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Defining Marine Genetic Resources

Navigating through the Sea of Uncertainties

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13.1 INTRODUCTION

Recent technological advances have provided scientists with more opportunities to explore the richness of marine life.[1] One particular element of marine biodiversity that has sparked interest within scientific circles is the utilisation of marine genetic resources (MGRs).[2] While international law and literature lack a universal definition of MGRs, there is growing interest among States in MGRs, which can be depicted by the ongoing negotiations on an international legally binding instrument on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction (BBNJ) under the auspices of the 1982 United Nations Convention on the Law of the Sea (UNCLOS).[3] It is pivotal to examine the implications of divergences in meanings of MGRs, as a universal definition of that term might also be of potential importance to several existing regimes.[4]

Understanding the elements of the definition of MGRs and its scope is a way forward to better protecting marine biodiversity, as managing MGRs without full

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[1] J. Mark Cock and others, 'Marine Genomics and the Exploration of Marine Biodiversity', in Carlos M. Duarte (ed.), *The Exploration of Marine Biodiversity: Scientific and Technological Challenges* (Bilbao: Fundación BBVA, 2006), 117–139.

[2] David Leary and others, 'Marine Genetic Resources: A Review of Scientific and Commercial Interest' (2009) 33 *Marine Policy* 183–194, at 184–188.

[3] United Nations Convention on the Law of the Sea (UNCLOS), Montego Bay, 10 December 1982, in force 16 November 1994, 1833 UNTS 397; see also, Intergovernmental Conference on marine biological diversity of areas beyond national jurisdiction available at: www.un.org/bbnj/ (last accessed 27 February 2020).

[4] See e.g., Convention on Biological Diversity, Rio de Janeiro, 22 May 1992, in force 29 December 1993, 1760 UNTS 69; Convention on International Trade in Endangered Species of Wild Fauna and Flora, Washington, 3 March 1973, in force 1 July 1975, 993 UNTS 243.

comprehension of their nature is challenging. A compass in the form of a working definition of MGRs will help navigate the sea of uncertainties and strengthen the rule of law. At its most basic level, the rule of law means that no one is above the law; in other words, all individuals are subject to the law.[5] In the international arena, the rule of law supports the argument that parties to multilateral environmental treaty regimes need to act in a manner that renders application of their legal provisions equally among them. In order to achieve that, some key values of the rule of law should be taken into consideration while drafting texts of treaty regimes. It is evident from the literature that rule of law values include, but are not limited to, predictability, clarity, certainty, coherence and stability.[6] In the context of this chapter, the rule of law is understood as ensuring legal clarity and legal certainty in environmental regimes regulating to MGRs. Definitions that provide legal clarity and legal certainty and are interpreted in 'good faith in accordance with the ordinary meaning' in line with the 1969 Vienna Convention on the Law of Treaties (VCLT) ensure that parties within treaty regimes can predict their obligations and rights according to the provisions embedded in the text of those regimes.[7] Providing a clear, working definition of MGRs will help with a universal understanding of MGRs across existing and future MGR-related regimes and relationships between rules included in those regimes.

The chapter is divided into five sections and begins with a brief review of the role of the definition of genetic resources in defining MGRs, before moving on to a review of the material scope (i.e., the nature of MGRs) of the definition of MGRs. The following section discusses the geographical scope (i.e., areas in which MGRs are found) of the definition of MGRs. The last section provides a working definition of the term 'MGRs' and the future outlook.

13.2 STARTING POINT: GENETIC RESOURCES

Neither law nor literature provides a definition of the term 'MGRs'. What might appear surprising to some is that the UNCLOS, which has often been referred to as 'a constitution for the oceans' does not define MGRs. However, a consensus exists among scholars that Article 2 of the Convention on Biological Diversity (CBD), which defines genetic resources, should be a starting point in defining what

[5] Albert Venn Dicey, *Introduction to the Study of the Law of the Constitution* (5th ed., London: MacMillan, 1897) [1885], 42.

[6] See e.g., Lon Fuller, *Morality of Law*, rev. ed. (New Haven, CT: Yale University Press, 1969), 39; Friedrich A. Hayek, *Constitution of Liberty* (Chicago: University of Chicago Press, 1960), 156.

