



**Intergovernmental Conference on
the Conservation and Sustainable
Use of Biodiversity Beyond
National Jurisdictions**

Recommendations on research issues,
data management and international cooperation
in ocean science .



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1 Introduction

Brief historical review

After almost 10 years of informal and preparatory discussions, the Intergovernmental Conference on the Management of Marine Biodiversity Beyond National Jurisdictions began in September 2018 at United Nations headquarters in New York, with a second session between March and April 2019. According to General Assembly Resolution 72/249, adopted on December 24, 2017, the Conference is scheduled in four two-week sessions through 2020 and is expected to propose a text for an international, legally binding treaty on the management of biological resources in the high seas, under the auspices of the United Nations Convention on the Law of the Sea (UNCLOS). Unlike many UN environmental texts, the future treaty will actually be a legally binding, international instrument with the mandate to ensure sustainable use and conservation of marine biodiversity in the high seas.

NB: The “high seas” represent more than half of our planet’s surface!

Preparation and organization of the Conference

The December 2017 resolution mandated the national delegates to elect a chairperson for the entire conference, and also a facilitator for each of the four negotiation topics. Ms. Rena Lee, Ambassador from Singapore, was elected chairwoman and is responsible for leading the entire process through 2020. After a planning meeting in April 2018 to outline the stages of the process, Ms. Lee had hoped to propose a basic text for the first session, which took place in September 2018. Finally, such a text was submitted only in February 2019, for the second session. This text – core of the current «draft zero»– logically responded to the elements of the resolution and the process of the Preparatory Conference, with a thematic «package» previously defined in 2011, which has four parts:

- 1) *Marine genetic resources, including those related to the sharing of benefits*
- 2) *Management tools by zones, including Marine Protected Areas*

- 3) *Environmental impact studies*
- 4) *Capacity building and transfer of marine technology*

Around the basic text published following the first session, thematic discussions were organized on these 4 topics during the second session in March / April 2019, with the facilitators acting as reporters. The chairperson then brought together the recommendations and visions of different groups and nations to propose a draft for the future High Seas Biodiversity Treaty – the long-awaited «draft zero» made public in June 2019. On the basis of this text, we have formulated a set of remarks, criticisms and recommendations on the stakes concerning the research and scientific cooperation for the protection of the Ocean.

2 Towards a legal framework and international management for marine genetic resources

2.1 // General considerations about scientific research on the high seas

The ocean represents 71% of the Earth’s surface and is home to a hitherto unsuspected diversity of life, species and micro-organisms – the foundation of global biology and climate. Stakes are high when we consider the ocean as the largest ecosystem on the planet, a source of life and oxygen, and regulation of the climate. This is why the future treaty on biodiversity in the high seas will have to define important scientific issues, ranging from a system of notification or authorization for collecting samples to management of genetic databases of marine organisms.

On all points, a more general first consideration concerns the development of basic scientific research at an international level. In the face of the climate emergency and increasing anthropogenic impacts on marine biodiversity today, oceanographic research must be encouraged and facilitated more than ever to broaden our knowledge of oceanic ecosystems, especially because of the major role played by marine biogeochemical processes in our planet’s equilibrium. Although our knowledge about

key species, especially fish, has advanced a great deal, we still know very little about the ecological benefits of the planktonic ecosystem, which is composed of more than 80% of micro-organisms.

This objective of supporting scientific research is relatively consensual in principle, and is already included in the Convention on the Law of the Sea (UNCLOS, hereinafter “Convention”) in Articles 239 et seq. Moreover, it is repeated in Part b, article 7 of the draft text. Beyond the principle of support for research, it is important to remember that several points remain to be defined for a concrete implementation of scientific cooperation projects, including funding, sharing of research infrastructures, and data management, for example.

A second general consideration of this treaty is essential: the use of marine genetic resources in the field of health (medicine, pharmaceutical, cosmetics), for the production of energy, and for any commercial activity. This issue related to the use of resources rightly calls for the establishment of international regulation by the treaty. Indeed, the existence of large disparities between nations, that is, unequal levels of access and exploitation of these resources (especially when they are microorganisms!) justifies establishing a system to fund developing countries and ensure they get equitable access to these resources.

