of the modalities foreseen for accessing the samples or results of the utilization referred to in subparagraphs (i) and (iii).

Article 13

OPTION I – Monitoring and transparency

3. Parties shall take the necessary legislative, administrative or policy measures, as appropriate, to ensure that:
(a) An identifier is assigned to marine genetic resources collected in situ or accessed ex situ, including as digital sequence information;
(b) Databases, repositories and gene banks under their jurisdiction are required to notify the open and self-declaratory notification system within the clearing-house mechanism when marine genetic resources of areas beyond national jurisdiction, including derivatives, are accessed;

Comments below address the above combined select sections of **Article 11 Option II** and **Article 13 Option I.** In summary, many scientists need to provide disclosure of origin for publication, their institutions, and/or funders. The proposal to "monitor" each access to data in **Article 11 Option II** and **Article 13 Option I** will not only create a significant burden on the administration of databases but also, on the users, including students.

If the goal of the Member States is to further scientific research without significant resource burdens to various stakeholders, two approaches may be preferable, which would include opportunities to seek monetary benefits from those who profit from products/services that utilized MGRs of ABNJ:

1. notification at the time of publication in International Nucleotide Sequence Database Collaboration (INSDC) databases, and

2. notification at the time of commercialization (**Art. 11, Option II, 5(b)).**

The INSDC databases are the only databases that are publicly available and usable for the sharing of sequence data that are generated from MGRs of ABNJ. INSDC does not track usage at the level of individual users. Such tracking would require the registration of all users (including, for example, high school students who might be using the data for a school report). It would also require an additional login for each use, which would require an implementation of an authentication system for all users. INSDC is against such an approach in principle because any requirement to log in (which is needed to document access) will increase friction to data access.

Further, while many users access INSDC databases directly, logging in for these individual users would be an inconvenience and for some, an unacceptable loss of anonymity; however, usage is often through machine access. In other words, many users work with software that accesses various databases and retrieves a data set for further processing or analysis. In this case, authentication is highly impractical: the work required to engineer, operate, and support a user authentication system and for all the dependent users (here largely the direct machine access users) to adapt to the authentication system would be costly far beyond what federal or philanthropic agencies could afford.
Such costs would be particularly problematic given that the ABNJ data currently only make up no more than 3% of the total sequences (which is a high estimate) but that all users of INSDC would need to switch to an authenticated access, which would be a highly disproportionate change. Therefore, it is difficult to imagine a good scientific reason for the insurmountable amount of data that will be generated. Another point to consider are the resources (i.e., IT and personnel) that would be required for the Clearinghouse Mechanism to administer the generated data.

A more efficient and effective proposal would be to place the notification requirement at the time of publication. By the time a researcher publishes, the nature of the usage of the cited data is better defined; at the point of access from an INSDC database, this may not have been deeply planned or even known. A citation of a sequence record in a publication also reflects a more significant usage of a sequence record; the citing authors must actively cite, and this indicates more than a passing inspection, which aligns with the definition of "utilization of marine genetic resources" **(Article 1.19, Option B).**
Finally, implementing such a system would not require active notification; the clearinghouse mechanism could simply mine citations from the literature. Methods and tools exist to carry out this task, and providing these as services for the Clearinghouse Mechanism would be a comparatively minor addition. This automated approach would alleviate the need for monitoring, as proposed in **Article 13, Option I.**

INSDC databases could further support benefit sharing with the following actions:

- A policy change (expected implementation by the end of 2022) on the mandatory requirement for spatio-temporal data with new sequence data submissions; this new policy will support better identification of sequences from ABNJ; see https://www.insdc.org/spatio-temporal-annotation-policy-18-11-2021

- build "contextual data services" to provide marine region mark-up on high seas and coastal records to aid management and classification