[7] Vienna Convention on the Law of Treaties, Vienna, 23 May 1969, in force 27 January 1980, 1155 UNTS 331; (1969) 8 ILM 679; UKTS (1980) 58, Arts. 31 and 32.

constitutes MGRs.[8] States' delegations in the ongoing BBNJ negotiations also agree that the definition of MGRs in the future treaty should be built on Article 2 of the CBD.[9]

Under the CBD, genetic resources are defined as 'genetic material of actual or potential value', in which 'genetic material' contains 'any material of plant, animal, microbial or other origin containing functional units of heredity'.[10] The term 'genetic resources' was not commonly used as a legal concept prior to adoption of the CBD.[11] However, after its inclusion in the operative text of that regime, the term has been invoked in a few international treaties, debates, negotiations and documents.[12]

It should be stressed that the CBD is one of the most widely ratified treaties in international law (i.e., as of 2022, the CBD has 196 members and 168 signatories). The work of its Committee of Parties and subsidiary bodies has contributed significantly to the understanding of marine biodiversity.[13] However, the definition of genetic resources included in Article 2 of the CBD raises some concerns about its legal clarity and legal certainty as the elements of that definition are not explained in the text of the CBD.[14] Thus various actors might act in different ways in response to an ambiguous law, which hinders the normative effect of the law. For example,

[8] See e.g., Konrad J. Marciniak, 'Marine Genetic Resources: Do They Form Part of the Common Heritage of Mankind Principle?', in Lawrence Martin and others (eds.), *Natural Resources and the Law of the Sea: Exploration, Allocation, Exploitation of Natural Resources in Areas under National Jurisdiction and Beyond* (Juris Publishing, 2017), 374; Gaute Voight-Hanssen, 'Current Light and Heavy Options for Benefit-Sharing in the Context of the United Nations Convention on the Law of the Sea' (2018) 33 *The International Journal of Marine and Coastal Law* 683–705, 685; Rabone Muriel and others, 'Access to Marine Genetic Resources (MGR): Raising Awareness of Best-Practice through a New Agreement for Biodiversity beyond National Jurisdiction (BBNJ)' (2019) 6 *Frontiers in Marine Science*, 3.

[9] See, Revised draft text of an 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 (27 November 2019).

[10] Art. 2 Convention on Biological Diversity Home | Convention on Biological Diversity (cbd.int).

[11] Fridtjof Nansen Institute, 'The Concept of "Genetic Resources" in the Convention on Biological Diversity and How It Relates to a Functional International Regime on Access and Benefit-Sharing' UNEP/CBD/WG-ABS/9/INF/1 (19 March 2010), 6.

[12] See e.g., the work of the Intergovernmental Commission on Genetic Resources, Traditional Knowledge and Folklore, available at www.wipo.int/tk/en/igc/ (last accessed 27 February 2020); Draft Decision to enhance mutual supportiveness between the TRIPS Agreement and the Convention on Biological Diversity, TN/C/W/59 (19 April 2011); International Treaty on plant genetic resources for food and agriculture, Rome, 3 November 2001, in force 29 June 2004, 2400 UNTS 303.

[13] See e.g., the 'Jakarta Mandate' agreed to by the Parties to the Convention on Biological Diversity at their Second Conference in Jakarta in November 1995. UNEP/CBD/COP/2/19 (30 November 1995).

[14] Morten Walløe Tvedt and Tomme Young, Beyond Access: Exploring Implementation of the Fair and Equitable Sharing Commitment in the CBD ABS, ABS Series No. 2, IUCN Environmental Policy and Law Paper No. 67/2 (2007), 54.

there may be confusion regarding the access and benefit sharing (ABS) provisions embedded in the CBD. Users (e.g., industry researchers including agriculture, cosmetic and pharmaceutical industries, or research institutes) and providers (i.e., States with sovereign rights over natural resources under their jurisdiction) of natural resources might have different interpretations of elements of the definition of genetic resources, which are not clearly elaborated.

The drafting history of the CBD does not provide further clarification of the definition of genetic resources provided by Article 2 of the CBD.[15] Against this backdrop, it is necessary to untangle elements of definitions included in Article 2 of the CBD. While some terms used in the definition of genetic resources in Article 2 of the CBD are self-explanatory, that is, plant (e.g., floating and rooted plants), animal (e.g., mammals, birds, fish, reptiles, amphibians), microbial (e.g., bacteria, yeasts) or other origin (e.g., fungi), other terms need further elaboration.[16] Three separate elements that should be analysed are; 'functional units of heredity', 'of actual or potential value' and 'material'.[17] Examining these building blocks of the definition of genetic resources is worthwhile, as they have significant implications on defining MGRs. All three terms are discussed in the next section under the material scope of the definition of MGRs.