Structured financing should be paramount, in order to share the benefits arising from the use of these resources which, located beyond national jurisdictions, belong to the international community as a whole. For the Tara Ocean Foundation, the first objective related to the funding issue is the establishment of an effective system to finance research and strengthen capacity in developing countries. To this end, international scientific cooperation at several levels must exist to ensure the governance of these very particular resources whose economic potential is certainly perceptible, but whose scientific interest is undeniable.

As for sources of such financing, it seems illusory to expect significant financial income from the commercialization of these microorganisms, given the high cost of research on the high seas, still at a very exploratory level. A patent on a potentially marketable molecule takes about twenty years before reaching the

threshold of profitability. Let’s remember that 30 years ago, the exploitation of minerals in the seabed appeared like an eldorado. However, at this stage, no exploitation permit has been issued by the International Seabed Authority, and no commercial project is in progress. On the other hand, the pressure of cumulative impacts on marine organisms is urgent, and we can not wait so long to finance research on resources of the high seas: They may already be exhausted in 30 years because of acidification, deoxygenation, and increases in temperature!

2.2 // Definition, legal status and scope

a] Definition of a marine genetic resource

According to the definition in the Convention on Biological Diversity (hereinafter called CBD), a genetic resource refers to «genetic material of actual or potential value», the genetic material being «of plant, animal, microbial or other origin, containing functional units of heredity» (Article 2). However, these are marine genetic resources – that is to say, present in the marine environment or coming from it – in areas that are outside zones under national jurisdiction. In other words, these resources are adrift in the high seas (an area defined in Article 86 of the Convention), and in the zone which includes the deep seabed and its sub-strata. These resources, not properly mentioned in the Convention and beyond the scope of the CBD and its Nagoya Protocol, require their own legal identity and framework.

In light of the principle of complementarity and coordination of various international legal instruments, it is coherent to use the legal acquis of the definition of a genetic resource to determine the scope of the agreement. However, when referring to genetic material, this definition does not specify whether it includes only micro-organisms, or whether the collection of fish and shellfish for the purpose of genetic use is also covered. Thus, differentiating between the collection of fish and shellfish as raw products of fishery, and the collection of these same organisms to do research on their genetic properties could help define the scope. Detecting this intention appears without particular difficulties because a collection of marine organisms for the purposes of genetic research would be carried out in very small quantities, unlike that for the raw use of marine products.

b] Definition of the digital sequence, or information in silico

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The legal framework surrounding digital genetic information – the massive data on genetic sequences after DNA extraction and sequencing – is still very embryonic, even in the context of terrestrial resources under national jurisdiction. Concerning resources collected on the high seas, the framework is even more complex: For the future treaty, it's a question of determining if the text takes into account the two dimensions that genetic resources can have: the biological resource itself, and the intangible dimension of that resource, i.e., the digital information of the genome.

In principle, the draft text invites delimitation of the scope of access to genetic resources that may be in situ, ex situ, or in silico. In other words, it's a question of how far the agreement's legal framework accompanies the resource in the process of its utilisation. It seems desirable and feasible that the agreement not only applies at the time of in situ sampling, but also regulates the living resource ex situ. On the other hand, the question of whether the agreement should settle the case of in silico access to the resource, i.e, the use of digital data, is otherwise more complex. Indeed, the technical difficulty that traceability poses at this stage of using the resource creates a real problem in the monitoring of digital data. Since in silico data are most often available in open databases and therefore accessible via simple Internet access, controlling and monitoring all the researchers who have access to these data appears very expensive and difficult on a practical plan.

c] Question on the possible retroactivity of the agreement

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Even if the notion of retroactivity is admissible in principle, it is difficult to envisage the Agreement applying to resources collected or obtained before it went into effect. This is due, first of all, to the difficulty of traceability, since most museums and institutions holding collections of biological samples had not initially planned to trace every user of their resources. In addition, the vast majority of collections are already «open» to the scientific community, as for example the Harvard Museum of Natural History which samples and sends pieces of tissue or other samples free of charge to institutions that make the request. On this issue, the question of stability of scientific institutions

must also be taken into account, in light of the general principles of predictability and legal certainty.

