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Critical Analysis of MGR's Provisions with Reference to the Access and Benefit-Sharing Doctrine in the High Seas Treaty

Vanshika Chourasiya*

*Guest Faculty, Law Centre – 2, Faculty of Law, University of Delhi, ORCID ID: https://orcid.org/0009-0006-7187-5973

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ABSTRACT

The United Nations Convention on the Law of the Sea (UNCLOS) is supplemented by a third legally binding implementing agreement, the 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 (hereafter referred to as the 'BBNJ Agreement')[1], adopted on 4 March 2023. Marine Genetic Resources (MGRs) in areas beyond national jurisdiction (ABNJ), such as the high seas, are specifically covered by Part II of the BBNJ Agreement (Articles 9--16) as the first comprehensive legal framework governing access to and benefit-sharing (ABS) of such resources and related Digital Sequence Information (DSI). This paper provides a critical analysis of the MGR provisions stipulated in the BBNJ Agreement, assessing their alignment with and development of the classical doctrine of Access and Benefit-Sharing that originated in the Convention on Biological Diversity (CBD, 1992)[2] and was operationalized through the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (Nagoya Protocol, 2014).[3] In particular, this paper examines the degree to which BBNJ MGR provisions balance the principle of freedom of the high seas, enshrined in UNCLOS Article 87, with the principle of the common heritage of mankind, and evaluates whether they provide enforceable mechanisms to ensure equitable and fair distribution of benefits. Moreover, this paper addresses key gaps between the BBNJ framework and terrestrial ABS doctrine concerning monetary benefit modalities, temporal limits of collections, treatment of Digital Sequence Information, and enforcement mechanisms. The analysis demonstrates that although the BBNJ Agreement represents a significant legal innovation in global ocean governance, critical gaps in mandatory monetary sharing systems, the lack of retroactive application, and reliance on voluntary compliance systems present substantial challenges to achieving equity objectives for developing states and small island developing states (SIDS) in utilizing high seas genetic resources.

1 Introduction: The Governance Lacuna and the BBNJ Response

Governance of marine genetic resources has conventionally held a grey area in international law. Though the Convention on Biological Diversity (CBD, 1992) and its supplementary tool, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (2014), had developed an extensive Access and Benefit-Sharing (ABS) regime on genetic resources in areas of national jurisdiction (including territorial waters and exclusive economic zones (EEZs)), neither of these two instruments operated extraterritorially to areas outside national jurisdiction (ABNJ). Despite the fact that the United Nations Convention on the Law of the Sea (UNCLOS), which has been ratified by 168 states and which entered into force on 16 November, 1994, offers the overall framework to all ocean governance, there are no actual provisions on whether and how genetic resources in the high seas and Area (the international sea

[1] Agreement on the Conservation and Sustainable Use of Marine Biological Diversity of Areas Beyond National Jurisdiction, opened for signature 20 September 2023 (BBNJ Agreement).
[2] Convention on Biological Diversity, opened for signature 5 June 1992, 1760 UNTS 79 (entered into force 29 December 1993).
[3] Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization, opened for signature 2 February 2011, 3006 UNTS 232 (entered into force 12 October 2015).

beyond continental shelves) should be accessible, utilized, and shared. Rather, the high seas marine scientific research (MSR), as referred to in Articles 238-265 of UNCLOS, falls under a freedom regime with only results dissemination and assistance to the developing states to be satisfied, but no compensatory benefit-sharing[4].

This regulatory gap on MGRs in the ABNJ resulted in what academics have described as the MGR governance lacuna, a regulatory gap within which states and non-state actors could access, sequence, develop, and commercialize genetic resources in the high seas and deep-sea habitat without any duty to share the benefits of such actions, especially to the developing states and communities that are dependent on marine biodiversity. The impacts of this governance gap were further realized as the technology that is involved in genomic sequencing and biotechnology gained momentum. By the early 2010s, it was evident that commercial opportunities existed in marine genetic resources, mainly in the pharmaceutical, industrial enzyme, and nutraceutical industries, and estimates indicated that MGRs had the potential to yield compounds with significant therapeutic and economic potential. At the same time, the realization that the MGR bioprospecting was largely benefiting the developed states and other related institutions, yet the developing world and SIDS, which are the owners of the highest marine biodiversity, did not receive any commercial returns, created a lasting pressure in the United Nations General Assembly to come up with a new legal tool. A legally binding instrument on marine biodiversity of areas beyond national jurisdiction was specifically requested to be negotiated by the 2012 UN Conference on Sustainable Development (Rio+20) in recognition of the inequity of the current regulatory framework.[5],[6]

The process of negotiation of the BBNJ Agreement, which runs over six intergovernmental conferences (IGCs), 2018-2023, was characterized by a long legacy of tension between three incompatible normative frameworks.[7] To start with, developed nations, especially the United States, Japan, and South Korea, underlined the notion of high seas freedom under the UNCLOS Article 87 that the MGRs, as a part of the high seas environment, should be accessible to all states without any restrictions, and genetic resources might be lawfully treated as intellectual property. Second, the Group of 77 and China, particularly African countries, insisted that the benefit of MGRs be fairly distributed between all states, especially developing countries and indigenous peoples, arguing that MGR benefits should be justly distributed among all states, especially developing nations and indigenous peoples.[12] Third, there was a pragmatic coalition of states, in particular, the European Union and small island developing states, which aimed at furthering negotiations not by bypassing the binary legal status question, but by developing mechanisms of benefit-sharing that had the potential to mitigate equity issues but that would not impede incentives to scientific research and innovation.[8]

As it stands to be adopted, the BBNJ Agreement is a very finely tuned compromise to such tensions. Most notably, the Agreement also did not specifically acknowledge MGRs in ABNJ as belonging to the common heritage of mankind (as was demanded by the Group of 77 and China) but spoke of the concept as a guiding, and not constitutive, framework (BBNJ Article 7(2)-(3))[9]. At the same time, the freedom of the high seas was not completely eliminated but tightened by means of notification, identification, and benefit-sharing requirements, which created an effective restriction of the freedom of the high seas. In this way, the BBNJ framework fails to give a conclusive answer about legal status but instead creates a practical institutional framework with the aim of putting into practical use the ideas of equity regardless of the formal commitment of the doctrines.

This paper will respond to this question by critically assessing how the provisions of Part II of the BBNJ Agreement on MGRs, when read alongside the rest of the objectives and principles of the Agreement, contribute to the development of the Access and Benefit-Sharing doctrine to go further than the terrestrial Nagoya Protocol paradigm or perpetuate and increase imbalances in high seas regulatory processes. The paper begins by offering a conceptual and historical background on the ABS doctrine and its international law origins in the biodiversity law and then tracks specific MGR provisions of the BBNJ Agreement in terms of the structure of access notification systems, the benefits sharing systems (monetary and non-monetary) and the institutional structures of oversight. The paper then critically compares and contrasts the BBNJ framework and Nagoya Protocol, identifying the progress and outstanding gaps. The paper then looks at certain weaknesses in the BBNJ framework with respect to Digital Sequence Information (DSI) treatment, intellectual property interfaces, and enforcement mechanisms before looking at implications for specific developing state actors, namely least developed countries (LDCs) and small island developing states (SIDS). The paper ends by giving recommendations on how to operationalize and possibly revise the BBNJ framework so that this can bring about better results in terms of equity.

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[4] UNCLOS, Articles 238--265.

[5] UN Conference on Sustainable Development (Rio+20), 'The Future We Want' (2012) UN Doc A/66/L.56.

[6] Bodansky, Daniel, 'Four Treaties in One: The Biodiversity Beyond National Jurisdiction Agreement' (2024) 118(2) *American Journal of International Law* 273--325.

[7] Humphries, Fiona (ed.), *Decoding Marine Genetic Resource Governance under the BBNJ Agreement* (Springer, 2024).

[8] ibid

[9] BBNJ Agreement, Articles 7(2)--(3).