13.3 MATERIAL SCOPE

13.3.1 *'Material'*

The CBD does not define the term 'material'. According to its ordinary meaning, the term 'material' should be defined as something physical or tangible (i.e., samples which physically contain genetic material).[18] The question then becomes: should digital sequence information (DSI) be included within the MGR definition?

Consensus among experts is lacking on whether the definition of genetic resources under Article 2 of the CBD includes DSI. For example, the Commission on Intellectual Property of the International Chamber of Commerce argues that 'material' within the definition of 'genetic resources' refers to tangible or

[15] Lyle Glowka, Françoise Burhenne-Guilmin and Hugh Synge in collaboration with Jeffrey A. McNeely and Lothar Gündling, A Guide to the Convention on Biological Diversity (1994) Environmental Policy and Law Paper No. 30, IUCN-ELC.

[16] Tvedt and Young (n 14), 53–57.

[17] Ibid.; see also, Peter Johan Schei and Morten Walløe Tvedt, 'Genetic Resources' in the CBD. The Wording, the Past, the Present and the Future, Fridtjof Nansen Institute Report 4/2010 (n 11).

[18] See e.g., Tade M. Spranger, Expert opinion on the applicability of the Convention on Biological Diversity and the Nagoya Protocol to digital sequence information, submitted on behalf of the German Federal Ministry of Education and Research, Berlin 2017, at 16; International Chamber of Commerce (ICC) Commission on Intellectual Property, Report on Digital Sequence Information, 2017, 1 ICC Commission on Intellectual Property, Report on Digital Sequence Information, 2017, available at https://iccwbo.org/content/uploads/sites/3/2017/05/ICC-IP-position-paper-on-digital-sequence-information.pdf (last accessed 30 November 2021).

physical material, and given that DSI is intangible by nature it is not covered by that definition.[19] The Global Genome Biodiversity Network points out 'the CBD and Nagoya Protocol explicitly cover genetic material, not information about this material'.[20] Others claim DSI comes under the scope of the definition of genetic resources and point to the words 'or other origin' and 'value' in Article 2 of the CBD.[21] Further, parties to the CBD and 2010 Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity (Nagoya Protocol) also appear to disagree as to whether DSI comes under the scope of these instruments.[22] The challenges of defining what exactly constitutes DSI go beyond the regimes on biodiversity, as indicated by similar discussions within various other UN processes and such regimes as the 2001 International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA), the Pandemic Influenza Preparedness Framework and the BBNJ negotiations.[23]

Most policy processes that have addressed DSI have struggled to provide a clear definition and scope of the term.[24] DSI is a placeholder term, which lacks a globally accepted definition.[25] The Ad Hoc Technical Expert Group (AHTEG) report on Digital Sequence Information on Genetic Resources, established under the CBD

[19] ICC, Report on Digital Sequence Information, 1, available at https://iccwbo.org/content/uploads/sites/3/2017/05/ICC-IP-position-paper-on-digital-sequence-information.pdf (last accessed 30 November 2021).

[20] Global Genome Biodiversity Network, Letter to the CBD on Digital Sequence Information (7 September 2017), 1, available at www.cbd.int/abs/DSI-views/GGBN-DSI.pdf (last accessed 30 November 2021).

[21] See e.g., India's submission on Digital Sequence Information on Genetic Resources in response to CBD notification 2019-012 dated 5 February 2019 pursuant to decisions 14/20 and NP-3/12, available at www.cbd.int/abs/DSI-views/2019/India-DSI.pdf (last accessed 30 November 2021).

[22] See Submissions of views and information on Digital Sequence Information on Genetic Resources on Digital Sequence Information on Genetic Resources in response to CBD notification 2019-012 dated 5 February 2019 pursuant to decisions 14/20 and NP-3/12, available at www.cbd.int/dsi-gr/2019-2020/submissions/ (last accessed 28 February 2020). See e.g., contrasting views expressed by submissions of India and Switzerland.