d] Legal status of marine genetic resources: Associating the philosophy of a common resource with the need to facilitate its access for scientific research purposes

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Article 87 of the Convention defines the principle of freedom of the high seas in respect to the rights granted by the Convention, a freedom which can already be described as relative, considering the existence of national and regional regulations such as fishing quotas, for example. In addition, the regime of the Convention has distinguished the water column from the Zone (the ocean floor and seabed) to settle the question of the status of resources present in these spaces. The resources of the water column are res nullius, while the mineral resources of the Zone are res communis, with the special status of «common heritage of humanity» described in Article 136. However, marine genetic resources, because they drift, are present both in the water column and in the Zone. In addition, they are not directly covered by the Convention, which, when adopted, was not yet sensitive to the current issue of biological resources, nor the ecological and climatic crisis, today unanimously recognized by the scientific community.

This is why, in the state of existing positive law, the case of marine genetic resources is not well-framed. In application of existing legal frameworks, it is first necessary to distinguish the resources present in the high seas from those present in areas of national jurisdiction which benefit from the CBD regime and the Nagoya Protocol. The principle of sovereignty governing this regime does not apply in the case of the high seas, an internationalized space. So, considering that the Convention does not contain any express reference to marine genetic resources present in the high seas, it is necessary that the BBNJ implementation agreement define a legal status and legal framework for these resources. In essence, this involves defining a status for living marine genetic resources, between res nullius, res communis, and sui generis.

Thus, considering that the micro-organisms constituting the bulk of the genetic resources are drifting, and are present in both the water column and the sediment, it seems very difficult to separate them from the resources of the water column. As a result, from a scientific standpoint, a single status for all marine genetic resources on the high seas is strongly recommended.

Given the great inequality of access to resources among different nations, and the wealth of marine genetic resources, the idea of shared responsibility is essential to ensure fair and equitable sharing – a principle that should accompany the definition of status.

However, given the importance of marine scientific research in understanding environmental issues and climate change, it is not desirable to impose a status and legal procedure which, if too heavy, would slow down fundamental research. On the contrary, such research needs to be encouraged! More specifically, the reasons (in order of importance) that lead to caution regarding the establishment of a common heritage status for humanity (such as that accorded to mineral resources of the Zone in Article 136 of the Convention) are as follows:

- ① The promotion of international scientific research on the high seas is hardly compatible with an overly complex legal architecture such as that established by the Nagoya Protocol. Indeed, access to resources with the prior authorization of the provider country and local communities protects certain rights of national governments and local populations, but greatly complicates sampling and research, and can put a brake on gaining knowledge about marine ecosystems.
- ② In the case of mineral resources, the requirement of prior authorization by an international authority is justified for resources that have a sure and direct value, unlike marine genetic resources. Indeed, the micro-organisms that constitute the core of the concept of «marine genetic resources» represent an immeasurable quantity of bacteria, viruses and eukaryotes in the water. In a single liter of water, billions of organisms can be found. These numbers demonstrate the difficulty of giving a status to a bacterium invisible to the naked

eye, unlike the oil or minerals of the Zone.

In order not to hinder the development of fundamental research, it seems essential to differentiate the access and collection of genetic resources done mainly for research, from the use and exploitation of these resources for commercial purposes.

- ③ In view of the difficulty in reaching a consensus within the international community on the concept of «common heritage of humanity» and its attribution to marine genetic resources, we must break out of a polarity that could block all negotiations. In this sense, it is essential to define a way of bringing together different visions in order to achieve the fair and equitable sharing intrinsic to the concept of a common resource. At the same time, we must not fall into a system with cumbersome and costly procedures which encounter difficulties in their implementation (as the example of the Nagoya regime has shown us).

In summary:

With the objective of establishing a fair and equitable economic order, described in the preamble of the Convention, and in view of the specific objectives related to genetic resources (Article 7 of the draft text), the Tara Ocean Foundation recommends sui generis status for marine genetic resources. Such status would define a middle way between completely free access and the attribution of common heritage status requiring a cumbersome procedure of authorization and follow-up.