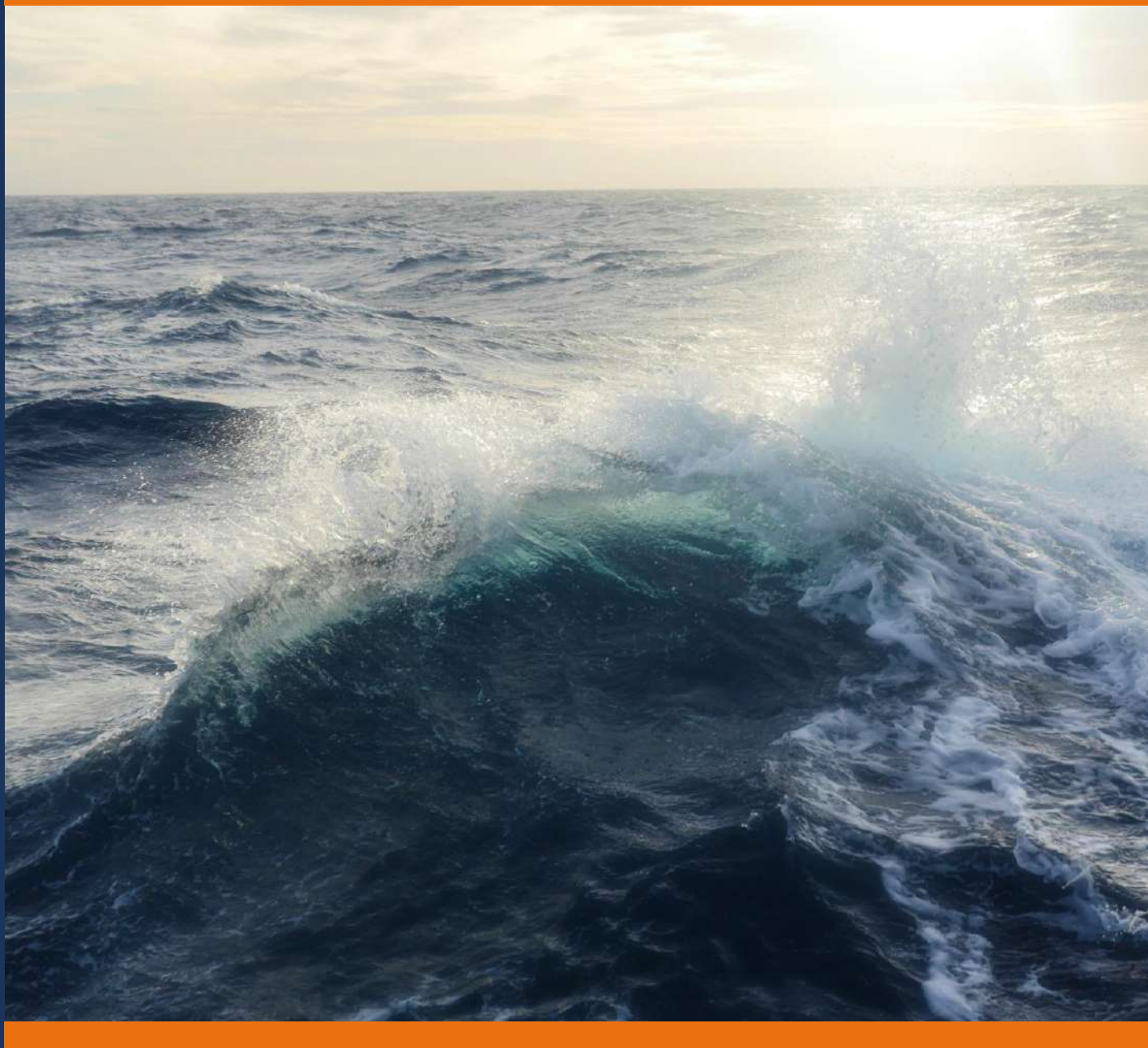
- build further services to support reporting on citations of data (based on the literature mining) to provide a view of the "reach" of a sequence from a given marine region, for example

Any new services on the literature database or INSDC would require development and come with some operational costs. These are expected to be low, but there is no immediately available source of finances for the new functions; if these services were useful to support the Treaty, then the Member States and INSDC may consider how best to collaborate as part of designing the Clearinghouse Mechanism.

In addition to the above, the Treaty could require notification at the time of commercialization, as proposed in **Art. 11, Option II, 4.5(b).** Since not all patents lead to commercialization, the most efficient way for the Parties to be notified of potential profit from a product/service that utilized MGRs of ABNJ is at the time of commercialization, should the Treaty include a provision on monetary benefit sharing.

This text was produced by the Tara Ocean Foundation and the Girguis Lab at Harvard University with support from the French Facility for Global Environment (FFEM) and contributions from scientists and experts from the University of Harvard, European Bioinformatics Institute (EBI) / European Molecular Biology Laboratory (EMBL), Ecole Normale Supérieure (ENS), CEA/Genoscope and University of São Carlos.

To go forward: Additional information about the Treaty, focusing on marine genetic resources and the questions on benefit sharing, is available at the BBNJ MGRs website hosted by the Girguis Lab at Harvard University.



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This document was produced with the support of the French Facility for Global Environment (FFEM)