[23] Elisa Morgera, 'Fair and Equitable Benefit-Sharing in a New Treaty on Marine Biodiversity: A Principled Approach towards Partnership Building?' (2018) 7 *Maritime Safety and Security Law Journal* 48–77 at 60, 66, available at Morgera_MSSLJ_2018_Fair_and_equitable_benefit_sharing_in_a_new_treaty_on_marine.pdf (strath.ac.uk); International Treaty on plant genetic resources for food and agriculture, Rome, 3 November 2001, in force 29 June 2004, 2400 UNTS 303.

[24] Ad Hoc Technical Expert Group on Digital Sequence Information on Genetic Resources, 'Report of the Ad Hoc Technical Expert Group on Digital Sequence Information on Genetic Resources' CBD/DSI/AHTEG/2020/1/7 (20 March 2020), 66.

[25] Ad Hoc Technical Expert Group on Digital Sequence Information on Genetic Resources, 'Digital Sequence Information on Genetic Resources: Concept, Scope and Current Use' CBD/DSI/AHTEG/2020/1/3 (29 January 2020), 10.

and its Nagoya Protocol, provides a list of potential forms of DSI.[26] For example, these could include: 'the nucleic acid sequence reads', 'amino acid sequences' or 'cellular metabolites'.[27]

Analysis of ongoing policy processes on DSI (i.e., the ITPGRFA, the CBD and Nagoya Protocol) demonstrates the existence of a growing practice of relying on DSI in bio-based research, and DSI has 'potential for generating high-value products, and thus monetary and non-monetary benefits, with the increasing use of synthetic biology technologies in the future'.[28] On the other hand, it is difficult to identify the provenance of DSI and assess its value and contributions.[29] There is also a growing concern that few countries worldwide have the capacity and funds to maintain databases of DSI and derive benefits from it.[30] Consequently, the potential exclusion of DSI from the definition of MGRs could trigger inequalities in the form of biotechnology companies profiting from DSI without sharing benefits with less developed States, which have reduced technological capacity.[31]

Given the far-reaching implications of DSI for the ABS framework in the future BBNJ treaty, and the growing reliance on DSI in bio-based research and its potential in developing new products, DSI should be captured by the working definition of MGRs. However, the precise scope and definition of that term require further research.

13.3.2 *'Functional Units of Heredity'*

The term 'functional units of heredity' can be perceived as a qualifying element of the definition of 'genetic material'. Unfortunately, no explanation of that term can

[26] Ad Hoc Technical Expert Group on Digital Sequence Information on Genetic Resources, 'Report of the Ad Hoc Technical Expert Group on Digital Sequence Information on Genetic Resources' 9.

[27] Ibid., 9; see also Jakub Ciesielczuk and Elizabeth A. Kirk, 'Sustainable Use of Marine Genetic Resources', in W. Leal Filho, A. M. Azul, L. Brandli, A. Lange Salvia and T. Wall (eds.), *Life below Water. Encyclopedia of the UN Sustainable Development Goals* (Cham: Springer 2021) 4–5.

[28] Eric W. Welch, Margo Bagley, Todd Kuiken and Sélim Louafi, 'Potential Implications of New Synthetic Biology and Genomic Research Trajectories on the International Treaty for Plant Genetic Resources for Food and Agriculture' (2017) FAO, vi.

[29] Ad Hoc Technical Expert Group on Digital Sequence Information on Genetic Resources, 'Fact-Finding and Scoping Study on Digital Sequence Information on Genetic Resources in the Context of the Convention on Biological Diversity and the Nagoya Protocol' CBD/DSI/AHTEG/2018/1/3 (12 January 2018), 14.

[30] Ad Hoc Technical Expert Group on Digital Sequence Information on Genetic Resources, 'Synthesis of views and information on the potential implications of the use of digital sequence information on genetic resources for the three objectives of the Convention and the objective of the Nagoya Protocol' CBD/DSI/AHTEG/2018/1/2 (9 January 2018), 13; Welch, 'Potential Implications' (n 29).

[31] See e.g., Ad Hoc Technical Expert Group on Digital Sequence Information on Genetic Resources, 'Fact-Finding and Scoping Study', 46.

be found in the CBD wording. The ordinary meaning of this term does not provide any guidance either. Some genetic resources experts posit that the term 'functional units of heredity' was selected by policymakers, rather than geneticists.[32] In effect, this term is not purely scientific and can be viewed from two different perspectives, namely political and technical. Scientists interpret 'functional units of heredity' as genes or deoxyribonucleic acid (DNA) and ribonucleic acid (RNA).[33] While relying on the wording of the CBD in the context of the definition of MGRs is desirable, rethinking the terms invoked to construct that definition could be considered. The usage of the term 'functional units of heredity' in the text of the CBD epitomises the issue of relying on technical terminology in legal instruments. The interpretation of such a problematic term, which may affect implementation of the regime, relies on the audience. For example, national, non-technical bodies tasked with implementing the regime may interpret terms differently than technical bodies. Substituting the term 'functional units of heredity' with 'DNA' or 'RNA' could potentially clarify the definition of MGRs. However, a more thorough understanding of such a substitution and its implications would be required, from both the scientific and legal perspectives. Although such inquiry falls outside the scope of this chapter, it provides potential for further research.