From the scientific community's standpoint, the implementation of such a regime should involve:

- Easier access to resources with an online notification procedure
- Simple but regulated access with conditions to ensure fair and equitable sharing of resources and data
- A mechanism of solidarity and sharing that would be, mainly through the creation of a special solidarity fund, both mandatory and open to voluntary contributions
- A real focus on capacity building and technology transfer in view of more equitable ac-

cess and sharing, to reduce inequality of access among countries

- Greater scientific cooperation among countries, and among the various stakeholders.

2.3 // Access to resources: from research vessel to digital sequence

There are 3 forms of access to marine genetic resources: in situ, ex situ and in silico.

a] In situ access: collection at sea

To regulate access of research vessels to resources, two competing solutions are proposed in Article 10 of the draft zero: in situ access to resources upon simple notification, and access based on the issuance of a permit or license.

• In situ access on prior notification

In view of the arguments already raised to promote and encourage scientific research, we recommend adopting the solution of a facilitated access on prior notification, as mentioned in Article 10 of the draft zero. Moreover, it is essential to highlight the difference between access and use of resources since in situ access is usually carried out without commercial intent and therefore doesn't require a heavy authorization process. On the contrary, in situ access must remain «simple» to promote research and therefore advance global understanding of environmental issues.

• An authorization system implemented for specific cases

Taking into account unequal access levels and the potential for massive in situ collections with the aim of commercializing by-products (that don't yet exist!) a permit or licensing system might be implemented, within the scope of paragraph 2 of Article 10. This system would only apply in case of access to genetic material performed with the purpose of developing and marketing a product. Similarly, any sampling carried out in marine protected areas or particularly vulnerable marine ecosystems, and any use of destructive devices should require special authorization after completion of an environmental impact study.

• Obligation of prior online notification

Article 10 deals with a notification, addressed to the secretariat, to be implemented within the definition of Article 50 of the draft zero. To facilitate scientific research, the Tara Ocean Foundation recommends implementing an electronic notification procedure via an online registration platform. Such an online system would be efficient and lighten the bureaucratic load. Moreover, to ensure traceability, an online notification would provide a single identifier allowing resource monitoring during a transfer or change of intent. For this reason, the online platform could be connected to a clearing house. Regarding the content of the notification, the draft agreement lists the various information to be provided: the location, date and purpose of the collection, name of the entity accessing the resource and the resources potentially available. This last requirement should be put in perspective, since it is rarely possible to know in advance the origin of the collected species or micro-organisms. Moreover, it is fundamental for the implementation of fair and equitable sharing that the notification obligation be made conditional on a commitment to share benefits with the international community.

• Exploring a validation procedure of site location during in situ collection

The agreement focuses on the high seas, and deals with genetic resources beyond areas of national jurisdictions. For the sake of evidence, it is recommended that a validation procedure of the sampling location be implemented. Implementing a system ensuring traceability is widely feasible thanks to current technological advances: GPS position of the vessel only needs to be sent at the time of collection of marine genetic resources, and confirmed by satellite by the competent scientific institution to be legally recognized.

• **An embargo period of two or three years maximum**

Deep-sea scientific research, and in particular on the “marine microbiome” is relatively recent, especially regarding DNA extraction and gene sequencing. From a scientific point of view, an embargo period is therefore necessary to organize these massive and complex datasets. To ensure open and equitable data access, a short embargo period of two or three years after collecting marine samples is therefore proposed, before making these data accessible. This period would also allow scientists to publish their research before providing open access to data. The scientific community will probably be reluctant to condition this embargo period of two years – necessary for scientific development – upon an immediate payment by scientific institutions. In contrast, if sample collection is carried out for applied and commercial research purposes, an additional embargo period could be envisaged, in exchange for payment of an exclusivity fee. This tax could be one of the financing sources of a special fund.

b] Ex situ access

Once the living samples are collected and sent to laboratories, the question arises of granting free access to these samples. Within the scientific community, such access is already granted by most institutions owning major collections. It would therefore put an obligation of means upon nations to ensure free access to the collections and databases – that could be referred to as “common resources” in the agreement.