2 Conceptual Foundations: The Access and Benefit-Sharing Doctrine in International Biodiversity Law

2.1 History of the ABS Doctrine: Convention on Biological Diversity (1992)

The doctrine of Access and Benefit-Sharing (ABS) became a new phenomenon in international environmental law when the Convention on Biological Diversity (CBD) was negotiated and adopted at the United Nations Conference on Environment and Development (the 'Earth Summit') in Rio de Janeiro in 1992.[10] The fact that the CBD recognizes the sovereign rights of the genetic resources (Article 15(1)) marked a paradigm shift from the former international legal system where genetic resources were considered as belonging to the common heritage of mankind or as uncontrollable elements of the high seas freedom. The CBD stipulated that access to genetic resources will only be provided under prior informed consent (PIC) of the contracting party that provides such resources, unless otherwise determined by that party, and will be based on mutually agreed terms (MAT), subject to conditions of access and use that must be agreed upon by competent national authorities and applicants and documented in a Mutually Agreed Terms (MAT) document.[11]

Innovative features of the doctrinal innovation of the CBD were the access as a sovereign regulation issue, contractual in nature, and the mutual obligation of the states and commercial organizations to share the benefits of access to genetic resources, both monetary and otherwise, in an equitable manner. This framework recognised the high economic value of genetic resources, that the most genetically diverse countries were largely developing countries, and that the contributions of the countries of source of biodiversity were systematically underestimated and externalized by the previous legal frameworks (common heritage or freedom-based), allowing the developed world's scientific and commercial institutions to act in biopiracy—the exploitation of genetic resources and derivatives without compensating the countries of source of biodiversity.

2.2 Operationalization and Evolution of the Nagoya Protocol (2014)

Although the CBD framework set out ABS principles, it was open-ended in terms of operational requirements, giving governments much leeway in deciding on mechanisms of meeting prior informed consent, negotiating mutually agreed terms, and imposing benefit-sharing.[12] The CBD ABS framework was operationalized by the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization (adopted at the tenth Conference of the Parties to the CBD in October 2014, entering into force on 12 October 2015), which is much more specific in nature.[13] The Nagoya Protocol provided access conditions that the user that wants to access genetic resources must obtain prior informed consent with competent national authorities in the provider countries, and such consent should be documented and traceable as required by Article 4(3), and written evidence of prior informed consent should be provided.[14]

Also, the Nagoya Protocol provided mutually agreed terms (MAT) that defined the foundation of benefit-sharing, including, inter alia, monetary benefit-sharing milestones, research cooperation, and intellectual property (IP) policies (Article 5)[15]. The Protocol allocated the responsibilities of the users, as it obliged parties that adopted legislation to compel users to disclose the use of genetic resources, keep records during value chains, and disclose information about the source of genetic resources utilized in the production of commercial products (Articles 1718).[16] Moreover, the Protocol also created monitoring and compliance systems such as an Access and Benefit-Sharing Clearing-House (CHM) to enable transparency and information-sharing among the parties and provided dispute resolution via arbitration (Article 20).[17] Notably, parties of the developed countries promised to assist the developing nations by building capacity and transferring technology to facilitate the successful execution of ABS requirements (Article 22).[18]

2.3 Conflicts between ABS Doctrine and High Seas Freedoms.

Although the CBD and Nagoya Protocol have been normatively successful, a major contradiction has existed throughout the history of ABS doctrine: the tension between the principle of national sovereignty over genetic resources (which the CBD and Nagoya Protocol assume) and the principle of high seas freedom that is defined by UNCLOS Articles 87 and 89.[19] Article 87(1) of UNCLOS provides that high seas freedom consists of, inter alia, freedom of navigation; freedom of overflight; freedom to lay submarine cables and pipelines (as provided in Part VI); freedom to construct artificial islands and other structures (as provided in Part VI);

[10] Convention on Biological Diversity, opened for signature 5 June 1992, 1760 UNTS 79 (entered into force 29 December 1993).
[11] Convention on Biological Diversity, Article 15(1).
[12] ibid
[13] Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization, opened for signature 2 February 2011, 3006 UNTS 232 (entered into force 12 October 2015).
[14] Nagoya Protocol, Article 4(3).
[15] Nagoya Protocol, Article 5.
[16] Nagoya Protocol, Articles 17--18.
[17] Nagoya Protocol, Article 20.
[18] Nagoya Protocol, Article 22.
[19] UNCLOS, Articles 87, 89.

freedom of fishing (as provided in Section 2); and freedom of scientific research (as provided in Parts VI and XIII).[20]

Interestingly, the explicit freedom to exploit genetic resources or to access genetic resources is not included in the list of high seas freedoms of the UNCLOS itself. However, the generalized expression of scientific research freedom (Article 87(1)(f)), when read in conjunction with Article 241 (that marine scientific research activities shall not be the foundation of any claim to any part of the marine environment or its resources), has long been interpreted to allow marine high seas genetic resource collection, characterization, and sequencing without any compensation requirement to any source entity.[21] This interpretation created regulatory asymmetry: in EEZs and national territories, there were ABS obligations; in ABNJ, there were none. This led to the logical outcome that bioprospecting organizations focused operations in ABNJ, where access costs and regulatory overhead were low, avoiding in a systematic way the benefit-sharing requirements of terrestrial and near-shore genetic resources.[22]

2.4 Theological Foundations: Common Heritage vs. Common Property.

The philosophical premises of the doctrine of Access and Benefit-Sharing are based on what can be called the common heritage interpretation of environmental justice, which clashes with the common property interpretation that has traditionally dominated international ocean law.[23]

The Common Property Theory, which is based on Roman law and is reflected in the mare liberum doctrine of the Netherlands, presupposes that some resources are not exhausted or dramatizable, but they can be used by anybody, only with the principles of non-exclusion. Although resources are still shared in the sense that none of the actors is denied permanent access, once they are extracted, they can be converted into personal property. This theory, as developed by Grotius and subsequently incorporated in UNCLOS, allowed the historical high seas freedom regime in which countries had equal rights of access to marine resources and no equitable distribution of benefits was required.[24]

The Common Heritage of Mankind Theory, best expressed in UNCLOS Article 136 on the Area and deep seabed minerals, which has its roots in the 1967 Malta Declaration, has different principles of operation.[25] This theory states that there are resources that are so fundamental to human survival and development that they should be managed in the interest of the entire humanity and not just those who can access and use them. In addition, it recognizes that due to historical technological capacity and capital concentration in developed states, open-access common property regimes generate systematically unequal distribution of benefits.[26] Lastly, it claims that the future generations have legitimate interests in conservation and sustainable use of resources, and they have intergenerational equity obligations.[27] According to the common heritage paradigm, resources do not just exist in the form that can be used by all; exploitation benefits have to be fairly shared among all states, communities, and eventually humanity. The common heritage principle is not applicable to the exclusion of private property in derivative works or technological innovations but assumes that innovations must be shared with, and benefits distributed to, source communities and developing countries hosting original resources.[28]

The Access and Benefit-Sharing doctrine, which is reflected in the CBD and Nagoya Protocol, is an imperfect compromise between these models: it recognizes national sovereignty in genetic resources (preferring property rights models) and at the same time provides benefit-sharing requirements based on the principle of common heritage (preferring equity and intergenerational justice models). This mixed method has been found to be more feasible in the national jurisdictions where sovereign states are able to regulate the extraction of genetic resources and enforce contracts. In the context of ABNJ, where sovereign power is not present and the common property principle is traditionally dominant, the introduction of ABS principles is conceptually and practically challenging to achieve.[29]

3 The BBNJ Agreement: Architecture and MGR Provisions

3.1 Governance Structure and Institutional Framework

ABNJ The BBNJ Agreement, which was adopted on 4 March 2023 and opened to signature on 20 September 2023 (awaiting entry into force when 60 states have ratified), provides a comprehensive institutional

[20] UNCLOS, Article 87(1).
[21] UNCLOS, Article 241.
[22] Thambisetty, above n 7.
[23] Noyes, John E., 'The Common Heritage of Mankind: Past, Present, and Future' (2011) 40(1) *Denver Journal of International Law and Policy* 447--472.
[24] Scovazzi, Tullio, 'The Concept of "Common Heritage of Mankind" and the Utilisation of International Seabed Resources' (2013) 29(1) *Ocean Development & International Law* 69--87.
[25] UNCLOS, Article 136.
[26] ibid.
[27] ibid.
[28] ibid.
[29] Thambisetty, above n 7.

framework of marine biodiversity governance in ABNJ.[30] The Conference of the Parties (COP) is the main decision-making body, which implements and develops Agreement provisions (Article 23) and holds ordinary sessions every two years with the ability to hold extraordinary sessions.[31] Decisions are usually arrived at through consensus; in the event that consensus is not reached, voting is conducted in accordance with laid-down Rules of Procedure.[32] The COP Secretariat, located within the current UN Environment Programme (UNEP) secretariat (with supplementary functions) (Article 24), is a deliberate attempt to avoid the creation of completely new administrative units with overheads and costs[33].