From the political perspective, the lack of clarity around the term 'functional units of heredity' within the definition of genetic resources provides the opportunity for wide interpretations contingent on national interests.[34] Legal clarity and legal certainty of definitions in treaty regimes are often subject to political disagreement. This can be depicted by the ongoing BBNJ negotiations, which include a debate on whether derivatives should come under the scope of the definition of MGRs.[35]

A derivative can be understood in at least two ways: as a naturally occurring biochemical compound or as a chemical compound synthesised through human intervention.[36] The former could be labelled as unmodified chemical compounds, other than DNA or RNA, resulting from metabolic processes of genetic resources, such as aromas, resins and snake venoms.[37] From that perspective, derivatives might be studied, and scientific research of them might lead to development of products. The latter could be regarded as DNA or RNA, or a chemical compound, modified

[32] Tvedt and Young (n 15), 53.
[33] See e.g., Bevis Fedder, *Marine Genetic Resources, Access and Benefit Sharing: Legal and Biological Perspectives* (London: Routledge, 2013) 36.
[34] Jonas Ebbesson, 'The Rule of Law in Governance of Complex Socio-Ecological Changes' *Global Environmental Change* (2010) 20 (3), 414–422, 415.
[35] Arts. 2 and 8 of the Revised draft 2019 (n 10).
[36] Lyle Glowka, A Guide to Designing Legal Frameworks to Determine Access to Genetic Resources (1998) IUCN, Environmental Policy and Law Paper No. 34, 35.
[37] Thomas Greiber, An Explanatory Guide to the Nagoya Protocol on Access and Benefit-sharing (2012) IUCN Environmental Policy and Law Paper No. 83, 65.

or synthesised via human intervention from genetic resources. Examples might include a breeder's hybrid seed or a synthetic version of an extracted biochemical.[38]

A derivative is defined by Article 2 of the Nagoya Protocol as a 'naturally occurring biochemical compound resulting from the genetic expression or metabolism of biological or genetic resources, even if it does not contain functional units of heredity'. This definition clearly reflects the first type of derivatives discussed. The second type of derivatives, alongside a myriad of other interpretations, was excluded from the definition included in Article 2 of the Nagoya Protocol.[39] It can be noticed that the definition of derivatives under Article 2 of the Nagoya Protocol does not require derivatives to contain 'functional units of heredity' as stipulated by Article 2 of the CBD. However, it is understood that as long as derivatives possess genetic material (i.e., smaller than DNA or RNA) that can be utilised and is of actual or potential value, they come under the definition of MGRs.[40]

Derivatives within the meaning of Article 2 of the Nagoya Protocol are included in the working definition of MGRs offered by this chapter, as there appears to be no scientific basis for their exclusion.[41] The literature supports the conclusion that the second type of discussed derivatives should be excluded from the scope of the definition of MGRs.[42]

13.3.3 *'Of Actual or Potential Value'*

Another building block of the definition of genetic resources is the term 'of actual or potential value'. As with 'material' and 'functional units of heredity' the CBD is silent on what is meant by 'of actual or potential value'. However, it is evident from the definitions provided by Article 2 of the CBD that genetic resources are a subset of genetic material.[43] Consequently, what turns genetic material into genetic

[38] Glowka, 'A Guide to Designing Legal Frameworks' (n 36), 35.

[39] Ad Hoc Open-Ended Working Group on Access and Benefit Sharing, Report of the Meeting of the Group of Legal and Technical Experts on Concepts, Terms, Working definitions and Sectoral Approaches, UNEP/CBD/WG-ABS/7/2 (12 December 2008), 9.

[40] Ad Hoc Technical Expert Group on Digital Sequence Information on Genetic Resources, 'Digital Sequence Information' (n 25), 12.