Since patenting of living organisms is prohibited – an interdiction we strongly recommend be included in the agreement – ex situ access must remain open. Moreover, the system of special authorizations envisaged in the event of commercial intent for in situ access, could also be relevant for ex situ resources. To this end, ex situ access in the framework of applied research with the purpose of marketing a by-product, could be conditional upon obtaining a license.

c] L'accès in silico

Once DNA is extracted from living organisms, digital sequencing can be carried out. This raises the question of sharing raw digital data. Knowing that DNA sequencing requires technical and financial means that all nations don't possess, universal access to these data is recommended with the objective of fair and equitable sharing. From a realistic and practical standpoint, open source is an effective solution to allow developing countries to access already sequenced data. For example, the genetic data on plankton, collected in the high seas by the schooner Tara in 2010 and available in free access since 2015, were recently used by a research team in Brazil to assemble for the first time the genome of a previously unknown bacterium with the potential to decompose hydrocarbons. Brazil will largely benefit from this research if this bacterium is proved to efficiently remedy the consequences of oil pollution. This access was cost-free for Brazil and required no bureaucratic procedures, only a simple request of the data source made available in free access by the researchers of the Tara Ocean program.

It is important to mention that such data sharing would be achievable on a voluntary basis, because of the difficulty of tracking digital data in open access. The creation of open databases should be encouraged by the Agreement, without imposing an obligation to ensure monitoring of all access, which would be impossible to achieve. Once sequenced, marine genetic resources potentially escape all traceability, so benefit sharing is difficult to implement except on a voluntary basis.

In any case, the risk of “profit loss” related to a possible commercial use of digital data that escapes resource traceability is low compared with the shared interest in making available the databases for the development of international scientific research.

The real difficulty lies in concrete access to the digital data by researchers. In developing countries, scientists lack the technical capacity and infrastructure to use these databases. This can make open access purely theoretical.

As a result, any proposition for governance of marine genetic resources must include both capacity building and technology transfer. In short, fair and equitable sharing cannot exist without strengthening scientific cooperation.

3 Issues of benefit sharing and capacity funding

3.1 // BBNJ versus Nagoya: To avoid repeating past mistakes, sharing should be organized in accordance with the underlying intent

A distinction is made between monetary and non-monetary benefits based on the model of sharing marine genetic resources applied in areas under national jurisdiction, under the Nagoya Protocol. This distinction relies on the principle that a monetary benefit implies the payment of a certain percentage of the profit derived from commercial use of genetic resources, while a non-monetary benefit refers to training programs, opening of databases, etc. Regarding resources present in areas beyond national jurisdiction, such nomenclature is inadequate because it doesn't take into account complex reality. Concretely, training programs and sharing of research infrastructure can sometimes have a much higher monetary value than the potential payment of a percentage of the profit derived from by-products of marine genetic resources. In fact, this distinction tends to weaken the importance of "non-cash" benefits, insufficiently considered despite the solution they could provide to the question of benefit sharing.

From the standpoint of research institutions that regularly fund student education and laboratories in developing countries, a more relevant distinction could be envisaged, based on the difference between benefit sharing with commercial or non-commercial intent.

In the first case, an obligation to pay a certain percentage related to by-product marketing should be imposed. At this stage, traceability is most important since it is necessary to trace marine genetic resources, collected in situ or accessed ex situ, to attach a benefit sharing obligation to the marketed by-product. This echoes the notion that only traceability of by-products derived from living organisms is

actually conceivable. In cases where samples are collected in situ for academic research purposes and with non-commercial intent but sent to laboratories where they are later used for commercial purposes, a change in status would then be necessary, and these same genetic resources would then join the "commercial intent" category.

In cases of use of resources for academic research purposes, benefit sharing should first be based on ex situ and in silico accesses (open database), thus allowing the sharing of "live" and digital data with all of humanity. Then, to ensure fair and equitable sharing, capacity building and technology transfer are essential and should be given top priority.