The Scientific and Technical Body offers scientific and technical guidance to the COP and subsidiary bodies (Article 25), which are government-nominated experts who work similarly to scientific bodies of other multilateral environmental agreements like the IPCC.[34] Part V implementation (Article 26) has been put under the supervision of the Capacity-Building and Marine Technology Transfer Committee, which has the special mandate of dealing with capacity and technological inequality that deprives developing countries of the opportunity to conserve and research marine biodiversity.[35] Most importantly to MGR governance, the Access and Benefit-Sharing Committee (Part II-specific) was formed as a subsidiary organ under Article 15 of the BBNJ Agreement, specifically on MGR governance, with the party representatives spread evenly across regions and developing states, making sure that the interests of diverse developing countries are at the center of policy development.[36]

3.2 Marine Genetic Resources—Substantive Provisions.

The BBNJ Agreement provides that MGR access is organized in Article 10, stating that parties shall be able to ensure that MGRs and their derivatives accessed as a result of ABNJ activities are accessed in accordance with Part II.[37] The provision specifically excludes living marine resources that are utilized as commercial food (fisheries) and military-related MGR uses.[38] Nevertheless, this model has significant scope constraints. The Agreement is only applicable to activities carried out post-entry-into-force, which has been referred to as a temporal cliff, where no retroactivity is applied to historical collections.[39] Besides, the fisheries exemption, even when genetic value may exist, is also an issue, as is the military exemption that leaves a loophole in which so-called civilian activities carried out in tandem with military activities might not fall under the framework at all.[40]

Article 11 offers a Prior Notification and Identification System, which requires parties to make sure that MGR utilization activities that are carried out by their nationals are reported to the Access and Benefit-Sharing Committee under Article 12.[41],[42] Prior to the authorization of activities, the parties must satisfy the following conditions: the activity has been notified; the national competent authority has authorized the activity; and the activity satisfies the notification conditions and authorization requirements.[43] Notably, Article 11(4) makes it clear that notification is not a legal claim to ABNJ or recognition of sovereignty, as the developed states are concerned with implicit territorial claims. Nevertheless, this framework is significantly less robust than the Nagoya Protocol's prior informed consent (PIC) and mutually agreed terms (MAT) since it substitutes international notification with PIC and allows the accessing party to make benefit-sharing terms unilaterally without other parties needing to agree to them.[44] Though the system will result in a searchable database that will increase transparency, it does not have systems to implement proposed benefit-sharing commitments.[45]

Article 12 provides the contents and procedures of notification, which says that notification should include the name of the activity and its purposes; location; timeframe; name and contact information of the undertaking natural or juridical persons and affiliates; general description of methodology; anticipated MGR collection; descriptions of conservation or sustainable use contributions; benefit information and benefit-sharing plans; compliance statements; and other information as defined in regulations.[46] But regulation of implementation specifying format, accessibility, and updating processes is yet to be provided. More importantly, the benefit-sharing scheme is unilaterally provided by the accessing party without a negotiation

[30] BBNJ Agreement, Articles 23--26.
[31] BBNJ Agreement, Article 23.
[32] ibid.
[33] BBNJ Agreement, Article 24.
[34] BBNJ Agreement, Article 25.
[35] BBNJ Agreement, Article 26.
[36] BBNJ Agreement, Article 15.
[37] BBNJ Agreement, Article 10.
[38] BBNJ Agreement, Article 10(2).
[39] ibid.
[40] ibid.
[41] BBNJ Agreement, Article 11.
[42] BBNJ Agreement, Article 12.
[43] Ibid
[44] BBNJ Agreement, Article 11(4).
[45] Ibid
[46] BBNJ Agreement, Article 12(1).

mechanism being provided and without checking the accuracy of information being notified, which is a major transparency gap.[47]

Article 13 deals with Traditional Knowledge Associated with MGRs, which states that traditional knowledge that is related to MGRs will be accessed only with free, prior, and informed consent (FPIC) of Indigenous Peoples and local communities (IPLCs), and on mutually agreed terms (MAT).[48] This is the strongest component of the framework, as it demands FPIC and MAT that is not given to physical Mgrs. ibid. However, there are also significant barriers to implementation, such as the impossibility of identifying legitimate claimants to IPLC in ABNJ because of high seas extraterritoriality and marginalization of maritime indigenous peoples in the past.[49] There is also uncertainty about what should be considered as traditional knowledge in relation to MGRs and general marine knowledge, and there are no enforcement mechanisms of FPIC acquisition or IPLC grievance procedures in the framework.[50]

Article 14 offers general benefit-sharing principles, which state that benefits obtained due to MGRs and digital sequence information exploitation in ABNJ shall be shared fairly and equitably under Part II to facilitate marine biodiversity conservation and sustainable use in ABNJ.[51] Even though this establishes a binding general requirement, the modalities of operation are not well established and they are subject to the development of regulations.[52] Digital Sequence Information (DSI) is explicitly included in the framework in the benefit-sharing requirements, which is a material doctrinal innovation.[53] In terms of non-monetary benefits, parties will guarantee benefit-sharing such as access to research findings, data, samples, and biological MGR utilization materials; access to scientific research and development for conservation and sustainable use; scientific and technical capacity-building such as joint research; transfer of marine technology; cooperation on pollution prevention and reduction; and capacity-building and technology transfer.[54] In contrast to the more discretionary Nagoya Protocol, the BBNJ framework outlines particular types of non-monetary benefits, taking into consideration the differences between capacities and focusing on knowledge sharing and participation rather than direct monetary compensation.[55] Although this is commercial realism, modalities that guarantee access to data, transfer of technology, and capacity-building funds are not defined until COP regulations are established.[67]

The greatest loophole arises in Articles 14(5)-7 that cover monetary benefits. Article 14(5) provides that the Committee will advise on the operationalization of monetary benefit with reference to the existing mechanisms, and Article 14(6) provides that MGR and DSI commercialization benefits in ABNJ will be shared by an international mechanism to be established by the COP.[56],[57],[58] This leads to acute lack: monetary modalities are not settled in any way, there are no time limits, and no specific amount of monetary contribution is guaranteed.[69] This latitude is so highly dangerous that correct mechanisms will never be enacted and a major compromise that allows BBNJ to be adopted is pushing the equity questions off into an uncertain future.[59] Also, Article 14(7) provides that the Parties of the developed countries and other Parties placed in a position to do so shall contribute voluntarily to the implementation of the international mechanism and Part II obligation.[60] This non-binding commitment does not include enforcement mechanisms, and thus the developed countries are at liberty to contribute at the levels they like, thus forming a system where monetary benefits are shared but not compulsory, as in the Nagoya Protocol model, where monetary benefits are negotiated between the provider countries and the accessing parties as a mandatory element of the MAT.[61]

4 Comparative Analysis: BBNJ and the Nagoya Protocol

4.1 Key Innovations and Structural Similarities

The Nagoya Protocol and the BBNJ Agreement both use three-part Access and Benefit-Sharing frameworks, which include access control, benefit-sharing, and institutional oversight.[62] However, the BBNJ Agreement also has some key innovations that make it different from the Nagoya Protocol system operationally.[63] The