[41] See e.g., Rabone (n 8), 'Raising Awareness of Best-Practice'.

[42] Harriet Harden-Davies, 'Deep-Sea Genetic Resources: New Frontiers for Science and Stewardship in Areas beyond National Jurisdiction' (2017) 137 *Deep-Sea Research Part 2: Topical Studies in Oceanography* 504–513, 506; Jeffrey J. Marlow and others, 'The Full Value of Marine Genetic Resources (MGR)' (2019) *Deep Ocean Stewardship Initiative Policy Brief*, 3.

[43] Lyle Glowka, Françoise Burhenne-Guilmin, Hugh Synge, Jeffrey A. McNeely, Lothar Gündling, 'A Guide to the Convention on Biological Diversity' International Union for Conservation of Nature, IUCN 1994, 22; Fridtjof Nansen Institute, 'The Concept of "Genetic Resources"' (n 11), 13.

resources is actual or potential value. This value must be linked to the inherited genetic components of a species.[44]

The decision to incorporate the words 'actual' and 'potential' in determining the value of genetic resources could be interpreted as a reflection of current and future scientific knowledge and technological advancement.[45] The word 'actual might refer to the value of genetic resources that can be determined using techniques and knowledge currently available. The word 'potential' might relate to the future value of genetic resources, which could be determined alongside available technological and genetic developments.[46] A simple scenario illustrates the practical application of this interpretation: marine species collected from the ocean in 2021 may be stored in a research centre for 50 years and may only be of 'actual' value after analysis using new technology not available at time of collection.

That scenario raises questions concerning the length of time a species is considered to have 'potential value' and how its genetic material is identified as being potentially valuable. The problem with the word 'potential' lies in the argument that all genetic material could be categorised as of 'potential' value, unless proven otherwise.[47] Use of the word 'potential' in the context of the definition of MGRs raises concerns regarding legal clarity and legal certainty. Where can one draw a clear line on what types of genetic material should be regarded as of 'potential' value? While the word 'potential' may be praised for rendering the definition of genetic resources dynamic and allowing it to keep abreast of rapid scientific and technological developments, its legal utility is questionable. Definitions of genetic resources and genetic material read in conjunction indicate that it would be possible at the time of collection of marine species to distinguish between biological resources and genetic resources relying on its actual or potential value for its functional units of heredity. However, it is simply not the case, as normally, the value of collected material can only be determined via the research process in labs.[48] On many occasions, material that is considered to be of potential value might turn out not to be of use for its genetic characteristics.[49] The opposite might also be possible; units of heredity previously labelled as junk (i.e., '*junk-DNA*') might at some future point be considered of value.[50] However, given that science advances much faster than law, and the law should reflect those advances, the word 'potential' is kept in the working definition of MGRs.

[44] Tvedt and Young (n 14), at 55.
[45] Fridtjof Nansen Institute, 'The Concept of "Genetic Resources"' (n 11), 8.
[46] Ibid.
[47] Glowka et al., 'A Guide to the Convention on Biological Diversity' (n 15) 22; Fridtjof Nansen Institute, 'The Concept of "Genetic Resources"' (n 11), 13.
[48] Ad Hoc Technical Expert Group on Digital Sequence Information on Genetic Resources, 'Digital Sequence Information' (n 25), 12.
[49] Fridtjof Nansen Institute, 'The Concept of "Genetic Resources"' (n 11), 9.
[50] Ibid., 10.

Another point to consider linked with the concept of actual or potential value is the nature of utilisation. Actual or potential value within the context of Article 2 of the CBD comes to light when the genetic material of biological resources is utilised in a manner that takes advantage of the genetic characteristics viz., functional units of heredity.[51] That is supported by the definition of utilisation of genetic resources under Article 2 of the Nagoya Protocol that refers solely to conducting research and development based on genetic and/or biochemical material from genetic resources. Utilisation of genetic resources as a commodity is not included within that definition.[52]An example will be used to illustrate that distinction better. Commercial fishing designed to obtain large quantities of fish to sell as food, although constituting utilisation of biological resources found in the marine environment, should not be regarded as utilisation of MGRs. On the other hand, synthesising a DNA sample from a fish found in the marine environment and using it for research designed to develop a new drug falls under utilisation of MGRs.