3.2 // Funding: Let's not miss the international momentum on ocean sciences

The question of creating a special fund ensuring fair access to marine resources is addressed in Part VII of the draft zero, related to funding. The Tara Ocean Foundation calls for establishing a special and well-structured fund to reinforce capacity building and technology transfer. When using genetic resources, we strongly recommend creating such a fund, more efficient than a fee system such as the one implemented in the framework of the Nagoya Protocol. Practice has shown that there are few marketed products actually derived from deep-sea genetic resources. Moreover, commercial use of genomes takes time. As a result, the system of benefit sharing rarely intervenes, and often too late. Consequently, greater interest must be given to capacity building and technology transfer, rather than reproducing a Nagoya-type system.

The purpose of this special fund would be to finance scientific research on the high seas, for the benefit of all. Benefit sharing would then intervene upstream, through facilitated access to marine genetic resources for all countries. This implies the implementation of true cooperation in the field of marine sciences: sharing of infrastructures, shiptime, scientific equipment, databases, but also scientific collaborations for training researchers and students.

Our ambition for strengthened scientific cooperation resonates at the highest level with the launch of the Decade of Ocean Science for Sustainable Development (2021-2030), ratified by the UN General Assembly and coordinated by the International Oceanographic Commission (IOC). The IPCC (Intergovernmental Panel on Climate Change) Special Report on the Ocean and Cryosphere, published in September 2019, also emphasized gaps in ocean sciences with regard to climate emergency and its increasing impacts on marine biodiversity.

Regarding the way the fund operates: developed countries should make a mandatory payment to reassure developing countries about the seriousness of their commitment and create a trusting environment to facilitate negotiations. The aim of this fund is not just to make simple recommendations as voluntary funds do, but to be a keystone of a fair and equitable sharing of benefits, much more effective than a fee system!

Another source of funding could come from voluntary contributions by existing organizations, development agencies and private stakeholders. In return, the fee system - that requires paying a certain percentage of gross profits - could be set to realistic rates around 3 or 5% when a by-product is marketed. In addition, the agreement should specify that it is not the shipowner's or public research institutions' responsibility to pay this fee, but that of the agency or private company wanting to market the by-product.

4 Issues of management and monitoring: Focus efforts on the scientific corpus

First, the competent scientific authority will have to define if management of the scientific issues laid down in the treaty will be dealt with by an entity or a network. Given the high stakes involved, the Tara Ocean Foundation strongly recommends the most ambitious option: a scientific entity with stable funding and a transversal mission that would exceed the simple verification and monitoring of sampling

notifications. This entity or scientific council would also foster cooperation projects by creating centralized databases with opportunities for participation in missions at sea and regional or international projects, as well as reference fellowships for under- and post-graduate students in ocean sciences.

Then, the entity or institution in charge of notifications, traceability and monitoring, as addressed in article 13 of the draft zero, will have to be determined. A clearing house could be the basis of the traceability chain, managing the mandatory system of electronic notification. It could also be entrusted with monitoring and tracking the entire access and benefit-sharing regime. However, cooperation with the scientific network or entity could be envisaged to complement monitoring. Implementation of this surveillance could imply an obligation of means borne by nations, as stipulated in the article, to ensure effective traceability of data and the sharing of benefits which arise from access and use.

5 Conclusion

In view of current negotiations and the emergency situation facing marine biodiversity and climate, the Tara Ocean Foundation strongly recommends that nations reinforce capacity building and technology transfer, and promote scientific cooperation to ensure a fair and equitable sharing of marine genetic resources. Implementing a system based on concrete obligations for nations within a regime of effective capacity building and technology transfer could be an alternative to the granting of the common heritage of mankind status - which meets strong opposition from several nations thus impeding scientific research to the detriment of all.

In conclusion, considering the importance of services provided by marine biodiversity, production of knowledge and understanding of the marine ecosystem must be given priority over the creation of a statute for an alga, bacterium or molecule. In 2019, when all temperature records are being broken and ice melt in the Arctic Ocean is attaining record levels, it is urgent to act. Safeguarding marine biodiversity requires an ambitious, global, inclusive, fair and equitable agreement on the high seas. Representing more than half of our Blue Planet, the high seas make our present possible and strongly influence our potential future on Earth.

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