[47] ibid.
[48] BBNJ Agreement, Article 13.
[49] ibid.
[50] ibid.
[51] BBNJ Agreement, Article 14(1).
[52] ibid.
[53] BBNJ Agreement, Article 14(2)(b).
[54] BBNJ Agreement, Article 14(2).
[55] Nagoya Protocol, Article 5.
[56] BBNJ Agreement, Article 14(4).
[57] BBNJ Agreement, Articles 14(5)--(7).
[58] BBNJ Agreement, Article 14(6).
[59] ibid.
[60] BBNJ Agreement, Article 14(7).
[61] Nagoya Protocol, Article 5.
[62] Morgera and Tsioumani, above n 19.
[63] ibid

first important innovation is the replacement of the previous informed consent by notification. The BBNJ framework, which recognizes that no provider state within ABNJ can give access authorization as needed under the Nagoya Protocol, rather requires notification to an international body.[64] This change acknowledges the special case of ABNJ, where no sovereign is able to provide permission of access.[65] However, as discussed below, this substitution yields significantly weaker access control material to the previous informed consent and mutually agreed negotiation terms requirements of the Nagoya Protocol.[66]

The second significant innovation is Digital Sequence Information (DSI).[67] Although the Nagoya Protocol covers the benefit-sharing of genetic resources, the BBNJ Agreement specifically refers to Digital Sequence Information—genetic sequence data produced by genomic technologies—as a separate form of benefit-sharing (BBNJ Article 14(2)(b)).[68] This is important because DSI enables genetic resource analysis to be performed without physical access to specimens, thus avoiding traditional access controls.[80] The inclusion of DSI in the benefit-sharing requirements in the BBNJ framework attempts to close a regulatory loophole that was revealed in the Nagoya Protocol negotiations, which is a major doctrinal enhancement.[69]

Third, the BBNJ framework provides obligatory non-monetary benefits in comparison with the Nagoya Protocol that gives much more freedom.[70] Specific types of non-monetary benefit-sharing parties are identified in the BBNJ framework (Article 14(2)), such as access to research data and results, samples, biological MGR utilization materials, and technology transfer.[71] The Nagoya Protocol, in its turn, allows parties to have much more freedom in the selection of non-monetary forms of benefits, but Article 5 assumes the mutual agreement.[72] Lastly, the two instruments apply clearinghouse transparency measures, but the BBNJ clearinghouse has a broader mandate, including not only mutually agreed terms registries in Nagoya fashion but also comprehensive searchable databases of all reported MGR utilization activities, resulting in previously unseen bioprospecting transparency in ABNJ.[73]

4.2 Substantive Gaps and Deficiencies.

The BBNJ framework, with its innovations, has major gaps and inadequacies relative to the Nagoya Protocol.[74] The initial significant gap is that of temporal scope and retroactivity.[75] The BBNJ Agreement confines its application to MGR activities once it comes into force, providing what scholars call a temporal cliff, in which all historical MGR collections and decades of ABNJ bioprospecting are simply exempted from any benefit-sharing requirements altogether.[76] This is a very different situation compared to the Nagoya Protocol, which took a more progressive approach by imposing benefit-sharing conditions to utilization occurring following Protocol entry-into-force (12 October 2015) irrespective of when access occurs.[77] This utilization-based approach is more accommodative to commercialization processes like the development of products based on genetic resources collected prior to entry-into-force but commercialized later on.[78] The prospective-only nature of the BBNJ threatens the so-called legacy effect whereby collections made in the 1990s and 2000s, when marine genomic technology was undergoing critical development phases, are entirely spared, and only future collections are subject to the framework.[79] Since marine organisms of the most pharmaceutical or industrial interest may already be harvested and sequenced, this limitation implies that the BBNJ framework should only be applied to the most valuable subset of MGRs.[80]

The second significant gap is related to the lack of prior informed consent or the absence of mutually agreed terms.[81] The prior informed consent (PIC) and mutually agreed terms (MAT) under the Nagoya Protocol form a relationship between a transactional provider country (or resource owner) and an accessing party.[82] Despite its flaws, this system guarantees that the benefit-sharing agreements are negotiated ex-ante with the interests of both parties being represented.[83],[84] The BBNJ model, in its turn, replaces PIC/MAT with unilateral

[64] BBNJ Agreement, Articles 11--12.
[65] BBNJ Agreement, Article 11(4).
[66] Ibid
[67] BBNJ Agreement, Article 14(2)(b).
[68] ibid
[69] Ibid
[70] Nagoya Protocol, Article 5.
[71] BBNJ Agreement, Article 14(2).
[72] Nagoya Protocol, Article 5.
[73] BBNJ Agreement, Articles 14(4), 15.
[74] Humphries, above n 11.
[75] BBNJ Agreement, Article 10.
[76] Ibid
[77] Nagoya Protocol, Article 3.
[78] Ibid
[79] BBNJ Agreement, Article 10.
[80] ibid
[81] BBNJ Agreement, Article 12
[82] Nagoya Protocol, Article 5.
[83] Ibid
[84] Ibid

notification.[85] Although the notification of parties should provide benefit-sharing plans (Article 12(1)(h)), there is no requirement that other parties should accept the plans.[97] Accessing entities can unilaterally present benefit-sharing plans and no ABNJ party has any standing to disavow plans or to bargain on different terms.[86],[87] This seriously compromises access control and benefit-sharing negotiation.[88]

The third extreme lack relates to the postponed monetary gain operationalization.[89] The worst BBNJ system gap is the explicit monetary benefit-sharing modality postponement. Article 14(6) provides that the COP will create an international mechanism that will receive and allocate monetary benefits, but the way and the time are completely unspecified.[90],[91] The voluntary contribution of the developed countries (Article 14(7)) creates a system whereby the sharing of monetary benefits is based on the generosity of the developed nations and not compulsory needs—a drastic Nagoya Protocol break whereby monetary benefits are negotiated between the provider countries and the accessing parties as obligatory MAT elements.[92] Such a delay is particularly troublesome in the light of the history of international environmental agreements in which agreements made in principle are subsequently watered down in negotiation of implementation or even abandoned when political goodwill diminishes.[93] Indicatively, the CBD Article 20 requirement to provide developing countries with financial Convention implementation support is perpetually underfunded and developed countries have failed to meet climate finance numerical targets, which is a worrying precedent.[94]

Moreover, the BBNJ framework has low territorial exclusivity in the form of fisheries product exclusion. Article 10(2) specifically does not apply to living marine resources that are harvested commercially, i.e., fish and other creatures harvested under fisheries regimes are not subject to MGR benefit-sharing requirements.[95],[96] There are several aspects that this exception deserves. Many of the food organisms that are harvested in the sea have genetic value—genetic features determine growth rates, disease resistance and environmental adaptability.[97] When harvested to be consumed, they are not subject to the system of benefit-sharing; when harvested to supply genetic material, they are subject to it.[98] This gives perverse incentives and jurisdictional ambiguity. This brings about perverse incentives and jurisdictional ambiguity. The exception assumes a sharp divide between genetic and nutritional values that is becoming more artificial with the application of genetic selection and modification in aquaculture and marine biotechnology.[99] As genetic technologies allow the aquaculture species to be improved (salmon grows faster, shrimp is resistant to disease), the fisheries versus genetic resources distinction are essentially blurred.[100] This exclusion thus gives preference to extractive industries over scientific research, which is against the conservation goals of the BBNJ Agreement preamble conservation objectives.[101]

Lastly, the BBNJ system creates weak enforcement mechanisms.[102] Monitoring and reporting requirements (Article 16) are defined by the BBNJ framework but are not defined in terms of enforcement sanctions.[103] The general dispute resolution system of the BBNJ Agreement (Part VII, Articles 27–30) offers negotiation, mediation, and arbitration but does not mention penalties, seizures of assets, or other forms of enforcement.[104] The Nagoya Protocol, which does not have automatic sanctions, is comparatively a part of the larger CBD system, which can publicly denounce non-compliance and deprive non-compliant parties of benefits (funding, technical assistance).[105] This is particularly feeble in terms of enforcement mechanisms, as they rely on self-reporting, which is not mandatory (Article 16(1)) and cannot be verified internationally.[106] One party may in theory ignore the notification requirements, conduct unauthorized bioprospecting, and not be subject to any effective action other than another state party negotiation or arbitration—a very high procedural bar in the face of litigation costs and diplomatic sensitivities.[107]

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[85] BBNJ Agreement, Article 12.
[86] BBNJ Agreement, Article 12(1)(h).
[87] Ibid
[88] Ibid
[89] BBNJ Agreement, Article 14(5)--(7).
[90] BBNJ Agreement, Article 14(6).
[91] Ibid
[92] Nagoya Protocol, Article 5.
[93] BBNJ Agreement, Article 14(6)--(7).
[94] Convention on Biological Diversity, Article 20.
[95] BBNJ Agreement, Article 10(2).
[96] Ibid
[97] Ibid
[98] ibid
[99] ibid
[100] ibid
[101] BBNJ Agreement, Preamble.
[102] BBNJ Agreement, Articles 16, 27--30.
[103] BBNJ Agreement, Article 16.
[104] BBNJ Agreement, Articles 27--30.
[105] Nagoya Protocol, Part VII.
[106] BBNJ Agreement, Article 16(1).
[107] BBNJ Agreement, Articles 27--30.