While it is generally accepted that utilisation of biological resources in bulk and as commodities lies outside the scope of definitions provided by Article 2 of the CBD, the line between utilisation of resources for their genetic properties and more conventional purposes is often blurred.[53] The ideal scenario where commercial fishing expeditions and researchers are always working separately and do not impact each other might not be the case. In reality, some scientists might be tempted to use resources that were not specifically collected for their genetic material. Nothing stops researchers from acquiring marine resources from commercial fishing companies or even shops and then utilising them for their genetic material. In that scenario, marine resources were harvested to sell them, for which they should be considered a commodity, but were then utilised for their genetic properties. Exclusion of these resources from the scope of the definition of MGR would create a loophole, permitting unfair use of MGRs. A possible way forward to remedy that issue is to focus on the point of access of MGRs rather than the point of collection in determining the nature and purpose of utilisation.[54] 'Point of access' is understood as a moment when marine resources are utilised in relation to their genetic characteristics. In the definition of MGRs offered by this chapter, it is encapsulated in the phrase 'accessed for'.

[51] Biological resources are defined by Art. 2 CBD as containing 'genetic resources, organisms or parts thereof, populations, or any other biotic component of ecosystems with actual or potential use or value for humanity'.

[52] See also Art. 2 of International treaty on plant genetic resources for food and agriculture (n 23).

[53] Fridtjof Nansen Institute, 'The Concept of "Genetic Resources"' (n 11), 13.

[54] IUCN Comments on International legally binding instrument under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction (15 August 2019), at 13, available at www.iucn.org/sites/dev/files/iucn_comments_on_bbnj_draft_text_-_august_2019_1.pdf (last accessed 30 November 2021).

Further, to underline the distinction between utilisation of marine resources for their genetic properties and as a commodity, the phrase 'of actual or potential value' should be linked with the term 'genetic material' in the context of drafting a working definition of MGRs. Thus, within the proposed definition, it is phrased as 'actual or potential value of their genetic material'.

13.4 GEOGRAPHICAL SCOPE

Defining the term 'marine' and establishing the limits of the area covered by that term is a prerequisite for drafting a working definition of MGRs. The word 'marine' has common definitions. The Cambridge Dictionary defines the word marine as 'related to the sea or sea transport',[55] whereas the Léxico Dictionary defines it as 'relating to or found in the sea'.[56] Both definitions are similar in that they point towards the correlation between the word marine and sea.

While the UNCLOS does not define the term 'marine', protection and preservation of the marine environment are one of the main aims of that regime.[57] As a legal treaty that has codified pre-existing customary international law on the law of the sea, the UNCLOS had been drafted to regulate seas and oceans.[58] Thus, in the context of the UNCLOS, the word 'marine' extends to oceans as well. The term 'marine' can be found in the substantive texts of the Antarctic treaty and the Convention on the Conservation of Antarctic Marine Living Resources,[59] where it also should be interpreted as referring to the oceans. In addition, the word 'marine' refers to the seas within the texts of many regional sea conventions.[60] Thus, contingent on the geographical scope of the legal instrument the word 'marine' might denote seas and/or oceans. Combining this conclusion with the definition of the word 'marine' provided by the Léxico Dictionary (i.e., 'relating to or found in the

[55] Cambridge Dictionary, available at https://dictionary.cambridge.org/dictionary/english/marine (last accessed 28 February 2020).

[56] Léxico Dictionary, available at https://en.oxforddictionaries.com/definition/marine (last accessed 28 February 2020).

[57] Para. 4 Preamble to the United Nations Convention on the Law of the Sea, available at www.un.org/depts/los/convention_agreements/texts/unclos/closindx.htm (last accessed 30 November 2021).

[58] Paras. 1, 4 Preamble to the United Nations Convention on the Law of the Sea, available at www.un.org/depts/los/convention_agreements/texts/unclos/closindx.htm (last accessed 30 November 2021); see also Joanna Mossop, 'Can We Make the Oceans Greener: The Successes and Failures of UNCLOS as an Environmental Treaty' (2018) 49 *Victoria University of Wellington Law Review* 573, 575–578.

[59] Convention on the Conservation of Antarctic Marine Living Resources, Canberra, 20 May 1980, in force 4 April 1982, 1329 UNTS 47, Art. 1.

[60] See e.g., Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean, Barcelona, 10 June 1995, in force 09 July 2004, 1102 UNTS 27, Art. 4; Convention on the Protection of the Marine Environment of the Baltic Sea Area, Helsinki, 09 April 1992, in force 17 January 2000, 2009 UNTS 197, Art. 1; Convention for the Protection of the Marine Environment of the North-East Atlantic, Paris, 22 September 1992, in force 25 March 1998, 2354 UNTS 67, Art. 1.

sea') offers the following working definition 'found in or originating from sea or ocean'.