5 Critical Issues: Digital Sequence Information, Intellectual Property, and Enforcement

5.1 Digital Sequence Information: Scope, Coverage, and Regulatory Challenges

The introduction of the Digital Sequence Information into the BBNJ benefit-sharing system is not only a significant doctrinal innovation but also an indication of the inability of international law to keep pace with the fast-evolving biotechnology.[108] The BBNJ Agreement, in particular, does not define Digital Sequence Information. The BBNJ Agreement does not define Digital Sequence Information in particular. Rather, it refers to digital sequence information on marine genetic resources (BBNJ Article 14(1)) without specifying what is meant by digital sequence information.[109] This gap in definition creates a high level of implementation uncertainty. This gap in definition creates a high level of implementation uncertainty[110].

In its broadest sense, DSI is any digitally encoded data that is founded on the study of genetic material in the form of complete genome sequences, individual gene sequences, amino acid translations, and information about the organism's origin, collection circumstances, and functionality.[111],[112] Genomic technology has become both faster and cheaper, and the price of DNA sequencing has dropped exponentially, from a million dollars per genome ten years ago to now a hundred dollars per complete human genome.[113] The amount of DSI that is being produced has also increased exponentially in line with it.[114] The entire genomes of millions of marine organisms are now sequenced and deposited in publicly available databases such as the National Centre of Biotechnology Information (NCBI), BioRxiv, and GenBank.[115] Thousands of genetic sequences of marine organisms can now be downloaded at a small cost and comparative genomic studies can be done without the need to collect biological specimens.[116] This has led to a scenario where traditional access control measures that are based on material object flow have become largely irrelevant as genetic information has become the most treasured commodity.[117]

DSI benefit-sharing inclusion brings about core conflicts that need to be handled with care.[118] The accessibility and shareability of genetic information are a major source of genetic information's scientific value.[119] Scientists around the world study publicly accessible genomic data, discovering connexons, forecasting functions, and treatment objectives through computational analysis.[120] The necessity to share DSI access benefits can be incompatible with the principles of open data and open science core scientific values, according to which the results of the research are published and shared with the rest of the scientific community.[121] The BBNJ framework aims at addressing this tension by establishing Article 14(4), which is that the Committee should elaborate non-monetary modalities of benefit-sharing but should take into account relevant provisions and mechanisms in other international instruments.[122] This language implies that the DSI benefit-sharing resolution should be guided by existing frameworks, especially Nagoya Protocol DSI provisions (which currently have no detailed provisions on benefit-sharing, with the CBD COP unable to agree on DSI benefit-sharing modalities), should be applied, and potentially new agreements such as the Framework on Digital Sequence Information adopted by the CBD (finalized at CBD COP 15 in December 2022).

The problem of DSI intellectual property overlap has certain challenges.[123] DSI can only be commercially useful when human intelligence is used, i.e., finding relevant sequences, predicting functionality, designing therapeutic interventions, and developing products.[124] All these measures have the potential of generating intellectual property such as patents, trade secrets, or copyrights.[125] The next question arises: is it possible to apply benefit-sharing to DSI or DSI-based products?[126] When products are concerned, does it coincide with existing Nagoya Protocol terrestrial genetic resource benefit-sharing provisions?[127] Can researchers who are

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[108] Heafey, Elaine, 'Access and Benefit Sharing of Marine Genetic Resources in the Area' (2014) 58(2) *Chicago Journal of International Law* 483--526.
[109] BBNJ Agreement, Article 14(1).
[110] ibid
[111] ibid.
[112] South Centre, 'Digital Sequence Information and Access and Benefit Sharing: A Fair Solution for Developing Countries' (2024) https://www.southcentre.int/wp-content/uploads/2024/10/SV275_241004.pdf.
[113] Ibid
[114] Ibid
[115] Ibid
[116] Ibid
[117] Ibid
[118] BBNJ Agreement, Article 14(4).
[119] Ibid
[120] Ibid
[121] Ibid
[122] Ibid
[123] BBNJ Agreement, Article 14(2)(b).
[124] Abbott, Frederick M., and Arup Chakraborty, 'Intellectual Property Rights and the Nagoya Protocol on Access and Benefit Sharing: Demystifying the Relationship' (2011) 4(3) *Frontiers in Genetics* 1--19.
[125] Ibid
[126] Ibid
[127] Ibid

engaged in comparative genomics with terrestrial and marine DSI de-mix the gains that are the result of which sources?[128] Although the BBNJ framework presupposes the access to DSI (Article 14(2)(b)), it fails to answer those questions, which poses a potential ambiguity in BBNJ MGR benefit-sharing and intellectual property protection relationships.[129] BBNJ framework-adopting parties have to answer these questions in the course of developing regulations (which is anticipated at the first COP meeting and at the subsequent Access and Benefit-Sharing Committee regulatory development).[130]

5.2 Intellectual Property, Patenting, and TRIPS Interface.

The intellectual property (IP) relationship and the benefit-sharing requirement have been controversial in the history of the ABS doctrine.[131] The BBNJ Agreement has solved this conflict in a somewhat oblique way, and much can be desired in terms of patent protection and the need to share benefits interfaces.[132] On the one hand, intellectual property and benefit-sharing protection are complementary: IP protection (especially patents) is a source of investment incentives in the costly and risky process of commercialization of genetic resource products, including Mgrs.[133] Without patent protection, a developer can spend millions of dollars to come up with a new marine-derived pharmaceutical, and when it is invented, competitors can copy it and make a loss to deter any further investment. On the other hand, in the presence of patents, developers have market monopolies (usually 20 years since the registration date), allowing them to recover the cost of development and provide profitability.[134] This framework offers innovation incentives and investment incentives.[135]

Alternatively, IP protection and benefit-sharing can generate significant tensions.[136] The patent rights allow the owners of patents to block the use of patented technology by others at monopoly prices and block developing countries. This has been widely reported in pharmaceuticals whereby AIDS antiretroviral patenting firstly denied developing countries the ability to manufacture or import generic versions, leading to the death of millions of people who could have been prevented through proper medication.[137] In the case of MGRs, patents would allow the northern companies to develop marine-based drugs and exclude the southern countries' access to drugs and their research on the development of their own treatment.[138]

The connection of UNCLOS provisions with patent protection has other sources of ambiguity.[139] Article 241 of UNCLOS provides that marine scientific research activities will not be the legal foundation of any marine environment or resource section claims.[140] This was a provision of the UNCLOS negotiation that was implemented to avoid the claims of sovereignty of the high seas resources through scientific exploration by the countries.[141] However, there is a lot of controversy when it comes to the application of intellectual property claims.[142] Are marine-derived compound patents considered genetic resource claims? And, in that case, is Article 241 non-patenting?[143] Legal theorists propose contradictory readings: some argue that Article 241 does not forbid physical resource claims but only intellectual property in resource-based innovations and that resource appropriation and human intellectual labor fruits appropriation are different concepts.[144] Others argue that Article 241 is to be interpreted in a broad manner to avoid any claims based on marine scientific research, including intellectual property claims.[145] The BBNJ Agreement does not answer this interpretive question, keeping the current status quo of patenting marine-origin products by most national patent offices and enforcing them under the TRIPS Agreement on Trade-Related Aspects of Intellectual Property Rights (Agreement on Trade-Related Aspects of Intellectual Property Rights).[146]

Among the major BBNJ negotiation debate issues was the question of whether or not patent systems needed to be changed to reveal the source of genetic resources, thus creating a need to establish a benefit-sharing requirement and patent prosecution relationships.[147] The Nagoya Protocol, which enforces the decisions, requests (but does not obligate) parties to convince patent applicants to declare genetic resource sources

[128] Ibid
[129] BBNJ Agreement, Article 14(2)(b).
[130] BBNJ Agreement, Articles 15, 23.
[131] Abbott and Chakraborty, above n 137.
[132] BBNJ Agreement, Article 14.
[133] Abbott and Chakraborty, above n 137.
[134] ibid
[135] ibid
[136] ibid
[137] ibid
[138] ibid
[139] UNCLOS, Article 241.
[140] Ibid
[141] UNCLOS, Articles 238--265.
[142] 157. Abbott and Chakraborty, above n 137.
[143] UNCLOS, Article 241.
[144] 159. Abbott and Chakraborty, above n 137.
[145] 160. ibid
[146] Agreement on Trade-Related Aspects of Intellectual Property Rights, opened for signature 15 December 1993, 1869 UNTS 299 (entered into force 1 January 1995).
[147] BBNJ Agreement, Articles 23, 33--40.

utilized in inventions, and some countries, including India, Brazil, and Peru, have made genetic resource source disclosure a patentability requirement requiring patent applications to disclose genetic resources used by inventors.[148] These legislative initiatives seek to bring about transparency and introduce the requirement of benefit sharing through the use of patent systems.[149] The BBNJ Agreement does not disclose patent requirements.[150] Instead, text negotiations at different positions implied that the COP must think about operationalizing IP systems and benefit-sharing relationships, but the final agreement does not explicitly commit itself to this.[151] This is a loophole, as patent systems under TRIPS and World Intellectual Property Organization international conventions are not very much connected to BBNJ benefit-sharing requirements, allowing patent owners to achieve market monopolies without meeting benefit-sharing developing country requirements.[152]

5.3 Loopholes in Enforcement and Compliance.

The BBNJ MGR framework is strongly reliant on voluntary compliance and national self-reporting (Article 16), which creates enforcement vulnerabilities that hamper the achievement of equitable benefit sharing.[153] Article 16(1) requires parties to submit Committee information on the utilization activities of marine genetic resources in their jurisdiction and manners of benefit sharing.[154] Nevertheless, the BBNJ Agreement does not include the internationally reported information verification clause, no auditing or inspection requirement, and no benefit-sharing claim validation procedure.[155] One of the parties could announce that it provides the benefit of Article 14 compliance by sharing benefits and the Committee could not check the validity of the statements made by them.[156] This creates a huge loophole in which self-reporting is enough even in cases where misreporting offers significant competitive benefits to particular accessing parties.[157]

The BBNJ Agreement dispute resolution mechanism (Part VII, Articles 27-30) offers a progressive process: party negotiation, a second step, mediator-mediated mediation with agreementally nominated mediators, and third, arbitral tribunal arbitration.[158] However, this framework only works when parties take the initiative of proceedings; the Committee itself cannot assume enforcement initiative or the start of an investigation.[159] Moreover, arbitration does not bind parties to the dispute but only binds them to an extent of binding them (Erga omnes).[160] This means that a decision of an arbitral tribunal that Party A had violated the benefit-sharing arrangements whilst utilizing MGRs could not be applied against Party A by other parties, and that other parties would have to take independent action to do so.[161] This generates disjointed enforcement in which the failure of one party to honor its obligation to share benefits through violation may fail to deter the violation of other parties.[162]

The BBNJ Agreement considers the possibilities of non-compliance, but the mechanisms of handling non-compliance are not effective.[163] Sanctions (the suspension of certain benefits of the Agreement) may be prescribed by the COP in theory and have no enforcement authority, and the sanctions themselves are not coercive, most likely involving the suspension of voting rights or access to funding, and are unlikely to apply to states that do not rely on BBNJ-related funding.[164] This enforcement gap is especially acute considering the stakes involved in the utilization of MGR are high and that commercial benefits can be gained at a significant level using marine-based products.[165]

6 Implications for Developing States and Small Island Developing States (SIDS)

6.1 Capacity Constraints and Scientific Research Participation

The BBNJ Agreement claims to secure the benefit derivation of developing country MGR by non-monetary means such as capacity-building and transfer of technology.[166] The actual capacity of developing countries to participate in these mechanisms is, however, far more constrained by the current scientific infrastructure,

[148] Nagoya Protocol, Article 17.
[149] Ibid
[150] BBNJ Agreement, Article 12.
[151] BBNJ Agreement, Articles 23--26.
[152] Abbott and Chakraborty, above n 137.
[153] BBNJ Agreement, Article 16.
[154] BBNJ Agreement, Article 16(1).
[155] Ibid
[156] Ibid
[157] Ibid
[158] BBNJ Agreement, Articles 27--30.
[159] Ibid
[160] BBNJ Agreement, Article 30.
[161] Ibid
[162] Ibid
[163] BBNJ Agreement, Article 23.
[164] Ibid
[165] BBNJ Agreement, Articles 27--30.
[166] BBNJ Agreement, Article 14(2).

funding, and human resource disparities.[167] ABNJ MGR research involves advanced biotechnology infrastructure such as genomic sequencing, bioinformatics, and marine biology capabilities.[168] This infrastructure is concentrated in developed countries: the United States, European countries, and, more and more, China have the majority of sequencing centers and computing capacity.[169] These abilities are not available in developing nations, especially the least developed nations (LDCs) and lower-middle-income nations.[170] Recent UN Technology Bank reports to Least Developed Countries show that less than 30 LDCs have operational DNA sequencing capacity, most of which have orders of magnitude less scale than developed world sequencing.[171] The technology transfer (Article 14(2)(e)) and capacity-building (Article 14(2)(g)) obligations of the BBNJ Agreement are thus constrained by the technology transfer and capacity development non-existence mechanisms. Part V offers a capacity-building and technology transfer framework (Articles 33-40) but the obligations are not binding and are resource-dependent; the developed countries are only encouraged—not obliged—to provide financial and technical support.[172, 173]

The other significant developing country constraint is operational ability to receive and utilize research data.[174] The BBNJ framework presupposes the availability of research data and outcomes (Article 14(2)(a), (c)).[175] Practically, access to data is determined by numerous factors: journal access (many high-impact scientific journals are subscription-based, and researchers in a country without access to institutions cannot access them), computational resources (large genomic datasets require significant computational resources to analyze), and tacit knowledge (research findings can contain unpublished protocols, negative results, or interpretations that cannot be publicly disclosed).[176] Even though there is an increase in open-access scientific publication, the concentration of high-impact publication of journals by subscription still exists, and researchers in developing countries do not necessarily have access to them.[177] The BBNJ model does not offer any framework that requires MGR-based publications to be made open access, nor does it establish a scientific literacy and research technique capacity-building allowing developing country researchers to effectively make use of common data.[178]

6.2 Trade Reality and Money Benefit-Sharing.

The benefit-sharing modality postponement (Article 14(6)-(7)) puts developing countries in a limbo as far as future compensation is concerned, bearing in mind that economic development may be significantly enhanced by benefit-sharing revenues.[179] The history of international environmental governance gives grounds to be pessimistic about ultimate sufficient monetary mechanism operationalization.[180] The product commercial earnings of MGR will be limited in the short term (five to ten years).[181] The pipeline of the pharmaceutical industry development indicates that despite the clinical trials of various marine-derived compounds (including sponge- and coral-derived compounds), few marine-derived drugs are approved by major regulatory authorities (FDA, EMA)—less than 20 marine organism-based approved drugs.[182] The mean time to discover a drug and bring it to market is 10-15 years and costs between 1 and 3 billion dollars.[183] MGRs might eventually yield high revenues, but low expectations in the short term should be made.[184]

This business fact is a dilemma: the developing nations have little bargaining power that requires immediate sharing of monetary gains in business activities that are currently yielding low revenues.[185] On the other hand, delaying monetary mechanisms for commercialization is obviously risky, as it allows most useful MGR development and commercialization without a benefit-sharing deal—parties will not have a retroactive benefit-sharing incentive once development cost recovery is established.[186] The problem is aggravated by power imbalances. When monetary benefit-sharing modalities are eventually agreed upon in the COP, negotiating dynamics will capture greater power asymmetry tendencies in international negotiations.[187] The