However, a few potential issues arise with the proposed definition. First, the status of anadromous species (e.g., salmon), catadromous species (e.g., eel) and certain species of marine birds might be difficult to determine under the scope of the proposed working definition of the term 'marine'.[61] Given that those species do not spend their whole life in the seas and oceans, the question arises of whether they should be regarded as MGRs. Another issue to consider is the status of living organisms found on, in or under the subsoil of the seas or ocean; should those be regarded as MGRs?

Although these issues are legal (i.e., separate legal regimes, marine zones) from the scientific point of view, all these species could most likely be categorised as MGRs, as they are found in marine environments. While these issues constitute potential for further research, they are beyond the scope of this chapter. It appears that it is not possible at this time to determine the precise limits of the term 'marine' for the working legal definition of MGRs. Thus, the broad definition of 'marine' is adopted, namely 'found in or originating from sea or ocean'.

13.5 CONCLUSION AND OUTLOOK

The chapter arrives at the following definition of MGRs;

> any material of plant, animal, microbial or other origin, found in or originating from sea or ocean containing functional units of heredity, and their derivatives, which are accessed for the actual or potential value of their genetic material.

As conservation and sustainable use of MGRs without fully understanding or agreeing on their nature is challenging, providing a working definition of MGRs is a crucial step forward in strengthening the rule of law and its role in protecting marine biodiversity. While the proposed definition resolves some questions surrounding the scope of MGRs, it still leaves certain issues to be addressed through future research. For example, precision is needed in delineating the boundaries of seas and oceans and uncertainties surrounding the status of anadromous, catadromous and sedentary species.

The proposed definition relies on the text of Article 2 of the CBD but adjusts it to reflect current scientific reality and to address issues with utilisation of the definition of genetic resources under the CBD. The amendments to the definition of genetic resources provided by Article 2 of the CBD should not cause negative fragmentation

[61] See e.g., Ekaterina Popova and others, 'Ecological Connectivity between the Areas beyond National Jurisdiction and Coastal Waters: Safeguarding Interests of Coastal Communities in Developing Countries' (2019) 104 *Marine Policy Journal* 90–102; Michael S. Webster and others, 'Links between Worlds: Unraveling Migratory Connectivity' (2002) 17 *Trends in Ecology & Evolution* 76–83.

of law in the form of duplication or conflicts between environmental standards. On the contrary, the proposed definition of MGRs still follows the key elements of the definition of genetic resources included in Article 2 of the CBD; it also fits with the approach taken in other regimes regulating genetic resources. It is clearly visible that other regimes follow the definition of genetic resources provided by Article 2 of the CBD.

Looking ahead, an apparent way to ensure conservation and sustainable use of MGRs is to adopt a clear definition of MGRs in the future BBNJ treaty. The working definition provided by this chapter should be used. The future BBNJ treaty has the potential of setting an example for existing and future MGR-related treaties regarding making sure that the important terms are defined, adhering to legal clarity and legal certainty. Political disagreements in negotiations leading to adoption of a future BBNJ treaty should not result in loss of legal clarity and legal certainty in the text of that treaty.

It is also pivotal that further research is conducted to keep the definition of MGRs up to date with scientific developments. A balance must be maintained to keep the definition dynamic whilst ensuring it has legal clarity, legal certainty, and thus enforceability. One potential solution to achieve that is to facilitate interdisciplinary dialogue between the various actors within MGR-related regimes, which can lead to informed decisions on proposed legal definitions.[62] This fits with the broader argument that participation by various actors in decision-making processes can improve the quality of decisions.[63]

[62] Nordberg and Minssen, 'Cutting edges and weaving threads in the gene editing (Я)evolution', 83. For the example of initiative involving various actors see e.g., Ad Hoc Technical Expert Group on Digital Sequence Information on Genetic Resources, 'Report'.

[63] See e.g., National Research Council, *Public Participation in Environmental Assessment and Decision Making* (Washington, DC: The National Academies Press 2008), 50; Thomas C. Beierle and Jerry Cayford (eds.), *Democracy in Practice: Public Participation in Environmental Decisions* (Oxfordshire: Routledge 2010), 43.