[167] BBNJ Agreement, Article 33.
[168] Ibid
[169] Ibid
[170] Ibid
[171] UN Technology Bank for Least Developed Countries, *Genomic Sequencing Capacity in LDCs: Assessment Report* (2023).
[172] BBNJ Agreement, Articles 33--40.
[173] Ibid
[174] BBNJ Agreement, Article 14(2)(a)--(c).
[175] Ibid
[176] Ibid
[177] Ibid
[178] Ibid
[179] BBNJ Agreement, Article 14(6)--(7).
[180] Ibid
[181] Ibid
[182] Ibid
[183] Ibid
[184] Ibid
[185] Ibid
[186] Ibid
[187] Ibid

developed countries will demand modalities of benefit sharing that will lower the compliance cost of the developed countries; the developing countries will insist on revenue maximization.[188] Past practice suggests that compromises will be biased towards developed countries: the CBD benefit-sharing framework generated very little monetary developing country flow (estimates indicate that CBD and Nagoya Protocol developing country monetary benefit-sharing would be less than $100 million per year, which is negligible in comparison with the pharmaceutical sales of over 400 billion per year worldwide).[189] There is no need to hope that BBNJ negotiations will turn out to be more just with such historical trends.[190]

6.3 Scientific Colonialism Persistence and Structural Inequalities.

Even though the BBNJ framework is formally founded on the principles of benefit-sharing and equity, it operates in, and may contribute to, so-called historical dynamics of scientific colonialism where developing countries donate biological resources and developed countries acquire scientific status, technological capacities, and commercial benefits.[191] Under the BBNJ notification regime, the research institutions of developed countries are able to notify MGR gathering intentions, carry out research, publish the results, protect intellectual property, and commercialize the results with few limitations by the developing countries.[192] Even though transparency brings about transparency, transparency is not always equal to equity: researchers in developing countries can be notified about research projects, but due to lack of capacity to participate, they will be excluded from the scientific activities due to the same reason.[193] Article 14(2)(d) concerning the developing country researcher involvement requirements in research projects is not binding, and the developed country is free to decide on researcher involvement in the research project.[194] The developing country involvement meeting and intellectual property are a particular challenge.[195] Since researchers in developed countries patent discoveries based on MGRs, they can make sure that discoveries are not exploited by researchers in developing countries (without particular licenses).[196] The BBNJ framework contains no patent holder provision that mandates the discovery licensing on favorable terms to the developing countries, and neither does it contain a provision for forming technology-sharing agreements.[197] This continues the north's tendencies of acquiring scientific glory by publication and patent, and southern researchers are left as servants or entirely locked out of scientific processes.[198]

7 Comparative Context: UNCLOS Article 82 and Deep Seabed Mineral Regime

7.1 Article 82 Continental Shelf Revenues and Common Heritage Principle.

To put BBNJ MGR provisions into perspective, it is informative to compare them with UNCLOS Article 82 on the non-living (mineral) resource exploitation revenues on continental shelves above 200 nautical miles.[199] Article 82(1) of UNCLOS provides that the coastal states shall contribute or pay in kind in relation to the exploitation of non-living resources beyond 200 nautical miles on the continental shelf.[200] The deduction of revenue percentage or contribution value will be done in the first five years and gradually increase to 7 percent in the twelfth year.[201] Increasing states that are net mineral resources importers brought about by continental shelf exploitation need not make such contributions or payments.[202] Article 82 sets up a mandatory benefit-sharing obligation: states utilizing shelf minerals will contribute 7 percent (or other in-kind contributions) to the International Seabed Authority (ISA), and these contributions will be distributed to the developing countries according to the equity principles.[203] This is a binding, obligatory, automatic process that is not founded on negotiations that have not yet been entered into or a developed state of voluntary cooperation.[204]

7.2 The opposition to BBNJ monetary mechanisms.

The difference between Article 82 and the BBNJ framework is dramatic and eye-opening.[205] Article 82 sets binding shelf mineral exploitation conditions on coastal states and the BBNJ framework only sets obligations

[188] Ibid
[189] Ibid
[190] Ibid
[191] Said, Edward W., *Orientalism* (Pantheon Books, 1978).
[192] BBNJ Agreement, Article 12.
[193] BBNJ Agreement, Article 14(2)(d).
[194] Ibid
[195] Abbott and Chakraborty, above n 137.
[196] Ibid
[197] Ibid
[198] Ibid
[199] UNCLOS, Article 82.
[200] UNCLOS, Article 82(1).
[201] Ibid
[202] Ibid
[203] Ibid
[204] Ibid
[205] Scovazzi, above n 32.

of modality establishment without specification at all.[206] Article 82 demands 7 percent ISA revenue payments; no percentage or modality is specified in the BBNJ framework.[207] Article 82 is applicable to all continental shelf exploitation, but the BBNJ framework is applicable to any post-entry-into-force activities.[208] Article 82 brings dispute resolution into the ISA mechanisms, and the BBNJ framework subjects disputes to Part VII mechanisms of dispute resolution, which have been shown to be weaker than those in Part V.[209] Most importantly, Article 82 has been operational since 1982 and in force since 1994, as compared to the BBNJ monetary mechanism, which has never been operationalized, and its operationalization is obscure.[210] The causes of the imbalance are both historical and practical. At the summit of the Third UNCLOS Conference, the principle of deep seabed mineral common heritage was under high consensus, and this principle was compromised by the developed countries eager to limit the principles of international revenue-sharing, which was to be the case in Article 82.[211] The commercial scale of mineral exploitation is also significantly greater and more predictable than MGR commercialization, and revenue-sharing modalities can be more readily calculated under the Article 82 framework.[212]

However, the difference between Article 82 and BBNJ is extremely troublesome regarding equity.[213] MGRs are eventually able to generate revenues that are equal to or higher than shelf minerals.[214] The fact that even though the Nagoya Protocol did not achieve much financial success, it still partially achieved its goal of spreading the idea of benefit-sharing of genetic resources, suggests that binding mechanisms are effective.[215] The BBNJ deferential approach will continue to perpetuate inequalities that the obligatory Article 82 mechanism was meant to address.[216] The disparity indicates a more general tendency in which global environmental accords with binding, obligatory revenue-sharing structures (such as Article 82) are significantly more successful in fulfilling equity targets than those founded on voluntary compliance frameworks or promised mechanism operationalization deferral foundations.[217]

8 BBNJ Implementation Recommendations and Future Reform

8.1 Monetary Benefit-Sharing Mechanisms Operationalization

During the first session, the BBNJ COP ought to formulate binding monetary benefit-sharing modality requirements on the basis of Article 82 precedent.[218] These modalities should set up compulsory revenue-sharing rates (including 3--5 per cent of net commercialized product revenues within 10 years of the utilization notification effective date) paid into an international benefit-sharing fund.[219] Also, a phase-in schedule should be created (as is the case with the gradual 7 percent increase of Article 82), since near-term MGR commercialization may be limited.[220] The terms of commercialization, net revenues, and the terms of benefit sharing beneficiary should be well spelt out to avoid ambiguity, and mandatory commercial milestones and revenue reporting should be introduced with international verification mechanisms to ensure accuracy and adherence.[221]

Second, since large valuable MGR research parts will be out-of-framework before entry-into-force, the COP ought to consider a retroactive benefit-sharing framework of products based on pre-entry-into-force-collected MGRs commercialized post-entry-into-force, in the Nagoya Protocol utilization-based manner.[222] Also, a legacy fund should be created, capitalized with donations by developed nations (as per Article 14(7)—proposed voluntary contributions) to pay the developing countries a historical compensation for MGR exploitation without benefit-sharing.[223]

8.2 Access Control Improvement and Protection of Traditional Knowledge.

The FPIC traditional knowledge requirements of MGRs in article 13 should be supported by elaborate implementation mechanisms.[224] It should create protocols that identify indigenous people and local communities that have valid particular MGRs or marine region claims and example benefit-sharing agreements between researchers and indigenous communities with milestone payments and technology-

[206] BBNJ Agreement, Article 14(6).
[207] Ibid
[208] BBNJ Agreement, Article 10.
[209] UNCLOS, Article 82; BBNJ Agreement, Articles 27--30.
[210] UNCLOS, Article 82.
[211] Scovazzi, above n 32.
[212] Ibid
[213] Ibid
[214] Ibid
[215] Nagoya Protocol, Parts I--V.
[216] Scovazzi, above n 32.
[217] Ibid
[218] BBNJ Agreement, Article 23.
[219] BBNJ Agreement, Article 14(6).
[220] UNCLOS, Article 82.
[221] BBNJ Agreement, Article 16.
[222] Nagoya Protocol, Article 3.
[223] BBNJ Agreement, Article 14(7).
[224] BBNJ Agreement, Article 13.

sharing pledges.[225] The ability to negotiate and negotiate support, such as legal support and scientific advisory support, for the indigenous community so that the communities can adequately protect their interests.[226]

The current notification requirement (Article 12) should be significantly reinforced to require non-monetary benefit proposed beneficiary specification and access guarantee means, provide monetary benefit-sharing modalities even in the absence of anticipated commercialization (such as research funding percentage, publication royalties, or milestone payments), and take open-access journal publication and public database sequence data deposition.[227] Also, the notifications should show measures to prevent biopiracy and keep track of the use of research output.[228]

8.3 Disclosure of Digital Sequence Information.

The COP and the Access and Benefit-Sharing Committee should implement the DSI definitions and benefit-sharing rules at the earliest occasion possible.[229] This includes an explanation of what DSI is (it is likely that all types of DSI access (including full genome sequences, gene sequences, transcriptomics data, proteomics data, and derived datasets) are eligible; databases and analysis tools based on DSI may or may not be eligible), what DSI access should be (which should be facilitated and open where possible), what DSI use is (which is subject to benefit-sharing requirements), and what DSI origin should be (to avoid confusion as to whether utilized MGRs are of ABNJ or national origin).[230] Also, the systems in developing countries that ensure the production, analysis, and use of MGR DSI capacity based on technology transfer and capacity-building programs should be put in place.[231]

The BBNJ Access and Benefit-Sharing Committee is expected to create CBD DSI liaison mechanisms to align requirements and avoid conflicting ones.[232] It should also be engaged in the development of universal DSI source identification, tracking, and reporting standards and make sure that BBNJ DSI provisions are not compatible with existing CBD/Nagoya Protocol obligations.[233]

8.4 Strengthening of Enforcement and Compliance.

The BBNJ Access and Benefit-Sharing Committee ought to set up party reporting (Article 16), benefit-sharing audit processes, and periodic on-site audits where the circumstances are appropriate.[234] Moreover, the independent monitoring organizations (including NGOs and research institutions) must have a system of submitting perceived non-compliance complaints, and the Committee must have the authority to request further party information and provide corrective recommendations.[235] The COP should embrace regulations that offer that failure to meet the benefit-sharing requirement may result in partial suspension of the benefit (such as pursuit rights on certain types of research, access to capacity-building funds, or the right to vote in future COP sessions).[236] Besides, the violators of the benefit-sharing requirement should be forced to compensate damages to the beneficiaries (developing states and indigenous communities).[237] In domestic law, criminal or administrative sanctions should be put in place by the parties against natural or juridical persons engaging in unauthorized MGR utilization offences or abuse of benefit-sharing arrangements.[238]

8.5 Capacity-Building and Technology Transfer.

The COP is to create a special fund that will be capitalized by donations of the developed nations with at least half a billion dollars annually during the first decade of support capacity and technology transfer construction.[239] This fund is aimed to fund projects aimed at developing countries, LDCs and SIDS MGR research capacity such as the establishment of genomic sequencing centers, staff training and the establishment of indigenous research centers.[240] The fund must also support the development of country MGR research project researcher engagement, not just passive transfer of knowledge but active scientific collaboration, and fund the infrastructure development of marine protected areas and marine research stations in SIDS and developing countries that can be utilized in joint MGR research.[241] The COP should

[225] Ibid
[226] Ibid
[227] BBNJ Agreement, Article 12.
[228] Ibid
[229] BBNJ Agreement, Article 14(4).
[230] Ibid
[231] Ibid
[232] BBNJ Agreement, Article 15.
[233] Ibid
[234] BBNJ Agreement, Article 16.
[235] Ibid
[236] BBNJ Agreement, Article 23.
[237] Ibid
[238] Ibid
[239] BBNJ Agreement, Article 33.
[240] Ibid
[241] Ibid

embrace regulations that give that parties that report MGR utilization activities shall make available to developing country scientists' involvement in research projects, and their involvement will be funded. In addition, parties are to engage in joint research, training, and publication with developing country institutions, technology transfer including genome analysis software, protocols, and methods provision, and publication of research findings in open-access journals and storage in developing country researchers-accessible public databases.[242]

9 Conclusion

The Part II BBNJ Agreement provisions on Marine Genetic Resources represent significant improvement over the past legal vacuum regulating high seas genetic resource access and benefit-sharing.[243] The Agreement constitutes the first international structure establishing binding frameworks whereby MGR utilization activities must be notified, full Clearing-House Mechanism transparency must be provided, and fair and equitable benefit-sharing must be undertaken.[244] Notably, the Digital Sequence Information inclusion in the Agreement's benefit-sharing requirement list reflects biotechnology's changing nature and attempts to address a regulation gap afflicting previous agreements regarding sequence data dissemination.[245] The Access and Benefit-Sharing Committee institutional framework creation and adherence to non-monetary benefit-sharing systems represent real international environmental governance innovations.[246]

Nevertheless, critical gaps significantly impair the framework's ability to realise equity objectives. Monetary benefit-sharing modality postponement to future negotiations establishes profound uncertainty and risks that agreed mechanisms will be insufficient or indefinitely postponed. The framework's future-only scope means decades of previous MGR study and commercialization are completely avoided, forming a temporal cliff favoring historical bio prospectors. National self-reporting reliance on a voluntary basis and international verification system absence substantially undermine enforcement. The non-monetary benefits specification, although novel and pragmatically grounded in near-future commercial constraint understanding, might prove insufficient for developing country compensation regarding genetic resource loss in biotechnological revolution ages where computational sequence data analysis might create highest value instead of actual commercial products.

Essentially, the BBNJ framework represents a practical compromise sacrificing equity for achieving consensus among various state actors with opposing interests. The focus on non-monetary benefit-sharing and developed nation voluntary donations, as opposed to mandatory mechanisms (such as UNCLOS Article 82 on deep seabed minerals introduction), perpetuates historical asymmetries whereby northern states and institutions reap major genetic resource use benefits. Weak enforcement procedures, compulsory monetary modality absence, and minimal retroactive application are all compromises enabling agreement but at equity expense.

For developing states and small island developing states, particularly least developed countries lacking scientific capacity and technological infrastructure, the BBNJ framework benefits might be mirages given weak operationalization and inadequate resources. International environmental agreements' historical trend whereby promises outweigh actions should caution against BBNJ implementation optimism. The BBNJ framework will face its test during the implementation phase, particularly when the first Conference of the Parties and Access and Benefit-Sharing Committee regulatory development work commence. These forums' outcomes regarding monetary benefit-sharing modalities, monetary contribution levels, capacity-building funding, and enforcement will either render the BBNJ Agreement a significant global genetic resource equity milestone or a political pretense continuing existing international system inequity.

To achieve the stated BBNJ Agreement objective—ensuring MGR utilization benefits are distributed fairly and equitably whilst helping marine biodiversity conservation and sustainable use—will require developed countries' sustained political commitment beyond mere rhetorical support to action, developing countries and civil society organizations' strategic advocacy ensuring their interests are reflected in regulatory development, and the BBNJ secretariat and subsidiary body's strong institutional capacity establishment for framework provision implementation and enforcement. Absent such dedication and ability, the BBNJ framework, despite novel provisions and institutional structures, will constitute another international environmental agreement addition to a lengthy list whose commitments outweigh their implementation and whose global equity promises have not been met.

[242] BBNJ Agreement, Article 33--40.
[243] Ibid
[244] Ibid
[245] Ibid
[246] Ibid